THE SOCIETY FOR SURGERY
OF THE ALIMENTARY TRACT

55th Annual Meeting

May 2-6, 2014

McCormick Place Convention Center
Chicago, Illinois

DDW2014
Digestive Disease Week

ABSTRACT SUPPLEMENT

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THE SOCIETY FOR SURGERY OF THE ALIMENTARY TRACT

PROGRAM BOOK ABSTRACT SUPPLEMENT

FIFTY-FIFTH ANNUAL MEETING

McCormick Place
Chicago, Illinois
May 2–6, 2014

Schedule-at-a-Glance

	FRI	SATURDAY	
	Other	504	Other
6:30 AM			
6:45 AM			
7:00 AM			
7:15 AM			
7:30 AM	RESIDENTS & FELLOWS RESEARCH CONFERENCE (by invitation only)		
7:45 AM		MAINTENANCE OF CERTIFICATION COURSE: Current Management of Benign and Malignant Foregut Diseases	
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11:30 AM			SURGICAL FELLOWSHIP FAIR
11:45 AM			
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3:45 PM			
4:00 PM			DDW CCS: Bariatric Sx & Mgt of NAFLD
4:15 PM			
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Schedule-at-a-Glance

	SUNDAY					
	501	502	504A	504BCD	South Hall	Other
6:30 AM						B'FAST W/THE EXPERTS: Paraesophageal Hernia
6:45 AM						
7:00 AM						
7:15 AM						
7:30 AM				OPENING SESSION		
7:45 AM						
8:00 AM				PRESIDENTIAL PLENARY A (PLENARY SESSION I)	POSTER SESSION I (authors available @ posters 12:00 PM - 2:00 PM)	
8:15 AM						
8:30 AM						
8:45 AM						
9:00 AM				PRESIDENTIAL ADDRESS		
9:15 AM						
9:30 AM						
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10:00 AM						
10:15 AM				PRESIDENTIAL PLENARY B (PLENARY SESSION II)		
10:30 AM						
10:45 AM						
11:00 AM				GUEST ORATOR		POSTER TOUR A: Colon-Rectal
11:15 AM						
11:30 AM						
11:45 AM						
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12:45 PM						
1:00 PM						
1:15 PM						
1:30 PM						
1:45 PM						
2:00 PM	CONTROVERSIES IN GI SURGERY DEBATES A: Hernia Repair; Bariatric Sx	VIDEO SESSION I	PLENARY SESSION III	STATE-OF-THE-ART CONFERENCE: Advances in the Diagnosis and Management of Gastroesophageal Reflux Disease		DDW CCS: Locally Advanced Rectal Ca Mgt
2:15 PM						
2:30 PM						
2:45 PM						
3:00 PM						
3:15 PM						
3:30 PM						
3:45 PM						
4:00 PM	INTL RELATIONS CMTE PANEL: Landmark CR Pubs (2010-2012)	QUICK SHOTS SESSION I	PLENARY SESSION IV			
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4:30 PM						
4:45 PM						
5:00 PM						
5:15 PM						
5:30 PM						
5:45 PM						

Schedule-at-a-Glance

	MONDAY						
	501	502	504A	504BCD	South Hall	Other	
6:30 AM						BFAST W/THE EXPERTS: Chronic Pancreatitis	BFAST W/THE EXPERTS: Cholecys-tectomy
6:45 AM							
7:00 AM							
7:15 AM							
7:30 AM				VIDEO SESSION II: BREAKFAST AT THE MOVIES			
7:45 AM							
8:00 AM	SSAT/AHPBA SYMPOSIUM: Hepatocellular Carcinoma		PUBLIC POLICY & ADVOCACY PANEL: ACA Consequences		POSTER SESSION II (authors available @ posters 12:00 PM - 2:00 PM)		
8:15 AM							
8:30 AM							
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9:30 AM							
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10:00 AM	VIDEO SESSION III	QUICK SHOTS SESSION II	PLENARY SESSION V	CLINICAL WARD ROUNDS I: Synch. CR Liver Metastases & Rectal Ca		DDW CCS: Severe Colitis: Meds or Sx	
10:15 AM							
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11:00 AM				STATE-OF-THE-ART LECTURE			POSTER TOUR B: Esopha-geal
11:15 AM							
11:30 AM							
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12:00 PM							
12:15 PM							
12:30 PM							
12:45 PM							WRITERS WORKSHOP 1: Manuscript Writing
1:00 PM							
1:15 PM							
1:30 PM							
1:45 PM							
2:00 PM	CONTROVERSIES IN GI SURGERY DEBATES B: Small Duct Chronic Pancreatitis; Paraesophageal Hernias		PLENARY SESSION VI	SSAT/ASCRS SYMPOSIUM: CR Surg Outcomes & Cost-Effectiveness		DDW CCS: Postsurgical Bile Leaks	
2:15 PM							
2:30 PM							
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3:00 PM							
3:15 PM							
3:30 PM							
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4:00 PM	CLINICAL WARD ROUNDS II: Esophageal Adeno-carcinoma		QUICK SHOTS SESSION III			DDW CCS: Diagnosing HPB Malignancy	
4:15 PM							
4:30 PM							
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5:00 PM				ANNUAL BUSINESS MEETING			
5:15 PM							
5:30 PM							
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Schedule-at-a-Glance

	TUESDAY						
	501	504A	504BCD	South Hall	Other		
6:30 AM							
6:45 AM							
7:00 AM							
7:15 AM							
7:30 AM			SSAT/ISDS B'FAST SYMPOSIUM				
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8:00 AM		PLENARY SESSION VII		POSTER SESSION III (authors available @ posters 12:00 PM - 2:00 PM)	DDW CCS: Managing Pancreatic Cysts		
8:15 AM							
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10:00 AM	CONTINUING EDUCATION CMTE PANEL: Cont Ed across Career Spectrum	PLENARY SESSION VIII			DDW CCS: Borderline Resectable Pancreas Ca		
10:15 AM							
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11:00 AM							
11:15 AM							
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12:00 PM			SSAT/SAGES LUNCHEON SYMPOSIUM: Quality Indicators				
12:15 PM							
12:30 PM					MEET-THE-PROFESSOR LUNCHEON: Anorectal Surgery	WRITERS WORKSHOP 2: Manuscript Revising	
12:45 PM							
1:00 PM							
1:15 PM							
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1:45 PM							
2:00 PM					DDW RESEARCH FORUM: Pancreas	DDW CCS: Barrett's Consensus Conference	BEST OF DDW
2:15 PM							
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SSAT PLENARY, VIDEO, AND QUICK SHOTS ABSTRACTS

Printed as submitted by the authors.

indicates a paper that is also being presented at the Residents & Fellows Research Conference. Participation in and attendance at this conference is by invitation only.

indicates a video presentation scheduled during a Plenary Session.

* *indicates the presenting author of a Plenary, Video, or Quick Shot presentation.*

Sunday, May 4, 2014

8:00 AM – 9:00 AM
S504BCD

PRESIDENTIAL PLENARY A (PLENARY SESSION I)

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Reflux Control Is an Important Component of the Management of Barrett's Esophagus: Results from a Retrospective Cohort of 1834 Patients

Craig S. Brown*[1,2], Brittany Lapin[2], Chi Wang[2], Jay Goldstein[2], John G. Linn[2], Woody Denham[2], Stephen P. Haggerty[2], Joann Carbray[2], Mark Talamonti[2], Michael B. Ujiki[2]
[1]Biological Sciences Division, University of Chicago Pritzker School of Medicine, Chicago, IL; [2]Surgery, NorthShore University Health Systems, Evanston, IL

INTRODUCTION: Barrett's esophagus (BE) is the most predictive risk factor for development of esophageal adenocarcinoma, a malignancy with the fastest increasing incidence rate in the US. Based on the assumption that all patients progress through low-grade dysplasia (LGD) to high-grade dysplasia (HGD) and finally to esophageal adenocarcinoma (EAC), we were interested in studying factors that may affect the rate of progression to LGD or greater. We were particularly interested in investigating the question of whether control of reflux, either surgically or medically, protects patients from progression to dysplastic disease or adenocarcinoma.

METHODS: We retrospectively collected and analyzed data from a cohort of BE patients participating in this single-center study comprised of all patients diagnosed with BE at a single health system's hospitals and clinics over a 10-year period. Patients were followed in order to identify those progressing from BE to LGD, HGD, and EAC. Mean follow up period was 5.4 years (9903 patient-years). We collected information from the patient's electronic medical records regarding demographic data, endoscopic findings, histological findings, smoking and alcohol history, medication use including PPI's, and history of bariatric and antireflux surgery. Risk adjusted model was performed using multivariable logistic regression in SAS 9.3 (Cary, NC).

RESULTS: This study included 1834 total BE patients, 105 of which had their BE progress to LGD, HGD, or EAC (confirmed by biopsy) with an annual incidence rate of 1.1%. Compared to the group that did not progress, the group that progressed was older (63.8 ± 13.5 vs. 68.8 ± 13.1. $p < .001$) and likely to be male (61% vs. 69%, $p = 0.098$). In the multivariable analysis, patients who had a history of antireflux surgery (n = 44) or PPI use without surgery (n = 1708) were found to progress at lower rates than patients who did not have antireflux surgery or were not taking PPI's (OR = 0.23, 95% CI 0.12–0.42).

CONCLUSIONS: In patients with BE without dysplasia, reflux control was associated with decreased risk of progression to LGD, HGD, or EAC. The results support the use of reflux control strategies such as PPI therapy or surgery in patients with non-dysplastic BE.

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Prevalence, Impact and Predictors of Hospital Acquired Conditions After Major Surgical Resection for Cancer: A NSQIP Analysis

Daniela Molena*, Benedetto Mungo, Miloslawa Stem, Anne O. Lidor
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BACKGROUND: The Centers for Medicare and Medicaid Services (CMS) initiated a nonpayment policy for certain hospital-acquired conditions (HACs) in 2008. As of 2013, 11 HAC have been identified; however, since their occurrence is linked—at least in part—to preoperative comorbidities, the preventability of HAC in these patients is questionable. This study aimed to determine the rate of the 3 most common HAC in patients undergoing major surgical resections for cancer: surgical site infection (SSI), urinary tract infection (UTI), and deep vein thrombosis (DVT). Additionally, the association of HAC with patients' characteristics and their effect on post-operative outcomes were investigated.

METHODS: Patients 18 years of age and older with a diagnosis of esophageal, gastric, hepatic, gallbladder, biliary, pancreatic, colic, anal and lung cancers, who underwent surgical resection were identified using the American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) database (2005–2012). Patients were grouped into two categories for comparison: HAC versus non-HAC patients. Outcomes, including 30-day mortality, mean length of stay (LOS), return to operating room, readmission and discharge destination were compared. Multiple pre-operative patient variables were considered and multivariate regression analysis was performed to identify risk factors for developing HAC.

RESULTS: 74,381 patients were identified, of whom 9,478 (12.74%) developed at least one of the three HAC. SSI was the most common (7.52%), followed by UTI (2.93%) and VTE (2.30%). The rate of HAC decreased from 15% to 11% over the study period. Pancreatic surgery was associated with the highest rates of SSI (10.88%) and UTI (3.83%), whereas the highest rates of VTE were observed in esophagectomy (5.92%). HAC patients had significantly higher rates of 30-day mortality (3.65% vs. 2.18%, $p < 0.001$), return to operating room (12.34% vs. 4.61%, $p < 0.001$), 30-day readmission (25.88% vs. 9.36%, $p < 0.001$), and had longer LOS (10 vs. 6 days, $p < 0.001$). Moreover, HAC patients were significantly less likely to be discharged home and more likely to be directed towards rehabilitation, acute care and skilled care. Multivariate analysis revealed that several peri-operative patients' factors, including dyspnea, steroid use and emergent surgery, were significantly associated with HAC (Table).

Table: Multivariable Logistic Regression Analysis of Variables Associated with Hospital-Acquired Condition (HAC)

Variable	OR	p	95% CI
Age ≥80	1.08	0.032	(1.01–1.17)
Race			
White	Reference	Reference	Reference
Black	0.98	0.643	(0.89–1.07)
Other	0.94	0.298	(0.83–1.06)
ASA classification			
No disturb/mild disturb	Reference	Reference	Reference
Severe Disturb	1.30	<0.001	(1.23–1.38)
Life threat/moribund	1.57	<0.001	(1.40–1.76)
BMI ≥30	1.36	<0.001	(1.29–1.44)
Dyspnea	1.27	<0.001	(1.17–1.37)
Steroid use	1.32	0.001	(1.12–1.54)
Radiation	1.52	<0.001	(1.40–1.65)
Emergency surgery	1.38	<0.001	(1.17–1.64)
Procedure type			
Lung surgery	Reference	Reference	Reference
Esophagectomy	3.91	<0.001	(3.28–4.65)
Hepatectomy	2.28	<0.001	(1.95–2.67)
Colectomy	2.65	<0.001	(2.30–3.06)
Gastrectomy	2.72	<0.001	(2.29–3.23)
Pancreatectomy/ Pancreaticoduodenectomy	4.05	<0.001	(3.49–4.69)

CONCLUSION: Our data demonstrate that the development of HAC is strongly associated with pre-operative patient characteristics. These data suggest that the nonpayment policy might be excessively penalizing healthcare providers, since inherent patient factors are not modifiable and seem to play an important role in the development of HAC in this population. These findings are important to help inform health care policy decisions regarding access to care for patients undergoing cancer surgery.

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Bariatric Surgery Improves Histological Features of Nonalcoholic Fatty Liver Disease and Liver Fibrosis

Andrew A. Taitano*[1], Michael Markow[2], Jon E. Finan[2], Donald E. Wheeler[2], John Paul Gonzalvo[1], Michel M. Murr[1]
[1]Bariatric Surgery, University of South Florida, Tampa, FL; [2]Pathology and Cell Biology, University of South Florida, Tampa, FL

INTRODUCTION: Nonalcoholic fatty liver disease (NAFLD) is prevalent in bariatric patients. We sought to determine the effects of surgically-induced weight loss on the histological features of NAFLD in patients undergoing bariatric surgery.

METHODS: A blinded pathologist reviewed all liver biopsies done during the index bariatric procedure and any liver biopsies done during subsequent abdominal operations from 1998–2013. Biopsies were examined using H&E, trichrome and iron stains and graded using the Brunt classification. Data for analysis was collected prospectively and included demographics and weight loss.

RESULTS: Paired biopsies for 152 patients (82% women) were included. Mean interval between biopsies was 29 ± 22 months. Mean age was 46 ± 11 years. Mean pre-op BMI was 52 ± 10 kg/m^2; mean excess body weight loss was 62 ± 22% at the time of the subsequent biopsy.

The findings on the initial biopsy were steatosis (78%) lobular inflammation (42%), chronic portal inflammation (68%). Steatohepatitis was present in 33%. Fibrosis (Grade 2–3) was present in 41%, and cirrhosis was present in 2%.

On post-op biopsy, steatosis resolved in 70% (82/118); lobular inflammation resolved in 74% (46/62); chronic portal inflammation resolved in 32% (32/99) and steatohepatitis resolved in 88% (44/50). Fibrosis of any grade resolved in 21% and improved in another 23% of patients. Specifically, Grade 2 fibrosis was present in 52 patients pre-op; 16 (31%) resolved, 16 (31%) improved, and 15 (29%) did not worsen post-op. Of the 10 patients with bridging fibrosis (Grade 3), one resolved and seven improved. Cirrhosis improved in one of three patients who had it preoperatively.

CONCLUSION: Bariatric surgery improves liver histology in severely obese patients and is associated with resolution of steatosis or steatohepatitis in the majority of patients. More importantly, Grade 2 or 3 (bridging) fibrosis is resolved or improved in 65% of patients. Bariatric surgery should be considered as the treatment of choice of NAFLD in severely obese patients.

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Morbidity Mortality and Weight Loss Outcomes After Reoperative Bariatric Surgery in the USA

Ranjan Sudan*[1], Ninh T. Nguyen[2], Matthew M. Hutter[3], Stacy A. Brethauer[4], Jaime Ponce[5], John M. Morton[6]
[1]Department of Surgery, Duke University Medical Center, Durham, NC; [2]Department of Surgery, University of California, Irvine, Irvine, CA; [3]Department of Surgery, Massachusetts General Hospital, Boston, MA; [4]Department of Surgery, Cleveland Clinic, Cleveland, OH; [5]Department of Surgery, Hamilton Medical Center, Dalton, GA; [6]Department of Surgery, Stanford Medical Center, Palo Alto, CA

BACKGROUND: Obesity is a chronic disease that is successfully treated by different primary bariatric operations but, some patients will need reoperations. Although complications are covered by insurance carriers, requests for reoperations for inadequate weight loss or resolution of comorbidities are frequently denied. The perception of high complication rates and uncertain benefits after reoperations, combined with paucity of good data are likely contributory. Therefore, our aim was to evaluate the safety and weight loss outcomes after reoperative bariatric surgery from a large bariatric surgery-specific database.

METHODS: The multi-institutional prospective database for the American Society for Metabolic and Bariatric Surgery was queried for all patients undergoing bariatric operations between 6/2007 and 03/2012. Operations for correction of complications as well as inadequate outcomes from the primary operations were included. Morbidity was defined as serious adverse events (bleeding, leaks, pulmonary embolism, etc.). Excess weight loss (EWL) was calculated from the time of reoperation.

RESULTS: 404,222 patients had no reoperations while 20,406 (4.8%) underwent reoperations. In the reoperative group, women were over represented (86 versus 78.5%), as were Caucasians (73 versus 69%) and Black race (15 versus 12%). Reoperative patients had a mean age of 46 ± 11.33 vs. 45 ± 11.86 years. Reoperations were within one year of the index bariatric operation in 25% of patients, one to five years in 40%, six to ten years in 21% and more than 10 years in 14% after primary operation. The rate of reoperations per year increased steadily from 3.1% in 2007 to 6.3% in 2012. Among patients undergoing reoperations 10,139 (50%) had previously undergone a laparoscopic adjustable band (LAGB) placement, 6411 (31%) a Roux-en-Y gastric bypass (RYGB), 444 (2%) a sleeve gastrectomy (SG), 1685 (8%) a vertical banded gastroplasty (VBG), and 236 (1.2%) a duodenal switch (DS). The operations were most commonly revised to a RYGB in 6801 (33.3%), LAGB (24.8%), SG 1684 (8.1%), DS 393 (1.9%), distal gastric bypass 259 (1.3%) and a group of other operations 6229 (30.6%). EWL at 1-year to RYGB was 27%, LAGB (15.4%), SG (16.5%) and DS (30.9%). The 30-day and 1-year morbidity and mortality rates of the four most common primary and reoperative bariatric operations are low and are shown in the table.

CONCLUSIONS: Although, the rate of reoperations has steadily increased over the last five years to 6.3% per year, most bariatric surgery patients do not need reoperations. Among those who do, the complication rate is low and with satisfactory weight loss. These findings from a large database are critical to convince all stake-holders that outcomes after reoperative bariatric surgery are better than previously believed and are needed to help increase access of patients who need reoperations.

Table: Morbidity and Mortality Rates of Primary Bariatric Operations vs. Reoperations

	30-day morbidity (%)		1-year morbidity (%)		30-day mortality (%)		1-year mortality (%)	
	primary	reoperation	primary	reoperation	primary	reoperation	primary	reoperation
RYGB	2.56	4.48	2.97	4.97	0.15	0.25	0.4	0.47
LAGB	0.29	0.12	0.37	0.18	0.03	0	0.09	0.02
SG	1.32	2.12	1.47	2.48	0.06	0.12	0.2	0.24
DS	3.15	4.52	4.05	4.52	0.34	1.13	1.19	1.36

10:15 AM – 11:00 AM
S504BCD

PRESIDENTIAL PLENARY B (PLENARY SESSION II)

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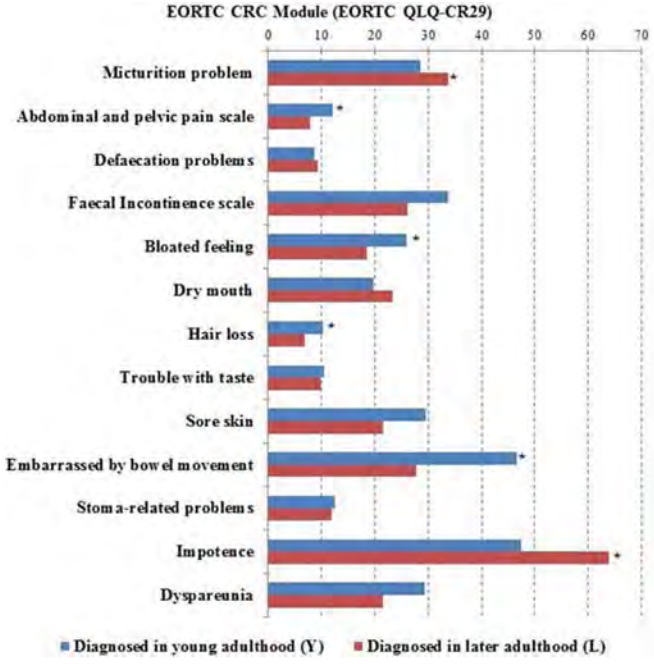
Persistent Functional Deficits and Symptoms Among Long-Term Survivors of Colorectal Cancer Treated with Surgery and Multimodality Therapy: Differences by Age at Initial Diagnosis

Christina Bailey*, Hop S. Tran Cao, Chung-Yuan Hu, George J. Chang, Barry W. Feig, Miguel Rodriguez-Bigas, Sa Nguyen, John M. Skibber, Y. Nancy You
Surgical Oncology, University of Texas, MD Anderson Cancer, Houston, TX

BACKGROUND: Colorectal cancer (CRC) survival outcomes have significantly improved and increasing attention is now being turned to the needs of cancer survivors. We investigated the functional outcomes and symptoms reported by long-term (10 years) CRC survivors who underwent surgery and other multimodality treatments, and examined the key determinants of these outcomes.

METHODS: A total of 1,215 eligible long-term CRC survivors were identified from an Institutional Tumor Registry. 415 survivors who had been diagnosed during young adulthood (Y, age 18–50 years) were matched at a 1:2 ratio to 801 patients diagnosed during later adulthood (L, age >50 years), for tumor site (colon vs. rectum) and oncologic treatments received (surgical and nonsurgical). A cross-sectional survey study was conducted using the validated EORTC CRC module (CR29) including 4 functional scales and13 symptom scales. Scores were standardized by linear transformation (score range: 0–100) and were compared between Y and L patients using Student's t-test. Multivariate linear regression was performed to assess the impact of patient and treatment factors on functional outcomes.

RESULTS: 830 survivors responded at an interval of 10.8 ± 3 years from diagnosis, including 282 Y patients (mean age at diagnosis 43 ± 6 years) and 548 L patients (mean age at diagnosis 63 ± 8 years). The response rate was 68% overall and in both subgroups. Subgroups did not differ in regards to tumor site (proximal colon, distal colon, rectum; p = 0.592), radiation (p = 0.538), surgical procedure (segmental colectomy, proctectomy without stoma, proctecomy with stoma, other; p = 0.214) or presence of stoma (p = 0.607), although chemotherapy was received by more Y patients (86.1 vs. 77.7%; p = 0.004). Functional differences were identified, with Y patients reporting more anxiety (57.1 vs 69.6, p < 0.001), worse body image perception (73.9 vs 81.8, p < 0.001), better male sexual function (44.2 vs 55.7, p = 0.002) and better female sexual function (68.1 vs 76.0, p = 0.014) when compared to L patients. Among the 13 symptoms assessed, abdominal/pelvic pain, bloating, hair loss, and embarrassment with bowel movements were more significant among Y patients, while L patients reported more problems with micturition and impotence (Figure). After adjusting for patient and treatment factors, younger initial age at CRC diagnosis was the most influential independent contributor for more anxiety, while the presence of an ostomy had the strongest negative impact on body image.



Results of EORTC CRC module (EORTC QLQ-CR 29) symptom scales: a higher score indicates a higher level of symptomatology.

CONCLUSION: Long-term survivors of CRC face ongoing deficits in function and symptoms. The initial age at CRC diagnosis impacted patient-reported experiences and may be associated with long-term coping. These persisting effects should inform the care of CRC patients and survivors.

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A Multifaceted Knowledge Translation Strategy Can Increase and Sustain Compliance with Guideline Recommendations for Mechanical Bowel Preparation

Cagla Eskicioglu*[2], Emily Pearsall[1], Darlene Fenech[1], Mary-Anne Aarts[1], Allan Okrainec[1], Robin S. Mcleod[1]
[1]Surgery, University of Toronto, Toronto, ON; [2]Surgery, McMaster University, Hamilton, ON

BACKGROUND: Transfer of evidence into clinical practice is a slow and haphazard process. Whether or not the change in practice is sustainable is unknown. This study reports the outcome of a five year knowledge translation strategy adopted to increase adherence with a guideline for mechanical bowel preparation (MBP) for elective colorectal surgery patients.

METHODS: In 2008, we developed a locally tailored evidence-based guideline which recommended that MBP be omitted for all patients undergoing elective colorectal surgery except for those patients having a low anterior resection (LAR). Following completion of the guideline, a knowledge translation strategy including educational sessions given by opinion leaders was initiated at seven adult teaching hospitals affiliated with a single institution. Subsequently, between 2009 and 2013, other knowledge translation strategies including reminder cards, electronic updates and standardized orders were utilized. To assess compliance with guideline recommendations, a retrospective audit of a convenience sample of patients undergoing elective colorectal surgery at the hospitals was conducted pre-guideline implementation in 2008 (n = 78), six-weeks post-guideline implementation in 2008–09 (n = 118), and four years post-guideline implementation in 2013 (n = 153). Patients were grouped according to procedure: right colon resections (RCR) including ileocolic resection and right hemicoloectomy; left colon resections (LCR) including reversal of Hartmann, sigmoid resection, sigmoidectomy, left hemicoloectomy, and finally, anterior resection; and LAR.

RESULTS: A total of 349 patients (175 males, 174 females, mean age 60.4) were included in the study: 160 had a RCR, 107 had a LCR and 82 had a LAR. Overall, 159 (45.6%) had laparoscopic procedures. The demographic characteristics of the patients are presented in Table 1. Overall, there was a steady increase in adherence to the MBP guideline recommendations. Compliance increased from 71% to 95% (p = 0.002) for patients having a RCR, 45% to 59% (p = 0.34) for patients having a LCR, and 31% to 60% (p = 0.10) for patients having a LAR. Table 2 illustrates compliance with guideline recommendations before and after implementation.

CONCLUSION: Using a tailored knowledge translation strategy, we observed increased compliance with guideline recommendations over time suggesting that a longitudinal strategy is required to increase and sustain compliance with recommendations. Furthermore, different strategies may be required at different times (i.e., educational sessions initially and reminders and standardized orders to maintain adherence). While overall increased compliance was observed for all procedures, adherence with LCR and LAR recommendations was lower suggesting that patient factors may also affect physician decision-making.

Table 1: Demographic Characteristics

	1. Before (June–Oct, 2008) (n = 78)	2. After (Dec 2008–Mar 2009) (n = 118)	3. After (July–Nov, 2013) (n = 153)
Mean age	59.8	60.8	60.7
Male	38 (48.7%)	62 (52.5%)	75 (49.0%)
Female	40 (51.3%)	56 (47.5%)	78 (51.0%)
Location of Anastomosis			
Right-colon resections	31 (39.7%)	53 (44.9%)	76 (49.7%)
Left-colon resections	31 (39.7%)	32 (27.1%)	44 (28.8%)
LAR	16 (20.5%)	33 (28.0%)	33 (21.6%)
Type of Surgery			
Open	47 (60.3%)	59 (50.0%)	37 (24.2%)
Laparoscopic	26 (33.3%)	48 (40.7%)	85 (55.6%)
Lap to Open	5 (6.4%)	11 (9.3%)	31 (20.3%)

Table 2: Compliance with Guideline Recommendations Before and After Implementation

	1. Before		2. After			3. After (2013)		
	Right-colon resections: number/% who received no MBP							
	Compliant	%	Compliant	%	p-value*	Compliant	%	p-value**
Laparoscopic	7/11	63.6	25/31	80.6		50/52	96.2	
Open	13/17	76.5	13/17	76.5		10/11	90.9	
Converted	2/3	66.7	4/5	80.0		12/13	92.3	
Total	22/31	71.0	42/53	79.2	0.55	72/76	94.7	0.002
	Left-colon resections: number/% who received no MBP							
	Compliant	%	Compliant	%	p-value*	Compliant	%	p-value**
Laparoscopic	6/12	50.0	5/13	38.5		8/17	47.1	
Open	7/17	41.2	10/17	58.8		10/16	62.5	
Converted	1/2	50.0	1/2	50.0		8/11	72.7	
Total	14/31	45.2	16/32	50.0	0.90	26/44	59.1	0.34
	Low anterior resection: number/% who received MBP							
	Compliant	%	Compliant	%	p-value*	Compliant	%	p-value**
Laparoscopic	2/3	66.7	3/4	75.0		11/16	68.8	
Open	3/13	23.1	14/25	56.0		4/10	40.0	
Converted	0/0	NA	3/4	75.0		5/7	71.4	
Total	5/16	31.3	20/33	60.6	0.10	20/33	60.6	0.10

*p values 1 vs 2 **p values 1 vs 3

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Cost-Effectiveness of Total Pancreatectomy with Islet Cell Autotransplantation for the Treatment of Small Duct Chronic Pancreatitis

Gregory C. Wilson*, Daniel E. Abbott, Daniel P. Schauer, Mark H. Eckman, Syed Ahmad

Surgery, University of Cincinnati, Cincinnati, OH

INTRODUCTION: Total pancreatectomy and islet cell autotransplantation (TPIAT) has gained popularity for managing chronic pancreatitis (CP), but a cost-benefit assessment has not been scientifically performed. We hypothesized that TPIAT decreases long-term resource utilization and improves quality-of-life, justifying the initial costs and risks of the procedure.

METHODS: From 1999–2013, 46 patients with small duct CP and detailed treatment and outcomes data in the perioperative period (12 months before and after TPIAT) were analyzed. These data populated a Markov model comparing ongoing medical management versus TPIAT for small duct CP. The surgery cohort included perioperative mortality and complication rates, while CT imaging, insulin use, morphine equivalent (MEQ) and endoscopic procedure (EGD, EUS, ERCP) and readmissions were used in both surgical and medical cohorts. Survival (quality adjusted life years, QALY) and cost (based on Medicare payment, 2013 US$) were discounted at 3% per year.

RESULTS: Median patient age was 36 years (range: 15–61) with a predominance of females (n = 29, 63%). The etiologies of CP were primarily idiopathic (n = 30, 65%) followed by genetic (n = 12, 26%). In the 12 months prior to TPIAT (medical management cohort), annual mean per patient hospital admissions were 1.6 (range: 0–11), endoscopic procedures 1.3 (range: 0–6), and imaging (CT/MRI) 1.3 (range = 0–4). In the surgical cohort there were no perioperative deaths, with complication and 30-day readmission rates of 41% and 37%, respectively. 1 year after TPIAT, annual mean per patient admissions, endoscopic procedures and imaging had decreased to 0.9 (range: 0–4), 0.4 (range: 0–2) and 0.9 (range: 0–5), respectively. Furthermore, monthly narcotic use in the surgical cohort decreased from 138 to 37 MEQ (p = 0.012). Cost and survival for the TPIAT versus continued medical management were $153,576/14.9 QALYs and $196,042/11.5 QALYs, respectively. Sensitivity analyses with variable perioperative mortality rates, quality of life adjustment and TPIAT payment did not substantially change the cost-effectiveness analysis.

CONCLUSIONS: In patients with refractory small duct CP, TPIAT is associated with both decreased cost and increased quality-adjusted survival. Because TPIAT is a cost-effective treatment for small duct pancreatitis, tertiary care centers should look for opportunities to increase the use of TPIAT, and insurers should more enthusiastically embrace its use.

2:00 PM – 3:30 PM
S504A

PLENARY SESSION III

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The Value of Drains As a Fistula Mitigation Strategy for Pancreatoduodenectomy: Something for Everyone? Results of a Randomized Prospective Multi-Institutional Study

Matthew T. Mcmillan*[1], William E. Fisher[2], Jeffrey Drebin[1], Stephen W. Behrman[3], Mark Bloomston[4], Kimberly M. Brown[6], Steven J. Hughes[10], Katherine A. Morgan[9], Vic Velanovich[5], Jordan M. Winter[7], Nicholas J. Zyromski[8], Charles M. Vollmer[1]
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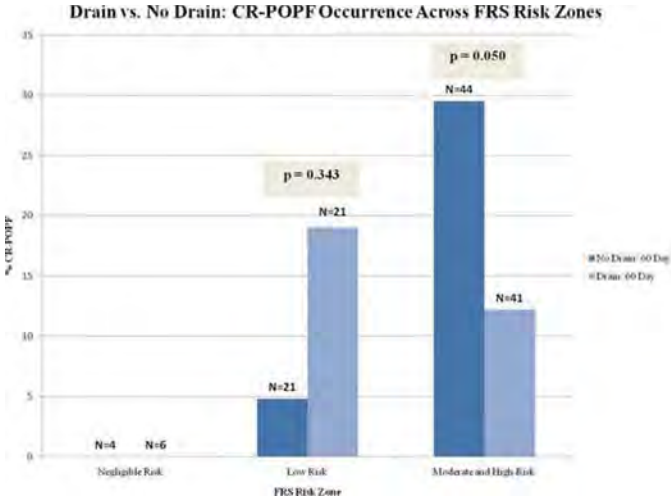
INTRODUCTION: A recent randomized controlled trial investigating intraperitoneal drain use during pancreatoduodenectomy (PD) had a primary goal of assessing overall morbidity. It was terminated early with findings that routine elimination of drains in PD increases mortality and the severity and frequency of overall complications. Here, we provide a subset analysis of drain value in reference to clinically-relevant postoperative pancreatic fistula (CR-POPF), with emphasis on risk-adjusted outcomes.

METHODS: Nine institutions performed 137 PDs, with patients randomized to intraperitoneal drainage (D; n = 68) or no drainage (ND; n = 69). CR-POPFs were categorized, at POD 60, as ISGPF Grade B or C. The Fistula Risk Score (FRS), a 10-point scale derived from four validated risk factors for CR-POPF (soft gland, small duct, high-risk pathology, increased blood loss), facilitated risk adjustment between groups. FRS risk zones include: Negligible (FRS 0), Low (FRS 1–2), Moderate (FRS 3–6) & High (FRS 7–10).

RESULTS: There was no difference in overall fistula risk between the two groups as judged by mean FRS (D = 3.51 vs. ND = 3.57; p = 0.897), rates of each of the aforementioned individual risk factors, or stent use. When used, drains were typically removed POD 7. Overall, CR-POPF rates were higher in the no drain group compared to the drain group (20.3% vs. 13.2%; OR: 1.67; p = 0.269), as were rates of the severe Grade C POPFs (8.7% vs. 2.9%; OR: 3.14; p = 0.274). The use of drains in the presence of known individual FRS factors was associated with lower CR-POPF rates, particularly for soft glands (11.8% vs. 34.3%; OR: 0.26; p = 0.027). For each cohort, CR-POPF occurrence was assessed across the various FRS risk zones. CR-POPF never occurred in the 10 patients with negligible risk. In patients with Low risk, the rate of CR-POPF was actually higher when drains were utilized (19.0% vs. 4.8%; OR: 4.71; p = 0.343). Conversely, there were significantly fewer CR-POPFs (12.2% vs. 29.5%; p = 0.050) when drains were used in Moderate and High risk scenarios (Figure). The benefit of drains in these particular patients is detailed in the table that follows. Lastly, patients who suffered CR-POPFs experienced shorter duration of stay (15.2 d vs. 34.7 d, p = 0.010) and reduced 90-d mortality (11.1% vs. 42.9%; OR: 0.17; p = 0.176) when a drain was used.

Table: Moderate and High Risk Groups (FRS 3–10)

	No Drain (N=44)		Drain (N=41)			
FRS Risk Factors	N	CR-POPF, N (%)	N	CR-POPF, N (%)	p-Value	Odds Ratio
Soft gland texture	33	12 (36.4)	32	3 (9.4)	0.010	5.52
EBL (>400 mL)	21	8 (38.1)	21	3 (14.3)	0.079	3.69
Duct diameter (<5mm)	35	11 (31.4)	35	5 (14.3)	0.088	2.75
High-risk pathology	26	8 (30.8)	23	3 (13.0)	0.138	2.96
≥1 risk factors	44	13 (29.5)	41	5 (12.2)	0.050	3.02
≥2 risk factors	42	13 (31.0)	38	5 (13.2)	0.057	2.96
≥3 risk factors	24	10 (41.7)	26	3 (11.5)	0.015	5.46



CONCLUSION: Controversy exists over the efficacy of drains as a fistula mitigation strategy in cases of PD. The results of this analysis suggest that drains diminish the rate and severity of CR-POPF in patients with Moderate and High fistula risk, but they might be avoided in the roughly one-third of patients with Negligible or Low risk. The premature discontinuation of this study, due to obvious deleterious outcomes in the absence of drains, limits its statistical power; yet, the randomization process and risk adjustment with the FRS ensures absence of bias.

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Does Routine Drainage of the Operative Bed Following Elective Distal Pancreatectomy Reduce Complications? An Analysis of the ACS-NSQIP Pancreatectomy Demonstration Project

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Routine drainage of the operative bed and its impact on morbidity and mortality following elective pancreatectomy remains controversial. Data specific to those having distal pancreatectomy (DP) have not been presented in subset analyses in series inclusive of both left and right pancreas resections. A previous retrospective study suggested no benefit to drain placement in DP. We sought to examine if prophylactic drainage confers a reduction in postoperative complications in a multi-institutional collaborative.

METHODS: The American College of Surgeons-National Surgical Quality Improvement Program Pancreatectomy Demonstration Project database was utilized to analyze the impact of drain placement on patients undergoing elective DP from November 2011–December 2012. Propensity scores for drain placement were calculated using the following variables: age, gender, race, body mass index (BMI), operative duration, presence of a concurrent organ or vascular resection, pre-operative albumin, pancreas texture and duct size, and pathology. Nearest neighbor matching was used to create a matched cohort based on drain placement. Outcomes examined focused on post-operative pancreatic fistula (PF), intrabdominal septic morbidity, and the need for percutaneous drainage and/or reoperation. The matched cohort was compared using bivariate and logistic regression analyses. Significance was assessed at the 95th percentile.

RESULTS: During the study period, 761 patients from 43 institutions having DP were accrued, 606 of whom received a prophylactic drain. Propensity score matching was possible in 116 patients. After matching, drain and no drain groups were not different with respect to age, BMI, gland texture, operative time or the need for concurrent organ or vascular resection. PF were significantly more common in those that received a drain (Table). The placement of a prophylactic drain did not reduce the incidence of organ space or deep incisional infection nor the need for post-operative percutaneous drainage or reoperation. In the matched cohort, there was no mortality in either the drain or no drain group.

	PF*	Organ Space SSI	Deep Incisional SSI	Percutaneous Drainage	Re-Operation
Drain (n = 116)	21	10	1	14	1
No drain (n = 116)	7	4	3	9	1

PF – pancreatic fistula, SSI – surgical site infection, *p < .05

CONCLUSIONS: In a propensity-score matched analysis of a multi-institutional cohort, the placement of drains in the operative bed following elective DP was associated with a higher PF rate but did not reduce intrabdominal septic morbidity or the need for post-operative percutaneous drainage or reoperation.

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Laparoscopic Total Pancreatectomy for Main-Duct IPMN

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The operative technique of laparoscopic total pancreatectomy with splenectomy will be presented in a patient with main-duct IPMN of the pancreas. This video demonstrates the feasibility of laparoscopic total pancreatectomy using a setup with five 12mm ports similar to laparoscopic pancreatoduodenectomy. It emphasizes the technique of safe laparoscopic resection while maintaining oncologic principles of margin negative resection. The steps for resection are demonstrated and are the same steps than for open resection but in different order to allow for a laparoscopic approach.

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Timing of Discharge: A Key to Understanding the Reason for Readmission After Colorectal Surgery

Kristin N. Kelly*, James C. Iannuzzi, Christopher T. Aquina, Christian P. Probst, Katia Noyes, John R. Monson, Fergal Fleming
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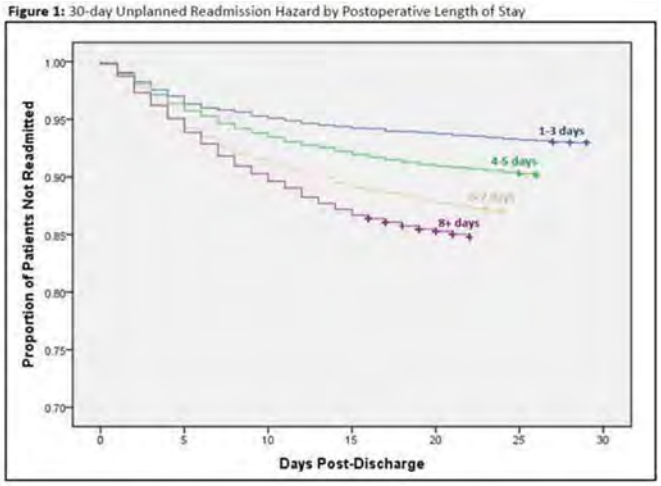
PURPOSE: In the current healthcare environment there is an ever-present pressure to improve the value of care delivery. As a result, many question if patients are being discharged too soon as a means of reducing cost. There is a growing interest in understanding the delicate balance between appropriate hospital length of stay (LOS) and prevention of unnecessary readmissions. This study examines the relationship between postoperative LOS and unplanned readmission after colorectal resection and explores whether patients discharged earlier are at risk for different complications necessitating readmission.

METHODS: Patients undergoing colorectal resection were selected by CPT code from the 2012 ACS NSQIP database. Only patients surviving to discharge with a postoperative LOS 1–14 days in duration were included allowing for at least 2 weeks of follow-up. Patients were stratified by LOS quartile: 1–3 days, 4–5 days, 6–7 days, and ≥8 days. Kaplan Meier analysis was used to examine the relationship of patient and perioperative characteristics with 30-day unplanned readmission. Factors with a $p < 0.1$ were included in the Cox proportional hazards model. Subsequently, ICD-9 codes were used to group reasons for unplanned readmission. Chi-square analysis compared LOS and patient and perioperative factors with the primary reason for readmission. Factors with a $p < 0.1$ were included in a multivariable logistic regression for each readmission reason.

RESULTS: For 33,033 patients undergoing colorectal resection, the overall 30-day unplanned readmission rate was 11% ranging from 7% in patients with a 1–3 day LOS to 15% in patients with a ≥8 day LOS. Mean postoperative LOS was 5.9 days. After adjusting for patient and perioperative factors, greater postoperative LOS was associated with higher relative hazard of readmission (Figure 1). The most common reported reasons for readmission were intra-abdominal infection, wound complications, and ileus/obstruction (Table). Patients with a 1–3 day LOS were more likely than patients with longer LOS to be readmitted with ileus/obstruction (OR: 1.7 CI: 1.2,2.4 p = 0.01) and pain (OR: 1.8 CI: 1.0,3.4 p = 0.05). LOS was not significantly associated with readmission for intraabdominal infection or medical complications.

Figure 1: 30-day Unplanned Readmission Hazard by Postoperative Length of Stay



CONCLUSIONS: After adjusting for patient and perioperative characteristics this study found longer LOS was independently associated with increased unplanned 30-day readmissions following colorectal resection. Patients with a complicated hospital course continue to be high risk post-discharge, while straightforward early discharges have a different readmission risk profile. More targeted readmission prevention strategies, like ensuring appropriate bowel function and pain regimens for patients discharged earlier, are critical to focusing resource utilization for patients following colorectal surgery.

Table: Multivariable Analysis of Association Between Length of Stay Quartile and Re-Admission Reason

		1–3 Days LOS		4–5 Days LOS		6–7 Days LOS	
Readmission Reason	N (% Of All Readmissions)	Adjusted OR (CI)	p-Value	Adjusted OR (CI)	p-Value	Adjusted OR (CI)	p-Value
Intra-abdominal infection	505 (13.5)	0.85 (0.60, 1.21)	0.38	0.95 (0.73, 1.23)	0.71	0.92 (0.70, 1.20)	0.85
Wound complication	500 (13.4)	0.98 (0.66, 1.45)	0.91	1.23 (0.94, 1.62)	0.13	1.35 (1.05, 1.75)	0.02
Ileus or obstruction	401 (10.7)	1.65 (1.15, 2.37)	0.01	1.11 (0.82, 1.50)	0.49	0.99 (0.73, 1.35)	0.95
Medical complication	255 (6.8)	0.80 (0.47, 1.38)	0.43	0.88 (0.61, 1.28)	0.51	0.86 (0.61, 1.22)	0.40
Pain	141 (3.8)	1.83 (0.99, 3.36)	0.05	1.32 (0.80, 2.18)	0.27	1.22 (0.73, 2.05)	0.45

LOS: Postoperative Length of Stay; OR: Odds Ratio; CI: 95% Confidence Interval *LOS ≥8 days used at the reference category in all models. Other less frequent reasons for readmission included sepsis, dehydration, hemorrhage, PE/DVT, other GI complaints, and other/unknown Intra-abdominal infection model also adjusted for age, sex, diabetes, ASA class, functional status, cardiac comorbidity, bleeding disorder, preoperative sepsis/SIRS, anemia, wound class, emergency cases, discharge to non-home location, and minor pre-discharge complications. Wound complication model also adjusted for age, Hispanic ethnicity, race, obesity, smoking, pulmonary comorbidity, hepatic insufficiency, renal insufficiency, open surgery, and minor/major pre-discharge complications. Ileus/obstruction model also adjusted for obesity, diabetes, ASA class, cardiac comorbidity, renal insufficiency, chemotherapy/radiation/disseminated cancer, bleeding disorder, anemia, preoperative sepsis/SIRS, wound class, discharge to non-home location, open surgery, blood transfusion, and pre-discharge major complications. Medical complication model also adjusted for age, diabetes, ASA class, pulmonary comorbidity, cardiac comorbidity, bleeding disorder, anemia, open surgery, discharge to a non-home location, and pre-discharge major complications. Pain model also adjusted for age, race, diabetes, ASA class, anemia, open surgery, discharge to a non-home location, and blood transfusion.

Adjusted Readmission Hazard Ratios (95% CI) 1–3 days LOS (top line): Reference 4–5 days LOS (2nd line from top): 1.28 (1.14, 1.44) p-value < 0.001 6–7 days LOS (3rd line from top): 1.58 (1.40, 1.80) p-value < 0.001 8+ days LOS (Bottom line): 1.70 (1.49, 1.93) p-value < 0.001 Logrank test: p-value < 0.001 Breslow test: p-value <0.001 LOS: Postoperative length of stay Model adjusted for age, race, transfer status, body mass index, diabetes, ASA class, functional status, smoking, pulmonary comorbidity, hepatic insufficiency, cardiac comorbidity, renal insufficiency, neurological comorbidity, chemotherapy, radiation, disseminated cancer, bleeding disorder, chronic steroid use, preoperative sepsis, preoperative transfusion, anemia, wound class, discharge location, open surgery, emergency case status, and pre-discharge complications.

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Readmissions After Esophageal Resections

Abhishek Sundaram*[1], Ananth Srinivasan[1], Sarah Baker[2], Sumeet K. Mittal[1]

[1]Surgery, Creighton University, Omaha, NE; [2]ICU Nursing, Creighton University, Omaha, NE

BACKGROUND: There has been an increasing emphasis on readmission, both from a quality of care and a cost perspective. Esophagectomy for esophageal cancer is one of the more morbid surgical procedures. However, limited reports exist on risk factors associated with readmission after esophagectomy.

OBJECTIVE: Determine the 30-day readmission rate after esophagectomy for esophageal cancer and risk factors associated with readmission.

METHODS: Retrospective review of the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) 2011–12 database was performed to identify patients who underwent elective esophagectomy for esophageal cancer.

RESULTS: One thousand one hundred and three patients satisfied study criteria. One hundred and thirty seven patients (12.4%) were readmitted within 30 days of surgery. Readmitted patients were significantly older (mean age: 65.9 years vs. 63.8 years, p = 0.02) and had a higher proportion of males (91.2% vs. 83.2%, p = 0.01) than patients who were not readmitted. There was no significant difference between the groups in terms of other peri-operative variables like cardiac disease, neo-adjuvant therapy (chemotherapy within 30 days and radiation within 90 days of surgery), type of esophagectomy performed and body mass index. Readmitted patients had a higher incidence of superficial surgical site infections (SSI) (13.1% vs. 4.9%, p < 0.001), deep incisional SSI (8% vs. 1.8%, p < 0.001), organ space infections (12.4% vs. 5.5%, p = 0.002), sepsis (21.2% vs. 11.3%, p = 0.001) and venous thromboembolism (11.7% vs. 3.9%, p < 0.001). Readmitted patients had a significantly shorter mean length of index hospital stay (11.25 vs. 14.75 days, p < 0.001). On multivariate logistic regression analysis, significant risk factors for 30 day readmission were: male gender, history of pulmonary disease, diabetes mellitus (DM), hypertension (HTN), postoperative wound complications, sepsis and shorter hospital stay. Patients who were readmitted had a significantly higher incidence of the following post discharge complications: SSI (7.3% vs. 1%, p < 0.001), deep incisional SSI (3.6% vs. 0.4%, p < 0.001), organ space infections (5.1% vs. 1.9%, p = 0.05), pneumonia (7.3% vs. 2.1%, p = 0.001) and venous thromboembolism (2.9% vs. 0.8%, p = 0.02).

CONCLUSIONS: Readmission rate after esophagectomy for esophageal cancer is around 12.4%. Patients, who are male, have co-morbid conditions like DM, HTN and pulmonary disease are at higher risk for readmission. Earlier discharge is not always ideal as it comes at the cost of a higher readmission rate. Emphasis should be placed on optimizing modifiable peri-operative factors namely, comorbid conditions, tissue handling, wound care and pulmonary toilet as a means to reduce readmission.

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Immunoscoring for Prognostic Assessment of Colon Cancer: A Novel Complement to Ultrastaging

Simon Lavotshkin*[1], John R. Jalas[2], Hitoe Torisu-Itakura[1], Junko Ozao-Choy[1], Rafay A. Haseeb[1], Alexander Stojadinovic[3], Zev Wainberg[4], Anton Bilchik[1]

[1]The John Wayne Cancer Institute, Santa Monica, CA; [2]Saint John's Health Center, Santa Monica, CA; [3]Uniformed Services University of Health and Sciences, Bethesda, MD; [4]UCLA School of Medicine, Santa Monica, CA

INTRODUCTION: Although AJCC/TNM staging remains the gold standard for prognostic assessment of colon cancer, it cannot explain variable outcomes among patients with the same stage of disease. Several groups have examined a prognostic immunoscore based on immune infiltrates in the primary tumor. We hypothesized that an immunoscore based on five immune variables might improve the accuracy of ultrastaging in patients with colon cancer.

METHODS: Our study group comprised patients enrolled in an ongoing prospective trial of ultrastaging for colon cancer (RO1 CA090848). Resected tumor specimens were analyzed for CD3, CD4, CD8, CD68, and FoxP3 in a blinded fashion by a pathologist. Areas positive for tumor-infiltrating lymphocytes (TIL) were defined as hot spots and stratified as focal or diffuse based on their staining pattern on broad magnification. Hot spots were then scored as high or low, based on the briskness of the lymphocytic response, in the center of the tumor (CT) and in the invasive margin (IM). This categorical score was compared with a continuous score derived from analysis of 360 images on 36 patients with stage I–III colon cancer with ImageJ processing software. The immunoscore was then correlated with AJCC/TNM stage and with disease-free survival.

RESULTS: The mean number of nodes was 17. Fisher's exact test showed that the continuous variable scored by ImageJ analysis software matched the pathologist's categorical scoring system (p-value = 0.0048–0.0421 for all but CD68 and FoxP3). Mean TIL counts in the CT region were consistently higher in stage I than in stage III tumors: CD3, CD4 and CD8 counts were 774, 872 and 745, respectively, in stage I tumors, as compared with 535 ($p = 0.05$), 614 and 487, respectively, in stage III tumors. This increase was not observed for CD68 or FoxP3. Patients with a disease-free survival >5 years tended to have a higher CD8/CD3 ratio in both IM and CT regions, as compared to patients with disease-free survival <36 months ($p = 0.08$).

CONCLUSIONS: This is the first study to validate an immunoscore using specimens and data from a prospective clinical trial in which surgery and pathology techniques were standardized. Our preliminary results suggest that an immunoscore based on CD3, CD4 and CD8 corresponds with earlier stage colon cancer and improved disease-free survival and should be further examined for inclusion in the AJCC staging system.

2:00 PM – 3:30 PM
S502

VIDEO SESSION I

465

Robotic Assisted Laparoscopic Total Pelvic Exenteration

Sanjay S. Reddy*[1], Radhika K. Smith[1], Rosalia Viterbo[2], Cynthia A. Bergman[3], Eric I. Chang[4], Jeffrey M. Farma[1]

[1]Surgical Oncology, Fox Chase Cancer Center, Philadelphia, PA; [2]Urologic Oncology, Fox Chase Cancer Center, Philadelphia, PA; [3]Gynecologic Oncology, Fox Chase Cancer Center, Philadelphia, PA; [4]Plastic and Reconstructive Surgery, Fox Chase Cancer Center, Philadelphia, PA

The purpose of this video is to demonstrate the technique of a total pelvic exenteration using a robotic assisted laparoscopic approach with gracilis flap reconstruction.

We present a case of a woman with recurrent anal squamous cell carcinoma invading the vagina and urethra. She had previously received chemoradiotherapy and presented with a recurrence. This procedure was done in coordination with surgical oncology, urology, gynecologic oncology, and plastic and reconstructive surgery. We present this multidisciplinary, minimally invasive approach to pelvic exenteration as a safe and effective modality of surgical therapy.

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Laparoscopic Release of Median Arcuate Ligament

Ankit Patel*, Juan Toro, Nathan Lytle, S. Scott Davis, Edward Lin

Department of Surgery, Emory University, Atlanta, GA

Median arcuate ligament syndrome is a complicated condition usually characterized by abdominal pain and weight loss caused by compression of the celiac artery by the median arcuate ligament. The anatomy of the ligament and its close proximity to the aorta makes the treatment difficult. The laparoscopic approach can provide excellent visualization for dissection in addition to the known benefits of a minimally invasive procedure. We present a laparoscopic case in high-definition video.

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Retrieval of the Eroded Gastric Band: A Hybrid Endoscopic and Laparoscopic Approach

Monica Young*, Nojan Toomari, Ninh T. Nguyen
Surgery, University of California Irvine Medical Center, Orange, CA

This is a 64-year-old female with a history of morbid obesity and previous laparoscopic gastric banding six years ago. She was taken to the operating room for retrieval of an eroded and embedded gastric band. The cathether was identified and found to be encased in a large inflammatory mass in the left upper quadrant. A hybrid endoscopic and laparoscopic approach is utilized to mobilize, transect and remove the device.

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Totally Laparoscopic Right Hepatectomy with Roux-en-Y Hepaticojejunostomy

Marcel C. Machado*, Rodrigo C. Surjan, Fabio F. Makdissi, Marcel Autran Machado
Surgery, University of São Paulo, São Paulo, Brazil

We present a video of a totally laparoscopic right hepatectomy with hilar dissection and lymphadenectomy, en bloc resection of extrahepatic bile duct and Roux-en-Y hepaticojejunostomy in a 58-year-old patient with intraductal papillary neoplasm of the right hepatic duct. Operative time was 400 minutes. Postoperative recovery was uneventful. Surgical margins were free. Patient is well with no evidence of the disease 14 months after the procedure. Laparoscopic right hepatectomy with hepaticojejunostomy is feasible and safe, provided it is performed in a specialized center and staff with experience in hepatobiliary surgery and advanced laparoscopic. It is reserved for selected cases.

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Laparoscopic Redo Paraesophageal Hernia Repair with Collis Gastroplasty for Shortened Esophagus

Rachel Jones*, Carl Tadaki, Dmitry Oleynikov
University of Nebraska Medical Center, Omaha, NE

Esophageal shortening can be seen in patients with chronic inflammation associated with gastroesophageal reflux disease (GERD) and paraesophageal hernias. During surgical treatment of these conditions it is important to address the esophageal shortening during the operation for optimal outcomes. Ideally, 2.5 to 3 cm of tension free intraabdominal esophagus is recommended. During this video we show a redo paraesophageal hernia repair in which we were unable to achieve adequate esophageal lengthening despite extensive mediastinal dissection. We therefore proceeded with Collis gastroplasty with Toupet fundoplication.

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Laparoscopic Excision of Leiomyoma of the Stomach and Distal Esophagus

Bernardo Borraez*, Marco E. Allaix, Fernando Herbella, Marco G. Patti
General Surgery, University of Chicago, Chicago, IL

44-year-old woman

6-month history of progressive dysphagia and regurgitation

Unclear localization in the diagnosis approach

Procedure: Laparoscopic excision of leiomyoma of the stomach and distal esophagus, and partial fundoplication.

Uneventful postoperative course

Discharged on postoperative day #3 after soft diet

Pathology report: Leiomyoma

4:00 PM – 5:30 PM
S504A

PLENARY SESSION IV

506

Peri-Operative Patient Reported Outcomes Predict Serious Surgical Complications

Juliane Bingener*[1], Jeff Sloan[3], Paul Novotny[3], Barbara A. Pockaj[2], Heidi Nelson[4]
[1]Division of General Surgery, Mayo Clinic - Rochester, Rochester, MN; [2]Surgery, Mayo Clinic, Scottsdale, AZ; [3]Health Sciences Research, Mayo Clinic, Rochester, MN; [4]Surgery, Mayo Clinic, Rochester, MN

BACKGROUND: Decreased survival after colon cancer surgery has been reported in patients with deficient baseline quality-of-life (QOL) as described in a recent secondary analysis of the COST(Clinical Outcomes of Surgical Therapy) trial. We hypothesized that deficits in baseline QOL are also associated with postoperative complications.

PATIENTS AND METHODS: A secondary analysis of the COST trial 93-46-53 (INT 0146) was performed. Patient demographics, surgical complications (grade 0–4), composite and single item QOL scores were used for univariate and multivariate analysis. QOL deficit was defined as an overall QOL score <50 on a 100 point scale. Early changes in QOL were defined as changes from baseline to postoperative day 2 or day 14 (POD2 POD14). 416 patients provided the power to identify + 5 points (0.5 standard deviation [STD]) difference in the global QOL scale with a 95% confidence interval.

RESULTS: Of the 431 patients who were enrolled in the QOL portion of the COST trial, 81 patients (19%) experienced complications prior to discharge. Of these, 42 complications (7%) were serious (grade 2–4) including two deaths (0.5%). Eighty-nine patients (24%) experienced late complications within 2 months of the operation, including readmission.

55 patients (13%) had a QOL score < 50 at baseline. Patients with a baseline QOL deficit were more likely to have a serious early complication than patients without a QOL deficit (16 vs 6%, p = 0.0234). Patients who experienced early complications reported worse "appearance" (0.25 STD, p = 0.0126), and worsening breathing (0.3 STD, p = 0.033) on postoperative day 2.

Patients with an early complication were 3 years older (p = 0.03) and more likely ASA III (p = 0.0034). Gender, race, tumor stage and laparoscopic or open approach were not associated with an increased frequency of complications. Patients with complications experienced a 3.5 day longer hospital stay (p = 0.0001). After adjusting for age, gender, race, tumor stage, ASA and operative approach, significant predictors for being readmitted to the hospital were baseline pain distress (OR 1.61, CI 1.11–2.34, p = 0.0125), changes from baseline to day 2 in fatigue (OR 1.34 CI 1.03–1.74, p = 0.032) and from baseline to postoperative day 14 in activity (OR 1.56 CI 1.07–2.29, p = 0.0225), daily living (OR 2.08, CI 1.23–3.51, p = 0.0063) and outlook (OR 2.78, CI 1.19–6.53, p = 0.0187).

DISCUSSION: The QOL assessment was initially included in the COST trial to compare two surgical approaches for their impact on the patient. Together with other reports this study suggests that QOL tools also can provide an early indicator for patients at risk of complications. Further studies are needed to evaluate whether perioperative assessment of QOL may assist in reducing postoperative complications, length of hospital stay and readmission.

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Allogeneic Adipose-Derived Stem Cells for the Treatment of Crohn's Perianal Fistula: A Phase I/IIa Clinical Study

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BACKGROUND: The treatment of Crohn's perianal fistula remains an extremely challenging problem as many fistulae do not respond to conventional surgical and/or medical management and recurrence rates are substantial. We have previously demonstrated that autologous adipose tissue-derived stem cells (ASCs) are safe and have therapeutic potential for healing perianal fistula associated with Crohn's disease. Aim: This clinical study was aimed to evaluate the safety and efficacy of allogenic adipose-derived stem cells (ALLO-ASCs) for the treatment of perianal fistula in Crohn's disease.

METHODS: The study was designed multicenter, randomized phase I/IIa clinical study to compare two different doses of ALLO-ASCs. In this dose escalation study, patients were sequentially enrolled in two dosing group with three patients in each group. The first three patients (group 1) were given 1 x 107 cell/ml based on the size of fistula tract. After 4 weeks, this dose was deemed safe, and additional three patients (group 2) were given 3 x 107 cell/ml. Efficacy endpoint was complete closure at 8 weeks after injection, defined as a complete closure of external opening without any sign of drainage and inflammation. Patients who completed visit at 8 weeks were followed up for an additional 6 months.

RESULTS: There were no grade 3 or 4 severity adverse events and no events were related to ALLO-ASC. Two patients in group 1 showed over 50% closure of fistula at 8 weeks after injection. Of the three patients enrolled in group 2, one showed complete closure at 8 weeks. Five out of six patients were then monitored for additional 6 months. Two out of 3 patients in group 1, and one of 2 patients in group 2 maintained complete closures of the fistula at 8 months. Invstigator's satisfaction showed similar results with efficacy of ALLO-ASC.

CONCLUSIONS: Our data suggests that Allogenic adipose-derived stem cells (ALLO-ASCs) are tolerable, safety, and demonstrated efficacy and feasibility for treatment of Crohn's fistula.

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Does the Use of Neoadjuvant Therapy for Pancreatic Adenocarcinoma Increase Postoperative Morbidity and Mortality Rates?

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INTRODUCTION: The effects of neoadjuvant therapy on postoperative complications following pancreatectomy for pancreatic cancer have not been well studied. Using prospectively collected data from the NSQIP Pancreatectomy Demonstration Project, we compared postoperative outcomes for patients with pancreatic adenocarcinoma treated with a surgery-first vs. neoadjuvant therapy-first approach.

METHODS: We included all patients with pancreatic adenocarcinoma captured within the NSQIP Pancreatectomy Demonstration Project from November 2011 to December 2012. Patients were classified according to neoadjuvant therapy status (chemotherapy and/or radiation). Patients receiving neoadjuvant therapy were then further classified as having received chemotherapy alone or radiation with or without chemotherapy. The groups were compared using the Fisher's exact test with significance set at $p < 0.05$.

RESULTS: Of the 1,567 patients with pancreatic cancer identified, 199 patients received neoadjuvant therapy—99 patients (6.3%) received neoadjuvant chemotherapy alone and 100 (6.4%) received neoadjuvant (chemo)radiation. Demographic data were not notably different between the surgery-first and the neoadjuvant therapy groups. Patients treated with neoadjuvant therapy were more likely to need a vascular resection than patients treated with surgery first (41.5% vs. 17.3%, p < 0.0001). Patients treated with any neoadjuvant therapy were also more like to undergo biliary stenting (58.9% vs. 44.5%, p = 0.0006) and were less likely to have a laparoscopic resection (6.0% vs. 8.6%, p = 0.05) than patients treated with surgery first. The 30-day mortality rate did not differ for patients in the neoadjuvant therapy compared to the surgery-first groups (2.0% vs. 1.5%, p = 0.56). Overall postoperative morbidity also did not differ between the two groups (56.3% vs. 52.9%, p = 0.34). Postoperative mortality and the incidence of most 30-day complications did not differ significantly based on use of neoadjuvant therapy; however, patients treated with neoadjuvant therapy were significantly less likely to have a deep organ space infection (3.0% vs. 11.5%, p = 0.0004) and patients treated with neoadjuvant radiation were less like to develop a pancreatic fistula (7.3% vs. 15.5%, p = 0.03).

Table: Demographic Characteristics by Treatment Strategy

Characteristics	No neoadjuvant therapy	Neoadjuvant chemotherapy	Neoadjuvant radiation
Race			
Caucasian	116 (88.1%)	86 (86.9%)	89 (89.9%)
African-American	96 (7.3%)	5 (5.1%)	4 (4.0%)
Other	61 (4.6%)	8 (8.1%)	6 (6.1%)
Gender			
Female	635 (46.4%)	42 (42.4%)	48 (48.0%)
Male	733 (53.6%)	57 (57.6%)	52 (52.0%)
ASA Class			
Class I	10 (0.7%)	0 (0%)	1 (1.0%)
Class II	359 (26.3%)	24 (24.2%)	27 (27.0%)
Class III	937 (68.8%)	69 (69.7%)	63 (63.0%)
Class IV	57 (4.2%)	6 (6.1%)	9 (9.0%)
BMI Category			
Underweight	26 (1.9%)	1 (0.6%)	3 (3.0%)
Normal	512 (37.5%)	44 (44.9%)	50 (50.0%)
Obese	350 (25.6%)	16 (16.3%)	14 (14.0%)
Overweight	478 (35.0%)	37 (37.8%)	33 (33.0%)

CONCLUSIONS: Only 12.7% of patients with pancreatic adenocarcinoma captured in the Pancreatectomy Demonstration Project were treated with neoadjuvant therapy. Our data suggest that patients receiving neoadjuvant therapy in this dataset had more extensive disease (more frequently requiring vascular resection). Despite this, neoadjuvant therapy was associated with lower rates of deep organ-space infections and neoadjuvant radiation was associated with lower rates of pancreatic fistula. Concern over increasing rates of postoperative complications should not deter the use of neoadjuvant therapy for pancreatic cancer.

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Surgeon and Facility Volume Play Significant Role in Hernia Recurrence and Reoperation After Open Incisional Hernia Repair

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PURPOSE: Incisional hernia is a common complication following gastrointestinal surgery occurring in up to 20% of patients. Many surgeons elect to perform their own incisional hernia repairs despite performing only a small number of hernia repairs annually. There is no prior literature on the association between surgeon volume, facility characteristics, and incisional hernia repair outcomes. This study examines the relationship between physician and institutional characteristics, hernia recurrence, and reoperation rates following open initial hernia repair.

METHODS: Patients undergoing open initial incisional hernia repair between 2000 and 2006 were selected by CPT code from the New York Statewide Planning and Research Cooperative System (SPARCS). Incisional hernia recurrence and surgical repairs over a five year period were determined by ICD-9 and CPT codes. Surgeon and facility volumes were calculated as a mean number of initial incisional hernia repairs per year over the 2000 to 2006 period. Additional facility characteristics included academic status, bed number, and urban/rural location. Univariate analysis was used to compare patient, surgeon, and facility characteristics with incisional hernia recurrence and reoperation. Factors with a p-value <0.1 were included in multivariable logistic regression.

RESULTS: A total of 18,171 patients underwent open initial incisional hernia repair in New York State in 2000–2006. The mean number of initial hernia repairs per year were 39 for facilities (median = 30, range: 1–138) and 10 for individual surgeons (median = 7, range: 1–64). The hernia reoperation rate was 6.8% with a captured hernia recurrence rate of 8.9%. The mean time between initial hernia repair and reoperation was 24 months (median = 19, range = 0.1–60). After adjusting for patient and facility characteristics, both upper 50th percentile and top 25th quartile for surgeon volume, top 25th quartile for facility volume, and status as an ambulatory surgery center were significantly protective for both hernia recurrence (Table 1) and hernia reoperation (Table 2). Academic status, facility size, and urban/rural location of the institution were not significantly associated with hernia recurrence or reoperation.

CONCLUSIONS: This study suggests a strong association between individual surgeon and facility incisional hernia repair volume and the subsequent risk of incisional hernia recurrence and reoperation. Referral to high-volume surgeons and institutions may lead to improved patient outcomes and lower costs.

Table 1:

Incisional Hernia Recurrence – Multivariable Logistic Regression			
Surgeon/Facility Variables	**Odds Ratio**	**95% Confidence Interval**	**P-Value**
Top 25% Surgeon Volume (13+ cases/year)	0.70	(0.61, 0.81)	<0.001
Top 50% Surgeon Volume (7+ cases/year)	0.77	(0.68, 0.85)	<0.001
Top 25% Facility Volume (50+ cases/year)	0.86	(0.75, 0.98)	0.02
Ambulatory Surgery Center	0.51	(0.34, 0.76)	0.001
Patient Variables	**Odds Ratio**	**95% Confidence Interval**	**P-Value**
Reducible Hernia	1.36	(1.20, 1.55)	<0.001
White Race	1.33	(1.17, 1.50)	<0.001
Female Sex	1.25	(1.12, 1.40)	<0.001
Elixhauser Comorbidity Score	1.10	(1.03, 1.16)	0.002

*This model also controls for urban facility setting and mesh placement.

Table 2:

Incisional Hernia Reoperation – Multivariable Logistic Regression			
Surgeon/Facility Variables	**Odds Ratio**	**95% Confidence Interval**	**P-Value**
Top 25% Surgeon Volume (13+ cases/year)	0.75	(0.64, 0.88)	<0.001
Top 50% Surgeon Volume (7+ cases/year)	0.80	(0.71, 0.91)	<0.001
Top 25% Facility Volume (50+ cases/year)	0.83	(0.71, 0.97)	0.02
Ambulatory Surgery Center	0.50	(0.32, 0.78)	0.002
Patient Variables	**Odds Ratio**	**95% Confidence Interval**	**P-Value**
Mesh Placement	0.87	(0.78, 0.99)	0.03
Reducible Hernia	1.42	(1.23, 1.65)	<0.001
White Race	1.31	(1.14, 1.51)	<0.001
Female Sex	1.25	(1.10, 1.41)	<0.001
Elixhauser Comorbidity Score	1.08	(1.01, 1.15)	0.03

*This model also controls for urban facility setting.

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Nonoperative Management of Symptomatic Cholelithiasis in Pregnancy Is Associated with Frequent Antepartum and Early Postpartum Hospitalizations

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INTRODUCTION: Symptomatic gallstone disease during pregnancy is a leading cause of non-obstetric hospitalizations and operations. Although laparoscopic cholecystectomy (LC) is safe and efficacious in pregnancy (SAGES Guidelines, 2011), practice patterns are variable with nonoperative management favored by some providers. The aim of this study was to evaluate practice patterns and outcomes of pregnant patients undergoing nonoperative management for symptomatic cholelithiasis (SC).

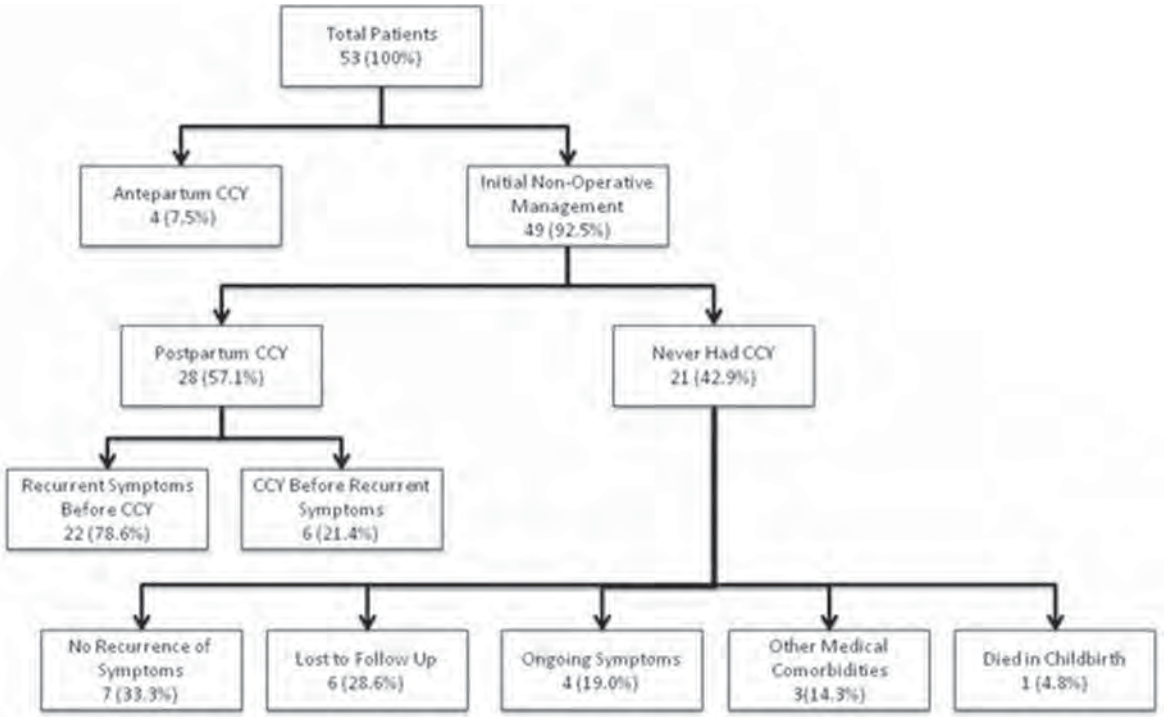
METHODS: We performed a retrospective analysis of all patients who presented to a tertiary care academic center over a 42-month period (Jan 2009–July 2012). Women (age 18 or older) with uncomplicated SC during pregnancy (without cholecystitis, pancreatitis, choledocholithiasis, or cholangitis) were included. Patients were identified by querying an electronic data repository for relevant diagnoses, imaging, and procedure codes. Patients were also contacted via a standardized telephone survey to supplement the chart review and account for outside hospitalizations and treatments.

RESULTS: A total of 53 women (mean age 32.4 y, SD 6.7) with SC were identified during the study period (Table). Mean gestational age at initial presentation was 23 weeks (9 patients in first, 22 in second, and 22 in third trimester). Four women (7.5%) underwent LC in the antepartum period, all in the second trimester (Figure). There were no maternal or fetal complications associated with LC.

Table: Overall Patient Demographics (n = 53)

Maternal age at symptom onset, years (SD)	32.4 (6.7)
Gestational age in weeks at initial presentation, mean (SD)	23 (10.5)
Maternal gravidity, median (range)	2 (1–7)
Third trimester symptom onset	22 (41.5%)
Public aid/self-pay	21 (39.6%)
Ethnicity	
Caucasian (Non-hispanic)	18 (34.0%)
Hispanic/Latino	16 (30.1%)
African-American	8 (15.1%)
Other/declined race	11 (20.8%)

Forty-nine women (92.5%) had initial non-operative management. Of these women, 18 (36.7%) were hospitalized more than once in the antepartum period (range 0–5 hospitalizations). Postpartum LC was performed in 28 women (57.1%), the majority (n = 21) within 3 months postpartum. Of women who underwent postpartum LC, 22 (78.6%) had recurrent symptoms postpartum prior to LC, and 14 (50.0%) were readmitted at least once (median 1, range 1–4) postpartum for SC prior to undergoing LC.



Flow chart depicting the clinical and surgical outcomes of 53 patients with symptomatic cholelithiasis over a 3.5 year period.

In the remaining 21 women who never underwent LC (42.9%), long-term follow-up information was available in 15 (six could not be reached for telephone survey). Seven elected to not undergo LC due to absence of postpartum symptoms. Four patients had ongoing symptoms but had not undergone LC (one due to recurrent pregnancy). A single patient died from postpartum bleeding complications. Three women had other co-morbid medical conditions, and a decision to defer surgery was made in the postpartum period in conjunction with their providers.

CONCLUSIONS: A minority of pregnant patients with SC undergo antepartum LC. In the remaining patients, many have multiple antepartum admissions for SC. Furthermore, in those who undergo LC, half do so only after postpartum admission for SC. Given the safety of antepartum LC, early surgical intervention during pregnancy may be the optimal strategy to reduce antepartum and early postpartum admissions.

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Re-Interventions After Frey Procedure for Chronic Pancreatitis: Does Radicality of Head Coring Influence Outcomes?

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BACKGROUND: There is insufficient knowledge regarding the extent of head coring in patients with chronic pancreatitis.

AIM: Analyze outcomes of Frey procedure for chronic pancreatitis in three time periods.

MATERIALS AND METHODS: Five hundred patients underwent Frey procedure during a 27-year period. They were subdivided into 3 groups (A, B and C). The characteristics are in Table 1.

Table 1: Characteristics of Groups

Parameter	Group A	Group B	Group C
Time period	1993–1997	1998–2004	2005–2010
Number of patients	105	192	203
Characteristics			
Triangular wedge of head removed	yes	yes	complete head coring
Head duct cleared upto papilla	no	yes	yes
Sentinel stone removed	no	yes	yes
inferior part of head below main duct cored	no	yes	yes
Frey only when mass was present	yes	yes	no, always

RESULTS: 70 reinterventions were needed in 53 patients (10.6%). 45 were endoscopic and 25 surgical. The details are provided in Table 2. Reinterventions occurred in 34/105 patients in group A (32%), 27/192 patients in group B (14%) and 7/203 patients in group C (3%). Pain relief rates is group A, B and C were 84, 88 and 94%.

CONCLUSION: Increasing extent of head coring is associated with fewer reinterventions and improved pain relief. The critical aspects of head coring are: 1. complete stone clearance in the head as guided by intraoperative C-arm X-ray; 2. Only posterior capsule was left behind 3. procedure extent not influenced by size of the inflammatory mass formation, even performed when there was no mass; 4. Probe must enter the ampulla into the duodenum from the cored out pancreas; 5. inferior aspect of the head below the main pancreatic duct cored out, as well.

Table 2: Reinterventions

Pathology	Type of Intervention	Group A, n = 105	Group B, n = 192	Group C, n = 203
Biliary obstruction	ERCP/stent	12	10	5
Inflammatory head mass	ERCP/pancreatic stent	3	2	1
pseudocyst head	ERCP/transpapillary drainage	6	3	0
Pseudocyst head	Endoscopic drainage	2	1	0
Biliary obstruction	Choledochoduodenostomy	1	2	0
inflammatory head mass	Pancreaticoduodenectomy with lateral drainage	3	3	0
inflammatory head mass	side-to-side drainage of jejunal Roux loop	0	1	0
Intestinal obstruction	release of adhesions	2	1	1
Internal herniation	Reduction with closure of defect	1	0	0
abscess pancreatic tail	drainage	1	1	0
inflammatory head mass	re-head coring	5	3	0

4:00 PM – 5:30 PM
S502

QUICK SHOTS SESSION I

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The Effect of MRI in the Surgical Management of Hepatic Lesions After Initial CT Evaluation

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OBJECTIVE: MRI has been shown to be more accurate than CT in the diagnoses and characterization of hepatic lesions. However, it is unclear how MRI affects surgical decision making. The objective of this study is to identify the effect of MRI on clinical management of hepatic lesions after initial CT evaluation.

METHODS: A retrospective review of a prospective liver database between 2004 and 2013 was performed and a total of 102 cases in 101 patients were identified that underwent CT followed by MRI within 30 days to characterize hepatic lesions being evaluated for surgical treatment. The findings between CT and MRI were compared to identify differences in location, size, number and characterization of hepatic lesions. Diagnoses were confirmed by operative findings/pathology and follow up on imaging. The effect of MRI on management was classified into three categories: 1) No change from CT, 2) Diagnostic clarification leading to no surgery (A: unresectable, B: no indication for surgery, C: change in non-surgical treatment), and 3) Change in extent of surgical resection (A: larger resection, B: smaller resection).

RESULTS: In the 102 cases, the major tumor histology groups were as follows: benign (9 [9%]), colorectal metastases (47 [46%]), HCC/cholangiocarcinoma (26 [25%]), neuroendocrine metastases (12 [12%]), and other (8 [8%]). Category 1 had 57 cases (56%), category 2 had 19 cases (19%), and category 3 had 26 cases (25%). Of the 19 category 2 cases, there were eight 2A, nine 2B and two 2C cases. Of the 26 category 3 cases, there were fifteen 3A cases and eleven 3B cases. The number of tumors on CT (Mean 1.6 [category 1] vs. 2.4 [categories 2 and 3], $p = 0.0034$) was significantly associated with MRI imaging leading to a change in management. The maximum tumor size on CT (Mean 4.0 [category 1] vs. 2.7 [category 2 and 3], $p = 0.0714$) suggested a trend towards MRI having an effect on surgical management. Factors such as age, gender, BMI, cirrhosis, prior chemotherapy, tumor histology, vascular invasion on CT, and tumor location on CT were not significantly associated with MRI category 2 or 3.

CONCLUSION: The use of MRI in the surgical evaluation of hepatic lesions after initial CT scan changed management in 44% of cases. Multiple lesions and smaller lesions seen on CT may derive the most benefit from application of MRI imaging.

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Prognostic Value of Hepatic Margin Status After Resection of Colorectal Liver Metastases After Preoperative Chemotherapy

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Modern chemotherapy (CTX) clearly increases survival in stage IV colorectal cancer (CRC). In (isolated) liver metastases (CRC-LM) neoadjuvant/perioperative (neo) CTX may increase rates of resectability and also improve postoperative long-term survival although clear data are lacking. Due to the widespread use of (preoperative) CTX in patients with CRC-LM recent studies assessed the prognostic role of the hepatic margin after CTX and resection, with conflicting results reported. We, therefore, evaluated the outcome after resection of CRC-LM in relation to preoperative CTX and the hepatic resection status.

METHODS: Since 2000 541 hepatic resections for CRC-LM were performed in our department. Only patients with first hepatic resections and isolated hepatic metastases (without any extraheptic disease) were included in this study (n = 332). 129 patients (39%) had neoCTX (Oxaliplation or Irinotecan-based; in 32% of those including targeted therapy). The remaining 203 patients (61%) never had CTX before hepatectomy or CTX longer than 6 months before hepatectomy (in general adjuvant CTX after primary tumor). In the entire group 52% underwent at least hemihepatectomy. The results were gained by analysis of our prospective colorectal/hepatic database.

RESULTS: Mortality after resection was 2.4% (1.6% with and 2.9% without neoCTx). Positive hepatic margins occurred in 32 of 332 resections (9.6%; in 7% after neoCTx, in 11% without neoCTx). Both, patients after neoCTX and patients with positive margins had larger ($p < 0.02/< 0.03$) and more CRC-LM ($p < 0.01/< 0.001$) than patients without neoCTx/free margins. After hepatectomy overall 5-year-survival (5ySurv; n = 324) was 47%. In the entire group survival correlated strongly with the margin status (5ySurv 49% in R-0 and 29% in R+; $p < 0.001$). Survival also correlated with margin status in the subgroups with neoCTX (5ySurv 45% in R-0 vs formally 0% in R+; last patient at risk died after 4.1 years; $p < 0.01$) or without neoCTx (51% in R-0 vs 35% in R+; $p < 0.001$). In multivariate analysis of the entire group hepatic margin status ($p < 0.001$) and size of metastases >30 mm ($p < 0.003$) were associated with poorer survival. In patients after neoCTX only the resection margin was an independent predictor of survival ($p < 0.01$).

CONCLUSION: In patients with isolated colorectal liver metastases undergoing resection the hepatic margin status was an independent prognostic factor. This strong effect was also present after neoadjuvant chemotherapy for CRC-LM.

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The Perioperative Risk of Neoadjuvant Radiotherapy Before Low-Anterior Resection for Rectal Cancer

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INTRODUCTION: Neoadjuvant radiotherapy (nRT) reduces local recurrence after rectal resection and low-pelvic anastomosis (low-anterior resection or LAR) for rectal cancers. Many surgeons believe that nRT also increases postoperative anastomotic leak, intra-abdominal abscess and sepsis. However, studies performed to date, many small and retrospective, have conflicting results. This analysis of a prospective multi-institutional cohort was performed to determine if nRT worsens postoperative infectious morbidity.

METHODS: Patients who underwent LAR for rectal cancer from 2005–2012 were extracted from the National Surgical Quality Improvement Program's prospective database. Emergent surgeries and patients with disseminated cancers were excluded. Incidence of abdominal abscess, indicative of anastomotic leak, sepsis, and other perioperative morbidity were compared between patients who received nRT within 90 days preceding surgery and those who did not.

RESULTS: 1491 (26%) of 5719 patients received nRT. The nRT group was slightly younger (59 v. 62 yrs, $p < 0.0001$) and less likely to have hypertension (41% v. 51%, $p < 0.001$). In the nRT group, operative times were longer (209 v. 182 minutes, $p < 0.001$); fecal diversion was more common (66% v. 28%, $p < 0.001$), and laparoscopy was used less (22% v. 36%, $p < 0.001$). Abdominal abscess, a proxy for anastomotic leak, was more common in the nRT cohort (7.6% v. 5.1%, $p < 0.001$). On multivariate regression analysis, age, sex, steroid use, diabetes, and nRT were independent predictors of abdominal abscess. After controlling for these variables, as well as fecal diversion and laparoscopic surgery, nRT remained associated with increased odds of abdominal abscess (OR 1.43, 95% CI 1.1–1.9, $p = 0.004$). However, nRT was not associated with increased odds of septic shock, overall morbidity, major morbidity or death.

CONCLUSION: This is the largest study of outcomes after rectal resection with low-pelvic anastomosis (LAR) for rectal cancer. In this prospective, multi-institutional cohort, patients who received neoadjuvant radiation had a small, but real, increase in the rate of abdominal abscesses. Though nRT was an independent predictor of post-operative intra-abdominal abscess, it was not associated with septic shock or death. In patients who have undergone neoadjuvant radiation, surgeons should consider operative techniques which may help to diagnose (intraoperative leak testing) or mitigate (fecal diversion) anastomotic complications.

Table: Population and Outcomes After LAR for Rectal Cancer

	LAR	LAR + nRT	
	n = 4228 (74%)	n = 1491 (26%)	p-value
Age, median	63	59	< 0.0001
Male	2408 (57)	921 (62)	0.02
Body Mass Index	27.3	27.1	0.4
Smoking	676 (16)	297 (20)	0.001
Steroid Use	54 (1.3)	16 (1.1)	0.01
Co-morbidities			
Chemotherapy	64 (2)	446 (30)	< 0.001
Hypertension	2145 (51)	615 (41)	< 0.001
Diabetes	706 (17)	224 (15)	0.15
Weight Loss > 10%	169 (4)	117 (8)	< 0.001
ASA Class ≥3	2011 (48)	660 (44)	0.03
Outcomes			
Any Morbidity	914 (21.6)	362 (24.3)	0.1
Abdominal Abscess	216 (5.1)	114 (7.6)	0.001
Sepsis	175 (4.1)	76 (5.1)	0.3
Shock	78 (1.8)	28 (1.9)	0.03

LAR, Low-Anterior Resection; nRT, neoadjuvant radiotherapy; ASA, American Society of Anesthesiology

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Single Institution Experience with Neoadjuvant Treatment of Borderline Resectable Pancreatic Adenocarcinoma: Achieving R0 Resection with Modern Chemotherapy

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INTRODUCTION: Patients with borderline resectable pancreatic cancer (BRPC) are at high risk for early metastasis and margin-positive resection. In this group, neoadjuvant treatment strategies have been adopted to improve patient selection for surgery and increase R0 resection rates. Herein, we report our experience with neoadjuvant chemotherapy (NCT), primarily FOLFIRINOX/FOLFOX followed by 5FU/XRT, for patients with BRPC requiring pancreaticoduodenectomy.

METHODS: Data was collected retrospectively on patients with adenocarcinoma of the head of the pancreas from 1/1/2008 to 9/31/2013. Demographics, intraoperative blood loss, ICU stay, total hospital stay, post-operative complications, and rates of R0 resection were examined. Outcomes were compared between NCT and immediate surgery (IS) groups. AHPBA/SSO/SSAT consensus conference definition of "borderline resectable" was used.

RESULTS: 220 patients with PA were analyzed. Of the 220, 30 patients were classified as BRPC and underwent NCT. There was a trend toward increasing use of NCT in more recent years with 3 patients in 2008, and 8 in 2013. In comparison to the IS group, baseline demographics were similar in regards to age (IS 64.89 vs BRPC 65.17 [p = 0.89]) and sex (IS: Male 103/192 [53%] vs BRPC: Male 12/30 [40%], p = 0.164). There was no difference between the groups in pre-op albumin (IS 3.43 vs BRPC 3.32 [p = 0.46]), suggesting similar pre-operative nutritional status despite NCT. Intraoperative blood loss was significantly different between the two groups, with BRPC (mean = 1441 cc) losing more blood than their IS counterparts (mean = 686 cc). There were no significant differences in measured post-operative complication rates including wound infection (IS 20/190, 10.53% vs BRPC 4/30, 13.33%), anastomotic leak rate (IS 19/190, 10% vs BRPC 1/30, 3.33%), intra-abdominal abscess formation (IS 11/190, 5.79% vs BRPC 2/30, 6.67%), or fistula formation (IS 5/190, 2.63% vs BRPC 2/30, 6.67%). Hospital length of stay (LOS) (IS 13.2 days vs BRPC 16.5 days, p = 0.064) and ICU days (IS 1.9 days vs BRPC 1.3 days) were similar between the groups. Perhaps most importantly, the rate of R0 resection did not differ between the groups (C 167/192, 86.9% vs BRPC 27/30, 90%), suggesting that a true oncologic resection is both possible and expected.

CONCLUSIONS: In BRPC patients who undergo NCT with modern chemotherapies, R0 resection, hospital and ICU stay, and postoperative complications did not differ from there IS counterparts despite later presentation and/or more aggressive tumor biology. The increase in intraoperative blood loss in the BRPC group likely reflects the increased complexity of the vascular resections necessary to remove these tumors with negative margins. The current rate of R0 resection, and noted radiographic responses, indicate superior efficacy of newer regimens in the neoadjuvant setting.

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The Incidence of Pancreatogenic Diabetes After Major Partial Pancreatic Resection May Be Greater Than You Think

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BACKGROUND: The number of pancreatic resections performed each year in the United States according to the Nationwide Inpatient Sample is growing (currently around 5,000). Nearly half of the patients undergoing resection (many with benign disease) will experience prolonged survival (>2 years), yet the long-term risk of pancreatogenic (type III) diabetes remains unknown. Previous estimates from small studies outside of the U.S. suggest a risk between 10–20%.

METHODS: After IRB approval, 1107 patients were identified who underwent pancreatectomy at a single institution from 2005 to 2012. Living patients were contacted by telephone, and pre- and postoperative diagnoses of diabetes mellitus (DM) were confirmed using a verbal questionnaire. Only individuals who completed the survey were included in the study.

RESULTS: Calls were made to all 691 living patients who underwent partial pancreatectomy. DM-specific information was successfully obtained for 257 patients (23% of the total cohort), including 179 pancreaticoduodenectomies (PD) and 78 distal pancreatectomies (DP).

In the PD group: 44 (25%) patients reported having DM prior to resection (median onset 7 years prior, range 0.1 to 30), with 10 (6%) reporting onset within 1 year of resection. Of the group carrying a pre-operative diagnosis of DM, 3 (7%) had improved glucose control after resection (dose reduction in DM medicines), while 21 (48%) required escalated doses/medicines. Of 135 patients without preoperative DM, 24 (18%) were newly diagnosed with DM postoperatively (median onset 7.5 months postoperatively, range 1–64).

In the DP group: 23 patients (29%) had DM preoperatively, with just 4 having onset within 1 year of resection (5%). No patients had improved glucose control after resection, while 6 (26%) patients carrying a preoperative diagnosis of DM had worse control after resection. Out of 55 patients without preoperative DM, 17 (31%) developed new onset DM after resection (median 6 months, range 0–60).

In the total cohort of patients who developed DM after resection (n = 41), the most common pathologic diagnoses at the time of resection were ductal adenocarcinoma (36%), IPMN adenoma (28%), and chronic pancreatitis (8%). Out of 190 patients without a diagnosis of preoperative DM, a high preoperative HgbA1C level (>6%) was associated with an increased risk of developing new-onset DM post-resection (38% of patients in the >6% group vs. 11% in the ≤6% group, p < 0.02).

Table: Incidence of Perioperative DM with Partial Pancreatectomy

	PD	DP	Total
Non-diabetics: New onset DM postop	24/135 (18%)	17/55 (31%)	41/190 (22%)
Diabetics: Worse glucose control postop	21/44 (48%)	6/23 (26%)	27/67 (40%)
Total cohorts: New onset or worse control	45/179 (25%)	23/78 (29%)	68/257 (26%)

DM = diabetes mellitus, PD = pancreaticoduodenectomy, DP = distal pancreatectomy

CONCLUSIONS: Twenty-six percent of patients undergoing partial pancreatectomy experience new onset DM (22%) and/or worsening DM after resection (40%), a higher percentage of patients than previously reported. With a median follow-up time of 2.1 years after resection in this patient cohort, these figures may still underestimate the incidence of pancreatogenic diabetes. A high preoperative HgbA1C >6% identifies patients at highest risk.

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Timing of Surgical Intervention After Percutaneous Catheter Drainage (PCD) in Step Up Approach of Severe Acute Pancreatitis

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AIMS AND OBJECTIVES: To determine appropriate timing of surgical intervention after PCD in infected pancreatic necrosis (IPN), as a part of step up approach and to see change in morbidity and mortality after changing the interval of surgery after PCD.

MATERIALS AND METHODS: Randomized controlled trial was tried to find out the optimal timings of surgery following PCD in a patients with IPN who are not improving significantly within one week of PCD. The trail has to be stopped prematurely because of difficulty in recruitment of patients and apparent increase in the mortality in patients undergoing surgery early following PCD compared to patients who were managed with continued treatment of PCD. Following this rest 32 patients were managed by extended treatment with PCD in prospective manner and weekly inflammatory and nutritional markers were monitored in these patients. Surgery was performed in these patients when required. Out of 40 patients managed prospectively, 36 patients who underwent continued treatment with PCD were analyzed.

RESULTS: Duration between first PCD and surgery ranged from 10–58 days with a mean of 41 ± 16.15 days and median of 43 days. The efficacy of Extended treatment PCD alone in achieving complete recovery in patients with infected pancreatic necrosis was 68.5%.Overall mortality in the present study was 15.1%.Disease specific morality in PCD alone group was 5.5%. Disease specific mortality in surgery group was 42.8%. ICU stay and number of Extrapancreatic necrosis in posterior pararenal space were predicting need of surgery on univariate and multivariate analysis. Need of mechanical ventilation and organ failure at admission had high odd's ratio when factors affecting mortality were compared in patients managed by PCD alone and patients managed by surgery after PCD. Serial estimation of inflammatory and nutritional markers does not help in predicting the timing of surgery.

CONCLUSION: Early surgery following PCD results in high mortality in our randomized controlled study. Timing of surgery cannot be fixed and needs to be tailored depending on patient's response to extended treatment of PCD.

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Preoperative 18-FDG PET Predicts Survival in Resectable Pancreatic Cancer

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CONTEXT: The identification of prognostic factors useful in selecting patients with pancreatic cancer who will benefit from surgery or other treatments, is still debating. Preliminary reports showed that 18-Fluorodeoxyglucose Positron Emission Tomography (18-FDG PET) was predictive of prognosis in patients resected on for pancreatic adenocarcinoma (Sperti et al., *J.Gastrointest Surg*., 2003).

OBJECTIVE: The aim of this study is to evaluate the role of 18 FDG PET as a prognostic factor for patients who underwent resection for pancreatic cancer.

METHODS: From January 2004 to July 2011, a total of 110 patients who underwent resection for pancreatic cancer, were examined with 18-FDG PET (with-CT acquisition) in their preoperative work-up. The standardized uptake value (SUV) of 18 FDG was calculated and the patients were divided into high (>4.0) and low (≤4.0) SUV groups. They were also evaluated according to the tumor node status, stage (TNM), tumor grade, radicality of resection, and serum CA 19-9 levels.

RESULTS: Fifty-four cancers showed low and 56 high SUVs. Disease free survival (DFS) was significantly influenced by tumor stage ($p = 0.003$), node status ($p = 0.003$), radicality of resection ($p = 0.004$), SUV ($p = 0.0001$), CA 19-9 ($p = 0.001$) and grading ($p = 0.04$). Multivariate analysis showed that only stage ($p = 0.02$) and CA 19-9 ($p = 0.008$) were independent predictors of DFS. Overall survival was significantly influenced by node status ($p = 0.001$), radicality of resection ($p = 0.001$), stage ($p = 0.0001$), SUV ($p = 0.001$), CA 19-9 ($p = 0.0001$) and grading ($p = 0.008$). Multivariate analysis showed that stage ($p = 0.004$), CA 19-9 ($p = 0.001$), SUV ($p = 0.004$) and radicality ($p = 0.02$) were independent predictors of survival. When patients analyzed for SUV were stratified according to stage, FDG uptake was related to DFS ($p = 0.01$) and overall survival ($p = 0.001$) in tumor's stage I–II. Stratification for CA 19-9 levels, showed that SUV was related to DFS ($P = 0.01$) and overall survival ($p = 0.002$) in patients with high tumor marker levels. In these patients, multivariate analysis confirmed that SUV was independent predictor of survival.

CONCLUSION: This study confirm that tumor stage and CA 19-9 serum levels are the strongest independent factors influencing disease-free and overall survival after resection for pancreatic cancer. SUV, calculated with 18 FDG PET, is an independent predictor of overall survival, and an important prognostic parameter in stage I–II pancreatic carcinoma and may be useful in selecting patients for neoadjuvant therapy.

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Robotic Low Anterior Resection for Rectal Cancer and Short-Term Oncologic Outcomes

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BACKGROUND: Laparoscopic low anterior resection (LLAR) is considered an acceptable approach to rectal cancer. Due to limited oncologic and patient outcomes data, however, robotic low anterior resection (RLAR) remains more experimental. This study compared 30-day outcomes and pathologic surrogates of oncologic results between rectal cancer patients undergoing either RLAR or LLAR.

METHODS: All rectal cancer patients in the National Cancer Database (NCDB) undergoing RLAR or LLAR from 2010–2011 were stratified by operative approach. The NCDB collects data from more than 1,500 cancer centers across the United States and Puerto Rico, and is estimated to capture approximately 70 percent of all newly diagnosed cases of colorectal cancer. Predictors of RLAR were modeled with multivariable logistic regression. Groups were matched on propensity to undergo RLAR using a 2:1 nearest-neighbor matching algorithm. Primary oncologic endpoints included lymph node (LN) retrieval and margin status, while secondary 30-day outcomes were mortality, hospital length of stay, and unplanned readmission rates. Group characteristics were compared pre- and post-matching using Pearson's chi-square and one-way ANOVA.

RESULTS: 6,403 patients met inclusion criteria, of which 956 (14.9%) underwent RLAR. Baseline characteristics between groups were highly similar, except that RLAR patients were more likely to be treated at academic centers, to receive neoadjuvant therapy, had higher T-stage, and longer time from diagnosis to surgery (all p values <.001). Neoadjuvant therapy and treatment at an academic/research center remained the only significant predictor of robotic use following multivariable adjustment. Following propensity adjustment, RLAR was associated with reduced risk of conversion to open (9.5 vs. 16.4%, p < .001). There were no significant differences in LN retrieval, margin status, 30-day mortality, unplanned readmission, or hospital length of stay (Table).

Table. Propensity-adjusted outcomes following LAR, robotic versus laparoscopic approach

Variable	Laparoscopic LAR (n = 1,912)	Robotic LAR (n = 956)	P-value
Conversion to open	314 (16.4%)	91 (9.5%)	< 0.001
Nodes removed (IQR)	15 (11, 21)	15 (11, 20)	0.255
Positive margins	107 (6.6%)	60 (7.3%)	0.553
Surgical margins			0.634
Negative	1,829 (96.3%)	922 (96.8%)	
Positive margin -microscopic	42 (2.2%)	16 (1.7%)	
Positive margin -macroscopic	29 (1.5%)	14 (1.5%)	
Circumferential margin within 1mm	76 (4.7%)	45 (5.5%)	0.437
Short-term outcomes			
30-day mortality	15 (0.8%)	6 (0.6%)	0.815
30-day readmission	120 (6.3%)	68 (7.1%)	0.454
Hospital LOS (IQR)	5 (4, 7)	5 (4, 7)	0.785

CONCLUSIONS: In the largest series to date using a nationwide clinical database, we demonstrated equivalent perioperative safety and patient outcomes for robotic compared to laparoscopic LAR in the setting of rectal cancer. While the robotic approach required significantly fewer conversions to open, surrogates for proper oncologic surgery were nearly identical between the two approaches, suggesting that a robotic approach to colorectal cancer may be a suitable alternative. Further studies comparing long-term cancer recurrence and survival should be performed.

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Unconjugated But Not Conjugated Bile Acid Reduces Squamous Differentiation in Esophageal Cells Possibly Through Intracellular Mechanisms

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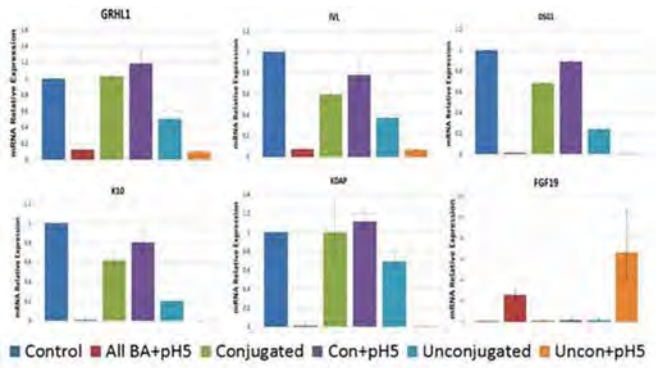
BACKGROUND: Barrett's Esophagus (BE) is a precancerous lesion in which the normal squamous epithelium of the esophagus undergoes columnar metaplasia as a result of protracted duodeno-esophageal reflux. Bile acid (BA) both conjugated and unconjugated at an acidic pH, forms the chief component of reflux and has the ability to affect cellular processes by virtue of its anionic detergent action or acting as a signaling molecule. Previously, our group had shown that the esophageal squamous epithelium loses the expression of genes involved in squamous differentiation following exposure to a cocktail containing conjugated and unconjugated BA at pH5. In this study, we aimed determining which BA component, whether conjugated or unconjugated, predominantly contributed to the down-regulation of squamous differentiation.

METHODS: Human telomerase-immortalized primary esophageal squamous cells (EPC1) were grown on polyester transwells and treated separately with conjugated or unconjugated BA at both pH7.4 and pH5, in 15 min pulses three times a day for six days. Trans-epithelial Electrical Resistance (TEER) was measured daily, and at the end of the treatment cells were harvested for mRNA and protein.

RESULTS: Unconjugated BA at pH5 reduced the expression of genes involved in squamous differentiation as well as the TEER in the EPC1 in transwells culture, whereas conjugated BA did not have any significant effect. Moreover, unconjugated BA at pH5 induced the expression of FGF-19, a transcription target of BA nuclear receptor FXR.



In Figure, unconjugated cocktail at pH5 drastically down-regulates the expression of squamous genes GHRL1, IVL, DSG1, K10 and KDAP. Unconjugated cocktail at pH7.4 also down-regulates the squamous genes but to a lesser extent. Unconjugated cocktail at pH5 also induces nuclear bile acid receptor target FGF19.

CONCLUSIONS: Unconjugated BA at pH5 is unionized and can penetrate through cell membrane to enter EPC1 cells. On the other hand, EPC1 cell membrane is impermeable to conjugated BA due to the absence of apical BA transporters. Since the anionic detergent properties of BA increases with conjugation and ionization, these results implicate a possible intracellular signaling mechanism of action of BA to reduce the squamous differentiation in primary esophageal cells, as opposed to detergent action. Long term gastric acid suppression therapy might be putting patients at risk to BA induced altered cellular differentiation, as the therapy is known to increase bacterial deconjugation of BA.

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A Normal 24-Hour Catheter Study in a Patient with Symptomatic GERD: Pursue the Diagnosis with a Wireless 48-Hour Capsule

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BACKGROUND: Normal 24 hour ambulatory pH study is often treated by clinicians as being able to rule out GERD. Daily variations in esophageal acid exposure are well recognized but thought to be clinically insignificant. We studied the value of following a normal 24-hour ambulatory pH study with a wireless based 48-hour study in patients with a clinical suspicion of GERD.

METHODS: Patients with a normal 24-hr based pH study (total time pH <4 of 4.4% or less) presenting for the evaluation of GERD between 04/2009 to 11/2013 were analyzed. All patients with a negative 24-hour pH test with a clinical suspicion of GERD underwent further testing with a 48-hour wireless study. Testing was performed off acid suppression in the same esophageal testing laboratory. Patients were divided into two groups: "+ve Capsule Group" and "–ve Capsule Group" (based on abnormal or normal esophageal acid exposure on the capsule based study). All p-values <0.05 were considered significant.

RESULTS: 108 patients with a clinical suspicion of GERD and a normal 24-hour pH study underwent further 48-hour testing via wireless capsule. Fifty patients (46%) had a positive wireless capsule test (total esophageal acid exposure of >4.4% on either day or 48 hr total). Eleven additional patients had either isolated abnormal upright or supine acid exposure on one of the two days (upright >6.1%; supine >2%). Hence a total of 61 patients (56.4%) had an abnormal acid exposure on prolonged testing. 24 hr impedance/pH acid exposure in the +ve Capsule Group was significantly higher than the –ve Capsule Group: total acid (1.41% vs 0.79%; p = 0.001), upright acid (2.1% vs 1.2%; p = 0.002), and recumbent acid (0.38% vs 0.14% p = 0.037).

Of the 61 patients with a positive capsule test, 21 patients (34%) underwent antireflux surgery: 11 laparoscopic partial fundoplications, 6 complete fundoplications, 3 transoral incisionless fundoplications and 1 LINX anti-reflux system. Eleven patients had typical GERD symptoms; the other 10 patients had primarily extraesophageal symptoms. Followup was available in 17 patients at a mean of 17 + 13 months. All patients reported a significant improvement in their GERD HRQOLs postoperatively (15 + 10 vs 3 + 5; p = 0.0001).

CONCLUSION: This study reflects the clinically significant day to day variability in esophageal acid exposure in patients with GERD, and raises question about the negative predictive value of 24-hr catheter based reflux testing. Patients with normal esophageal acid exposure on a 24-hour catheter study have a 56% probability of demonstrating abnormal esophageal acid exposure on a 48-hour wireless capsule study. Patients offered surgery based on further testing have significant improvements in their GERD symptomatology.

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Mucosal Perforation During Laparoscopic Heller Myotomy Doesn't Influence the Final Outcome of the Treatment

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BACKGROUND: Laparoscopic Heller-Dor (LHD) is the currently accepted treatment for esophageal achalasia. The most common intraoperative complication (2–33%) is inadvertent mucosal perforation. There are no studies to determine whether the mucosal perforation affects the final outcome of LHD. The aim was to evaluate the final outcome in patients with accidental perforation detected during the operation or by the routine post-operative contrast swallow.

MATERIALS AND METHODS: 713 patients underwent LHD from 1992 to 2012 by 6 staff surgeons alternatively. Mucosal perforation was detected in 22 patients (Group A). The patients who underwent the operation uneventfully were defined Group NP. Furthermore, two different patient groups were considered: Group B patients operated by the same surgeon immediately before and Group C immediately after a perforation occurred. Patients were evaluated preoperatively by a detailed symptom questionnaire, manometry, endoscopy and barium swallow. Treatment failure was defined as a postoperative symptom score >10th percentile of the preoperative score (i.e. >8). Patients with a previous myotomy were excluded.

RESULTS: LHD was the primary treatment for 567 patients; 146 (20.5%) had a previous endoscopic treatment. There were 22 perforations (3.1%): 19 (86.5%) were recognized and repaired during the operation, 2 (9%) were detected by contrast swallow in the 1st POD and 1 (4.5%) was recognized in 3rd POD. The median follow-up was 35 months (IQR: 15–79).

Perforation was not related to the symptoms score or duration, age, radiological-grade, manometric pattern or surgeon's experience. The LES residual pressure was the only variable associated to perforation risk (Group NP: 10 mmHg vs Group A: 18 mmHg, p = 0.03). A previous endoscopic treatment did not increase the perforation rate (3/146 vs 19/567, 2% vs 3.3%, p = 0.59). The post-operative findings are shown in the table.

Table: The Post-Operative Findings

	NP 691 pts	Group A 22 pts	p-value
Hospital stay (days)	5 (4–6)	10 (10–15)	<0.01
Symptoms score	0 (0–3)	3 (0–3)	0.33
LES resting pressure	11 (8–15)	14.5 (8–20)	0.15
LES residual pressure	3 (1.5–6)	4.3 (1–11.1)	0.24
Failures	12.2%	18.2%	0.34
Time of failures (months)	12 (6–28)	11.5 (11–12)	0.79

Symptoms recurred in 4 patients of group A (18,2%), 2 patients of group B (10%) and 3 patients of group C (15%) (p = 0.99). The post-operative median symptom score was similar in all the 3 groups. The was no difference in the median procedure time between group B (148 min) and group C (138 min, p = 0.38).

CONCLUSIONS: accidental perforation during LHD is infrequent and cannot be predicted by preoperative therapy or by the surgeon's personal experience. The only predictive factor of perforation risk is a high LES resting pressure. In spite of longer operation and hospital stay, the outcome of surgical treatment is similar to those undergoing uneventful myotomy. A recent mucosal lesion does not influence the surgeon's subsequent performance.

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Comparison of Hospital Charges Between Laparoscopic Heller Myotomy and POEM

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INTRODUCTION: Peroral esophageal myotomy (POEM) is a novel surgical operation for the treatment of achalasia. In this study, we compared inpatient hospital charges between POEM and laparoscopic Heller myotomy (LHM).

METHODS: All POEM procedures performed at a single institution until the time of analysis were studied. All LHMs performed during the same time period served as a comparison group. During the study period, patients with achalasia were informed of their treatment options (pneumatic dilation, LHM, and POEM) and chose a procedure in consultation with their physicians. Total charges for each procedure and subsequent hospitalization were derived from the hospital's billing database. Charges within the following sub-categories were additionally compared: 1) Primary procedure, 2) instrumentation, 3) anesthesia, 4) non-OR medications, 5) laboratory testing, 6) radiologic studies, and 7) other diagnostic testing.

RESULTS: The initial 29 POEM procedures performed at the institution were analyzed, and 23 patients underwent LHM during the same time period. POEM patients were younger (mean 43 ± 15 vs. 54 ± 16 years, p = .01) and fewer POEM patients had received prior endoscopic therapy for achalasia (10% vs. 57%, p < .001). The procedure groups were otherwise similar in terms of gender distribution, BMI, ASA classification, duration of symptoms, manometric relaxation pressure, and achalasia sub-type. POEM cases had shorter operative times (mean 115 ± 39 vs. 148 ± 27 minutes, p = .001). Median length of stay was 1 day for both procedures (range POEM: 1–13 and LHM: 1–2 days, p = ns). One (3%) major complication (Grade IIIb) occurred as a result of POEM and none occurred for LHM (p = ns). Two (7%) minor complications (all Grade I) occurred for POEM and 4 (17%) minor complications (all Grade I) occurred after LHM (p = ns). Total charges were similar between procedure groups (POEM: $34,395 ± 18,962 vs. LHM: $33,738 ± 7,737, p = ns). POEM had lower OR instrumentation charges (mean $591 ± 324 vs. $2,626 ± 517, p < .001). All POEM patients underwent a per-protocol contrast esophagram on postoperative day one to rule out leak, whereas only 3 (13%) LHM patients had a similar study (p < .001). Resulting charges for radiologic studies were higher for POEM patients (mean $902 ± 507 vs. $83 ± 222, p < .001). Charges with the subcategories of primary procedure, anesthesia, non-OR medications, laboratory testing, and other diagnostic studies were similar between POEM and LHM. If the POEM patient with the major complication was removed from the analysis, mean total charges for POEM and LHM remained similar (POEM: $31,091 ± 6,669 vs. LHM: $33,738 ± 7,737, p = ns).

CONCLUSIONS: In this single-institution series, POEM and LHM resulted in similar total hospital charges. POEM incurred lower OR instrumentation charges, but higher radiology charges when a routine postoperative esophagram was performed.

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Toward Complete Identification of Patients with GERD: 96-Hour Wireless pH Monitoring Increases Reflux Detection Rate

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INTRODUCTION: Accurate and complete identification of patients with symptoms secondary to gastroesophageal reflux disease has been a clinical challenge. This has led to the classification, perhaps erroneously, of some patients as "functional heartburn." 48-hour wireless pH monitoring has been shown to increase the diagnostic yield of reflux detection. We hypothesize that 96-hour monitoring would further increase reflux detection rate.

METHODS: The study population consisted of 31 patients who underwent 96-hour wireless pH monitoring between February 2012 and October 2013.Patients with incomplete studies due to capsule dislodgement or failed signal transmission, achalasia, previous antireflux or gastric bypass surgery were excluded. Patient demographics, presenting symptoms, manometric and pH monitoring parameters were collected and compared. Patients were divided into pH negative, single day positive or multiple day positive groups for comparison. All studies were done off PPI medications for at least 7 days. A positive study was defined by DeMeester score >14.72 on any day.

RESULTS: Eighteen (58%) of the 31 patients were negative on all 4 days, 7 (23%) were positive on a single day and 6 (19%) were positive on multiple days. Thirteen percent of the patients (4/31) were only positive on day 3 or day 4 and would have been considered normal on a 48 hour study. Lower esophageal sphincter (LES) parameters correlated with the number of pH positive days including LES overall length ($\sigma = -0.43$, p = 0.02), IBP ($\sigma = -0.41$, p = 0.02) and IRP ($\sigma = -0.54$, p = 0.003). Mean axial separation between the LES and CD, 0.16 cm in pH negative, 0.66 cm in patients with one day positive and 0.26 in patients with multiple days positive (p = 0.1506).

CONCLUSIONS: 96 hour wireless pH monitoring identified pathologic esophageal acid exposure in 13% of patients who would have been considered normal on 48 hour study. These patients are more likely to have less profound alteration in characteristics of the gastroesopahgeal barrier including LES length and axial crural diaphragm separation. Prolonged 96-hour pH monitoring may be necessary before classifying patients as GERD negative or functional heartburn.

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Development of a Prognostic Nomogram for the Need for Surgery After Endoscopic Balloon Dilatation of Ileocolic Anastomotic Stricture for Crohn's Disease

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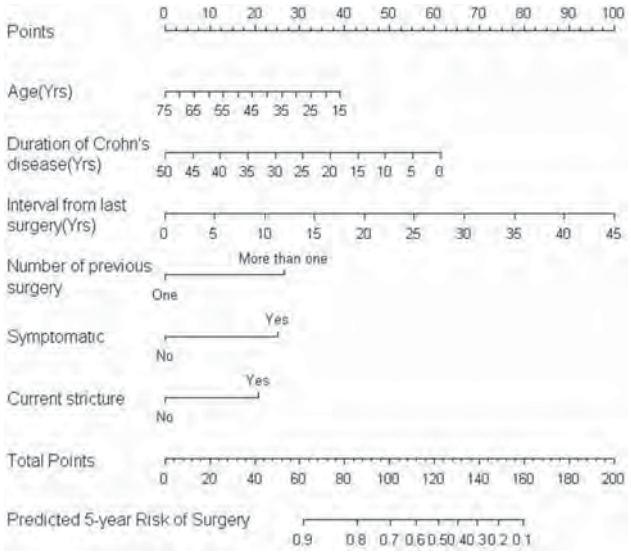
BACKGROUND: Endoscopic balloon dilatation has been increasingly used for the non-operative management of anastomotic strictures in patients with previous ileocolic resection for Crohn's disease. The aim of this study was to develop a nomogram to predict the need for surgery after initial endoscopic dilatation.

PATIENTS AND METHODS: Patients undergoing endoscopic dilatation of ileocolic anastomotic stricture between December 1998 and May 2013 were identified. Primary endpoint was need for bowel resection due to stricture, development of fistulizing disease, or perforation from endoscopic dilation. Cox proportional hazard regression model was used to assess factors significantly associated with the need for surgery within 5 years after initial dilation.

RESULTS: One hundred and eighty-four patients underwent a total of 454 endoscopic dilatations of ileocolic anastomosis (46.2% females, mean age 43, symptomatic stricture in 80%). Sixty-one patients (31.9%) eventually required surgery after a median follow up of 1.6 (0–13.3) years. Surgery was indicated for endoscopic perforation (n = 5), technical failure (n = 2), intractable stricture (n = 42), development of intestinal fistula or abscess (n = 8), and miscellaneous (n = 4). The 5-year risk of surgery was 53.3% (95% confidence interval, 0.4–0.6). A nomogram was developed using age, duration of Crohn's disease, interval from last surgery, multiple previous resections, symptomatic stricture, and the presence of concurrent stricture. The predictions from the nomogram appeared to be accurate and discriminating with a concordance index of 0.65.

Table: Cox Regression Model of Need for Surgery

Variable	Hazard Ratio (95% Confidence Interval)	P-Value
Age	0.97 (0.8–1.02)	0.07
Duration of Crohn's disease	0.96 (0.93–1.03)	0.07
Interval from last surgery	1.07 (1.03–1.12)	0.001
Multiple previous surgery	2.23 (1.27–3.94)	0.005
Symptomatic stricture	2.20 (0.97–4.97)	0.06
Concurrent stricture	2.0 (1.04–3.88)	0.04



CONCLUSION: The proposed nomogram is effective in predicting the 5-year probability of need for surgery to treat ileocolic strictures. It can be used to select patients for continued endoscopic dilatations vs. patients who should have surgery.

Monday, May 5, 2014

7:30 AM – 9:30 AM
S504BCD

VIDEO SESSION II: BREAKFAST AT THE MOVIES

526

Robotic-Assisted Partial Right Hepatectomy with Use of a Transthoracic Port

Shirin Sabbaghian[*1,2], David Bartlett[2], Allan Tsung[2]
[1]*Surgery, Lexington Medical Center, W. Columbia, SC;*
[2]*Surgery, University of Pittsburgh, Pittsburgh, PA*

INTRODUCTION: Robotic technology can be helpful with robotic resection of posterior liver lesions. Access to the posterior right liver can be challenging. A transthoracic port can be used to overcome this challenge.

METHODS: Robotic technology was used to resect a lesion in Segment VII of the liver. A transthoracic port was used without difficulty. The patient experienced a smooth postoperative course, and the patient did not have a pneumothorax postoperatively. Surgical margins were negative for tumor.

CONCLUSIONS: A transthoracic port can be used to help with robotic resection of posterior liver lesions.

527

Robotic Pancreaticoduodenectomy with Cholecystectomy

Sharona B. Ross[*], T.Y.A. Bowman, Alexander S. Rosemurgy
General Surgery, Florida Hospital Tampa, Tampa, FL

This video demonstrates a robotic pylorus-sparing pancreaticoduodenectomy. Laparoscopic technique is used to accomplish extended Kocher maneuver. After robot docking, sharp dssection, clips, linear staplers, and bipolar cautery were used to dissect the duodenum and head of pancreas from surrounding tissue. The pancreatic neck was divided, and the mesentery of the pancreas and duodenum were dissected free of the portal vein and superior mesenteric artery with subsequent specimen extraction. Pneumoperitoneum was reestablished and the reconstruction was undertaken: 2-layer pancreaticojejunostomy, 1-layer hepaticojejunostomy, and 2-layer duodenojejunostomy are demonstrated.

528

Hybrid Push-Pull Endoscopic and Laparoscopic Full-Thickness Resection for the Minimally Invasive Management of Gastric Gastrointestinal Stromal Tumors (GIST)

Paul T. Reynolds[*1], Melinda M. Lewis[2], Andrew S. Ross[3], Shishir K. Maithel[4], Flavio G. Rocha[5], Field F. Willingham[1]
[1]*Medicine, Division of Digestive Diseases, Emory University, Atlanta, GA;* [2]*Pathology, Division of Cytology, Emory University, Atlanta, GA;* [3]*Medicine, Section of Gastroenterology, Virginia Mason Medical Center, Seattle, WA;* [4]*Surgery, Division of Surgical Oncology, Emory University, Atlanta, GA;* [5]*Surgery, Section of General, Thoracic, and Vascular Surgery, Virginia Mason Medical Center, Seattle, WA*

Gastrointestinal stromal tumors (GISTs) arising in the stomach that are highly endophytic or in anatomically complex locations pose a challenge to standard laparoscopic wedge resection and may require complex procedures resulting in extensive gastric tissue removal. Endoscopic resection alone may leave behind tumor for GISTs arising in the muscularis propria or deeper. A push-pull modification of the hybrid endoscopic-laparoscopic approach (mean operative time 162 minutes) is shown here in a four patient case series to be a safe, effective alternative to standard methods for selected GISTs in order to minimize gastric tissue removal while still allowing for a full-thickness, R0 resection.

529

Laparoscopic Repair of Iatrogenic Diaphragmatic Hernia After Laparoscopic Splenectomy

Albert Huang[*], Brian J. Dunkin, Victor T. Wilcox
Surgery, Houston Methodist Hospital, Houston, TX

This video illustrates a case of a 35-year-old woman who underwent a renal transplant and a laparoscopic splenectomy for thrombocytopenia in 2011. She recovered well, but began to develop symptoms of dysphagia and reflux that increased.

She was seen in 2013 and underwent imaging, which suggested a Type II paraesophageal hernia. Upon entering the abdomen, the defect was discovered to be separate from the hiatus and indicated a completely different site and etiology for the hernia.

A primary repair of the defect was performed. A mesh overlay was added due to the patient's immunosuppressed status. This is the first reported case of an iatrogenic diaphragmatic injury after laparoscopic splenectomy.

530

Robotic Heller Myotomy and Dor Fundoplication with Real-Time Functional Lumen Imaging Probe

Hassanain Jassim*, Jon Gould
Minimally Invasive General Surgery, Medical College of Wisconsin, Milwaukee, WI

Achalasia is a well-known, but rare esophageal motility disorder caused by aperistalsis of the esophageal body and a failure of relaxation of the lower esophageal sphincter.

We present a case of a 68-year-old female who underwent a robotic Heller Myotomy with Dor Fundoplication. In addition, real-time esophageal distensibility was recorded using a functional lumen imaging probe at three time points: pre-myotomy, post-myotomy, and post-fundoplication.

The video demonstrates key points in the operation, as well as real-time images from the imaging probe and intraoperative endoscopy. Lastly, data from our small series of three patients is graphically illustrated.

531

Laparoscopic Duodenojejunostomy for Superior Mesenteric Artery Syndrome

Hugh G. Auchincloss*, Peter J. Fagenholz, Ozanan Meireles
Surgery, Massachusetts General Hospital, Boston, MA

A 21-year-old man presented with abdominal pain, vomiting and jaundice occurring 4 months after a motor vehicle accident that had left him a C6 paraplegic. In the interim he had lost 40 lbs and now had a BMI of 19. On exam his abdomen was distended. His jaundice resolved with nasogastric decompression. CT scan demonstrated dilation of the stomach and proximal duodenum with a transition point at the crossing of the superior mesenteric artery. The SMA formed a 25 degree angle with the aorta, consistent with SMA syndrome. He was brought to the operating room for a laparoscopic duodenojejunostomy. His postoperative course was unremarkable and he was able to return to spinal cord rehabilitation.

532

Turnbull-Cutait Pull Through for Recto-Vaginal Fistula

Joseph Garvin*, Jean Ashburn, Feza H. Remzi
Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic, Cleveland, OH

This video demonstrates the utility of the Turnbull-Cutait abdominoperineal colonic pull through in the management of a complex recto-vaginal fistula. The patient presented with a fistula having previously undergone a low anterior resection for rectal cancer with preoperative chemoradiotherapy. A symptomatic vaginal fistula developed following closure of defunctioning ileostomy. We demonstrate the techniques used in this procedure including colonic mobilization, excision of phlegmon, mucosectomy, excision of scar tissue, staged placement of the anal sutures, tissue placement in order to prevent recurrence and acceptance of a degree of ectropion in order to prevent retraction and stricture.

533

Arterial Approach Distal Pancreatectomy

Yi Miao*
Department of General Surgery, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

Survival outcome after standard distal pancreatectomy (DP) for left-sided pancreatic adenocarcinoma is poor, which may be attribute to both the disease nature and the surgical procedure. Accordingly, several efforts could be taken to deal with this problem. One of our practice is to adopt an arterial approach for DP, which emphasize the dissection of superior mesenteric artery (SMA) and celiac trunk (CT) in the early stage of the procedure, and also deepens the retroperitoneal dissection plane beyond the Gerota fascia. Our technique could provide the best chance to achieve a negative margin and lymph node clearance after DP, hence improving the survival of the patients.

10:00 AM – 11:00 AM
S504A

PLENARY SESSION V

617

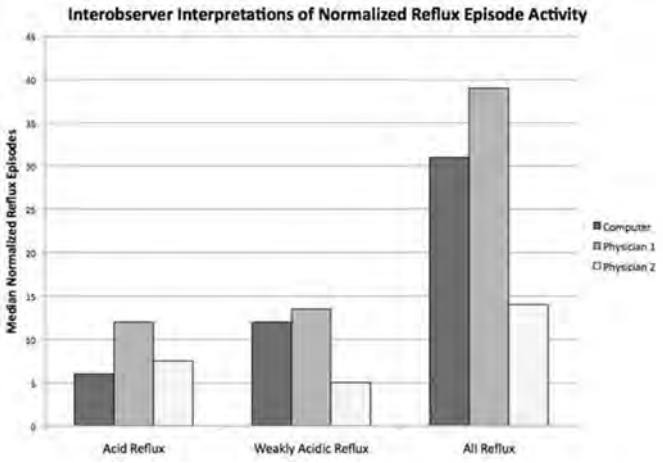
More Art Than Science: Impedance Analysis Prone to Interpretation Error

Thomas Ciecierega*[2], Benjamin L. Gordon[1], Anna Aronova[1], Carl V. Crawford[3], Rasa Zarnegar[1]
[1]Surgery, Weill Cornell Medical College/New York Presbyterian Hospital, New York, NY; [2]Pediatrics, Weill Cornell Medical College/New York Presbyterian Hospital, New York, NY;[3]Gastroenterology, Weill Cornell Medical College/New York Presbyterian Hospital, New York, NY

BACKGROUND: Esophageal pH monitoring is the gold standard for diagnosis of acid reflux, and with the advent of the DeMeester score interpretation can be made with relative ease. However, impedance monitoring to evaluate for all reflux does not have a standardized scale, which can confound interpretation between observers. We aim to determine the inter-observer variability of 24-hour impedance testing interpretations between physicians and computer software.

METHODS: Thirty-eight patients that underwent 24-hour impedance monitoring at a tertiary referral center were randomly selected between 2008 and 2013. Two physicians, who routinely use impedance testing, each interpreted raw impedance data generated by the Given Imaging Digitrapper pH-Z Monitoring Test for the same patient cohort. These interpretations were then compared to the computer interpretation of the same cohort. Normalized reflux episode activity (NREA) and reflux symptom association probability were evaluated to determine diagnostic accuracy.

RESULTS: NREA interpretations did not significantly differ between each physician and the computer for Total Acid Reflux (p = 0.17) or for Total Nonacid Reflux (p = 0.21). However, Physician 2 interpreted the number of Total Weakly Acidic Reflux episodes significantly differently than Physician 1 (p = 0.0001) and the computer (p = 0.006), whereas Physician 1's interpretations where not significantly different from the computer. In analyzing Total All Reflux episodes, Physician 1 and Physician 2 significantly differed from each other (p = 0.008) but did not differ when compared to the computer. The variability in analysis of NREA lead to a change in diagnostic management in 21% of patients when comparing computer analysis versus physician. Moreover, 12% of patients had a change in management when comparing between physicians. Finally, the correlation between symptoms differed in 3% of physician-physician interpretations versus 10% of computer-physician interpretations.



CONCLUSION: Impedance testing analysis is subject to marked variability between physicians and computer software. As such, unlike the finite score for pH monitoring, impedance is prone to interpretation error leading to differences in diagnosis and symptom correlation. This variability should be taken into consideration by clinicians when evaluating impedance results.

618

Laparoscopic Revision Fundoplication of Transoral Fundoplication

Reginald Bell*
SurgOne Foregut Institute, Englewood, CO

Transoral fundoplication creates a full-thickness fusion of the distal esophagus to the fundus using small H-shaped polypropylene fasteners. With laparoscopic revision surgery there is potential for leak related to the treatment of these full-thickness fasteners.

There have been reports that laparoscopic revision of a TF is associated with complications of postoperative leak and abscess. These complications a due to tension on or difficulties treating the fasteners, or unfamiliarity with the surgical changes of TF.

This video illustrates a systematic approach to laparoscopic revision that has been used in over 25 procedures without any adverse outcome.

619

The Significance of Signet Ring Cell Histology in Early Esophageal Adenocarcinoma

Stephanie G. Worrell*, Steven R. Demeester, Joseph D. Dixon, Christina L. Greene, Daniel S. OH, Jeffrey A. Hagen
Keck School of Medicine of Univeristy of Southern California, Los Angeles, CA

BACKGROUND: Signet ring cell (SRC) histology is thought to confer a worse prognosis for gastric and esophageal cancers and the appropriateness of endoscopic therapy for superficial adenocarcinoma of the esophagus with SRC histology is controversial. Our aim was to evaluate the impact of SRC histology on lymph node metastasis and survival in patients with early esophageal adenocarcinoma.

METHODS: A retrospective chart review was performed of all patients with esophageal or gastroesophageal junction adenocarcinoma who underwent primary esophagectomy for a pT1-2 tumor that was ≤5 cm in size from 4/1990 to 5/2012. Patient characteristics and survival were compared based on the presence or absence of SRC histology.

RESULTS: There were 200 patients that met inclusion criteria, 16 (8%) had SRC histology and 184 were non-SRC. Esophagectomy consisted of en bloc transthoracic (n = 98), transhiatal (n = 64), or vagal-sparing (n = 38). There was no difference in type of esophagectomy between groups. Patient demographics, tumor characteristics, and survival are compared in the table. Patients with SRC were younger and more likely to have involved nodes. All 4 patients with pT1a SRC tumors were N0 compared to 97 of 99 patients (98%) with non-SRC histology. In patients with T1b or T2 lesions, those with SRC histology were more likely to have lymph node metastases (7/12 [58%] for SRC versus 26/85 [31%] for non-SRC, p = 0.09). In addition, T1b or T2 patients with SRC histology were more likely to have N2-3 disease (SRC 58% versus 15% for non-SRC, p = 0.002). Overall 5-year and disease-specific survival were equivalent between groups.

Total n = 200	SRC, n = 16	No SRC, n = 184	p value
Sex M:F	14:2	149:35	0.52
Age (years)	59	67	0.047
T status			0.09
pT1a	4 (25%)	99 (54%)	
pT1b	6 (37.5%)	42 (23%)	
pT2	6 (37.5%)	43 (23%)	
N status			<0.0001
pN0	9 (56%)	156 (85%)	
pN1	0 7 (44%)	15 (8%)	
pN2-3		13 (7%)	
Median tumor size (cm)	1.5	1	0.25
5-year overall survival	73%	69%	0.65
5-year disesase-specific survival	86%	86%	0.09

CONCLUSIONS: Intramucosal (T1a) adenocarcinoma with or without SRC histology has a low risk of lymph node metastases and endoscopic resection can be considered in these patients. However, deeper invasion with SRC histology was associated with a significantly increased risk of lymph node metastases compared to similar invasion without SRC histology. Further, patients with SRC histology were more likely to have multiple (N2-3) involved nodes. Neoadjuvant therapy prior to surgical resection is recommended for T1b or deeper lesions that show SRC histology.

620

End of the Road for a Dysfunctional End-Organ: Gastrectomy for Refractory Gastroparesis

Neil Bhayani*[1,2], Ahmed M. Sharata[2], Christy M. Dunst[2], Ashwin A. Kurian[2], Kevin M. Reavis[2], Lee L. Swanstrom[2]
[1]Providence Cancer Center, Portland, OR; [2]Gastrointestinal & Minimally Invasive Surgery, The Oregon Clinic, Portland, OR

INTRODUCTION: Gastroparesis is a functional disorder resulting in debilitating nausea, overflow esophageal reflux & abdominal pain and is frequently refractory to medical treatment. Surgical therapies such as pyloroplasty and neurostimulators aim to facilitate emptying. When treatments to facilitate gastric emptying fail, subtotal gastrectomy has been employed with varying success. Herein, we examined outcomes after gastrectomy for diabetic and idiopathic gastroparesis.

METHODS: A prospective database was queried for gastrectomies with Roux-en-Y reconstruction performed for gastroparesis from 1993–2013. Primary outcomes were improvements in pre- versus post-operative symptoms at last follow-up, measured on a 5-point scale. Secondary outcome was operative morbidity.

RESULTS: Thirty-five patients underwent total or near-total gastrectomies for idiopathic (23%), post-operative(43%), or diabetic (34%) gastroparesis. Anti-emetics and pro-kinetics afforded no relief in 34.5% of patients. There were no operative mortalities. Six patients suffered a leak requiring anastomotic revision. With a median follow-up of 11.4 months, nausea improved or resolved in 70% after surgery. Chronic abdominal pain improved or resolved in 69% of patients. Belching and bloating resolved for 75% and 81%, respectively (p < 0.01).

CONCLUSIONS: Regardless of etiology, medically-refractrory gastroparesis is a chronic and devastating disease. Surgery can ameliorate, and often relieve symptoms of nausea, excessive belching and gas bloat. Chronic abdominal pain commonly resolved or improved with resection. Despite attendant morbidity, gastrectomy can palliate symptoms of gastroparesis.

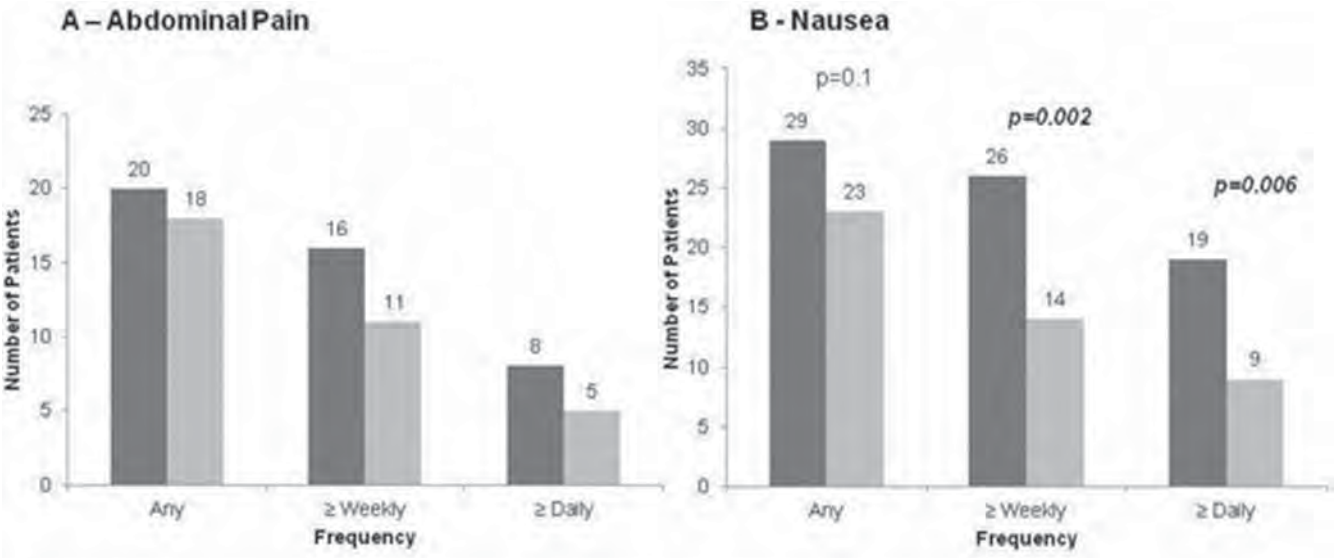


Figure 1. Comparison of symptoms Before surgery (dark bars) and After surgery (light bars)

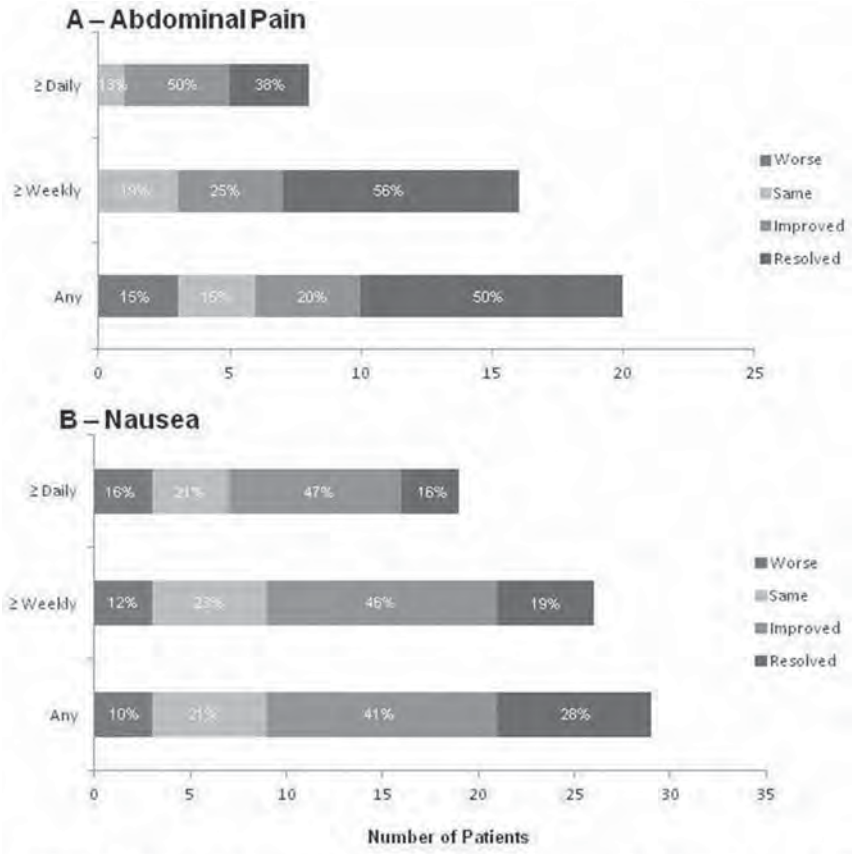


Figure 2. Change in symptoms with preoperative Abdominal Pain (A) or Nausea (B)

10:00 AM – 11:00 AM
S502

QUICK SHOTS SESSION II

621

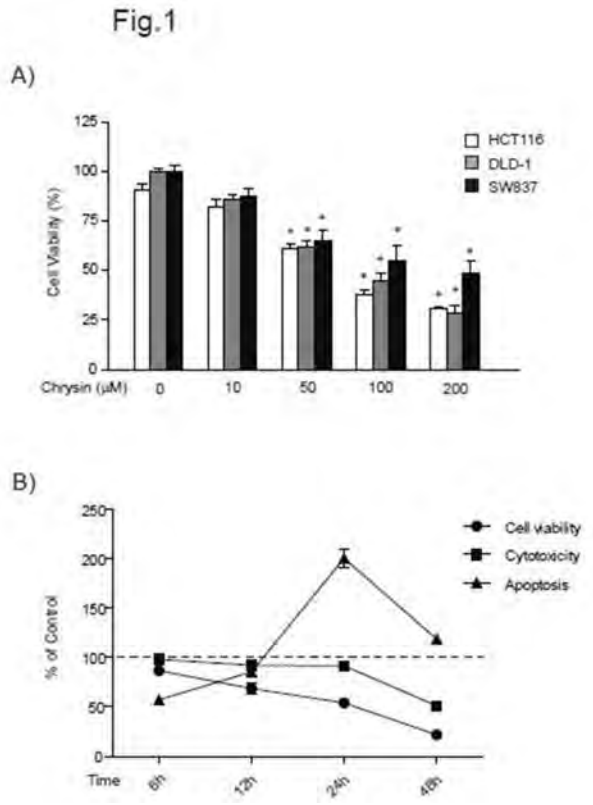
Aryl Hydrocarbon Receptor Is Required for Induction of Apoptosis by the Flavonoid Chrysin in Colon Tumor Cells

Sean Ronnekleiv-Kelly*, Manabu Nukaya, Patrick Carney, Gregory D. Kennedy
Surgery, University of Wisconsin, Madison, WI

INTRODUCTION: The aryl hydrocarbon receptor (AHR) is a ligand-binding transcriptional receptor that has been implicated in a number of GI malignancies including colon and rectal cancer. Chrysin, a member of the family of natural flavonoids isolated from propolis, is an AHR ligand and has been found to induce cell death or arrest cell proliferation in various tumor cell lines in vitro. We have hypothesized that chrysin will inhibit growth of colon cancer cells and that this inhibition is dependent upon the AHR.

METHODS: The cell viability, cytotoxicity and apoptosis in colon tumor cells were measured by XTT assay (Life technologies, Carlsbad, CA) and ApoTox-Glo™ Triplex Assay system (Promega, Madison, WI). The apoptotic cells were detected by TUNEL assay (Promega). The si-scramble (control) and si-AHR expression HCT116 cells were generated by stable transfection of small interfering-RNA (si-RNA) expression vectors. The transcriptional activity of AHR was measured by dual-luciferase reporter gene assay system (Promega). Statistical analysis was performed with GraphPad Prism 5 for Windows.

RESULTS: We found a dose dependent increase in AHR transcriptional activity (increase of Cyp1a1 mRNA by 8 fold over control, $P < 0.05$). This effect was confirmed using an AHR responsive luciferase reporter assay. Cell viability was reduced in all three colon tumor cell lines exposed to chrysin (Figure 1A) and this seemed to be due to an increase apoptosis (200% of apoptosis compared to control, $P < 0.05$, Figure 1B). Stably transfected cells expressing si-AHR were resistant to chrysin-induced cell apoptosis compared to si-Scramble expressing cells (80% viability v. 60% viability, $P < 0.05$).



CONCLUSION: Using three different colon tumor cell lines and creating AHR si-RNA cells, we have found (1) that the chrysin-induced cell death in colon tumor cells is due to apoptosis and (2) the apoptosis mediated by chrysin in these cell lines requires AHR. Current work is focusing on elucidating the mechanism by which AHR participates in the induction of apoptosis. If chrysin will prove to be a novel chemotherapeutic in the future remains to be determined.

622

Normalization of Carcinoembryonic Antigen Levels Post-Neoadjuvant Therapy Is a Strong Predictor of Pathologic Complete Response in Rectal Cancer

Ariella Kleiman[*1], Nancy Morin[1], Philip H. Gordon[1], TE Vuong[2], Abbas Kezouh[3], Julio Faria[1], Gabriela Ghitulescu[1], Marylise Boutros[1]
[1]Surgery, Jewish General Hospital, Montreal, QC; [2]Radiation Oncology, Jewish General Hospital, Montreal, QC; [3]Biostatistics and Epidemiology, Jewish General Hospital, Montreal, QC

PURPOSE: Several authors have investigated the relationship between carcinoembryonic antigen (CEA) and pathologic complete response; however to date there is no clear consensus regarding its predictive value. The purpose of this study is to examine the association of pre-treatment and post-treatment CEA with pathologic complete response.

METHODS: After institutional review board approval, we conducted a retrospective chart review of a prospectively maintained database of all patients who underwent primary rectal cancer resections after having completed neoadjuvant treatment from 1/07–11/13. Patients were divided into three groups based on final pathology: pathological complete response (PCR), defined as T stage of 0 in the operative specimen, partial response (PR), and no response (NR). Pretreatment CEA was measured at the initial visit with the oncologist or surgeon, while posttreatment CEA was measured after completing neoadjuvant treatment and prior to surgery. In our laboratory, a normal CEA ranges from 0–3.0 ug/L. Chi-square, student's t and wilcoxon rank sum tests were used for univariate analyses for categorical, normally distributed continuous and non-normally distributed continuous variables, respectively. All variables with a $p < 0.15$ on univariate analysis were included in a multivariate logistic regression model.

RESULTS: 141 (63 years, 60.4% male) patients underwent primary rectal cancer resections after completing neoadjuvant treatment (56% external beam, 44% brachytherapy). Of those, 28 (19.96%) achieved PCR, 43 (30.5%) had PR, and 69 (48.9%) had NR. Univariate analysis revealed that patients with PCR had similar demographic, pretreatment tumor characteristics, staging, pretreatment CEA levels and CEA ratios (posttreatment/pretreatment). For patients with an initial elevated CEA (n = 85, 60%), posttreatment CEA was significantly lower for patients with PCR compared to those with partial or no response (median 2.2 [IQR 1.00,2.90] vs median 3.3 [IQR 1.9,6.3]), $p < 0.03$. On multivariate logistic regression, in patients with an initial elevated pretreatment CEA and taking into account age, gender, poorly differentiated tumors, and smoking status, a normal post-treatment is a highly significant predictor of PCR (OR 59.2 (95% CI 1.66,∞).

CONCLUSIONS: In patients with an initially elevated CEA, a normal post- neoadjuvant treatment CEA is a highly significant predictor of pathologic complete response.

623

Visceral Adipose Tissue Changes After Surgery in Colorectal Cancer Patients May Have Prognostic Implications

Eun Kyung Choe[*1,2], Heung-Kwon OH[2], Sang Hui Moon[2], Seung-Bum Ryoo[2], Kyu Joo Park[2]
[1]Surgery, Seoul National University Hospital Healthcare System Gangnam Center, Seoul, Republic of Korea; [2]Surgery, Seoul National University College of Medicine, Seoul, Republic of Korea

PURPOSE: Although studies suggested the possible relationship between the amount of visceral adipose tissue and prognosis in colorectal cancer (CRC) patients, there are few studies assessing the changes in body component after colectomy. We intended to verify the adipose tissue area changes before and after surgery to determine their clinical relevance.

METHODS: CT assessed adipose tissue areas (subcutaneous, SAT; visceral, VAT) were measured before and annually after curative resection in stage I to III CRC patients. Patients who had total colectomy or stoma were excluded. Demographic and clinical characteristics were reviewed in prospectively collected cohort of patients. Changes in adipose tissue area were assessed by calculating the difference of adipose tissue area between preoperative and most recent postoperative CT without any findings of recurrence. Adipose tissue obesity was defined as amount of more than 50 percentiles.

RESULTS: The study cohort included 447 males and 254 females (age 62.0 ± 10.8 years). Median follow up period was 67.3 ± 17.8 months (range:12.3–102.2 months). CT scans were available in 651 patients (CT follow up duration: median 44.6 months, range: 12.3–82.8 months). Preoperative VAT obesity was observed in 323 patients (49.4%) and SAT obesity in 266 (47%). Preoperative VAT obesity was associated with earlier TNM stage ($p = 0.042$) and negative venous invasion ($p = 0.02$). After surgery, 266 patients (53%) showed increase in VAT, and 358 patients (63.3%) in SAT after surgery. Chemotherapy did not influence in VAT or SAT changes ($p = 0.086$). Increase in VAT amount after surgery was associated with pathologic differentiation and increase in SAT with T stage and TNM stage. By Kaplan Meier analysis, increased VAT and SAT after surgery showed higher OS ($p = 0.001$, 0.03) and DFS ($p = 0.004$, 0.02) in stage 3. On univariate analysis, TNM stage, pathologic differentiation, perineural invasion, preoperative CEA level, postoperative VAT and SAT change were significant predictors of OS and DFS. Preoperative VAT obesity was not associated with OS ($p = 0.148$) and DFS ($p = 0.615$). By multivariate Cox regression analysis, TNM stage ($p = 0.049$), differentiation ($p = 0.006$), perineural invasion ($p = 0.000$) and postoperative VAT change (HR, decrease : increase = 1 : 0.493, $p = 0.012$) were significant predictors for OS and DFS.

CONCLUSIONS: In contrary to other studies, preoperative visceral obesity was not a predictor for poor prognosis in our cohort of patients. Instead, the increase in visceral fat amount after surgery was a significant positive predictor of overall and disease free survival in CRC patients undergoing curative resection.

624

Implementation of Best Practices in Colorectal Surgery at a Safety Net Hospital: Facilitators and Barriers

Zeinab Alawadi*[1,2], Uma Phatak[1,2], Isabel Leal[1], Burzeen E. Karanjawala[1], Stefanos G. Millas[1,2], Julie Holihan[1], Tien C. Ko[1], Lillian Kao[1,2]
[1]University of Texas Health Science Center at Houston, Houston, TX; [2]Center for Surgical Trials & Evidence-based Practice, Houston, TX

BACKGROUND: Enhanced Recovery After Surgery (ERAS) pathway is known to reduce complications and length of stay in colorectal surgery patients. However, it is unclear whether an ERAS pathway would be feasible at a safety-net hospital. The aim of this study is to identify local barriers and facilitators to implementation of ERAS pathway for colorectal surgery patients at a safety-net hospital.

METHODS: Semi-structured interviews were conducted to assess current practice, knowledge of the evidence, willingness to adopt the pathway, and perceived barriers and facilitators to change. Stratified purposive sampling was used. Interviews with 8 anesthesiologist, 5 surgeons, 6 nurses and 10 patients were audiotaped, transcribed verbatim and coded using qualitative content analysis. To ensure rigor in data analysis we developed a coding frame to review all transcripts; used participant's quotes; and employed analytic triangulation to establish credibility.

RESULTS: Medical staff addressed factors specific to ERAS implementation, while patients spoke to those related to general recovery. The categories identified across the different medical professions as facilitators were: 1) feasibility, alignment with current practice, 2) smallness of community, 3) good working team and communication, and 4) caring for patients. The barriers were: 1) adapting to change, 2) lack of coordination between different departments, 3) special patient population, 4) limited resources, and 5) rotating residents. Medical staff were familiar with the majority of the ERAS pathway, although practice was not routine. Exceptions included preoperative carbohydrate loading which was perceived to have limited evidence by most surgeons and anesthesiologists, and early mobilization and preoperative education, which were considered important for patient recovery but were not utilized secondary to limited resources. The categories identified in patient interviews as facilitators of overall recovery were: 1) welcoming a speedy recovery, 2) comfort, being well-cared for, and 3) good social support. The barriers were: 1) need for prolonged rest and 2) lack of quiet and private space. Both medical staff and patients expressed an overwhelming positive attitude and support for implementation of ERAS.

CONCLUSION: Use of a qualitative approach accessed what key stakeholders identified as the most important factors on the organizational, practitioner and patient level, impacting improvements in outcomes and efficiency of care. While limited hospital resources is perceived to be a barrier to ERAS implementation at a safety-net hospital, there is strong support for such pathways and multiple factors were identified that may facilitate change. The findings of this qualitative study serve as a basis for modifying and designing interventions targeted to the needs of this population and hospital setting.

625

The Surgical Care Survey Is an Accurate Measure of Patient Satisfaction Across Surgical Care Domains

Ryan K. Schmocker*, Linda Cherney Stafford, Alexander Siy, Glen Leverson, Emily Winslow
Department of Surgery, University of Wisconsin, Madison, WI

BACKGROUND: With the introduction of the Affordable Care Act, the patient experience has been increasingly emphasized. Patient satisfaction outcomes are currently measured using the Hospital Consumer Assessment of Healthcare Providers & Systems (HCAHPS) survey, however this tool does not assess information specific to surgical patients. The American College of Surgeons-sponsored and National Quality Forum-endorsed Surgical Care Survey focuses on the characteristics of surgical care that impact the patient experience. We set forth to identify which factors impact overall surgeon rating.

METHODS: All patients undergoing a general surgical operation at our institution from 6/13–11/13 were sent the Surgical Care Survey within 3 days of discharge. Secondary mailings were sent to nonresponders for the first 226 patients. Survey responses were entered into an ongoing database, as part of a prospective study examining surgical readmissions. Data was analyzed using the highest response as the "Topbox" score. Data analysis was generated using SAS software, with appropriate application of $\chi 2$ and t-tests for univariate analysis.

RESULTS: The response rate for the 1123 surveys sent was 40.4%. The average age was 59 ± 16 yrs, length of stay was 4.0 ± 6.6 days, and 23% had unscheduled operations. 27.1% of patients were treated by colorectal surgeons, 27.1% by burn/trauma/acute care surgeons, 16.7% by minimally invasive surgeons, and the remainder by breast, hepatobiliary, and endocrine surgeons. Of those who responded to the overall surgeon rating item ("What number would you use to rate all your care from this surgeon?"), 72% (315) rated their surgeon as the best surgeon possible (10 = highest score). Elective operations ($p < 0.0001$) and older patient age ($p = 0.014$) were associated with higher ratings. Additionally, there were differences between practice groups and satisfaction ($p < 0.0001$), with those undergoing endocrine or hepatobiliary procedures having highest scores and those undergoing burn/trauma/acute care procedures having the lowest scores. Dramatic differences were seen in surgeon rating as a function of each care domain examined. Specifically, those patients who reported adequate information giving before surgery, participation in shared decision making, and effective patient-surgeon communication rated their surgeons most highly (Table).

CONCLUSION: The Surgical Care Survey is a new patient satisfaction measure that is a valid tool to elucidate patient satisfaction specific to surgeons. Further, it demonstrates the essential domains that impact patient ratings of their surgeons: effective communication, shared decision-making, adequate preparation for surgery, and surgeon attentiveness on the day of surgery. This information helps surgeons to identify potential areas for improvement that will positively affect the surgical patient experience.

Table: Percent of Patients with "Topbox" Responses to Survey Questions in Each Care Domain

Survey Question	Patients with Highest Overall Surgeon Rating (Score = 10, n=315)	Patients with Lower Overall Surgeon Rating (Score <10, n=120)	p-value
Preparation For Surgery Domain			
Before your surgery, did anyone in this surgeon's office give you all the information you needed about your surgery?	93.8%	73.2%	**<0.0001**
Before your surgery, did anyone in this surgeon's office give you easy to understand instructions about getting ready for your surgery?	95.0%	70.4%	**<0.0001**
Shared Decision Making Domain			
During your office visits before your surgery, did this surgeon talk with you about the reasons you might want to have surgery?	77.4%	52.1%	**0.0005**
During your office visits before your surgery, did this surgeon talk without you about the reasons you might not want to have the surgery?	15.5%	4.3%	**0.0430**
Preoperative Communication Domain			
During your office visits before your surgery, did this surgeon listen carefully to you?	98.4%	78.2%	**<0.0001**
During your office visits before your surgery, did this surgeon spend enough time with you?	96.5%	72.0%	**<0.0001**
During your office visits before your surgery, did this surgeon encourage you to ask questions?	96.1%	72.4%	**<0.0001**
During your office visits before your surgery, did this surgeon show respect for what you had to say?	99.2%	82.6%	**<0.0001**
Day of Surgery Attentiveness Domain			
After you arrived at the hospital or surgical facility, did this surgeon visit you before your surgery?	96.1%	83.9%	**<0.0001**
Before you left the hospital or surgical facility, did this surgeon discuss the outcome of your surgery with you?	91.4%	66.7%	**<0.0001**

626

A Randomised, Single-Blinded Trial Assessing the Effect of a Two Week Preoperative Very Low Calorie Diet on Laparoscopic Cholecystectomy Procedure in Obese Patients

Nicholas Burr*, Katherine Burnand, Rajiv Lahiri, John M. Bennett, Michael P. Lewis

Upper Gastrointestinal Surgery, Norfolk and Norwich University Hospital, Norwich, United Kingdom

BACKGROUND: A very low calorie diet (VLCD) before bariatric surgery has been shown to decrease liver volume and improve laparoscopic operative access and is often a routine part of the preoperative workup for bariatric procedures. During laparoscopic cholecystectomy the effect of a VLCD could ease dissection of the gall bladder, improve operative views and reduce hepatic bleeding from surgical trauma. The aims of this study were to investigate whether a 2 week calorie restricted diet before surgery can reduce operative time and post-operative complications. The primary outcome measure was operation time. Secondary outcomes were length of stay, operative complications and day case rates.

METHODS: Patients with BMI >30 kg/m^2, aged between 18–70 years with symptomatic gallstone disease attending for elective laparoscopic cholecystectomy at the Norfolk and Norwich University Hospital, UK were invited to take part in the study. Patients were recruited between May 2011 and May 2013. Exclusion criteria were previous abdominal surgery, common bile duct stones, type I or type II diabetes mellitus and liver disease. Patients were randomised at preassessment to a VLCD or normal diet for two weeks prior to cholecystectomy. Comprehensive food diaries were used to document dietary intake in both groups. A single surgeon, blind to the intervention group, performed all operations. An a priori power calculation determined that 23 patients were required in each group to detect a clinically significant difference in operation time of 2.5 minutes at 80% power with 95% confidence intervals.

RESULTS: 21 cases and 25 controls were recruited into the study. One patient (control group) withdrew and was analysed on an intention to treat (ITT) basis. There was no significant difference in age, gender, BMI and co-morbidity between the study groups. The VLCD was well tolerated and resulted in a mean weight loss difference of 2.5 kg (95% CI, 1.4–3.6) compared to normal diet. There was a significant reduction in median operative time of 6 minutes (p = 0.004) for patients taking the VLCD compared to controls (25 minutes [range 18–40.5 minutes] versus 31 minutes [20–170]). There were no differences in secondary outcome measures (complication rate, length of stay, or day case rates) between the groups.

DISCUSSION: This is the first study to investigate the use of VLCD before laparoscopic cholecystectomy in obese patients. The key finding was a statistically significant reduction in operation time for the intervention group (p = 0.004). Low calorie diet can be offered to patients before cholecystectomy as a safe, well tolerated intervention to reduce operative time but also to reduce weight and thus protect against future weight related morbidity.

627

The Treatment and Revised Classification of Gallbladder Perforation in Acute Cholecystitis: The Importance of Intrahepatic and Abdominal Abscess Formation

Lygia Stewart*[1], Gary Jarvis[2], J. Mcleod Griffiss[2]
[1]UCSF/SF V AMC, San Francisco, CA; [2]Infectious Disease, UCSF/SF VAMC, San Francisco, CA

BACKGROUND: Intrahepatic and abdominal abscess is a rarely reported complication of acute cholecystitis. Prior perforated cholecystitis classification systems have not included hepatic abscess as an entity. We reviewed our series and report risk factors, and treatment outcomes of perforated cholecystitis with a focus on a the presentation of cases with an associated abscess.

METHODS: 618 patients with gallstones were studied; there were 536 men, 82 women; average age 62 (range: 17–104). Among these patients, 241 had acute cholecystitis. Gallstones, bile, and blood (as applicable) were cultured, Stone type recorded. Illness severity was classified as: none (no inflammatory manifestations), SIRS (fever, leukocytosis, tachycardia), severe (abscess, cholangitis, empyema), or MODS (bacteremia, hypotension, organ failure). We looked for factors associated with gallbladder perforation and abscess. Multivariate analysis was performed to determine associated factors and optimal treatment approach.

RESULTS: Of 241 acute cholecystitis cases, 58 had associated perforation (20 intrahepatic abscess, 15 abdominal/peritoneal abscess, 20 free perforation, 3 cholecystoenteric fistula). Biliary bacteria were present in 58% of uncomplicated acute cholecystitis and 91% of perforated cases (P < 0.0001); predominant organisms were: E. coli, Klebsiella, Staph, and Enterococcus. On multivariate analysis, gallbladder perforation was associated with biliary bacteria (P = 0.002). Diabetes was present in 41% of cases with perforation, but only 20% of uncomplicated cases (P = 0.002). MODS manifestations were present in 41% of cases with perforation, but only 16% of uncomplicated cases, (P < 0.0001). 47% of perforation/abscess cases were initially treated with cholecystostomy (C-tube), while C-tube was used in 17% of non-perforated cases. Peri-operative hospital stay was shorter for perforation cases initially treated with C-tube (hosp > 1 week, 29% vs 86%, C-tube vs none, P = 0.006); similar to uncomplicated peri-operative stays (29% hosp > 1 week, P = NS).

CONCLUSIONS: This is the largest series of abscess associated with acute cholecystitis in the literature; and most detailed study of gallbladder perforation. We propose a new classification of gallbladder perforation that includes distinct entities of peritoneal abscess, intrahepatic abscess, free perforation, and cholecystoenteric fistula. Optimal treatment of intrahepatic abscess/perforated cholecystitis is C-tube followed by interval laparoscopic cholecystectomy.

628

Thoracolaparoscopic Dissection of Lymph Nodes Involved in the Drainage of the Esophagus Is Feasible and Safe in Human Cadavers and Swine

Hannah T. KüNzli[*1,2], Mark I. Van Berge Henegouwen[3], Suzanne S. Gisbertz[3], Marinus J. Wiezer[4], Cees A. Seldenrijk[5], Jacques J. Bergman[2], Bas L. Weusten[1,2]

[1]Gastroenterology, St. Antonius Hospital, Nieuwegein, Netherlands; [2]Gastroenterology, Academic Medical Center Amsterdam, Amsterdam, Netherlands; [3]Surgery, Academic Medical Center Amsterdam, Amsterdam, Netherlands; [4]Surgery, St. Antonius Hospital, Nieuwegein, Netherlands; [5]Pathology, St. Antonius Hospital, Nieuwegein, Netherlands

BACKGROUND: Low-risk early esophageal cancer can safely be managed endoscopically. In case of high-risk cancer (i.e., submucosal invasion, poor tumor differentiation, or lymphovascular invasion), esophagectomy with lymph node dissection is currently advocated given the relatively high rates of lymph node (LN) metastasis in these patients. However, this procedure is associated with substantial morbidity and mortality and a reduced quality of life. Endoscopic radical (R0) local resection (by means of ESD or EMR), followed by thoracolaparoscopic lymph node dissection without concomitant esophagectomy could be an attractive alternative.

AIM: To evaluate the feasibility and safety of thoracolaparoscopic dissection of LN involved in the drainage of the esophagus in human cadavers 1) and swine 2), leaving the esophagus and cardia in situ.

METHODS: 1) In fresh human cadavers, thoracolaparoscopic dissection of LN involved in drainage of the esophagus was performed. Following LN dissection, a regular esophagectomy was performed and the resection specimen was analysed for any retained LN. 2) In the animal survival study, thoracolaparoscopic dissection of LN was performed in swine. 28 days after the procedure, the swine were sacrificed and a regular esophagectomy was performed. Outcome parameters included the number of dissected LN during lymphadenectomy, and the number of retained LN in the esophagectomy specimens. In the animal survival study, outcome parameters also included the presence of ischemia and/or stenosis in the esophagectomy specimens (safety parameters). Technical success was defined as a ratio ≥0.9 between the number of dissected LN during lymphadenectomy and the total (resected plus retained) number of LN.

RESULTS: In 5 fresh human cadavers (3 male, median age 83 years), a median of 26 LN (IQR 22–46) was dissected. In 2 esophagectomy specimen, 1 retained LN was found (1 high paraesophageal, 1 low paraesophageal). All procedures were considered technically successful. In 8 female swine, a median of 11 LN (IQR: 6–16) was dissected. In 4/8 esophagectomy specimens, a median of 4 retained LN (IQR: 3–6) were found (paraesophageal and around the lesser curvature). One pig died because of ventricular fibrillation during the procedure, all others survived uneventfully. The esophagectomy specimens showed no signs of ischemia or stenosis.

CONCLUSIONS: Thoracolaparoscopic dissection of lymph nodes involved in the drainage of the esophagus appears to be feasible in human cadavers and swine. The animal survival study suggests that the esophageal vascularity is not severely compromised by this procedure. As anatomy is different in humans, further studies on this new algorithm consisting of radical endoscopic resection, followed by thoracolaparoscopic lymph node dissection in patients with high-risk early esophageal cancer however, are warranted.

629

Prognostic Value of Histological Tumor Regression After Neoadjuvant/Perioperative Treatment of Esophageal Cancer

Frank Makowiec[*1], Jens Hoeppner[1], Torben Glatz[1], Hannes P. Neeff[1], Ulrich T. Hopt[1], Peter Bronsert[2]

[1]Department of Surgery, University of Freiburg, Freiburg, Germany; [2]Institute of Pathology, University of Freiburg, Freiburg, Germany

Perioperative chemotherapy (periCTx) or neoadjuvant chemoradiation (neoCRT) are increasingly used in patients with adeno- (AC) or squamous cell carcinoma (SCC) of the esophagus. However, no reliable parameters to predict major response have been established so far. As for other GI-cancers recent data suggested a better outcome in patients with total or subtotal histological tumor regression, especially in AC. We therefore investigated tumor regression grade (TRG) and its potential impact on survival in 221 patients after periCTx or neoCRT plus resection for esophageal cancer.

METHODS: We analyzed patients who underwent esophageal resection for SCC (n = 102) or AC (n = 119) after neoCRT or neoCTx since 1995. Patients with 90-day mortality were excluded. Neoadjuvant treatment was performed in patients with (in pretherapeutical staging) at least T3- or node positive tumors. Patients with SCC underwent neoCRT with 36–45 Gy and cisplatin-based CTx. Patients with ACC underwent the same neoCRT (n = 69) or neoCTx (ECF- or FLOT protocols; n = 50). TRG in the primary tumor was estimated using the MANDARD-classification (TRG 1 = total regression, TRG 5 = no regression). In a subanalysis patients with total/subtotal TRG but positive nodes were reclassified as poor TRG (corrTRG).

RESULTS: In all 221 patients TRG was 1 (total) in 29%, good to moderate (TRG: 2–3) in 41% and poor (TRG: 4–5) in 30%. TRG was significantly better after neoCRT than after neoCTx in all patients ($p < 0.001$) and in patients with AC ($p < 0.02$). After correction for positive nodes corrTRG was 1 (22%), 2–3 (33%) or poor (45%).

5-year survival (5ySurv) in all 221 patients was 43%. It was 35% in SCC and 52% in AC ($p = 0.06$). 5ySurv was even 63% in patients with AC and periCTx. Patients with corrTRG 1 had a better survival than patients with corrTRG 2–5 ($p < 0.03$). In multivariate survival analysis however, only lymph node ratio (LNR) <0.1 ($p < 0.001$), T-stage <3 ($p < 0.001$) and AC ($p < 0.001$) but not TRG or corrTRG were associated with better survival. In the subgroup of patients with SCC corrTRG univariately influenced survival ($p < 0.03$). In multivariate analysis however, LNR was the only independent predictor of survival (in both histological subgroups).

CONCLUSION: After neoadjuvant therapy of esophageal cancer a relevant proportion showed complete histological tumor regression. However, TRG did not independently predict survival. Best prognosticator (in SCC and AC) was the nodal status (LNR) which may also be influenced by preoperative CRT/CTx. The relative good outcome in patients with AC after CTx may also be due to the postoperative part of CTx whose effects are not detectable in the specimen.

630

Survival Implications of Non-Regional Lymph Node Involvement on Staging PET/CT for Esophageal Adenocarcinoma

Michal J. Lada*, Michelle S. Han, Andreas Tschoner, Christian G. Peyre, Carolyn E. Jones, Thomas J. Watson, Jeffrey H. Peters

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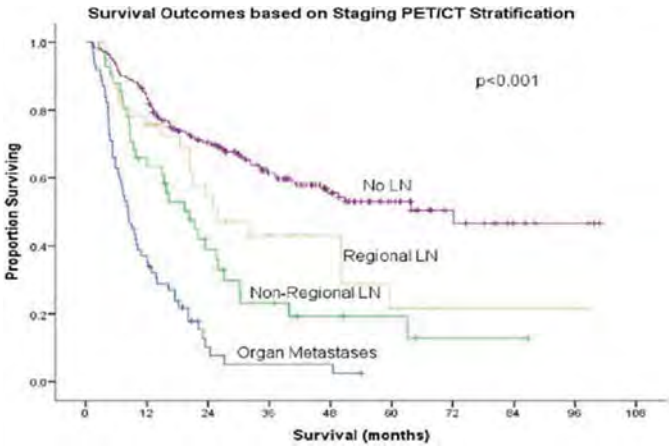
OBJECTIVES: With the advent of routine staging PET/CT in the evaluation of esophageal adenocarcinoma (EAC), PET-positive non-regional lymph nodes (NRLN) are commonly encountered. These have traditionally been grouped with distant organ metastases although the clinical significance of PET-positive lymph nodes outside the boundaries of standard resection margins is unknown, particularly in the era of routine neoadjuvant chemoradiotherapy. Our aim was to assess the prevalence, clinical implications and survival outcomes of patients with NRLN on pre-treatment clinical staging.

METHODS: The study population consisted of 310 patients with EAC evaluated between 2005 and 2012. The mean age was 65 ± 0.6 years and 86% were male. All had pre-treatment staging PET/CT imaging. PET-positive lymph nodes (LN) were defined as SUVmax >1.5. Regional lymph nodes (RLN) were defined as infra-carinal paraesophageal, left gastric, lesser curve or celiac lymph nodes. NRLN were defined as those outside of these resection fields; namely, above the carina and below the celiac axis. Survival was estimated via the Kaplan-Meier method.

RESULTS: Hypermetabolic lymph nodes were identified in 26% (80/310) of the patients, of which 47% (38/80) had RLN and 53% (42/80) had NRLN. Distant organ metastases were noted in 18% (55/310) and no metastases in 56% (175/310) of the patients. Esophagectomy was performed in 61% (188) of the patients of which 60% (112) received neoadjuvant therapy. Five-year survival (KM) was 50% in patients with no evidence of metastases, 22% in patients with RLN alone, 12% in those with NRLN, and 0% in patients with distant organ metastases. Patients with NRLN had significantly better 5-year survival than those with organ metastases ($p < 0.001$ [Figure]). Median survival in patients with NRLN s/p neoadjuvant therapy and esophagectomy was significantly longer than in patients with solid organ metastases (17.9 vs. 8.2 months, $p < 0.001$).



CONCLUSIONS: Routine use of PET/CT staging identifies non-regional lymph node disease in half of patients with clinically positive nodes and almost 15% of all patients. Although long-term survival is not as good as patients who are clinically node negative or with regional nodes, combined neoadjuvant therapy and esophagectomy result in improved survival over patients with solid organ metastases.

10:00 AM – 11:00 AM
S501

VIDEO SESSION III

631

Robotic Liver Resection Segments V, VI, & VII

Sharona B. Ross*, TY A. Bowman, Thomas W. Wood, Alexander S. Rosemurgy
General Surgery, Florida Hospital Tampa, Tampa, FL

This video demonstrates partial hepatectomy through a robotic approach for multifocal hepatocellular cancer with intraoperative ultrasound guidance. Umbilical camera port, robotic port, and assistant port locations are demonstrated. Right liver was mobilized back to the inferior vena cava using robotic instruments. Robotic vessel sealer and monopolar electrocautery were utilized to resect segments V, VI, and VII of the liver, encompassing all lesions. Specimen was extracted through the lateral assistant port site after enlarging it in a cosmetically acceptable manner. Estimated blood loss was under 200 cc, margins were negative, and the patient underwent an uncomplicated and full recovery.

632

Stepwise Per-Oral Endoscopic Myotomy Procedure with Demonstration of the Critical View During the Myotomy

Ozanan R. Meireles, David W. Rattner, Smita Sihag*
Surgery, Harvard/MGH, Boston, MA

This video demonstrates the stepwise approach to the POEM procedure and the importance of the critical view of the circular fibers and sub-mucosa during the Myotomy. Using this technique we performed completed myotomies in 5 subjects with no esophageal perforations and no mucosal injuries.

633

The Role of the Robot in Robotic Gastrectomy for Gastric Cancer

Cristina Harnsberger*, Ryan C. Broderick, Catherine Beck, Kaitlyn J. Kelly, Santiago Horgan
UCSD, San Diego, CA

In the submitted video we present robotic gastrectomy for gastric cancer, in order to demonstrate the role of the robot in the management thereof. The robotic surgery platform offers technical advantages over the laparoscopic approach for gastrectomy with lymphadenectomy for cancer. The excellent visualization and wristed instrumentation allow for more precise dissection than can be done with laparoscopic or open surgery. Though long-term oncologic outcomes remain to be determined, robotic gastrectomy is safe and feasible in selected patients.

634

Robotic Assisted Laparoscopic Central Pancreatectomy with Roux-en-Y Pancreaticojejunostomy for Pancreatic Neuroendocrine Tumor

Alfredo D. Guerron*, John H. Rodriguez, Kevin M. El-Hayek, Matthew Walsh
General Surgery, Cleveland Clinic, Cleveland, OH

INTRODUCTION: Pancreas neuroendocrine tumors (PNET) with pancreatic duct (PD) involvement present the challenge of clearing the surgical margin.

CASE: 53-year-old male found to have an incidental pancreatic mass on CT. EUS with FNA showed PNET. MRI revealed a neck cystic mass in proximity to PD.

METHODS: We used five ports and a liver retractor. Linear stapler was used to transect the proximal pancreas. A 60 cm Roux limb was fashioned and a jejunojejunostomy was performed laparoscopically. The robot was docked and an end to side pancreaticojejunostomy performed using a Blumgart technique.

CONCLUSION: Robot assisted laparoscopic procedures can be performed with safety following oncologic principles.

2:00 PM – 3:30 PM
S504A

PLENARY SESSION VI

745

Do Adverse Childhood Experiences Affect Surgical Weight Loss Outcomes?

Nayna A. Lodhia*, Ulysses S. Rosas, Michelle Moore, John M. Morton
Surgery, Stanford University, Stanford, CA

INTRODUCTION: Adverse Childhood Experiences (ACEs) are known independent risk factors for chronic diseases. However, little is know about the influence of ACEs on weight loss following bariatric surgery. Understanding the relationship between ACEs and surgical weight loss may optimize perioperative care to ensure long-term success.

METHODS: Demographic, preoperative and postoperative data were prospectively obtained for 148 consecutive patients undergoing weight loss surgery at a single academic institution. Patients enrolled in the study completed the ACE questionnaire, a validated questionnaire in which higher scores indicate greater amounts of childhood maltreatment including verbal, physical or sexual abuse as well as family dysfunction. Patients were compared on the basis of high (≥6) versus low (<6) ACE scores and preoperative comorbidities using Students t-tests, chi-squared tests, and correlation analysis.

RESULTS: Follow up rates at 3-, 6- and 12-months postoperative were 70%, 64% and 62%, respectively. At the time of submission not all patients had reached the 12-month postoperative time point. Patients had an average age of 49 years, 78% were female, 50% were Caucasian, 31% Hispanic, and 9.3% African-American. 57% of patients had a laparoscopic Roux-en-Y gastric bypass, 36% had a laparoscopic sleeve gastrectomy, and 7% had a laparoscopic gastric band. 12-months postoperatively patients saw a significant reduction from their preoperative BMI of 45 to 31 kg/m^2 ($p \leq 0.01$). When compared to population norms, surgical weight loss patients were more likely to have an ACE score ≥4 (37.2 vs 12.5%, $p < 0.001$). There was a positive correlation between number of preoperative comorbidities and ACE score ($R = 0.166$, $p = 0.04$). When compared to patients with low ACE scores (<6), patients with a high ACE score (≥6) had a significantly higher postoperative BMI at 3– (39.2 versus 35.3 kg/m^2, $p \leq 0.02$) and 6-months (35.7 versus 32.3 kg/m2, $p \leq 0.05$) and trended towards a higher BMI at 12-months postoperatively (33.4 versus 30.1 kg/m^2, $p \leq 0.16$). 6-month percent excess weight loss was significantly lower in patients with a high ACE score vs. those with low ACE score (51.4% vs 63.3%). High scoring patients also had higher total cholesterol (196 vs 171 mg/dL, $p = 0.06$) and LDL cholesterol (119 vs 96 mg/dL, $p = 0.07$) when compared to those with low scores at 12-months postoperative.

CONCLUSIONS: ACE scores correlate with number of comorbidities in this surgical weight loss patient population; however, surgical weight loss patients were found to have significantly greater ACE scores than population norms. Patients with a high ACE score are more likely to have higher postoperative BMIs, total and LDL cholesterol.

746

The Effect of Concurrent Esophageal Pathology on Bariatric Surgical Planning

Daniel Davila Bradley*[1], Brian E. Louie[1], Ralph W. Aye[1], Ross Mcmahon[2], Judy Chen[2], Alexander S. Farivar[1]
[1]Thoracic and Esophageal Surgery Clinic, Swedish Cancer Institute, Seattle, WA; [2]Swedish Weight Loss Services, Swedish Medical Center, Seattle, WA

INTRODUCTION: Gastroesophageal reflux disease (GERD), hiatal hernias (HH), and esophageal dysmotility are common in patients planning bariatric surgery. There is no established paradigm guiding bariatric surgeons when esophageal disease is noted preoperatively, i.e. to perform additional esophageal workup or even change the operative plan completely. Previous research demonstrates increased complications and worse outcomes after laparoscopic adjustable gastric banding (GB) and sleeve gastrectomy (SG) if esophageal pathology is not addressed. This study reviewed how an esophageal workup affected a bariatric operative plan in patients with concurrent esophageal pathology.

METHODS: From 2006 to 2013, we retrospectively reviewed 80 patients referred by the bariatric team to dedicated esophageal surgeons after noting a hiatal hernia (>3 cm) on preoperative esophagogastroduodenoscopy (EGD). All patients underwent an EGD, esophagram (UGI), high resolution manometry (HRM) and pH test.

RESULTS: Sixty percent of patients reported reflux symptoms preoperatively, while 10% had dysphagia. The original plan was a Roux-en-Y Gastric Bypass (RYGB) in 35% patients, GB in 45%, and SG in 20% patients. Of the patients scheduled for GB, the plan was changed in 20% of patients that had symptomatic reflux with high DeMeester (>14.7) scores or dysphagia with an abnormal manometry (less than 70% peristalsis or low normal mean distal amplitude 30–50 mmHg). On the patients scheduled for SG, the plan was changed to a RYGB in 60%. Sixty percent of these patients had high DeMeester scores (>14.7) and/or abnormal manometry, and 10% had Barrett's. The remainder had large hernias (5 cm or larger). Barrett's esophagus was reported on pathology on 13% of the patients. In the non-RYGB patients, the plan was changed to a RYGB in 25% of the patients with Barrett's. All patients underwent a concurrent hiatal hernia repair. In 30% of the patients, the original plan from the bariatric team was changed based on esophageal testing findings. Mean follow-up was 12 months (3–48) and 95% of the patients reported resolution of reflux after surgery.

DISCUSSION: We recommend a thorough esophageal workup preoperatively in bariatric patients noted to have esophageal pathology. A significant number of patients may have their operative plan changed to a RYGB to prevent possible adverse outcomes including dysphagia or severe reflux. Physicians should be careful with patients exhibiting dysphagia if LAGB is planned and in patients with elevated DeMeester scores or Barrett's esophagus planning to undergo SG. Additional esophageal workup may help counsel patients to a safer and more appropriate bariatric operation.

747

The Durability of Endoscopic Therapy for Treatment of Barrett's Metaplasia, Dysplasia and Mucosal Cancer After Nissen Fundoplication

Corey Johnson*[1], Brian E. Louie[1], Christy M. Dunst[2], Steven R. Demeester[3], Michal J. Lada[5], Jeffrey H. Peters[5], Ralph W. Aye[1], Alexander S. Farivar[1], Joe Dixon[3,4], Stephanie G. Worrell[3], Jessica Reynolds[4], Aaron Willie[2], John Lipham[4]
[1]Swedish Cancer Institute, Swedish Medical Center, Seattle, WA; [2]General and Minimally Invasive Surgery, The Oregon Clinic, Portland, OR; [3]Division of Thoracic Surgery, University of Southern California, Keck School of Medicine, Los Angeles, CA; [4]Division of Upper GI and General Surgery, University of Southern California, Keck School of Medicine, Los Angeles, CA;[5]Division of Thoracic Surgery, University of Rochester School of Medicine, Rochester, NY

INTRODUCTION: Radiofrequency ablation (RFA) with or without endoscopic resection (EMR) is an established treatment strategy for Barrett's metaplasia, dysplasia and mucosal cancer. During and after endotherapy, most patients are managed with proton pump inhibitors at maximal daily doses. The incidence of recurrent Barrett's metaplasia, dysplasia or cancer after complete eradication is reported at 28% at 2.2 years of follow-up using this strategy. Theoretically, fundoplication may offer better control of GERD thus possibly influencing the recurrence of Barrett's metaplasia. We hypothesize the addition of fundoplication should result in a lower recurrence rates after complete eradication.

METHODS: Multi-institutional retrospective review of patients undergoing endotherapy followed by fundoplication.

RESULTS: A total of 49 patients underwent RFA +/– EMR followed by Nissen fundoplication. The mean age was 61 years with 40 males and a BMI of 29.8. All but 1 patient was Caucasian. The median Barrett's length was 5.5 cm. Hiatal hernias were seen in 98% with a mean size of 3 cm. Entry histology was non-dysplastic Barrett's (NDBE, 8%), low grade dysplasia (LGD, 16%), high grade dysplasia (HGD, 51%) and intramucosal cancer (IMC, 24%). Multilevel dysplasia was found in 16 patients (33%), and raised or nodular histology in 17 patients (35%). The average duration of symptoms prior to fundoplication was 220 months.

EMR was performed in 53% followed by 3.7 RFA treatments (range: 1–11) with 44/49 achieving complete eradication. Five patients did not achieve remission: one had persistent Barrett's, 2 patients had HGD eradicated with persistent NDBE, 1 patient had intramucosal cancer eradicated with persistent NDBE, and 1 patient had LGD on entry with no further biopsy results available. Five patients (10%) had strictures after RFA. A total of 9/49 (18%) patients required a Collis gastroplasty to achieve adequate intra-abdominal esophageal length. Fundoplication was done on average 8 months after eradication of dysplasia.

At 32 months mean follow-up after complete eradication, 12 patients had recurrent disease. Of these, 9/44 (20.5%) occurred after fundoplication and 3 recurred prior to fundoplication. Of the post-fundoplication recurrences, 6 had HGD on entry pathology with only Barrett's on recurrence, 2 had LGD on entry with Barrett's on recurrence, and one had LGD on entry and on recurrence.

CONCLUSION: In patients who undergo fundoplication after RFA +/– EMR for Barrett's metaplasia, dysplasia, or intramucosal cancer, the rate of recurrence at a mean follow-up of 32 months is 20.5%. This rate appears superior to RFA +/– EMR combined with medical management alone in patients with more advanced entry pathology. Moreover, only one patient developed a recurrence after fundoplication that progressed beyond NDBE and none developed esophageal cancer.

748

The Surgical Apgar Score Predicts Early Postoperative Outcomes in a Veteran Population Undergoing Major Surgery of the Alimentary Tract

Ioannis Hatzaras*[1,2], Antonio Masi[1,2], Antonio Pinna[1,3], Alan S. Rosman[4,1], Dena Neihaus[1], Steven Cohen[1,2], John K. Saunders[1,2], Elliot Newman[1,2], Russell S. Berman[1,2], Thomas H. Gouge[1,2], H. Leon Pachter[1,2], Marcovalerio Melis[1,2]
[1]Surgery, NYHHS VAMC, New York, NY; [2]Surgery, NYU School of Medicine, New York, NY; [3]Surgery, University of Sassari, Sassari, Italy; [4]Medicine, James J. Peters VAMC, Bronx, NY

BACKGROUND: We have previously validated use of the Surgical Apgar Score (SAS), a 10-point score calculated using limited intra-operative data (blood loss, lowest heart rate, lowest mean arterial pressure) for prediction of post-operative morbidity and mortality in a veteran population undergoing general surgery. Herein, we aim to validate use of the SAS for prediction of early post-operative outcomes in a veteran population undergoing major surgery of the alimentary tract.

METHODS: We reviewed VASQIP demographics, comorbidities, type of surgery, and post-operative outcomes data of patients undergoing GI surgery at the NY Harbor VAMC. We categorized patients in 4 distinct groups according to their SAS and descriptive statistics were used to compare the groups' characteristics. Multivariate logistic regression was used to assess the effect of SAS on the study's two endpoints: postoperative morbidity and mortality.

RESULTS: From October 2006 to July 2009, 2125 patients underwent general surgery operations. Of those, 695 patients underwent major operations on the alimentary tract. The subpopulation of the four SAS groups were: SAS ≤4: 25; SAS 5–6: 163; SAS 7–8: 332; SAS 9–10: 175. Demographics and baseline patient characteristics, type of surgery and post-operative outcomes among the SAS groups are summarized in table that follows. SAS groups did not differ in age, gender and race, however patients with lower SAS had a lower preoperative functional status. By multivariate analysis, low SAS scores were independently associated with increased post-operative morbidity (O.R. 0.81, C.I. [0.72, 0.92], p = 0.001, [Figure 1]) and mortality (O.R. 0.78, C.I. [0.64, 0.95], p = 0.015, [Figure 2]), Other independent variables associated with morbidity were: age (O.R. 1.01, C.I. [1.00, 1.03], P = 0.039) and preoperative functional status (O.R. 2.0, C.I. [1.54, 2.61], P < 0.001); the only other independent variable associated with increased mortality was preoperative functional status (O.R. 3.53, C.I. [2.42, 5.15], P < 0.001).

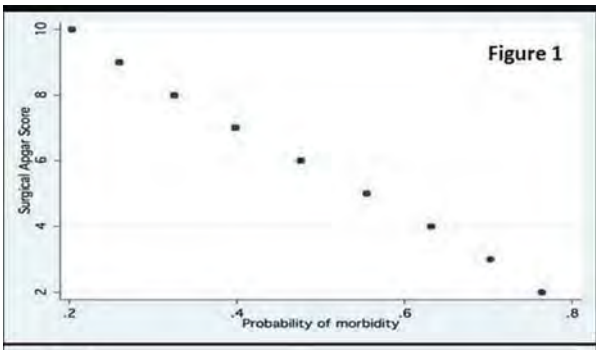


Figure 1

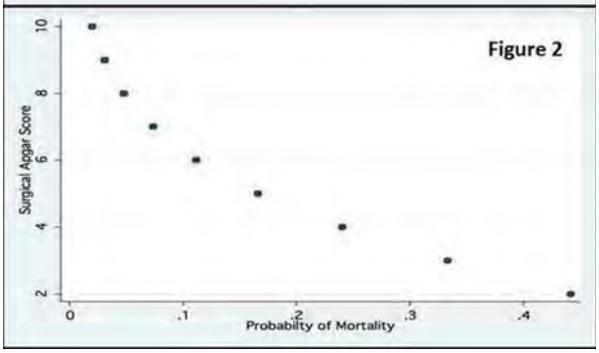


Figure 2

CONCLUSIONS: The SAS correlates with fixed pre-operative risk (functional status, ASA class) and effectively identifies patients at high risk for post-operative complications following major surgery of the alimentary tract.

	Apgar 0–4, N = 25	Apgar 5–6, N = 163	Apgar 7–8, N = 332	Apgar 9–10, N = 175	Total N = 695	P value
Age (years)	69.9 ± 2.4	69.5 ± 0.9	68.0 ± 0.7	69.5 ± 0.8	68.8 ± 11.8	0.41
Male Gender	25 (100%)	160 (98.1%)	321 (96.7%)	173 (98.9%)	679 (97.7%)	0.34
Race distribution Hispanic Caucasian African-American Other	3 (14.3%) 8 (38.1%) 9 (42.9%) 1 (4.7%)	15 (10.5%) 59 (41.3%) 59 (41.3%) 10 (6.9%)	47 (15.9%) 130 (44.2%) 94 (31.9%) 23 (7.8%)	15 (9.5%) 67 (42.4%) 58 (36.7%) 18 (11.4%)	80 (12.9%) 264 (42.9%) 220 (35.7%) 52 (8.4%)	0.32
Functional status Independent Partially Dependent Totally Dependent	7 (28.0%) 7 (28.0%) 11 (44.0%)	82 (50.3%) 39 (23.9%) 42 (25.7%)	247 (74.4%) 54 (16.3%) 31 (9.3%)	142 (81.1%) 24 (13.7%) 9 (5.1%)	478 (68.8%) 124 (17.8%) 93 (13.4%)	<0.01
Smoking within 1 year prior to surgery	6 (24.0%)	45 (27.6%)	88 (26.5%)	45 (25.7%)	184 (26.5%)	0.97
ASA class ASA 2 ASA 3 ASA 4 ASA 5	0 7 (28.0%) 17 (68.0%) 1 (4.0%)	3 (1.8%) 81 (49.7%) 69 (42.3%) 10 (6.1%)	28 (8.4%) 236 (71.1%) 64 (19.3%) 4 (1.2%)	28 (11.4%) 136 (77.7%) 19 (10.9%) 0	51 (7.3%) 460 (66.2%) 169 (24.3%) 15 (2.2%)	<0.01
Site of Surgery Esophagus Stomach Intestine (except rectum) Rectum Liver Biliary Tract Pancreas Peritoneum and Omentum	0 3 (12.0%) 17 (68.0%) 0 1 (4.0%) 2 (8.0%) 1 (4.0%) 1 (4.0%)	4 (2.4%) 9 (5.5%) 105 (64.4%) 3 (1.8%) 6 (3.7%) 7 (4.3%) 12 (7.4%) 17 (10.4%)	13 (3.9%) 21 (6.3%) 189 (56.9%) 15 (4.5%) 20 (6.0%) 19 (5.7%) 23 (6.9%) 32 (9.6%)	2 (1.1%) 7 (4.0%) 107 (61.1%) 1 (0.6%) 8 (4.6%) 12 (6.9%) 4 (2.3%) 34 (19.4%)	19 (2.7%) 40 (5.8) 418 (60.1%) 19 (2.7%) 35 (5.0%) 40 (5.8%) 40 (5.8%) 84 (12.1%)	n/a
Cancer Surgery	4 (16.0%)	41 (25.2%)	105 (31.6%)	43 (24.6%)	193 (27.8%)	0.13
Overall morbidity	13 (52.0%)	86 (52.8%)	119 (35.8%)	41 (23.4%)	259 (37.3%)	<0.001
30-day mortality	4 (16.0%)	25 (15.3%)	20 (6.0%)	3 (1.7%)	52 (7.5%)	<0.001

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Surgical Resection Provides a Significant Overall Survival Benefit for Patients with Small Pancreatic Neuroendocrine Tumors

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BACKGROUND: Pancreatic neuroendocrine tumors (PNETs) have a widely variable potential for malignant behavior. Most series examining the efficacy of surgical resection of these tumors are underpowered, single institutional, retrospective studies. There continues to be controversy regarding the optimal management of incidentally discovered small (≤2 cm) non-functioning PNETs. We evaluated the subpopulation of small, non-functional PNETs in the National Cancer Data Base (NCDB) to determine if an aggressive surgical approach provides a significant survival advantage over observation.

METHODS: The National Cancer Data Base was queried to identify all patients with PNETs ≤2 cm in size treated between 2003 and 2011. Patients with metastatic disease at the time of presentation and those with unknown histologic grade were excluded. Kaplan-Meier analysis, stratified by histologic grade and treatment type, was used to evaluate the difference in 5-year overall survival (OS) between patients who received surgery and those who did not. Multivariable Cox regression was used to determine the relative importance of surgical intervention in overall survival.

RESULTS: 749 patients met inclusion criteria. 93.2% underwent surgery and 6.8% were managed with observation alone. 24.7% were size 0–1 cm and 75.3% were 1.1–2 cm. There were no significant differences between patients in the surgical and observation cohort with regard to tumor size, tumor location, or comorbid disease characteristics. A greater percentage of patients in the observation cohort had moderately or poorly differentiated tumors than did patients in the surgical cohort (37.3% vs. 11.3%, $p < 0.05$). Five-year OS was 89.6% for patients who underwent surgery and 40.1% for those who did not ($p < 0.0001$). Variables included in the final multivariate Cox model were selected by backwards selection and included: age, Charlson score, tumor location, histologic grade, and treatment (surgery vs. observation). When controlling for Charlson score, age, and tumor location, observation without surgical resection (OR 4.94, 95% CI [2.79, 8.76]) and poorly differentiated histology (OR 8.15, 95% CI [4.47, 14.85]) were independently associated with a significant increase in the risk of death ($p < 0.0001$). Lymph node positivity and tumor size were not associated with an increased risk of death.

CONCLUSION: In patients with localized, non-functional pancreatic neuroendocrine tumors 2 cm in size or smaller, surgical resection provides a significant overall survival advantage over observation. This benefit is independent of patient age, co-morbid status, and histologic grade of the tumor.

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Per-Oral Endoscopic Myotomy (POEM) for Esophageal Spastic Disorders: Analysis of 100 Patients

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INTRODUCTION: POEM is a flexible endoscopic approach to lower esophageal sphincter (LES) myotomy to relieve dysphagia. The technique has been rapidly adopted worldwide with short term clinical outcomes. We report on a consecutive patient cohort with clinical and objective outcomes representing the establishment of a POEM program within a busy esophageal surgical practice.

METHODS: Comprehensive data was collected prospectively on all patients undergoing POEM from October 2010 to November 2013 at a single institution. Patients were classified based on high resolution manometry (HRM). Operative data and immediate outcomes were reviewed. Symptom scores, HRM and timed-barium swallow (TBS) were performed prior to procedure. Patients were asked to undergo routine postoperative testing 6–12 months after surgery with the addition of standard 24-h pH. Morbidity was defined as requiring additional procedures or prolonged hospital stay >2 days.

RESULTS: One hundred POEM patients were included in the final analysis. The mean age was 58 years (18–83 years). Presenting symptoms included dysphagia 81, chest pain 10 and regurgitation 9. Mean follow-up was 16 months. HRM diagnosis was 75 achalasia (30 Type I, 43 Type II, 2 Type III), 12 nutcracker, 5 DES and 8 hypertensive non-relaxing LES.

Mean operative time was 128 mins. Median hospital LOS was 1 day. Overall morbidity was 8%; the majority of these were treated endoscopically without further sequelae (2 full-thickness esophageal perforations, 3 had intra-tunnel leak diagnosed on routine esophagram and 1 developed a post-operative intra-tunnel hemorrhage, 1 developed Ogilvie's and 1 required prolonged intubation for CO_2 retention).

Average LES resting/residual pressure significantly decreased (44.3/22.2 to 19.6/11.7 in mmHg). Esophageal emptying improved from 30% to 95% on TBS with 84.2% patients demonstrating >90% emptying at one minute. Of the achalasia patients, 18% (7/39) showed normal peristalsis (>80% peristalsis) on post-op HRM.

Abnormal acid exposure was present in 35.5% (21/59). Of these, 14 were asymptomatic. No reflux patient required additional antireflux procedure.

Eckardt scores decreased from 6 to 1. Dysphagia was improved or eradicated in 97% with a complete resolution accomplished in 89%. Dysphagia relief was better for achalasia patients (46/47 patients; 97%) vs. non-achalasia patients (17/24; 70%). Of those with preoperative chest pain, 95% reported complete relief.

Four patients have refractory dysphagia. Two non-achalasia patients underwent laparoscopic Heller myotomy and 2 are improving with serial endoscopic dilatations.

CONCLUSION: This study represents the largest POEM series to include objective data. Despite reflux in 1/3 of patients, POEM provides excellent relief of dysphagia (97%) and chest pain (95%) for patients with esophageal spastic disorders.

4:00 PM – 5:00 PM
S504A

QUICK SHOTS SESSION III

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Does Drain Fluid Amylase Accurately Predict Pancreatic Fistula?

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BACKGROUND/INTRODUCTION: Improvements in the ability to predict pancreatic fistula (PF) could enhance patient outcome by early drain removal and avoidance of drain-related morbidity in those who will not develop PF. Although clinical predictors are associated with an increased risk for PF, these are imprecise. Previous studies have shown that drain fluid amylase on post operative day 1 (DFA1) > 5000 is predictive of PF. Therefore, we sought to assess the accuracy of DFA1 to predict PF.

METHODS: Patients undergoing pancreatic resection from 11/1/11 to 12/31/12 were selected from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Pancreatectomy Demonstration Project (PDP) database. PF was defined as persistent drainage of amylase-rich fluid in addition to drain continuation >7 days, percutaneous drainage of pancreatic fluid collection, or re-operation. Factors significantly associated with pancreatic fistula on univariate analysis ($p < 0.1$) were included in logistic regression analysis to evaluate factors independently associated with PF. An ROC curve was utilized to determine the best predictive performance between DFA1 and PF.

RESULTS: DFA1 was recorded in 536 of 2724 patients who underwent PR, including patients undergoing pancreaticoduodenectomy (n = 380), distal pancreatectomy (n = 140), and enucleation (n = 16). PF occurred in 92 subjects (17.2%). On univariate analysis, DFA1, increased body mass index (BMI), small pancreatic duct size and soft pancreatic texture were significantly associated with PF ($p < 0.05$). On multivariate analysis, all four of these factors were independently associated with PF ($p < 0.05$). Among multiple DFA1 cutoff values, 60 U/L demonstrated the highest sensitivity (Se) and negative predictive value (NPV [Table]). 141 (26.3%) subjects satisfied this DFA1 cutoff. ROC confirmed the significant relationship between DFA1 and PF, with a c-statistic of 0.761 (Figure).

Table: PF Rates Associated with DFA1 Cutoffs ($p < 0.001$)

DFA1 (U/L)	DFA1 total (n < DFA1)	PF (n)	PF (%)	Se (%)	Sp (%)	NPV (%)	PPV (%)
5000	382	36	23.4	39.1	85.8	87.2	36.7
2500	351	55	29.7	59.8	79.1	90.5	37.2
350	243	75	25.6	81.5	54.7	93.5	27.2
100	170	85	23.2	92.4	38.3	96.0	23.7
90	163	89	23.9	96.7	36.7	98.2	24.1
60	141	90	22.7	97.8	31.8	98.6	22.9
25	69	90	19.3	97.8	15.5	97.2	19.4

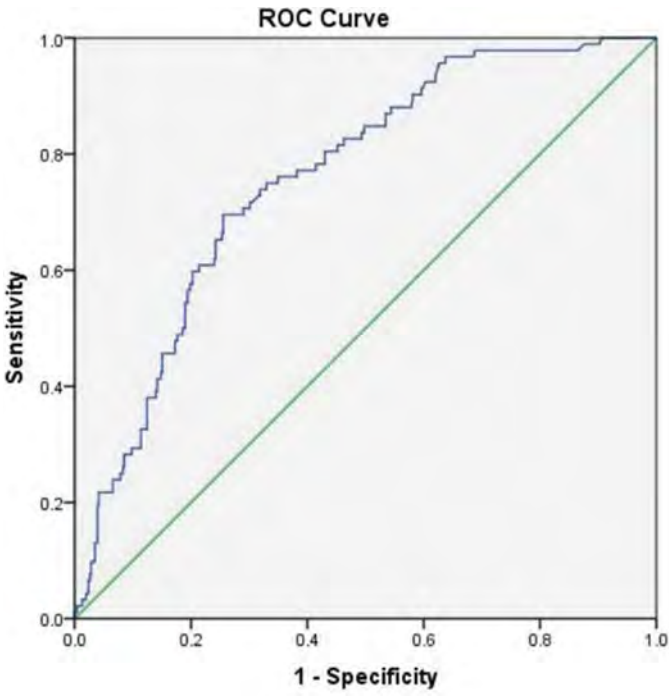

Figure: ROC curve (c-statistic = 0.761; $p < 0.0001$; CI 0.711–0.810).

CONCLUSIONS: Although DFA1 >5000 U/L was associated with high specificity, the sensitivity was low, thus decreasing its clinical usefulness. Lower DFA1 levels resulted in improved NPV; for example, a cut-off of 100 would incur only 4% FN rate while allowing 31% (170/536) of patients to undergo early drain removal safely. Therefore, in patients with low DFA1, early drain removal is recommended.

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Risk Factors Associated with Portomesenteric Venous Thrombosis After Surgery for Medically Refractory Ulcerative Colitis

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PURPOSE: Ulcerative colitis (UC) is a predisposing factor for portomesenteric venous thrombosis (PMVT). However, data on risk factors of PMVT following abdominal surgery for UC remain limited. The aim of this study was to investigate factors associated with PMVT after surgical treatment for UC.

METHODS: Patients who completed restorative proctocolectomy and ileal pouch-anal anastomosis (IPAA) including diverting ileostomy closure for medically refractory UC were identified. Patient-related, disease-related and treatment-related variables were collected. Univariable and multivariable analyses were performed to assess factors associated with PMVT.

Table: Multivariable Analysis of Risk Factors Associated with Postoperative PMVT After Surgery for Medically Refractory UC

Procedures	Odds Ratio (95% Confidence Interval)	p
TPC vs CP	6.7 (2.6–17.4)	<0.001
TPC vs TAC	3.8 (1.7–8.6)	0.002
TAC vs CP	1.8 (0. 7–4.6)	0.24
Preoperative steroids use	3.8 (1.5–9.7)	0.006
Preoperative platelet count		0.12
≤400 x 10^3/μL	1	
>400 x 10^3/μL	1.8 (0.9–3. 8)	
History of DVT and/or PE	4.2 (0.9–20.1)	0.07
Age at surgery	0.9 (0.9–1.0)	0.054

PMVT: portomesenteric venous thrombosis; UC: ulcerative colitis; TPC: total proctocolectomy; CP: completion proctectomy; TAC: total abdominal colectomy; DVT: deep vein thrombosis; PE: pulmonary embolism

RESULTS: Of the 521 patients completing surgical treatment for UC between 2006 and 2012, symptomatic PMVTs were diagnosed by CT or ultrasound in 36 patients (7%), half of whom required readmission. PMVT resulted in a significantly increased combined hospital stay (21.9 vs 14.9 days, p < 0.001). The relative incidence of PMVT was 4% after total abdominal colectomy (TAC), 2% after subsequent completion proctectomy (CP) and 8% after total proctocolectomy (TPC) with IPAA (p = 0.008). No PMVT occurred after stoma closure. When comparing 322 patients with 3-stage approach (initial TAC followed by CP with IPAA) versus 199 patients with 2-stage approach (initial TPC with IPAA), the combined incidence of PMVT was comparable (20 cases, 6% vs.16 cases, 8%, respectively; p = 0.43). Univariate analysis showed that patients developing PMVT were younger (33.8 vs 39.4 years old, p = 0.014), had lower preoperative albumin level (3.5 vs 3.8 g/dl, p = 0.037) and were more likely on steroids within a month before surgery (83% vs 59%, p = 0.006). Multivariate analysis indicated that TPC was associated with a significantly greater risk of PMVT than CP (OR = 6.7, p < 0.001) or TAC (OR = 3.8, p = 0.002). Preoperative steroids remained a significant factor associated with PMVT (Table). Previous history of thromboembolic disease, use of laparoscopic surgery and use of biologics were not significantly associated with the risk of postoperative PMVT.

CONCLUSIONS: PMVT often leads to readmission and prolonged hospital stay. Steroids use rather than other medications or specific surgical approaches is associated with an increased risk of PMVT. When a 3-stage approach is necessary, it does not result in an increase in overall PMVT rate.

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A Multicenter Evaluation of Clinical and Surgical Risk Factors for Anastomotic Leak After Restorative Proctocolectomy with Ileal Pouch-Anal Anastomosis

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INTRODUCTION: Anastomotic leakage (AL) is one of the most feared complications after restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) that could negatively impact long-term patient outcome in pouch function and quality of life. Although previous studies have identified several risk factors for AL, predictive factors in the specific current IBD patient remain subject of debate. Since timely identification of high-risk patients could influence surgical decision-making and diminish the risk for complications, the aim of our study is to identify clinical and surgical parameters associated with AL.

METHODS: Between September 1990 and April 2013, a total of 691 patients who underwent IPAA surgery for IBD, dysplasia, or FAP were identified from prospectively maintained databases of 3 colorectal tertiary referral centers. Retrospective chart review identified additional data on demographic and surgical variables. AL was defined as any leak confirmed by either contrast extravasation on imaging or during re-laparotomy (leak grades B; drainage, and C; re-laparotomy). Multivariate regression models were developed to identify risk factors for AL.

RESULTS: A total of 691 patients (55.7% male) were included with a median age of 39 years (17–77). One hundred and two (14.8%) patients developed postoperative AL. Univariate analysis identified, age at surgery (>55 years), long-term disease course (>5 years), overweight (BMI >25),

high ASA classification (≥3), steroids (≥20 mg), anti-TNF (<3 months preoperatively) and the combination of both therapies as risk factors. Surgical factors were multistaged procedures (primary IPAA vs subtotal colectomy with completion proctectomy and IPAA at a later stage), J-pouch and perioperative blood transfusion. Multivariate regression models demonstrated, long-term disease course (OR 2.01, 95% CI 1.27–3.19, P = 0.003), high ASA score (OR 1.94, 95% CI 1.09–3.47, P = 0.03) and a combination of anti-TNF and steroid treatment (OR 5.61, 95% CI 1.71–18.48, P = 0.005) as independent preoperative risk factors for AL. The only surgical risk factor that was independently associated with decreased leak rate was subtotal colectomy with IPAA at a later stage (OR 0.53, 95% CI 0.33–0.846, p = 0.008). Since a staged procedure was therefore considered as a confounding variable, subgroup analysis of patients with primary IPAA was also performed. This demonstrated that long-term disease course (OR 1.79, 95% CI 1.03–3.14, p = 0.04) and a combination of anti-TNF and steroid treatment (OR 3.96, 95% CI 1.15–13.77, p = 0.03) remained independent preoperative risk factors.

CONCLUSIONS: Long-term disease course, high ASA score, and a combination of anti-TNF and steroid treatment within 3 months before IPAA were all independent preoperative risk factors for AL. A staged procedure seems an appropriate strategy when these risk factors are identified.

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Complications After Hospital Discharge Leading to Readmission in Colorectal Resection Patients: A Review of the ACS-NSQIP Database

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BACKGROUND: To reduce costs surgeons strive to shorten the length of stay (LOS). However, the earlier the discharge the greater the number of complications that occur out of hospital. The purpose of this study was to determine the type and proportion of complications that occur after discharge in Colorectal Resection Patients (CRP) and to determine the readmission rate.

METHODS: The data used for this study was obtained from the NSQIP database which was queried for elective CRP's in 2012. Exclusion criteria were: totally dependent health status, ventilator dependence, sepsis, prior surgery within 30 days, emergency cases and ASA status 4, 5. Demographic parameters, comorbidities, LOS, complications and readmissions were assessed. The Fisher's exact test was used for univariate analysis.

RESULTS: A total of 23847 CRP's were identified; indications for surgery were: malignant tumor 50.4%, benign tumor 14.2%, diverticulitis 23.5%, IBD 10.2%, and other 1.7%. The operations performed were: segmental resection, 84.5%; APR/proctectomy 8.7%; and total colectomy 6.8%. Stomas were constructed in 21.8% and laparoscopic methods used in 56.3% of cases. The mean LOS was 6.4 ± 5.4 days and the mortality rate 0.8%. Unplanned readmission occurred in 10.2% of patients and the reoperation rate was 4.7%. The overall morbidity rate was 24.3%; 40.1% of the complications occurred after discharge. Readmission was required for 49.7% of patients with post-discharge complications. The individual complication data is presented in the following order: 1) the overall rate of the complication in question, 2) the percentage of patients with that complication diagnosed post discharge, and 3) the percentage of patients with that complication who were readmitted. The most frequent complications after discharge were: superficial SSI, 6.8%, 59.7%, 26.6%; sepsis, 3.4%, 36.4%, 92.4%; Organ Space SSI, 4.0%, 49.3%, 88.9%; and UTI, 2.8%, 42.9%, 40.4%. Rarer complications with a high readmission rate were: pneumonia, 1.4%, 18.5%, 71.4%; DVT 1.2%, 47.2%, 73.1%; wound disruption, 1.1%, 51.3%, 59.6%; progressive Renal Insufficiency, 0.7%, 49.7%, 86.4%; Pulmonary Embolism, 0.6%, 46.3%, 88.2%; and CVA/Stroke, 0.2%, 33.3%, 92.3%.

CONCLUSION: Forty percent of complications occurred after discharge and half the affected patients required readmission. The most common late complications were superficial SSI, organ space infection, sepsis, and UTI. The readmission rate for individual complications varied from 26–90%. It is not clear to what extent discharge delays recognition of the complication and the start of treatment. After discharge, CRP's should be followed closely in order to diagnose and treat late complications early. When assessing costs for inpatient procedures it is critical to include costs associated with late complications including readmission and treatments.

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Readmission Decreases Patient Satisfaction in Colorectal Surgery

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PURPOSE: HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) is a validated questionnaire designed to measure patients' perception of their in hospital experience with care. HCAHPS is a component of Medicare's value-based purchase initiative. Medicare has also started penalizing hospitals with high readmission rates for certain diagnoses. The aim of this study is to determine if 30-day readmission after colorectal surgery influences HCAHPS scores.

METHODS: HCAHPS surveys collected after patients' discharges from 2012–2013 following colorectal surgery were linked with a prospectively maintained outcomes database, which included 30-day readmission rates after surgery. HCAHPS domains evaluated were: how well nurses and doctors communicate with patients; how responsive hospital staff are to patients' needs; how well hospital staff help patients manage pain; how well the staff communicates with patients about new medicines; whether key information is provided at discharge; hospital cleanliness and quietness; hospital recommendation; and overall hospital rating. Most favorable survey responses for domains were compared for patients undergoing primary admission versus 30-day readmission.

RESULTS: 1079 HCAHPS surveys were evaluated. 1012 questionnaires (93.8%) corresponded to primary admissions (P), and 67 surveys (6.2%) were from readmissions (R). Patients readmitted to the hospital (R) were statistically more likely to respond unfavorably to "pain management" domains compared to those patients with a primary admission (P) ($p = 0.004$). Patients who were readmitted (R) are also less likely to recommend the hospital ($p = 0.004$). Readmission did not influence the other HCAHPS domains.

Table: Comparison of Primary Admission and Re-Admission "Top Box" Answers in Each HCAHPS Domain

HCAHPS Domains	Primary Admission	Readmission	p Value
Communication with Nurses	689 (68.1%)	41 (61.2%)	0.24
Communication with Doctors	711 (70.3%)	41 (61.2%)	0.12
Responsiveness of Hospital Staff	196 (43.9%)	10 (32.3%)	0.21
Pain Management	544 (58.7%)	24 (39.3%)	0.004
Communication about Medicine Medicine	260 (46.3%)	18 (47.4%)	0.90
Discharge Information	873 (86.3%)	55 (82.1%)	0.34
Cleanliness of Hospital Environment	708 (70.0%)	47 (70.1%)	0.97
Quietness of Hospital Environment	457 (45.2%)	33 (49.3%)	0.51
Overall Hospital Rating	202 (79.8%)	48 (72.7%)	0.17
Recommend the Hospital	867 (85.7%)	49 (73.1%)	0.007

CONCLUSION: Hospital readmission after surgery negatively impacts HCAHPS scores associated with pain and hospital recommendation. Readmissions have the potential to influence hospital reimbursement in two different ways, by itself and by lower HCAHPS score.

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Comparative Readmission Rates for Bariatric Surgery

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BACKGROUND: Readmissions are an important quality metric for bariatric surgery. Our study aim is compare causes of readmissions, time to readmission, and characteristics of readmitted patients across all three types of bariatric surgery: laparoscopic Roux-en-Y gastric bypass (LRYGB), laparoscopic adjustable gastric band (LAGB), and laparoscopic sleeve gastrectomy (LSG).

METHODS: A total of 1,874 patients undergoing bariatric surgery at a single academic institution over a 10-year period from 2003 to 2013 were included in this retrospective analysis. Preoperative data collected included patients' demographic information, anthropometric features, and biochemical risk factors. Inpatient data such as operation duration and hospital length of stay (LOS) were recorded. Readmission data collected collected, included time to readmission, cause of readmission, and readmission hospital LOS. Data were analyzed by one-way ANOVA and chi-square tests as needed, STATA, release 12.

RESULTS: 1,411 (75.3%) patients were LRYGB, 168 (8.96%) were LAGB, and 295 (15.7%) were LSG. A total of 113 patients (6.37%) were readmitted. Mean time to readmission was 124 days (median: 22; IQR: 8, 84). Of all readmissions, 64.6% were within 30 days, 22.1% from 30 to 90 days, 1.77% from 90 to 180 days, and 11.5% from 180 days to one year. Incidence of 30-day readmission was not significantly different across surgery types (LRYGB: 4.18%; LAGB: 2.38%; LSG: 3.39%, $p = 0.463$). Mean hospital LOS for the 30-day readmission was 5.70 days, and did not differ significantly across surgery types. Most common causes of 30-day readmissions for all patients were ulcers/strictures (19.2%), vitamin/nutritional deficiencies or dehydration (17.8%), and bowel obstruction (13.7%). Causes of 30-day readmission did not vary significantly across surgery types, with LRYGB readmissions most commonly due to ulcers/strictures (23.7%), LAGB due to vitamin/nutritional deficiencies or dehydration (50.0%), and LSG due to deep venous thrombosis or pulmonary embolism (30.0%, $p = 0.050$). Patients with 30-day readmission did not have a significantly higher operative time (170 minutes vs. 160, $p = 0.183$), but had a significantly longer postoperative LOS (4.77 days vs. 2.63, $p < 0.001$). There was no significant difference in age, sex, race, insurance type, or BMI.

CONCLUSIONS: Most readmissions after bariatric surgery occur within 30 days, while a measurable proportion occur within a year. There are no significant differences in 30-day readmission rates and causes of 30-day readmissions across surgery types.

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When Tissue Is the Issue: A New Device for Extracorporeal Hypothermic Perfusion of Intestinal Lumen and Vasculature Decreases the Rate of Necrosis During Graft Transportation

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INTRODUCTION: Intestine remains the least commonly transplanted organ despite continuing need. With the advancement in immunosuppression and surgical techniques, the rate of successful small bowel transplants has increased however little has changed in the crucial intermediary step of keeping intestinal tissue viable. We sought to develop a device that could improve the preservation of the graft during this period by perfusing both the intestinal lumen and vasculature. We hypothesized that such treatment would lead to a lesser degree of necrosis than under the conditions of the current standard of care.

METHODS: Porcine small bowel was obtained using standard procurement techniques within 30 mins of circulatory arrest. Following dissection of the superior mesenteric artery and vein, each vessel was cannulated and attached to polyvinyl chloride (PVC) tubing. 2 meters of bowel from both the proximal and distal ends respectively were resected and stored in standard fashion as control. The remaining length of bowel was flushed with normal saline. Similar cannulation was performed as tubing was installed into the proximal and distal ends of the bowel. The graft, including the attached mesentery, was placed in a sterile bowel bag that was immersed in an ice bath within an insulated perfusion device. The two PVC tubes from the superior mesenteric vessels were attached to a self-priming, peristaltic pump to conduct cold normal saline in the anterograde direction. A separate identical pump was attached to the two PVC tubes in the intestinal lumen. Both legs of the experiment were allowed to run for 4 hours followed by formalin fixation.

RESULTS: Samples from both the control and experimental specimens (Figures 1 and 2, respectively) were analyzed using Hematoxylin-Eosin staining. The control samples of the proximal and distal portions both showed increased epithelial inflammation with increased lymphocytes and eosinophils. There was focal early ulceration in the proximal portion. In contrast, the tissue samples that were continuously perfused with cold saline showed comparatively less inflammation and no detectable ulceration with overall reduced epithelial damage.

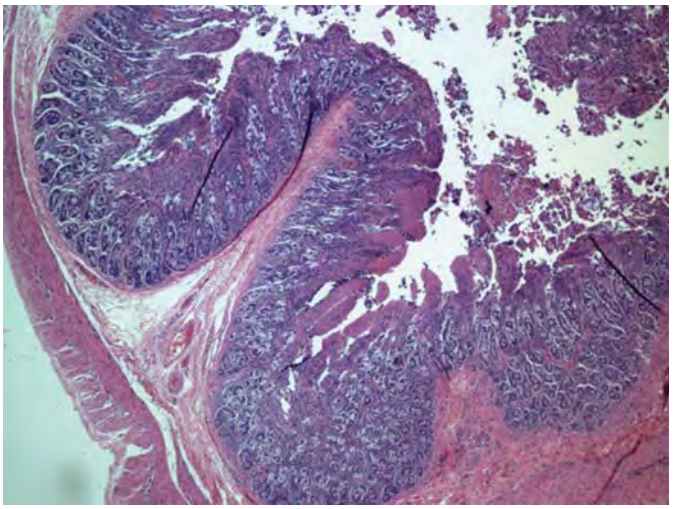

Figure 1: Control intestinal wall, proximal portion.

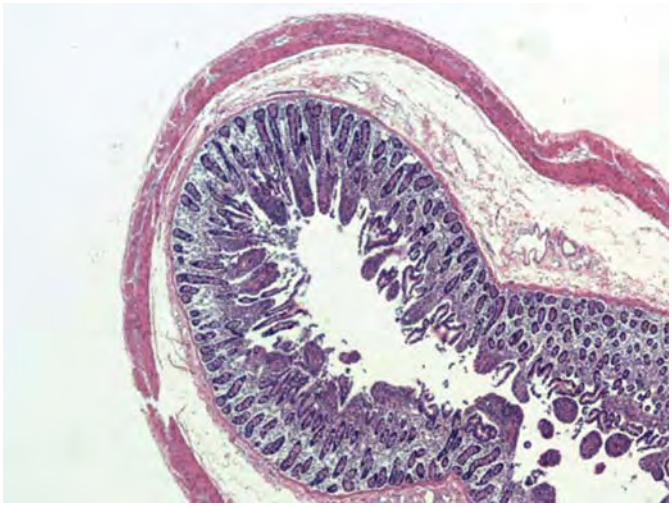

Figure 2: Experimental Intestinal Wall.

CONCLUSION: The standard of care in preservation methods for intestinal grafts has not changed in the last two decades. Our results demonstrate that by using a perfusion system with a simple preservation solution, better histological results can be generated than by cold storage alone. These findings confirm that the continuous perfusion of small bowel with cold fluid aids in organ preservation by decreasing the rate of necrosis in intestinal tissue for transplantation. This presents opportunity for increasing the availability and quality of donor organs for transplantation by continuous perfusion of the mesentery and lumen of the intestine to allow for increased viability of the organ.

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Strictureplasty for Treatment of Crohn's Disease: A NSQIP Database Analysis

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Oregon Health and Science University, Portland, OR

BACKGROUND: Strictureplasty has been proposed as a good alternative to small bowel resection for the treatment of Crohn's Disease (CD) related strictures. It has the advantage of preserving bowel length, and specialized centers have reported favorable results with the operation. However, the actual utilization of this procedure in the United States is thought to be low, and the Residency Review Committee (RRC) has recently removed strictureplasty from the required case experience for residents in Colon and Rectal Surgery programs. Using a large national database, we sought to determine the use and outcomes of strictureplasty and small bowel resection in the treatment of Crohn's patients.

METHODS: We examined the ACS-NSQIP database from the years 2005–2012. All patients who underwent an elective small bowel resection and/or strictureplasty for Crohn's disease were examined. We examined trends in utilization and compared outcome variables for small bowel resection alone (SBR) to strictureplasty with or without SBR. Cohort outcomes were compared using Pearson test and Kruskal-Wallis test.

RESULTS: We identified 1202 CD patients who underwent elective surgical intervention consisting of small bowel resection, strictureplasty, or both. Comparing 2005 to 2012, the proportion of patients undergoing strictureplasty decreased over time (30 vs 17%). Comparing outcome variables, median operative time was shorter in patients with SBR than strictureplasty (158 vs 177 min, $p = 0.001$), yet organ space SSI occurred more frequently with SBR than with strictureplasty (6 vs. 3%, $p < 0.001$). Superficial surgical site infection (SSI), deep SSI, reoperation rate and readmission within 30 days were no different between the groups.

CONCLUSION: The use of strictureplasty as an elective intervention for CD related strictures is decreasing in the ACS-NSQIP database. Short term surgical outcomes are similar between strictureplasty and SBR. Since strictureplasty has a decreased risk of organ space infection and preserves bowel length, this procedure may be underutilized.

Tuesday, May 6, 2014

8:00 AM – 9:30 AM
S504A

PLENARY SESSION VII

898

Importance of Lymph Node Involvement in Pancreatic Neuroendocrine Tumors: Impact on Survival and Implications for Surgical Resection

Thomas Curran*[1], Barbara A. Pockaj[2], Richard J. Gray[2], Nabil Wasif[2]
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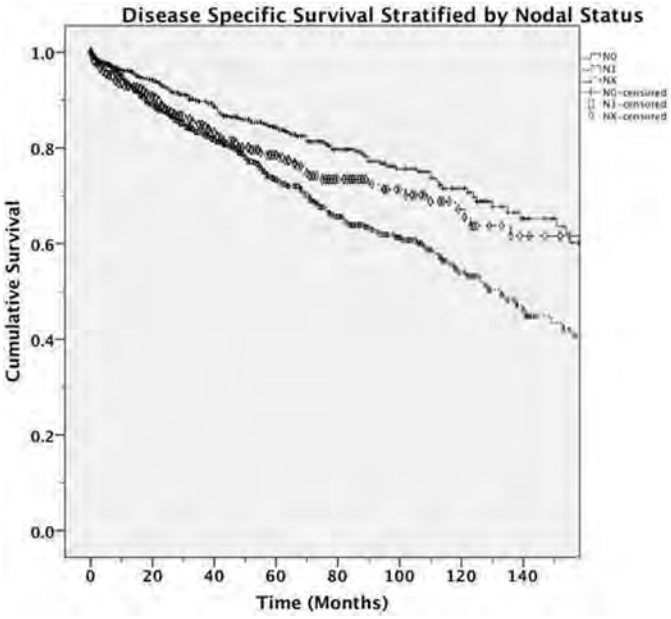
BACKGROUND: Pancreatic neuroendocrine tumors (PNETs) are rare neoplasms with a variable clinical course. Data regarding predictors of lymph node involvement and the impact of nodal metastases on survival has been limited to single institution series. Similarly, the role of limited surgical resection, if any, in the management of PNETs is unknown. We aim to use a national cancer registry to: 1) identify factors associated with lymph node involvement 2) evaluate the effect of nodal metastases on survival and 3) identify a subset of patients suitable for limited resection.

METHODS: All patients undergoing surgery for PNETs in the Surveillance, Epidemiology, and End Results (SEER) tumor registry from 1988 to 2010 were included. Pathologic lymph node status was classified as positive (N1), negative (N0) or unknown (Nx). Predictors of lymph node involvement were evaluated using multivariable logistic regression. Kaplan-Meier estimations were used to calculate unadjusted disease specific survival (DSS). Clinicopathologic predictors of DSS were determined via multivariable Cox regression analysis.

RESULTS: We identified 1,915 patients undergoing surgery for a PNET. Mean age was 55.9 (SD + 14.0) years and approximately half of the patients were female (48%). Most common tumor location was in the tail of the pancreas (34%) and the majority of the tumors were non-functional

(62%). Breakdown by tumor grade was 49% grade I–II, 8% grade III–IV and 43% unknown. Tumor size was 0–2 cm in 24%, 2–5 cm in 42% and greater than 5 cm in 34%. Lymph node status was N0 in 755 cases (39%), N1 in 735 cases (38%) and Nx in 425 cases (22%). Nodal positivity was associated with increasing tumor size ($p < 0.001$) and grade ($p < 0.001$). Median follow up was 40 months (IQR: 16–77 months) with 405 disease specific deaths. Unadjusted DSS at 5 years was 81% for N0, 74% for Nx and 69% for N1 respectively, ($p < 0.001$). After adjustment for tumor size and grade, DSS was significantly decreased in N1 patients (HR: 1.57, 95% CI: 1.23–1.95). For patients who had at least one node examined and had low grade PNETs < 1 cm in size no nodal metastases were found.



CONCLUSIONS: High tumor grade and increasing size predicts nodal metastases in patients with PNETs. N1 status is independently associated with decreased DSS. Low-grade tumors less than 1 cm are unlikely to have lymph node metastases, suggesting that enucleation or local resection may be oncologically safe in this patient subset.

899

Pancreaticoduodenectomy with Major Vascular Resection: A Comparisson of Laparoscopic Versus Open Approaches

Kristopher Croome*, Michael B. Farnell, Mark J. Truty, Florencia G. Que, Kaye M. Reid Lombardo, David M. Nagorney, Michael L. Kendrick
Mayo Clinic, Rochester, MN

BACKGROUND: Major vascular resection (MVR) with open pancreaticoduodenectomy is well-established with perioperative and oncological outcomes that are similar to patients undergoing pancreaticoduodenectomy without venous involvement. This study compares outcomes of total laparoscopic versus open pancreaticoduodenectomy with MVR.

METHODS: Single institution, retrospective review of all patients undergoing laparoscopic or open pancreaticoduodenectomy with MVR between the dates of July 2007 and July 2013.

RESULTS: A total of 89 patients (31 laparoscopic, 58 open) underwent pancreaticoduodenectomy with MVR. Mean operative blood loss was significantly less in the laparoscopic (842 cc) compared to the open group (1452 cc) ($p < 0.001$) as was median operative stay, 6 (4–118) days versus 9 (6–73) days respectively ($P = 0.006$). There was no significant difference in the total number of complications (lap 35%, open 48%) ($p = 0.24$) or severe complications (≥IIIB) (lap 6.4%, open 3.4%) ($p = 0.51$) in the 2 groups. In-hospital mortality or 90 day mortality was not different between the laparoscopic and open groups, 3.2% and 3.4% respectively ($p = 0.96$). Patency rates of the reconstructed vessels on post-operative imaging were not different between the laparoscopic (93%) and open groups (91%) ($p = 0.76$). In patients with a diagnosis of adenocarcinoma there was no difference in overall survival between the 2 groups ($p = 0.22$).

CONCLUSION: Total laparoscopic pancreaticoduodenectomy with major vascular resection is not only feasible and safe but can achieve results that are similar to open approaches with regard to morbidity, mortality and oncologic outcome.

900

Reappraisal of Peritoneal Cytology in 984 Patients with Pancreatic Cancer Who Underwent Curative Resection

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[1]Department of Surgery, Kansai Medical University, Hirakata, Japan; [2]Department of Surgery, Tohoku University, Sendai, Japan; [3]Department of Surgery, Hiroshima University, Hiroshima, Japan; [4]Second Department of Surgery, Wakayama Medical University, Wakayama, Japan; [5]Department of Surgery, Komagome Hospital, Tokyo, Japan; [6]Department of Surgery, Nara Medical University, Nara, Japan; [7]Division of Hepato-Biliary-Pancreatic Surgery, Department of Surgery, Kobe University Graduate School of Medicine, Kobe, Japan; [8]Multicenter Study Group of Pancreatobiliary Surgery, Japan, Japan

INTRODUCTION: Positive peritoneal washing cytology (CY) status in patients with resectable pancreatic cancer is defined as M1 disease in the American Joint Committee on Cancer. Although some articles have shown that there was no significant difference in overall survival curve between positive and negative CY in patients who underwent surgical resection, the number of patients with positive CY included retrospectively were a small population of 10–20 patients only. We reappraised the clinical value of peritoneal washing cytology in 984 pancreatic cancer patients with curative surgical intent.

PATIENTS: We collected the clinical data of 984 patients with pancreatic cancer who underwent curative resection between 2001 and 2011 at 7 high-volume surgical institutions in Japan. There were 69 patients (7%) with positive CY (CY+ group), and 915 patients with negative CY (CY– group). Clinico-pathological data and survival curve were compared between the two groups, and multivariate analysis was performed to find prognostic factors. All surviving patients were followed-up for at least one year.

RESULTS: There were significant correlations between CY+ and high level of pre- and post-operative CA19-9, high rate of pancreatic body and tail cancer, large tumor, positive lymph node metastasis, high lymph node ratio, and low rate of R0 resection.

Overall survival curve of CY+ was significantly worse than that of CY– (16 months vs. 25 months, median survival tim;, 6% vs. 37% 3-year survival rate, $p < 0.001$). A similar result was found upon comparison of disease-free survival (DFS) (8.8 months vs. 13.8 months, median DFS time; 5% vs. 25%, 3-year DFS rate, $p < 0.001$). Multivariate analysis showed that CY–, CA19-9 < 115IU/l, resectable disease, R0 resection, negative lymph node metastasis, tumor differentiation, and post-operative adjuvant therapy were significantly independent prognostic factors. The CY+ group had a significantly higher rate of peritoneal metastasis as a primary site of recurrence, relative to the CY– group (48% vs 21%, $p < 0.001$). Performance of gemcitabine or S-1–based adjuvant chemotherapy did not give a favorable survival outcome in patients with CY+. Multivariate analysis in the CY+ group indicated that the development of peritoneal metastasis only was independently associated with worse prognosis.

CONCLUSION: This study provides marginal support to the assumed benefits of curative resection for patients with CY+, and the development of a new strategy to prevent peritoneal metastasis during the post-operative period will be required for obtaining long-term survivors.

901

Volume Regeneration of Segment 2+3 After Right Portal Vein Embolization in Patients Undergoing 2-Stage Hepatectomy

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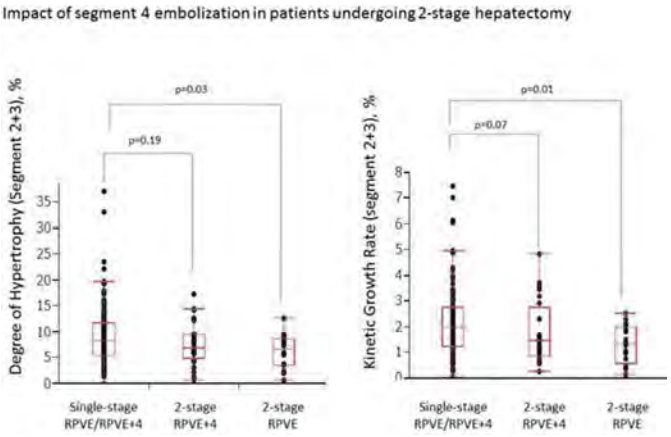
MD Anderson Cancer Centor, Houston, TX

BACKGROUND: Two-stage hepatectomy can offer a favorable prognosis in patients with advanced bilateral colorectal liver metastases. Right portal vein embolization (RPVE) following first-stage resection plays an important role in completing 2-stage hepatectomy by inducing hypertrophy of the left liver in patients with insufficient future liver remnant. The impact of first-stage resection on volume regeneration of segment 2+3 after RPVE has not been investigated.

METHOD: Volume data for segments 2 and 3 were compared between 45 patients undergoing 2-stage hepatectomy for colorectal liver metastases and 111 patients undergoing planned single-stage hepatectomy for colorectal liver metastases after RPVE or RPVE and embolization of segment 4 (RPVE+4). In patients undergoing 2-stage hepatectomy, baseline volume was calculated using images obtained after the first-stage resection.

RESULTS: Baseline volume of segments 2 and 3 did not differ between the 2 groups. However, degree of hypertrophy (difference between standardized volume of segments 2 and 3 before and after RPVE) was significantly lower in patients undergoing 2-stage hepatectomy (median 6.8% vs 8.3%, $p = 0.03$). Kinetic growth rate, defined as the degree of hypertrophy at initial volume assessment divided by the number of weeks elapsed after RPVE, was also significantly lower in the 2-stage hepatectomy group (1.4% vs 2.0%, $p < 0.001$). Multivariate analysis of 156 patients revealed that independent predictors of lower degree of hypertrophy were sinusoidal injury (HR: 2.72, CI: 1.22–5.40, $p = 0.02$), lack of segment 4 embolization (HR: 2.40, CI: 1.60–3.60, $p < 0.01$), body surface area >2.0 m^2 (HR: 1.94, CI: 1.32–2.89, $p < 0.01$), and 2-stage hepatectomy (HR: 1.81, CI: 1.21–2.67, $p < 0.01$). In patients undergoing 2-stage hepatectomy after RPVE+4, degree of hypertrophy and kinetic growth rate were similar to those in patients undergoing single-stage hepatectomy ($p = 0.19$ and $p = 0.07$, respectively [Figure]).



CONCLUSION: The first-stage resection impairs volume regeneration of segments 2 and 3 after RPVE in patients undergoing 2-stage hepatectomy. When 2-stage extended right hepatectomy is planned, additional embolization of segment 4 is needed to obtain volume hypertrophy similar to that in patients undergoing single-stage hepatectomy.

902

Multivisceral Transplantation for Non-Resectable Abdominal Neuroendocrine Tumors

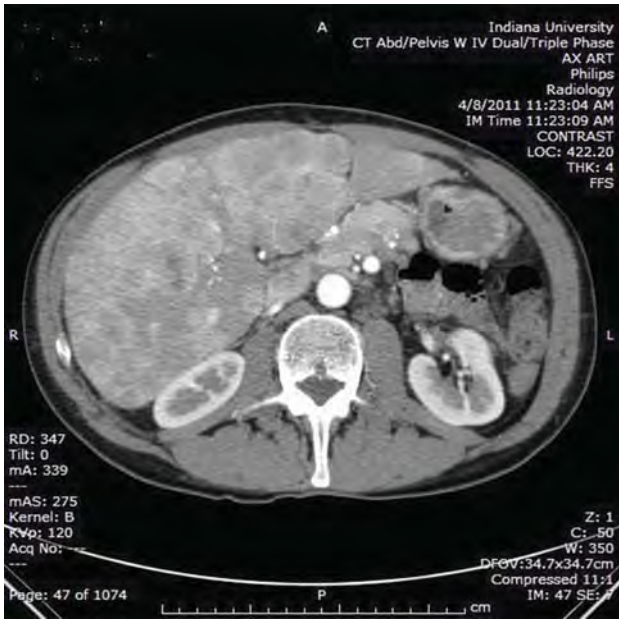
Richard S. Mangus*, Mary Maluccio, Chandrashekhar A. Kubal, Jonathan A. Fridell, A. Joseph Tector

Surgery, Transplantation Section, Indiana University, School of Medicine, Indianapolis, IN

INTRODUCTION: Neuroendocrine tumors (NETs) are slow growing tumors that are minimally responsive to chemotherapy and radiation therapy. These tumors may be cured with complete surgical resection. This paper presents a series of patients with metastatic or non-resectable NETs that were considered unresectable upon initial consideration, but subsequently underwent multivisceral transplant (MVT) with curative intent.

METHODS: All patients at our center undergoing MVT for metastatic or non-resectable NET were included in this analysis. Diagnosis of NET required tissue confirmation. All patients underwent pre-transplant imaging including octreotide scan and PET CT. Patients with tumor outside of the intestine, pancreas, duodenum and liver were excluded for MVT. Immunosuppression included antibody-based induction and maintenance tacrolimus with low dose steroids.

RESULTS: There were 120 full MVTs performed between 2004 and 2012, 13 of these were for NETs. All 13 NET patients had a primary abdominal tumor, with numerous metastatic liver lesions or a non-resectable primary encasing the root of the mesentery. A variety of pre-transplant therapies had been attempted on these patients including resection, chemotherapy and radiation therapy. There were 3 tumor types represented including carcinoid (4), islet cell (3), VIPoma (3). There were 3 with undetermined cell type. The MVT included resection of the native liver, stomach, duodenum, pancreas, spleen, intestine and right/transverse colon. The cluster graft included stomach, liver, duodenum, pancreas and intestine +/– colon. Lymph nodes in the retroperitoneum were resected during the operation in an attempt to remove all tumor. The following image demonstrates one of the transplanted patients with extensive liver involvement.



With a median follow up of 34 months (3–81), 8 of 13 patients are alive. There was 1 intraoperative death, and 5 of 12 surviving patients have recurrence (42%).

(a) 1 patient had recurrence in the transplant liver and died 10 months post-transplant of liver failure;

(b) 1 patient had asymptomatic recurrence in his mediastinal lymph nodes and died of neutropenic sepsis 17 months post-transplant;

(c) 3 patients have asymptomatic recurrence and are healthy and functional.

All eight living patients are healthy, enteral independent, at home with survival ranging from 3 to 81 months.

CONCLUSIONS: MVT for non-resectable abdominal NET may be a viable therapeutic option. We have several long-term, tumor free survivors who would otherwise have died from their terminal disease. Pre-transplant identification of occult or nodal disease using 68-Gallium based imaging is critical to assure complete tumor resection.

903

Single-Stage Cholecystectomy at the Time of Pancreatic Necrosectomy Is Safe and Prevents Future Biliary Complications: A 20-Year Single Institutional Experience with 217 Consecutive Patients

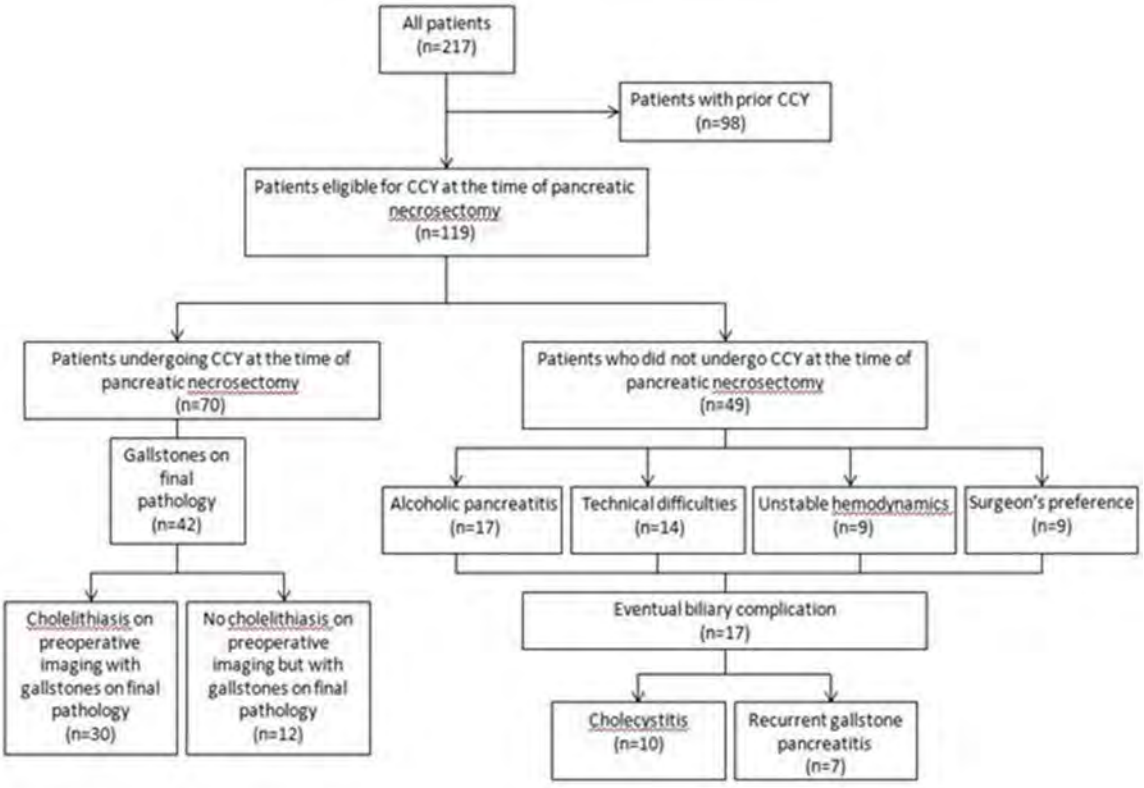
Zhi Ven Fong*, Miroslav P. Peev, Andrew L. Warshaw, Keith D. Lillemoe, Carlos Fernandez-Del Castillo, George C. Velmahos, Peter J. Fagenholz
General Surgery, Massachusetts General Hospital, Boston, MA

INTRODUCTION: Current guidelines recommend cholecystectomy (CCY) during the index admission for mild to moderate biliary pancreatitis as delayed CCY is associated with a substantial risk of recurrent biliary events. Delayed CCY is recommended in severe pancreatitis. As a result, CCY is frequently avoided at the time of pancreatic necrosectomy, although no studies have investigated the related outcomes. We sought to determine the safety of single-stage CCY performed at the time of necrosectomy and its effectiveness in preventing subsequent biliary complications.

METHODS: We retrospectively queried our institutional database of patients who underwent pancreatic necrosectomy for necrotizing pancreatitis from 1992–2012.

RESULTS: We identified 217 consecutive patients who underwent pancreatic necrosectomy during the study period. The most common etiologies of pancreatitis were biliary (41%) and alcoholic (24%), with a median CT-severity index score of 6 ± 1.6 and a 63.6% incidence of infected necrosis. Of them, 70 (59%) patients with a gallbladder underwent CCY at the time of pancreatic necrosectomy. CCY was not performed in the remaining 41% due to a clear non-biliary etiology (35%), technical difficulty (29%), intraoperative hemodynamic instability (18%), or surgeon preference (18%). There was 1 complication (gallbladder fossa hemorrhage) related to the single stage CCY at a median follow-up of 32 months. Based on final histopatholgical analysis, 43% of patients who had no cholelithiasis or biliary sludge on preoperative imaging had gallstones or sludge identified pathologically after single stage CCY. Of those who did not receive a single stage CCY, biliary complications developed in 35% of patients (21% cholecystitis, 14% recurrent gallstone pancreatitis) at a median time to incidence of 10 months. Seventeen (12%) patients eventually received a post-necrosectomy cholecystectomy, of which 75% required an open procedure.

CONCLUSION: This is the first study demonstrating that single stage CCY at the time of pancreatic necrosectomy is safe in selected patients and should be performed if technically feasible to prevent future biliary complications and reduce the need for a subsequent separate, often open, abdominal operation.



Denominator diagram of patients who underwent single-stage cholecystectomy at the time of pancreatic necrosectomy and those that did not.

10:00 AM – 11:30 AM
S504A

PLENARY SESSION VIII

971

Is Sacral Nerve Stimulation Here to Stay? Clinical Outcomes of a New Treatment for Fecal Incontinence

Ian M. Paquette*, Bobby L. Johnson, Martha Ferguson, Janice F. Rafferty
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PURPOSE: Sacral nerve stimulation (SNS) was approved by the Food and Drug Administration for the treatment of fecal incontinence (FI) in 2011. Previous industry-sponsored trials have shown excellent clinical outcomes with this technique. The purpose of this study is to examine relevant clinical outcomes of patients treated during our initial experience with SNS.

METHODS: A prospective database of all patients treated with SNS for FI by one of three Colorectal Surgeons was maintained starting in 2011. Patients with >2 episodes of FI per week with failure of conservative measures were eligible for SNS after a full discussion of options. Patients showing ≥50% improvement of symptoms during stage 1 test stimulation were offered chronic implantation of the InterStim system (Medtronic: Minneapolis, MN). Disease severity was tracked using the Wexner score, a validated FI scoring system with a score of 0 representing no symptoms, and 20 being the most severe disease.

RESULTS: One hundred and fifteen patients underwent stage 1 test stimulation with a 96.5% success rate. A total of 111 patients with a median age of 67 received a full system implantation. The median preoperative Wexner score was 14/20 (Interquartile range: 14–16). The median Wexner score decreased to 3/20 at 3 months, and this result persisted at 12 months (Figure) At 12 months, 93% of patients achieved at least a 50% improvement in Wexner Score (70% of patients achieved a 75–100% improvement). The most common adverse event was infection 4.4%. All but one patient with an infection required an explantation of the device. Two patients required revision of the electrode over time without the need to replace the entire system. A total of 54% of patients required programming changes in the office to obtain optimal results.

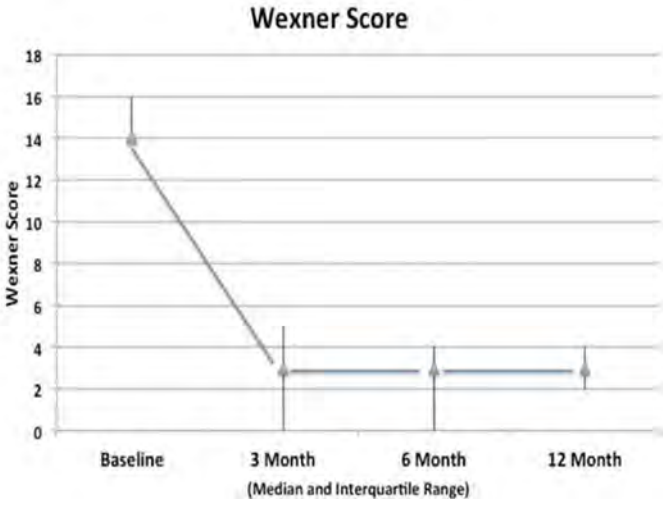

Figure: Change in Wexner score over time (median and interquartile range).

CONCLUSIONS: SNS is a safe and effective therapy for the treatment of FI. Postoperative patient surveillance is important, as many patients require programming changes, and some will require a lead revision over time.

972

Predictors and Outcomes of Readmission for *Clostridium Difficile* in a National Sample of Medicare Beneficiaries

Courtney Collins[*1], M. Didem Ayturk[1,2], Frederick A. Anderson[1,2], Heena P. Santry[1]

[1]Surgery, University of Massachusetts, Worcester, MA; [2]Center for Outcomes Research, Worcester, MA

INTRODUCTION: The incidence and severity of *Clostridium difficile* (CD) infections is rapidly increasing in the US, particularly in the elderly. Older patients may also be at increased risk of recurrence of CD, placing them at further risk for adverse outcomes. We examined readmission rates and patient characteristics in a national sample of Medicare beneficiaries with CD and determined predictors of CD readmission.

METHODS: We queried a 5% random sample of Medicare claims data (2009–2011) and identified hospitalized patients with CD by primary or secondary ICD-9 diagnosis codes. Patients were considered readmitted for CD after these index hospitalizations if they had a subsequent admission with CD as the primary diagnosis. Demographics (race, age, sex), clinical information (Elixhauser index, gastrointestinal comorbidities), and original CD hospitalization characteristics (length of stay [LOS], need for ICU care, CD as primary vs. secondary diagnosis) were compared for patients who were and were not readmitted for CD. A multivariable analysis determined independent predictors of CD readmission.

RESULTS: Of 8998 beneficiaries surviving a hospitalization with CD, 1267 (14%) were readmitted for CD during the study period. Median time to CD readmission was 23 days (IQR: 9–47 days). Readmitted patients were more likely to be female, 75–84 years old, have more comorbidities, and have a history of inflammatory bowel disease (IBD) than patients not readmitted (Table 1). Readmitted patients were significantly more likely to have had CD as the primary diagnosis, shorter LOS, and lower rates of ICU care during index admission. Of readmitted patients, 382 (30%) received outpatient CD treatment (vancomycin and/or metronidazole), 176 (14%) were exposed to other oral antibiotics, and 331 (26%) had ≥1 admission for reasons other than a primary diagnosis of CD prior to readmission for CD. Readmitted patients stayed a median of 7 days (IQR: 4–17) with 159 (12.5%) requiring ICU care; 85 (6.7%) died during their readmission. Colectomy rate was low at 0.9% (12 patients). On multivariable analysis female gender, Elixhauser index, age 75–84 years, IBD, original LOS <7 days, and ICD-9 as primary diagnosis were independent predictors of CD readmission (Table 2). About one fourth of readmitted patients (22%) were readmitted more than once.

Table 1: Characteristics of Medication Beneficiaries with a *Clostridium Difficile* Hospitalization (2009–2011)

	Readmitted Patients (N = 1267)	Non-Readmitted Patients (N = 7731)	P Value
Female N (%)	970 (76.6)	5580 (72.2)	<0.01
Age group N (%)			<0.01
65–74	289 (22.8)	2107 (27.3)	
75–84	544 (42.9)	2935 (38)	
85–104	424(34.3)	2689 (34.8)	
Race N (%)			0.17
Non-Hispanic	1063 (83.9)	6327 (81.8)	
White	92 (7.3)	707 (9.2)	
Black-Hispanic	76 (6)	469 (6.1)	
Other	36 (2.8)	228 (3)	
Elixhauser Score, N (%)			0.02
0	265 (20.9)	1828 (23.7)	
1	84 (6.60)	368 (4.8)	
2	134 (10.6)	746 (9.7)	
3	156 (12.3)	961 (12.4)	
>3	628 (49.6)	3828 (49.5)	
GI comorbidities, N (%)			
Diverticular Disease	152 (12)	762 (9.9)	.0.09
Inflammatory Bowel Disease	67 (5.3)	231 (3)	0.03
GERD	476 (37.6)	2587 (33.5)	0.26
Peptic Ulcer Disease	52 (4.1)	325 (4.2)	0.43
Colon cancer	43 (3.4)	234 (3)	0.88
Original CD Hospitalization Characteristics			
CD as primary diagnosis N(%)	593 (46.8)	2179 (28.2)	<0.01
Length of stay median (IQR)	7 (4,13)	9 (5,16)	<0.01
ICU stay, N (%)	262 (20.6)	2003 (26)	<0.01

Table 2: Predictors of Readmission for *Clostridium Difficile*

	Adjusted OR*	95% CI
Age 65–74	Ref.	Ref.
Age 75–84	**1.36**	(1.17,1.59)
Age ≥85	1.15	(0.98,1.35)
Female	**1.19**	(1.03, 1.37)
Elixhauser Index = 0	Ref	Ref
Elixhauser Index = 1	**1.66**	(1.26,2.19)
Elixhauser Index = 2	**1.30**	(1.03,1.63)
Elixhauser Index = 3	1.19	(0.96,1.48)
Elixhauser index >3	**1.28**	(1.09,1.50)
Inflammatory Bowel Disease	**1.44**	(1.05,1.97)
Original CD hospitalization Characteristics		
CD as primary diagnosis	**1.90**	(1.67,2.17)
LOS ≥7 days	**1.62**	(1.42,1.85)
ICU stay	0.99	(0.85,1.16)

*adjusted for all factors listed

CONCLUSION: Nearly 1 in 6 patients hospitalized for CD experience recurrence requiring readmission, often in the first month after their index hospitalization. It appears that older patients with more comorbidities, in particular IBD, admitted primarily for CD who had shorter treatment courses during index admission are at highest risk of readmission. These findings suggest that older patients at risk for CD readmission may benefit from documented eradication of CD prior to hospital discharge or more aggressive post-discharge CD treatment and monitoring.

973

Bariatric Outcomes Are Significantly Improved in Hospitals with Fellowship Council Accredited Bariatric Fellowships

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INTRODUCTION: Identifying hospital factors associated with improved outcome following bariatric surgery is of high priority. Previous studies centered on characteristics such as operative volume and Center-of-Excellence (COE) designation. Little is known regarding the impact of a fellowship training program on institutional outcomes. This study examines the effect of bariatric fellowship training program status on perioperative outcomes.

METHODS: Following IRB approval, New York Statewide Planning and Research Cooperative System (SPARCS) administrative data was used to identify 47,342 adult patients in 91 hospitals who underwent bariatric surgery from 2004–2010. SPARCS is a comprehensive longitudinal data reporting system, which collects patient-level risk characteristics, treatments, and outcomes for all New York State (NYS) hospital discharges. Bariatric surgery was identified by discharges with a primary diagnosis of overweight or obesity and a primary procedure code for laparoscopic gastric band (LGB), laparoscopic Roux-en-y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (LSG). Hospitals with fellowships were identified from the Fellowship Council website (n = 12). Statistical comparison between patient demographics, co-morbidities present at the time of operation, bariatric procedure performed and perioperative complication in hospitals with versus without fellowship was performed via univariate and multivariable regression analysis.

RESULTS: Of 47,342 patients, 11,343 patients underwent surgery in fellowship accredited hospitals versus 35,999 in hospitals without fellowship. Significant differences were demonstrated in patient demographics, comorbidity profiles and operative procedures performed in fellowship versus nonfellowship hospitals (Table). Univariate analysis initially demonstrated fellowship programs to have increased rates of cardiac complications (1.1%vs.0.6%, $p < 0.001$) and shock (2.1%vs.1.3%,$p < 0.001$) and decreased rates of pneumonia (0.5% vs. 0.7%,$p = 0.008$). Overall complication rate was not significantly different in fellowship versus nonfellowship accredited hospitals (4.3%vs. 4.0%, $p = 0.18$), respectively. No other differences in individual complications were demonstrated. Multivariable regression analysis controlling for patient demographic, co-morbidity, operative procedure and insurance payer demonstrated fellowship status significantly and independently correlated with improved perioperative outcome OR 0.88 (95% CI [0.78–0.98], $p = 0.02$).

Table: Significant Differences in Patient Demographics, Co-Morbidity Profile and Operative Procedure in Hospitals with vs. without a Fellowship Council–Accredited Bariatric Fellowship Program

Patient Demographics	Fellowship-Accredited Hospital (n = 11,343)	Nonfellowship-Accredited Hospital (n = 35,999)	P-value
Black	13.7%	12.8%	<0.001
Hispanic	19.2%	9.4%	<0.001
White	54.5%	66.6	<0.001
Medicaid	7.8%	3.2%	<0.001
Non CMS insured	85.3%	90.1%	<0.001
Patient Comorbidity			<0.001
Congestive heart failure	3.7%	3.0%	<0.001
Liver disease	14.8%	5.1%	<0.001
Pulmonary disease	29.5%	23.2%	<0.001
Operative Procedure			<0.001
Laparoscopic RYGB	67.0%	53.7%	<0.001
Laparoscopic AGB	21.9%	37.0%	<0.001

CONCLUSION: Fellowship accreditation status is associated with significantly improved bariatric outcomes in New York State. Differences in complications noted on univariate analysis likely reflect that fellowship accredited hospitals operate on higher risk patient populations and perform increased RYGB versus LGB.

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Small Bowel Resection Induces Long-Term Changes in the Enteric Microbiome of Mice

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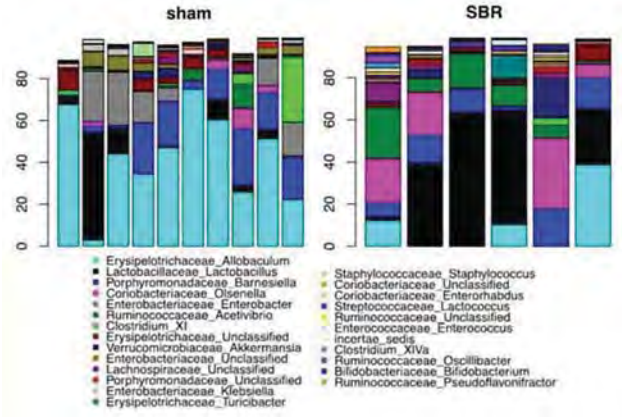
PURPOSE: The enteric microbiome is known to play a major role in healthy gut homeostasis and several disease states. It may also contribute to both the intestinal recovery and complications (diarrhea, malabsorption, recurrent sepsis) that occur in patients with short bowel syndrome. This has not been well-studied in a controlled setting, and the purpose of this investigation is to characterize the effects of massive small bowel resection on the murine enteric microflora.

METHODS: Wild-type C57BL6 mice underwent either 50% proximal small bowel resection (SBR) or a sham operation. Mice were sacrificed and enteric contents from small bowel, cecum, and stool were harvested at 7 and 90-days post-operatively. DNA was isolated, and the V3–V5 regions of the 16s rRNA gene amplified and pyrosequenced on a Roche 454 platform. Sequences were clustered into operation taxonomic units and classified. Communities were then analyzed for diversity and phylogenic composition.

RESULTS: In the long-term group, he microbes inhabiting the ileum of mice undergoing SBR and sham operation differed significantly at the genus level ($p < 0.001$). Cecal contents in these groups differed to a degree nearing significance ($p = 0.09$). Small bowel contents collected before and after SBR also differed significantly ($p = 0.006$). This was driven by an increase in Lactobacillus and decrease in Enterobacteriaceae species in mice undergoing SBR. No difference was seen in the stool long-term, or at any enteric site in the short-term. No difference in microbial community diversity was found in any group.



Boxplot displaying bacterial species composition of small bowel luminal contents 90 days post-operation in mice undergoing either sham operation or small bowel resection (SBR).

CONCLUSION: Bowel resection induces long-term changes in the microbial community of the murine small bowel that are attenuated in the cecum and absent in the stool. The increase in Lactobacillus encountered small bowel of resected mice correlates with limited previous studies. This may reflect an adaptive response to maximize energy extraction, but further studies are needed to establish causality.

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Short-Term Oncologic Outcomes Are Superior Following Laparoscopic Versus Open Low Anterior Resection for Rectal Cancer: Results from the National Cancer Database

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BACKGROUND: While laparoscopy has emerged as a standard technique for patients undergoing colorectal surgery, there is ongoing debate regarding the oncologic equivalence of laparoscopic compared to open low anterior resection (LAR) for rectal cancer. Clinical trials are underway to evaluate this question (ACOSOG-Z6051); however, final results will not be available for some time. In the interim, the purpose of this study is to evaluate the short-term oncologic outcomes for patients undergoing laparoscopic versus open LAR.

METHODS: The National Cancer Database (NCDB) was queried to identify patients undergoing LAR for rectal cancer between 2010–2011. Subjects were stratified by laparoscopic (LLAR) versus open (OLAR) technique. Perioperative variables were compared between groups, and subjects were then propensity matched using a 1:1 nearest-neighbor algorithm to adjust for bias at the level of treatment decision. Finally, short-term outcomes were compared between groups.

RESULTS: A total of 18,765 patients underwent LAR for rectal cancer, of which 6,430 (34.3%) were performed laparoscopically. Patients who underwent LLAR were slightly younger (61 vs. 62 years, $p < 0.001$). Those undergoing LLAR were more likely to have pre-operative T-stage 1/2 than T-stage 3/4 disease ($p < 0.001$) and were less likely to have radiographic evidence of nodal involvement ($p < 0.001$); thus, these patients were also less likely to have received neoadjuvant chemoradiation therapy ($p < 0.001$). After propensity matching, however, all baseline variables between groups were highly similar, including pre-operative stage, radiographic tumor characteristics, and use of neoadjuvant therapy (Table 1).

Table 1. Adjusted baseline characteristics (following propensity matching)

Variable	Open LAR (n = 6,430)	Laparoscopic LAR (n = 6,430)	P-value
Patient characteristics			
Age, yrs (IQR)	61 (52, 71)	61 (52, 71)	0.485
Female	2,681 (41.7%)	2,705 (42.1%)	0.681
Race			0.375
White	5,628 (88.3%)	5,572 (87.5%)	
Black	434 (6.8%)	464 (7.3%)	
Other	313 (4.9%)	334 (5.2%)	
Charlson Comorbidity Score			0.886
0	4,907 (76.3%)	4,884 (76%)	
1	1,181 (18.4%)	1,196 (18.6%)	
≥2	342 (5.3%)	350 (5.4%)	
Education above median	3,844 (63.8%)	3,789 (63.3%)	0.571
Income above median	4,383 (72.8%)	4,335 (72.4%)	0.68
Distance to cancer center (IQR)	9 (4, 21)	10 (5, 23)	0.763
Treatment facility			0.647
Community Cancer Program	505 (7.9%)	477 (7.5%)	
Comprehensive Community Cancer Program	3,855 (60.3%)	3,869 (60.5%)	
Academic/Research Program	2,038 (31.9%)	2,052 (32.1%)	
Tumor characteristics on pre-operative imaging			
Tumor size (mm)	38 (25, 50)	37 (24, 50)	0.832
cT stage element			0.909
1	913 (22.4%)	922 (22.9%)	
2	826 (20.3%)	829 (20.6%)	
3	2,178 (53.5%)	2,124 (52.7%)	
4	157 (3.9%)	159 (3.9%)	
cN stage element			0.864
0	3,979 (74.2%)	3,948 (74%)	
1	1,165 (21.7%)	1,160 (21.7%)	
2	219 (4.1%)	229 (4.3%)	
Pre-operative treatment specifics			
Neoadjuvant XRT	1,961 (30.7%)	1,938 (30.4%)	0.69
Neoadjuvant chemo	1,961 (30.8%)	1,978 (31.1%)	0.75
Days to definitive surgery (IQR)	37 (13, 115)	37 (15, 117)	0.969

Patients undergoing LLAR were more likely to have both gross (97.8 vs. 96.5%, $p < 0.001$) and microscopic (97.1 vs. 96.6%, $p < 0.001$) negative margins following surgical resection. Moreover, circumferential margins of at least 1mm were achieved more frequently in patients undergoing LLAR (94.3 vs. 92.2%, $p < 0.001$). There was no difference in median number of regional lymph nodes obtained (15 vs. 15). Patients undergoing LLAR had a shorter hospital length of stay (5 vs. 6 days, $p < 0.001$) without a corresponding increase in 30-day readmission rates (6 vs. 7%, $p = 0.02$). Overall, there was no difference in 30-day mortality (1.3 vs. 1.7%, $p = 0.06$).

CONCLUSIONS: Laparoscopic low anterior resection is a safe alternative to open surgery for patients with rectal cancer, with meaningful reductions in hospital length of stay. Furthermore, LLAR may also result in superior short-term oncologic outcomes as measured via surrogate pathologic endpoints in the NCDB. While these results support the increasing use of laparoscopy in colorectal surgery, further data are necessary to assess long-term outcomes. The final results of ACOSOG-Z6051 are eagerly awaited.

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Transanal Minimally Invasive Surgery for Total Mesorectal Excision (TAMIS-TME) with Laparoscopic Assistance

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This video demonstrates transanal minimally invasive surgery for total mesorectal excision (TAMIS-TME) with laparoscopic assistance. The patient is an 84 year old male with a T3N1M0 rectal adenocarcinoma. After induction, a transanal port is fixed above the sphincters, insufflation is obtained, and a transanal TME is performed. The abdominal portion of the proctectomy follows with laparoscopic ligation of the inferior mesenteric artery and mobilization of the left colon. The rectum is extracorporealized transanally, and transected at the rectosigmoid junction. A diverting ileostomy is created, and a coloanal anastomosis completes the procedure.

2:00 PM – 3:00 PM
S102D

DDW COMBINED RESEARCH FORUM (AGA-ACCREDITED)

986

P120catenin Facilitates Pancreatic Regeneration and Monoallelic Loss Accelerates Kras-Driven Carcinogenesis and Metastasis

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INTRODUCTION: Pancreatic ductal adenocarcinoma (PDAC) is the fourth leading cause of cancer-related deaths in the United States and worldwide. It has been shown that p120catenin (p120ctn) loss or mislocalization correlates with poor patient survival. P120ctn is critical for epithelial integrity by regulating turnover of membrane-bound cadherins and downstream signaling via small RhoGTPases.

METHOD: In order to study p120catenin loss in the pancreas we crossed the Pdx1cre line with p120ctnfl/fl mice, challenged the pancreas with cerulein-induced pancreatitis and introduced a KrasG12D mutation in combination with a R26YFP reporter allele.

RESULTS: p120ctnfl/fl mice display marked fatty degeneration but no cancer at 12 months of age. Interestingly, only the acinar compartment of the pancreas is affected although recombination was confirmed in all pancreatic lineages including islets of Langerhans. The relative amylase area in p120ctnfl/wt and p120ctnfl/fl mice is significantly decreased compared to wild-type controls. When challenging these mice with cerulein-induced acute pancreatitis, animals with monoallelic (p120ctnfl/wt) and biallelic (p120ctnfl/fl) loss of p120ctn show delayed regeneration and maintain an acinar-to-ductal phenotype. Remarkably, when introducing a mutant KrasG12D allele in combination with p120ctnfl/fl, mice are not viable. However, starting from 3 weeks of age Pdx1cre;p120ctnfl/wt;KrasG12D/+;R26YFP mice harbor the entire spectrum of PanIN (1-3) as well as cystic disease including mucinous cystic neoplasia and intraductal paplillary neoplasia. Within 20 weeks of age mice progress to PDAC with evident profound metastatic disease. These metastases (liver) are YFP positive (indicating recombination) but, surprisingly, retain p120ctn protein expression by immunofluorescence suggesting that no loss-of-heterozygosity (LOH) occurred. In addition, p120ctn co-localizes with E-cadherin at the plasma membrane. The absence of LOH suggests that one allele of p120ctn might be required to reestablish epithelial integrity at the metastatic site. When culturing wild-type, p120ctnfl/wt, and p120ctnfl/fl primary ductal epithelial cells in a three-dimensional system, only wild-type and p120ctnfl/wt are able to establish organized epithelial structures underscoring the in vivo results that one allele of p120ctn is sufficient to allow cells to revert back into an epithelial phenotype.

CONCLUSION: Taken together, p120ctn is required for proper pancreatic regeneration and monoallelic loss of p120ctn in combination with KrasG12D accelerates metastatic PDAC progression. The data indicate that monoallelic loss of p120ctn facilitates cellular plasticity. Our mouse model represents a novel, innovative and physiologically relevant tool to study pancreatic carcinogenesis and metastasis as well as EMT-MET plasticity.

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Clinical Utility of Using Second-Line Integrated Molecular Pathology Testing in Addition to First-Line Test Algorithms to Determine the Malignant Potential of Pancreatic Cysts (N = 492)

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BACKGROUND & AIMS: Results of a multi-center pancreatic cyst study have shown that, when cytology results are non-malignant, integrated molecular pathology (IMP) can accurately differentiate cysts with low vs. high malignant potential by incorporating DNA molecular analyses with first-line tests (cytologic atypia, CEA, imaging).[1] To assess the clinical utility of such testing in this study cohort, we compared the performance of IMP to that of algorithms integrating first-line test results.

METHODS: 492 patients with non-malignant cytology at the time of IMP diagnosis (RedPath) were included. Patient outcomes were classified as benign or malignant based on subsequent surgical pathology (n = 209) or clinical confirmation (n = 283) including malignant cytology post-IMP testing, clinical cancer management, or 23+ months (23–92 months; median 35 months) imaging follow-up. Sendai 2012 radiographic and cytology criteria and CEA criteria (Sendai+CEA) were evaluated for their ability to discriminate high from low risk disease based on the presence of at least one concerning cyst feature: cyst size = 3 cm, solid component, main duct involvement, pancreatic duct dilation = 1 cm, severe cytologic atypia, or CEA = 192. These criteria were also assessed using a support vector machine (SVM) learning algorithm trained with a radial basis function kernel using five-fold cross-validation.

RESULTS: Grouping patients as high risk (Sendai+CEA), based on the presence of at least one concerning first-line test, resulted in adequate sensitivity (59/66, 89%) for malignancy but at the expense of specificity (188/426, 44%) (Figure). Similar sensitivity (58/66, 88%) with improved specificity (311/426, 73%) was encountered when the SVM algorithm was used to determine the optimal combination of first-line test results that could best distinguish between patients with high and low risk of malignancy. By comparison, IMP was able to maintain statistically similar sensitivity (55/66, 83%)[1] to both Sendai+CEA and SVM (both $p > 0.4$) but with significantly improved specificity (386/426, 91%)[1] compared to Sendai+CEA and SVM (both $p < 0.0001$). Such differences were due to a 47% and 18% reduction in false positive diagnoses by IMP relative to Sendai+CEA and SVM, respectively.

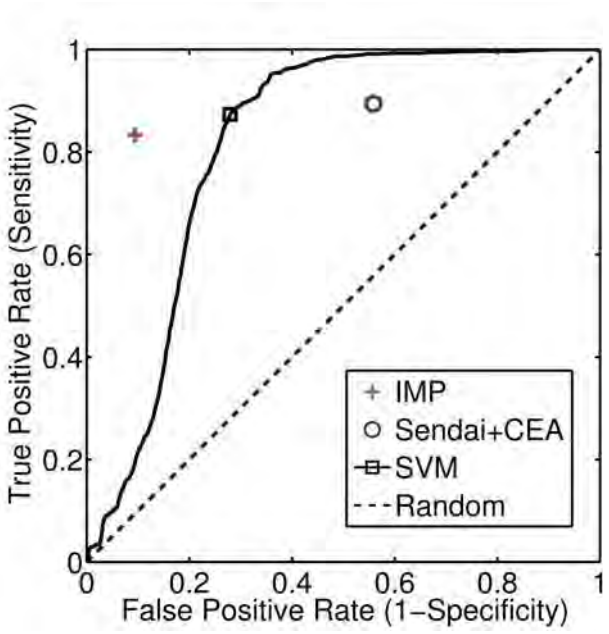

Figure: Receiver Operator Curve (ROC) for Integrated molecular pathology (IMP) performance compared to performance of integrated first-line testing algorithms, including Sendai+CEA and support vector machine learning (SVM) algorithms.

CONCLUSIONS: While guideline recommended and, even, computer generated (SVM) algorithms of first-line tests often provide false evidence of high risk disease resulting in low specificity for malignancy, second-line IMP testing more accurately differentiates between patients at high and low risk of malignancy. As such, IMP testing can help to avoid unnecessary surgeries in patients destined for benign outcome, while providing reliable evidence for the need of surgery in patients who are at high risk of adenocarcinoma.

REFERENCE: 1. Catalano, M, et al. *Poster*. ACG 2013; San Diego, CA.

988

Sequence Alterations in the WEE1 Non-Coding Region Is a Facilitator and Marker for Pancreatic Tumorigenesis

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INTRODUCTION: We discovered an abnormal sequence motif in a 56 bp non-coding region of the mitotic kinase inhibitor WEE1 in pancreatic adenocarcinoma, which contains the binding site of an RNA binding protein, HuR (important for cancer cell survival). WEE1 promotes DNA repair by regulating a mitotic checkpoint in the setting of DNA damage. We hypothesize that a germline sequence alteration (INDEL, insertion/deletion of bases) in WEE1 impairs HuR stabilization of the WEE1 transcript and abrogates this critical checkpoint in cells to enhance proliferation. Paradoxically, this phenotype could render cells susceptible to DNA damaging agents.

EXPERIMENTAL METHODS: The 56 bp HuR binding site on the WEE1 transcript was sequenced in 21 cancer cell lines, 30 familial pancreatic cancers, and 68 patients with normal pancreata. Functional assays were performed in cell lines with wild type and abnormal WEE1 sequence after treatment with mitomycin C (MMC).

RESULTS: An INDEL was identified in the poly-T track of the 56 bp region (ATGTACCTGTGTGTCCATCTTATATTTCTTTTTTTTTTAATTGTGAATTAGAC), which has 10 T's in the wild type sequence. In the control group, 51 patients had two wild type alleles, and 17 were heterozygous for a TT insertion (12 T's), establishing an abnormal allelic frequency of 12.5%. In 21 cancer cell lines, 10 were homozygous for the wild type sequence, and 11 exhibited a TT insertion. In 5 of these cell lines, the second allele exhibited a separate abnormality (11 T's). In total, the abnormal allelic frequency was three-fold increased at 38%. In 30 familial pancreatic cancers, 12 were homozygous for the wild type sequence and 18 had the TT insertion (abnormal allelic frequency of 30%, $p < 0.0003$ vs. controls). MMC (i.e., DNA damage) treatment of pancreatic cancer cell lines results in HuR movement from the nucleus to the cytoplasm with its bound mRNA (e.g., the WEE1 transcript). MMC induced WEE1 protein expression by Western blot in cell lines with wild type sequence, but not in cell lines containing INDELs in both alleles. Reporter constructs with luciferase in front of the HuR-WEE1 binding site (both wild type and abnormal sequence) were generated. Upon treatment with MMC, reporter activity was reduced with plasmids containing the TT insertion. Interestingly, biallelic abnormal binding site sequences (while observed in 5/21 cancer cell lines) were never identified in the germline of any patients (n=98, expected in 5% of individuals), suggesting that this sequence motif is functionally important and embryonic lethal.

CONCLUSIONS: The incidence of a TT insertion in the HuR binding site on WEE1 is increased in familial pancreatic cancer and results in decreased WEE1 expression upon DNA damage. These findings may have important implications for 1) genetic screening, 2) predicting chemo-responsiveness, 3) and the development of novel therapies.

POSTER SESSION DETAIL

Printed as submitted by the authors; designated presented authors in bold.

*indicates a poster featured in a **Poster Tour** (ticketed session with complimentary but limited registration):*

Sunday, May 4, 2014, 11:00 – 11:45 AM: Colon-Rectal

Monday, May 5, 2014, 11:00 – 11:45 AM: Esophageal

indicates a Poster of Distinction.

Sunday, May 4, 2014

Authors available at their posters to answer questions 12:00 PM – 2:00 PM; posters on display 8:00 AM – 5:00 PM.

12:00 PM – 2:00 PM
South Hall

POSTER SESSION I
(NON-CME)

Basic: Colon-Rectal

Su1920

Colorectal Cancer Is Associated with Elevated Plasma Levels of Chitinase 3-Like-1

H.M.C. Shantha Kumara[1], Hiromichi Miyagaki[1,2], Jeanine Arkenbosch[1], Xiaohong Yan[1], Sonali A. Herath[1], Sahani De Silva[1], Linda Njoh[1], Vesna Cekic[1], Richard L. Whelan[1]
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INTRODUCTION: Chitinase 3-Like1 (CHI3L1) is a secreted heparin binding glycoprotein expressed in many cell types including immune cells, endothelium and cancer cells. CHI3L1 enhances macrophage chemotaxis into cancers and macrophage production of IL8 and MCP-1 in the tumor microenvironment which promotes tumor angeogenesis and progression. CHI3L1 also regulates cellular and tissue responses via IL-13 receptor alpha 2 and promotes in vitro cancer cell proliferation, human endothelial cell migration and tubule formation. CHI3L1 expression has been noted in gliblastoma, colon, breast, and hepatocellular carcinomas and increased blood levels of CHI3L1 have been noted in patients with breast, lung, ovarian and prostate cancers. Blood levels in the setting of colorectal cancer (CRC) have not been well studied. This study's purpose was to compare preoperative (PreOp) plasma CHI3L1 levels in CRC and benign colonic pathology (BCP) patients.

METHOD: Preoperative (PreOp) plasma samples were obtained from consenting CRC and BCP patients undergoing elective resection. Demographic, clinical, operative and pathologic data were collected. CHI3L1 levels in preop plasma samples were determined via ELISA in duplicate and reported as median + 95% CI (ng/ml). The expression of CHI3L1in self paired CRC specimens with normal tissue of a subpopulation of study patients was assessed by QRT-PCR. The receiver operating characteristic (ROC) curve and area under the ROC curve (AUC) were used to assess plasma CHI3L1 as a diagnostic tool for CRC. The Mann-Whitney test was used for statistical analysis (significance $p < 0.05$).

RESULTS: A total of 188 CRC (79% colon, 21% rectal) and 78 BCP patients (adenoma 27%, diverticulitis 65%, other 8%) were studied. The male/female ratio's were similar but the CRC patients were older ($p < 0.001$). The CRC stage distribution was: Stage 1, 24%; Stage 2, 37%; Stage 3, 30%; and Stage 4, 9%. The median plasma CHI3L1 levels were significantly higher in the CRC (87.7, CI: 80.5, 106.8) vs. the BCP patients (36.2, CI: 30.3, 43.5; P = < 0.001). Plasma CHI3L1 levels were significantly higher in stage 4 patients vs. stage 1 ($p = 0.02$). The AUC value for ROC curve was 0.806(sensitivity 55%, specificity 96%). All CRC samples (n = 28) tested shows elevated expression of CHI3L1vs. paired normal tissue.

CONCLUSION: The CRC median CHI3L1level was 2.4 (142.3%) times higher than the BCP result and 52% higher in stage 4 vs. stage 1 patients. ROC curve analysis suggests a PreOp plasma CHI3L1 level has potential as a marker for early CRC detection. Higher levels of CHI3L1 in plasma of CRC may be from tumor, stromal or inflammatory cells associated with the cancer. CHI3L1 supports neoangeogenesis and tumor growth at tumor site. Further study with larger populations of control and CRC patients is warranted.

Su1921

Metformin Alters Cellular Metabolism of Colon Cancer Cells Co-Cultured with Adipocytes

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Currently two thirds of the nation's population is considered overweight or obese by measurement of body mass index. Colon and rectal cancers are intimately linked to the development and maintenance of obesity. Obesity is strongly associated with changes in the physiological function of adipose tissue, leading to insulin resistance, chronic inflammation, and altered secretion of adipokines, and carcinogenesis. Metformin, an oral hypoglycemic agent and an activator of AMP activated protein kinase (AMPK), has recently been tested for its anticancer effect. The goal of this study is to determine if using metformin in adipogenic environments alters cellular metabolism that leads to tumor inhibition.

METHODS: (i) Pre-adipocytes, 3T3L1 cells, were differentiated using dexamethasone, 3-Isobutyl-1-methyl-2,6(1H,3H)-purinedione (IBMX), and insulin and were grown in a transwell co-culture system with human colon cancer lines including SW480, HT29, and HCT116. Cell lysates were prepared from co-cultured cancer cells and analyzed using Western blot analysis. (ii) Primary adipocytes were isolated from either epididymal fat of C57/BL6 mice or human mesenteric fat of patients with colon cancer. Conditioned media was collected from cultured adipocytes and incubated with SW480, HT29 or HCT116 cells. Cell lysates were prepared from cancer cells and analyzed by Western blot. (iii) SW480, HT29, HCT116 cells were treated with different concentrations (0 mM, 0.25 mM, 0.50 mM, 1.0 mM, 5.0 mM) of metformin for 12 hours. The rates of glucose consumption and lactate production were measured using cell medium. Cell lysates were prepared and analyzed by Western blot.

RESULTS: We found that co-culturing colon cancer cells with differentiated 3T3L1 cells or primary adipocytes from mouse and human altered the activation status of signaling molecules, including mammalian target of rapamycin (mTOR), AMPK, and extracellular signal related kinases (ERK). In addition, metformin treatment resulted in a decrease in cell proliferation and an increase in AMPK activity in colon cancer cells. Significantly, the rates of glucose consumption and lactate production were decreased in a dose-dependent manner in metformin-treated cells.

CONCLUSIONS: Cancer cells grown in adipogenic environments have increased potential for increased growth, metastasis, and invasion. Treating cells with agents that down-regulate pathways common to adipogenesis and oncogenesis may provide therapeutic avenues to decrease cancer development.

Su1922

Plasma Levels of Matrix Metalloproteinase 3 (MMP3) Is Significantly Increased in Patients with Colorectal Cancer

H.M.C. Shantha Kumara[1], Xiaohong Yan[1], Hiromichi Miyagaki[1,2], Jeanine Arkenbosch[1], Sahani De Silva[1], Linda Njoh[1], Vesna Cekic[1], Richard L. Whelan[1]

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INTRODUCTION: MMP3, a member of the matrix metalloproteinase (MMPs) family, plays a role in the breakdown of extracellular matrix (ECM) and connective tissue remodeling and is thought to facilitate solid tumor progression and metastasis. MMP3 biosynthesis is regulated by epidermal growth factor, TNF-α, and IL1; the active form of MMP3 stimulates the epithelial-mesenchymal transition (EMT) during tumor development. Together with its activator, matriptase, MMP3 may promote tumor angiogenesis and growth via regulation of VEGF bioavailability. MMP3 over expression has been demonstrated in many malignancies including breast, lung, and ovarian cancer. Plasma MM3 levels in colorectal cancer (CRC) patients (pts) have not been well studied. This study's purpose was to compare plasma MM3 levels in pts with CRC and benign colonic pathology (BCP).

METHOD: Preoperative (PreOp) plasma samples were obtained from CRC and BCP pts undergoing elective resection. Clinical, demographic and final pathological data were prospectively collected. Plasma MMP3 levels were determined via ELISA in duplicate and are reported as median + 95% CI (ng/ml). Expression levels were determined in the tumors and paired normal tissues of a subpopulation of study patients by QRT-PCR. The candidacy of MMP3 as a diagnostic marker for CRC was validated by the receiver operating characteristic (ROC) curve and by the area under the ROC curve (AUC) results. The Mann-Whitney test was used for statistical analysis, (significance $p < 0.05$).

RESULTS: The study population consisted of 182 CRC (62% colon, 28% rectal) and 82 BCP pts (adenoma 26%, diverticulitis 67%, other 7%). CRC pts were older (mean age 67 vs. 58, $p < 0.001$) but the male/female ratios were similar. The median PreOp plasma MMP3 level was higher in the cancer pts (14.6, CI: 13.7, 15.8) than the BCP group (9.3, CI: 8.5, 10.5, $p < 0.001$).The CRC stage distribution was: Stage-1, 24%; Stage-2, 37%, Stage-3, 29%, Stage- 4, 10%. Plasma MMP3 levels were significantly higher in the Stage 3 and 4 pts than in the stage 1 group ($p = 0.01$).The AUC value for the ROC curve (which assesses the diagnostic potential of plasma MMP3 levels) was 0.759 (sensitivity 75%, specificity 67%). MMP3exprersion was elevated in all CRC tumors tested vs. paired normal tissues (n = 28).

CONCLUSION: The median plasma MMP3 level in the setting of CRC was 55% higher than noted in the BCP group ($p < 0.001$). Plasma MMP3 levels were higher in stage-3 and 4 versus the stage-1 pts. AUC levels suggest MMP3 may have value as a prognostic marker for CRC. The source of the additional MMP3 is likely the tumor and stroma. In addition, inflammatory cells in the peritumor environment, via cytokine elaboration, may enhance MMP3 expression in tumor and stromal cells and, thus, contribute to the higher plasma MMP3 levels. Further study with larger populations of control and CRC pts is warranted.

Su1923

Immune Microenvironment in Colonic Carciongenesis: Sporadic Mismatch Repair Genes Defects Are Associated to hiCD80+ Lamina Propria Monuclear Cells Infiltration

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BACKGROUND: Genomic defects in DNA mismatch repair (MMR) genes (MSH2, MLH1, PSM2 or MSH6) characterize the hereditary non polyposis colon cancer (HNPCC). However most colorectal cancers (CRC) with high-frequency microsatellite instability are sporadic, wherein the MMR defect develops because of inactivation of the MLH1 gene by DNA methylation. Multiple retrospective studies, including a population-based study and a meta-analysis, have demonstrated that patients with MMR-deficient colon cancers have a more favourable stage-adjusted prognosis compared with patients whose tumors have intact MMR. Since the immune environment of CRC has been demonstrated to influence its prognosis, we aimed to investigate the interplay between MMR genes and the immune environment in CRC.

PATIENTS AND METHODS: A group of 98 consecutive patients operated on for colorectal cancer was retrospectively analysed. Familial and medical history were retrieved to assess the presence of Bethesda criteria for HNPCC diagnosis. Immunohistochemistry for CD80, TLR4, MyD88, MSH2, MLH1, MSH6 and PSM2 was performed on tissue sections. Moreover, lamina propria mononuclear cells (LPMC), polymorphonuclear cells and eosoinophil tumour infiltration was quantified. Patients were stratified in three groups: no MMR genes defect, MMR gene defects alone and MMR genes defects and at least one positive Bethesda criteria. Non parametric statistics was used.

RESULTS: In the three groups no difference was observed in term of polymorphonuclear cells and eosinophil infiltration and in term of TLR4 and MyD88 expression. On the contrary, LPMC infiltration was significantly higher in patients who had a MMR gene defect alone compared to patients who had no MMR genes defect and to those with MMR gene defect and positive Bethesda criteria ($p = 0.014$). Similarly, a significantly higher frequency of patients with high CD80 expression was observed in patients who had a MMR genes defect alone compared to patients who had no MMR gene defect and to those with MMR genes defect and positive Bethesda criteria ($p = 0.048$).

CONCLUSION: In patients with MMR defects and no Bethesda criteria for HNPCC antigen presenting cells function seems enhanced as shown by higher frequency of hiCD80+ patients and higher LPMC infiltration. This immune activation may play a role in the prognosis of these patients.

Basic: Esophageal

Su1924

Tumor Microenvironment in Esophageal Adenocarcinoma: Innate and Adaptive Immunity Activation in Neoplastic Mucosa

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INTRODUCTION: Esophageal adenocarcinoma (EAC) is an increasingly common cancer with a poor prognosis. EAC microenvironment is characterized by lack of cytokines with anti-cancer effect and by high expression of immunosuppressive factors. The expression of costimulatory molecules CD80 and CD86 in the esophageal cancer tissue is significantly lower than in the mucosa of healthy patients and it is inversely correlated to the expression of TGF-beta1 and IL-10. This may be one of the mechanisms of impaired function of dendritic cells and immune escape of cancer cells in the esophageal cancer. The aim of the study is to investigate the interplay between epithelium and CD8 T cells that characterizes the immune environment of EAC.

PATIENTS AND METHODS: Fresh biopsies (n = 32) obtained from healthy esophagus, Barrett's esophagus, esophageal dysplasia and adenocarcinoma were analysed by flow cytometry to quantify the expression of CD80 on esophageal epithelial cells and, its receptor CD28 and the lymphocytes activation marker CD38 on CD8 infiltrating lymphocytes.

Mucosa samples from cancer and from healthy esophagus were obtained during esophagectomy from 58 patients affected by EAC and 12 patients affected by squamous cell cancer (SCC). Frozen samples were analysed with Real Time qPCR for innate immunity (Tlr4, Myd88), costimulatory molecules (Cd80, Cd86), and lymphocytes activation (Cd38, Cd69) genes expression. Immunohistochemistry for CD8 and NK cells cytolytic activity (CD107a) of tumor infiltrating lymphocytes and for CD80 was performed.

Non parametrical statistics was used.

RESULTS: Flow cytometric analysis revealed a significant increase of CD80+ esophageal epithelial cells in metaplasia during inflammatory esophageal carcinogenesis. Moreover, Real Time qPCR showed a significant upregulation of Tlr4, MyD88, Cd80, Cd86, Cd38 and Cd69 gene expression in EAC tissues compared to their matched normal tissues. CD80, CD8 and CD107a proteins expression was higher in the cancer tissue of patient who underwent neoadjuvant therapy. Finally, the number of intraepithelial CD107a+ cells resulted inversely correlated with tumor differentiation and Mandard tumor regression grade.

CONCLUSION: In inflammation-driven esophageal carcinogenesis there is evidence of an early active immune surveillance process mediated by CD80 overexpression on metaplastic esophageal epithelial cells. Overall, EAC microenvironment shows an inflamed phenotype characterized by the presence of functionally inhibited CD8+ T-cells. Notably, patients who underwent neoadjuvant CT-RT show an increased tumor infiltration of degranulating (CD107+) CD8+ and NK cells.

Basic: Pancreas

Su1926

Anatomo-Radiologic Study of the Vascularisation of the Pancreas Interrelated with Resective Surgery

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Postoperative pancreatic fistula is still regarded as a major complication. The aim of the present study was to describe the different patterns of the vascular architecture of the pancreas and to evaluate if they can predict the risk of postoperative complications after pancreatoduodenectomy (DCP). 9 specimens of duodenum, pancreas and spleen, were injected with acrylic resins to obtain vascular casts of the pancreas. 30 angiographies with computed tomography (CT angiography) of subjects without pancreatic pathology were analyzed to assess the depiction rate and to perform a detailed description (origin, calibre, course, anastomosis, variations) of: posterior superior pancreaticoduodenal artery (PDPS), anterior superior (PDAS), inferior pancreaticoduodenal (PDI), posterior inferior (PDPI), anterior inferior (PDAI), dorsal pancreatic (PD), magna (PM), transverse (PT) and caudal (PC). We have also analyzed thirteen preoperative CT angiographies of patients who underwent DCP. At the level of the pancreatic neck a paucivascular area was appreciable in all vascular casts. The PT artery is the only artery, linking the cervicocephalic segment with the somatocaudal one, originating from PD artery in 26.9%, from superior mesenteric artery (AMS) in 19.2%, from splenic artery in 7.7%, from pancreaticduodenaljejunal trunk (PDJ) in 7.7%, from gastroduodenal artery, PM and PDPI in 3.8%. High-risk vascular patterns of post-operative complications are: presence of a splenic artery with intrapancreatic course (33.3%), especially when combined with the absence of PT (44,4% vs 83,3% of cases with splenic artery with suprapancreatic course); presence of a PDI artery originating from the PDJ trunk (28.6%) or presence of PDAI and PDPI arteries arising from PDJ trunk (respectively 50% and 45.5%) or from first/second jejunal artery (11.1% and 18.2%); presence of PD artery originating from AMS (3.8%)

(with focus on the distance between these vessels) or a PT originating from AMS (26.9%) which goes first on the right and then on the left side; presence of a right hepatic artery originating from AMS (7.7%), especially from the right side, and in combination with a gastroduodenal artery originating from an aberrant right hepatic artery (10.3%); presence of compensator circulations in patients with mesenteric or celiac arterial stenosis. At the level of the pancreatic neck the paucivascular area corresponds to an area of microcirculation of the parenchyma due to the absence of vessels with significant calibre. It can facilitate the execution of the resection of the pancreatic head, but it makes the body-tail stump vulnerable to postoperative ischemic insults. Great attention to the preoperative study of patients undergoing DCP should be paid to analyze in detail the individual vascular anatomy, through a close relationship between the surgeon and the radiologist.

Figure 1: Cast of duodenum, pancreas, spleen and kidneys, CT celiak trunk, S, splenic artery, SM superior mesenteric artery, RK right kidney, LK left kidney.

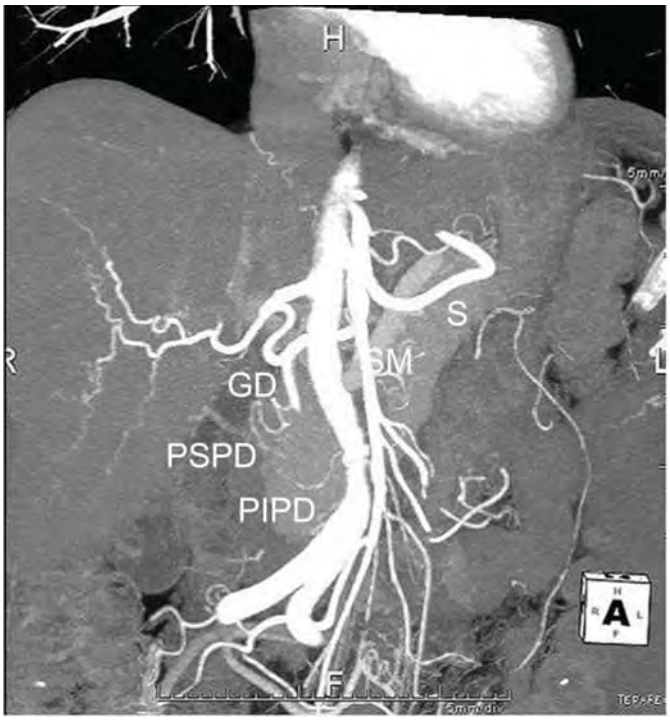

Figure 2: MIP reconstruction of a CT angiography, coronal view. SM mesenteric artery, S splenic artery, GD gastroduodenal artery, PSPD posterior superior pancreaticoduodenal artery, PIPD posterior inferior pancreaticoduodenal artery.

Basic: Small Bowel

Su1927

Generation of Porcine Intestinal Enteroids and Transducible Spheroids

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BACKGROUND: Porcine models are important tools for preclinical studies of stem cell transplantation. However, methods for the long-term culture and genetic manipulation of small intestinal crypt stem cells from adult pigs are lacking.

METHODS: Two-cm segments of jejunum were procured from 10- to 14-week-old Yorkshire pigs (n = 17). Crypts were isolated by EDTA chelation, suspended in Matrigel and grown in various culture media. We first used murine media containing only epidermal growth factor, noggin, and R-spondin 1 ("ENR medium") and then tested supplementation of Wnt3a, nicotinamide and small molecule inhibitors of GSK3 (CHIR99021), p160ROCK (Y27632), p38 MAP kinase (SB202190), and TGFβ receptor (LY2157299). We also isolated intestinal subepithelial myofibroblasts (ISEMFs), cultured them in DMEM with 10% FBS and added ISEMF or Wnt3a-conditioned medium (CM) to crypt cultures in a 1:1 ratio. We evaluated all media for enterosphere-forming efficiency and assessed cell lineage differentiation by immunohistology and fluorescence microscopy (FM). After we found that enteroids could be grown long-term in ENR medium with nicotinamide, Wnt3a-CM, SB202190 and LY2157299, we passaged enteroids while adding various compounds, e.g., PGE2 and the Notch ligand Jagged1, and tested media combinations to produce transducible cells. When crypts were grown in ENR medium with ISEMF-CM, CHIR99021 and Y27632, spheroids formed in culture that could be transduced using a lentiviral vector encoding a GFP reporter. Spheroids were maintained in this medium for 2 days and reporter activity was assessed by FM.

RESULTS: ENR medium did not sustain adult porcine enterospheres beyond 5 days in culture. Addition of nicotinamide and small molecule inhibitors drastically improved 2–5 day survival of enterospheres but did not support long-term culture. Crypts grown in presence of porcine ISEMF-CM or co-cultured with porcine ISEMFs formed large, thin-walled spheroids. In contrast, Wnt3a-CM resulted in complex enteroids with budding extensions. Passaged enteroids continued to proliferate well for up to 5 weeks in culture when PGE2 was added at time of passage to enhance growth whereas Jagged1 had no discernible effect. Successful lentiviral transfection of spheroids was demonstrated with reporter activity present in > 90% of transduced spheroids compared to controls.

DISCUSSION: We describe a novel method to maintain adult porcine crypt cells in culture over several weeks. Porcine crypts can be induced by specific supplements to form enteroids which can be repeatedly passaged in vitro. Porcine ISEMFs produce factors that induce formation of spheroids which can be successfully transduced with > 90% efficiency using lentiviral vectors.

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Basic: Stomach

Su1928

Comparison of Effects of Sleeve Gastrectomy, Duodenal-Jejunal Bypass and Ileal Transposition for the Treatment of Type II Diabetes

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BACKGROUND: Sleeve gastrectomy (SG), duodenal jejunal bypass (DJB) and ileal transposition (IT) have been reported to be effective for the treatment of T2DM. It is unknown which procedure has a stronger anti-diabetic effect. The purpose of this study was to compare the effectiveness of these novel procedures

METHODS: SG, DJB, IT and sham operation of each procedure were performed in 10- to 12-week-old Goto-Kakizaki rats, a spontaneous non-obese model of T2DM. The glucose homeostasis effect was evaluated by measuring fasting glucose (FBG) and glycosylated haemoglobin (HbA1c). Other parameters measured included gut hormonal alteration, body weight and lipid profile (cholesterol and triglycerides).

RESULTS: All three procedures had significant lower FBG when compared to the respective sham groups. DJB and IT had lower FBG than SG (SG vs DJB, p = 0.023; SG vs IT, p = 0.009) whereas DJB and IT had a similar FBG level, p = 0.678. For HbA1c, all procedures had lower levels than the respective sham groups, p < 0.001. The HbA1c of SG rebounded on 8th week, whereas HbA1c of DJB and IT remained at low level. SG had a significant higher HbA1c level than DJB and IT, p < 0.001, whereas DJB and IT had a similar level, p = 0.685.

For gut hormones analysis, GLP-1 and GIP levels were raised in DJB. DJB and IT induced more weight loss than SG, p = 0.045 and p = 0.038. DJB and IT significantly lower the cholesterol level than their sham groups, p = 0.001 and p = 0.013. DJB was more effective than SG in reducing the cholesterol level, p < 0.001. For triglyceride, SG had a lower level, p = 0.006, DJB had no difference, p = 0.663 whereas IT induced a higher level, p = 0.012 when compared to the respective sham groups.

CONCLUSION: SG, DJB and IT all had anti-diabetic effects. DJB and IT had more potent anti-diabetic effect than SG. Both foregut and hindgut theories might explain the anti-diabetic effect in DJB. The lipid absorption profile was different in three procedures. Each procedure has different effects on metabolic diseases and their clinical application deserve individual consideration.

Clinical: Biliary

Su1780

Predictors of Outcome in Resected Ampullary Carcinoma: A Single Institution Experience

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INTRODUCTION: Ampullary carcinomas are uncommon neoplasms, with surgical resection considered the main treatment. This study aims to evaluate factors which contribute to the overall survival (OS) and progression free survival (PFS) in patients undergoing resection.

METHODS: From 1996–2013, a single institution database of patients with resected ampullary carcinomas was reviewed. Clinical and pathologic factors were correlated with outcome and disease recurrence using Kaplan Meier curves and Cox proportional hazard models where applicable.

RESULTS: 91 patients were included in this study. There was a slight male predominance (55%), and the median age was 70 years (range: 40–86). The most common presenting symptom was jaundice or increased liver function enzymes (50%), followed by abdominal pain (23%) and bleeding (10%). The median body mass index (BMI) was 26 (range: 20–44), and the median hospital length of stay (LOS) was 13 days (range: 6–43). 90 (99%) underwent pancreaticoduodenectomy and one (1%) underwent ampullectomy. The complication rate was 37%, of which pancreatic or bile leak was most common (41%), followed by intra-abdominal abscess (21%).

Median follow-up for the cohort was 18 months, with a median OS of 54 months. Number of examined lymph nodes (LN) impacted OS, with a LN count > 10 having an improved OS compared to < 10, p = 0.025. Additionally, one or more positive LN and a LN ratio > = 0.1 adversely affected OS. Well-differentiated tumors demonstrated the best OS, compared to moderate or poorly differentiated tumors, p = 0.021. Pre-operative albumin, BMI, pathologic stage, presence of perineural or lymphovascular invasion, hospital LOS, and post-operative complications did not affect OS.

17 patients (19%) developed disease recurrence, most commonly with distant disease (N = 12, 71%). Median PFS was 25 months. One or more positive LN, LN ratio, and tumor differentiation affected PFS. There was a trend towards worse PFS with higher pathologic stage, p = 0.077. Patients with post-operative complications had worse PFS vs. those without a complication, p = 0.026. Multivariate analysis demonstrated older age, lower number of examined LN, presence of positive LN, tumor location (periampullary duodenum), and poor tumor differentiation was associated with a worse OS. Older age, presence of positive LN, poor tumor differentiation, and post-operative complications adversely affected PFS. Adjuvant chemotherapy or radiation following resection did not affect either OS or PFS.

CONCLUSIONS: In this study, surgical detail, with avoidance of complications and retrieval of a greater number of lymph nodes, affected overall and disease-free survival to a greater degree than pathologic variables, except tumor differentiation. Adjuvant therapy did not appear to affect outcome.

Su1781

Analysis of Abnormal Branching of the Cystic Duct

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PURPOSE: One of the major complications in laparoscopic cholecystectomy (LC) is biliary tract injury. We report here on the effectiveness of preoperative examinations in case with abnormal branching of the cystic duct.

MATERIAL AND METHOD: We studied 861 patients who underwent LC from December 2000 to 0ctober 2013. Using drip infusion cholecystoangiography-computed tomography (DIC-CT), magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatograhpy (ERCP), branching of the cystic duct was evaluated before surgery.

RESULT: Anatomic variants of the cystic duct were observed in twelve patients (1.4%). Abnormal branch types were as follows five cases of the cystic duct branching from the anterior right hepatic duct, four cases from the posterior right hepatic duct, one case from the duct of caudate lobe, one case from the accessory hepatic duct, and one case from the accessory cholecystohepatic duct. All procedures were performed without any intraoperative complications such as bile duct injuries.

CONCLUSION: Adequate preoperative study is required to recognize abnormal branching of the cystic duct, which may allow the prevention of injury to the biliary tract during the procedure.

Su1782

Urgent Laparoscopic Cholecystectomy: Is There a Weekend Effect?

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INTRODUCTION: There is concern over whether the quality of care delivered over the weekend is the same as during the week. Urgent surgery for left-sided diverticulitis and Crohn's disease has been shown to have disparate outcomes depending on whether they were performed on the weekend or weekday. This has been termed the "weekend effect". We sought to determine if there was a weekend effect with regards to urgent laparoscopic cholecystectomies (LC).

METHODS: The Nationwide Inpatient Data Sample (NIS) was queried for the years 2005 to 2009 for urgent, non-elective laparoscopic cholecystectomies performed within 24 hours of admission. We selected cases of acute cholecystitis, with or without concomitant choledocholithiasis. Cases of malignancy and choledocholithiasis without cholecystitis were excluded. The remaining patients were examined for age and comorbid conditions. We then evaluated for length of stay and overall morbidity and mortality. Univariate and multivariate logistic regression analyses were then performed to identify factors predicting post-operative morbidity and mortality.

RESULTS: A total of 586,444 laparoscopic cholecystectomies were performed, of which 122,958 (19%) were performed on the weekend. Among the most significant predictors of mortality were CHF, severe liver disease, CKD and COPD. Overall morbidity (2.75% vs. 2.43%, $p < 0.001$) and mortality (0.18% vs. 0.14%, $p < 0.01$) were higher in the weekday group as compared to the weekend group. See Tables.

CONCLUSION: We found a higher rate of morbidity and mortality in patients who undergo an operation on the weekday. Multivariate analysis reveals that the higher rate of complications and death seen within this group is due to the higher prevalence of severe comorbid conditions such as COPD, CHF, CKD and severe liver disease. Given that the timing of LC was not an independent predictor of mortality, we conclude that there is no weekend effect for urgently performed cholecystectomies.

	Weekday	Weekend	95% CI	P value
Age	47.9 ± 18.6	47.1 ± 18.3	0.683 - 0.917	< 0.0001
Length of Stay	2.5 ± 2.1	2.5 ± 2	- 0.013 - 1.013	NS

	No. (%) Weekday		Weekend		Risk Adjusted	
Variable	(n = 463486)	%	(n = 122958)	%	OR (95% CI)	P value
Comorbidity						
DM	60047	12.96	14819	12.05	0.80 (0.68 - 0.96)	0.015
HTN	138131	29.80	34778	28.28	0.77 (0.66 - 0.89)	0.000
Hypercholesterolemia	25857	5.58	6913	5.62	0.57 (0.41 - 0.79)	0.001
Smoking	62103	13.40	16780	13.65	0.21 (0.15 - 0.31)	0.000
MI	9138	1.97	2116	1.72	0.85 (0.63 - 1.16)	0.312
Sleep Apnea	5605	1.21	1452	1.18	N/A	N/A
COPD	19970	4.31	4591	3.73	3.76 (3.20 - 4.40)	0.000
PVD	3887	0.84	929	0.76	1.68 (1.23 - 2.29)	0.001
CKD	7536	1.63	1643	1.34	3.25 (2.66 - 3.96)	0.000
CAD	31409	6.78	7344	5.97	1.25 (1.05 - 1.50)	0.013
Obesity	57833	12.48	16307	13.26	0.38 (0.28 - 0.51)	0.000
Mild Liver Disease	12989	2.80	3220	2.62	0.19 (0.099 - 0.363)	0.000
CHF	11086	2.39	2412	1.96	13.2 (11.2 - 15.5)	0.000
Severe Liver Disease	13397	2.89	3332	2.71	10.6 (5.91 - 19.18)	0.000
Post-Operative Morbidity						
PE	348	0.075	98	0.080	3.8 (2.3 -6.2)	0.000
Pneumonia	3335	0.720	948	0.771	0.7 (0.47 - 0.94)	0.000
Post-Operative Infection	1295	0.279	299	0.243	1.8 (1.3 - 2.6)	0.000
Post-Operative fistula	38	0.008	0	0.000	10.9 (4.1 - 29.2)	0.000
DVT	342	0.074	68	0.055	N/A	N/A
Portomesenteric Thrombosis	48	0.010	10	0.008	7.9 (3.0 - 20.8)	0.000
Hemmorhage	2664	0.575	540	0.439	1.1 (0.75 - 1.5)	0.750
Post-Operative Stroke	30	0.006	41	0.033	14.8 (7.9 - 27.6)	0.000
Wound Dehiscence	107	0.023	14	0.011	3 (1.2 - 7.5)	0.000
Cardiac Complications	2354	0.508	512	0.416	4.0 (3.0 - 5.2)	0.000
Post-Operative Shock	188	0.041	55	0.045	19.9 (14.1 - 28.0)	0.000
CBD Injury	318	0.069	88	0.072	N/A	N/A

	Number Weekday	%	Number Weekend	%	Risk Adjusted OR (95% CI)	p value
Morbidity	12739	2.75	2992	2.43	9.3 (7.2 - 11.8)	0.000
Mortality	855	0.18	174	0.14		0.002

	Number		Number			Risk Adjusted	
Procedure Timing	Weekday	%	Weekend	%	p value	OR (95% CI)	p value
Weekend	0	0	122958	100	0.001	0.85 (0.73 - 1.01)	0.067
Weekday	463486	100	0	0	0.001	1.167 (0.99 - 1.38)	0.067

Su1783

What Are the Financial Implications of Centers for Regional Healthcare?

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INTRODUCTION: Financial implications on regionalization of healthcare and programmatic development are not often considered. We undertook this study to evaluate and compare hospital cost of care and income with a common operation (laparoscopic cholecystectomy) versus an operation often associated with HPB programmatic development and healthcare regionalization (pancreaticoduodenectomy).

METHODS AND PROCEDURES: The charges and reimbursements of all laparoscopic cholecystectomies (n = 201) and pancreaticoduodenectomies (n = 44) at one hospital undertaken from June 2012 to June 2013 were determined. Comparisons were undertaken using ANOVA with significance accepted at $p \leq 0.05$. Data are reported as median data or as median (mean ± SD).

RESULTS: Pancreaticoduodenectomy, relative to laparoscopic cholecystectomy, had greater time in the operating room (283 min vs. 93 min), hospital charges ($108,040.87 vs. $25,055.85), and hospital costs ($15,482.15 vs. $3,453.78) ($p < 0.0001$ for each), but generated similar income ($2,480.23 vs. $3,058.83, $p = 0.88$).

CONCLUSIONS: Pancreaticoduodenectomy requires more resource allocation and costs hospitals more but leads to no more income. Many hospitals invest great effort and resources to build programs and centers for regional healthcare. However, their accounting systems are not based on cost accounting, but rather on complex formulas of cost allocation. Consequently, these accounting systems have great, and possibly inappropriate, impact on perceived income associated with care. Considering these systems, it seems hospitals derive more return on investment from commonly undertaken operations than those often associated with regionalization of healthcare and programmatic development. Accounting systems need to reflect actual costs to allow determinations of actual income to better allocate healthcare resources and to seek appropriate compensation for hospital care.

Clinical: Colon-Rectal

Su1784

The Impact of Fast-Track Versus Traditional Perioperative Program on the Clinical and Immunological Outcomes After Laparoscopic Colorectal Surgery: A Prospective Randomized Trial

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BACKGROUND: Fast-track (FT) perioperative programs have been introduced in the West to reduce surgical stress and enhance recovery after open colorectal surgery. However, few studies have evaluated the impact of FT programs on the outcomes after laparoscopic colorectal surgery.

AIM: To compare the clinical and immunological outcomes of Chinese patients undergoing laparoscopic surgery for colorectal cancer within a FT vs. a traditional perioperative program.

METHODS: Between December 2010 and March 2013, 128 consecutive patients who underwent elective laparoscopic surgery for colonic and upper rectal cancer were randomized to receive either FT (n = 64) or traditional perioperative program (n = 64). Primary outcome was total postoperative hospital stay (including hospital stay of patients who were readmitted within 30 days after surgery). Secondary outcomes were 30-day morbidity and readmission rates, immunological parameters, quality of life, and costs. Data were analyzed by intention-to-treat principle.

RESULTS: The overall protocol compliance rate in the FT group was 80%. The FT group had shorter median postoperative hospital stay (4 vs. 5 days; $P < 0.001$) and total postoperative hospital stay (4 vs. 5.5 days; $P < 0.001$) than the traditional group. Overall 30-day morbidity rate also was lower in the FT group (14.1% vs. 28.1%; $P = 0.051$). Regression analysis revealed that FT program ($P < 0.001$) and absence of complications ($P < 0.001$) were strong independent predictors of shorter total hospital stay. There was no difference in readmission rates between the two groups (6.3% vs. 6.3%; $P = 1.000$). Quality of life in terms of physical and social functioning was better in the FT group than in the traditional group at 12 weeks after surgery. The total hospital cost was US$12,423 for the FT group and US$14,127 for the traditional group ($P = 0.054$). Postoperative systemic cytokine response (interleukin-6 peak level) was less in the FT group than in the traditional group. Several lymphocyte subsets of the cell-mediated immune system (total T cells, helper T cells, and natural killer-like T cells) also were less suppressed in the FT group.

CONCLUSIONS: FT perioperative program after laparoscopic surgery for colorectal cancer results in faster clinical recovery, reduced morbidity, lower hospital cost, less stress response, and better-preserved cell-mediated immunity compared with traditional perioperative care. FT program is an independent predictor of shorter total postoperative hospital stay after laparoscopic colorectal surgery. (ClinicalTrials.gov number, NCT01341366)

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Su1785

Mismatch Repair Status, Host Local and Systemic Inflammatory Responses and Survival in Patients with Primary Operable Colorectal Cancer

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INTRODUCTION: DNA mismatch repair deficient (MMRd) colorectal cancer (CRC) accounts for approximately 15% of sporadic cases and is characterised by a proximal location, poor differentiation and a conspicuous peritumoural inflammatory infiltrate. MMRd has also been associated with increased survival, potentially due to coordinated, adaptive local immunity. However, although local inflammatory responses have been well defined, other components of the tumour microenvironment and systemic inflammatory responses remain to be investigated.

OBJECTIVE: In the present study, the relationship between MMRd, local and systemic inflammatory responses and survival was examined in patients undergoing CRC resection.

METHODS: 228 patients who had undergone elective Stage I–III CRC resection at a single institution (1997–2007) were included. Local inflammatory responses were examined by IHC for mature (CD3), cytotoxic (CD8), regulatory (FOXP3) and memory (CD45R0) T-cells, Immunoscore and Klintrup-Mäkinen (KM) score. Systemic inflammatory responses were examined using modified Glasgow Prognostic Score (mGPS) and neutrophil:lymphocyte ratio (NLR). MMR status was determined on a tissue microarray by IHC for MLH1, MSH2, MSH6 and PMS2.

RESULTS: MMRd was identified in 39 patients (17%). MMRd tumours were proximal ($p < 0.001$), poorly differentiated with less venous invasion (VI) (both $p < 0.05$) [Table I]. MMRd was associated with increased stromal and intraepithelial CD3+, CD8+ and CD45R0+ density and Immunoscore (all $p < 0.05$) but not FOXP3+ density or KM score. MMRd was associated with elevated mGPS ($p < 0.05$) and NLR ($p < 0.01$).

There were 70 cancer deaths over a median follow-up of 115 months (range: 59–179 months). MMRd was not associated with cancer-specific survival (CSS) on univariate analysis (Table). In contrast, T and N stage, VI, tumour perforation, margin and peritoneal involvement, an infiltrative margin, local and systemic inflammatory responses and tumour stroma percentage (TSP) were associated with CSS on univariate analysis.

Table I: The Relationship Between Mismatch Repair (MMR) Status, Clinicopathological Characteristics, and Survival in Patients Undergoing Elective Curative Colorectal Cancer Resection

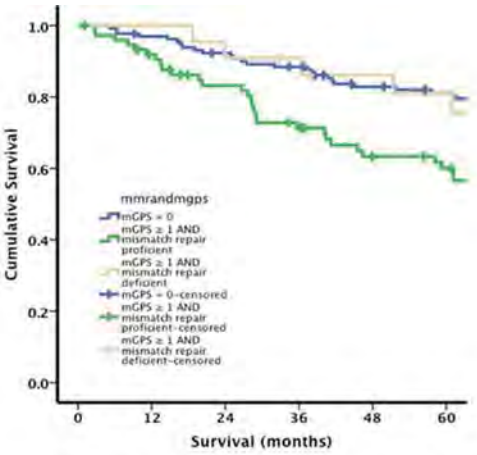
	MMR Intact (n = 189)	MMR Eficient (n = 39)	*P**	Cancer-Specific Survival †	*P*
Tumour site (right/ left/ rectum)	**62 (33)/55 (29)/72 (38)**	**25 (64)/9 (23)/5 (13)**	**<0.001**	1.04 (0.79–1.38)	0.770
T stage (1/ 2/ 3/ 4)	7 (4)/14 (7)/121 (64)/47 (25)	1 (3)/3 (8)/20 (51)/15 (38)	0.197	**1.65 (1.12–2.43)**	**0.011**
N stage (0/ 1/ 2)	101 (54)/65 (34)/23 (12)	26 (67)/12 (31)/1 (2)	0.056	1.84 (1.34–2.52)	**<0.001**
Differentiation (mod_well/ poor)	**170 (9)/19 (10)**	**30 (77)/9 (23)**	**0.024**	1.67 (0.88–3.19)	0.117
Venous invasion (no/ yes)	**117 (62)/72 (38)**	**31 (80)/8 (20)**	**0.037**	**2.77 (1.72–4.45)**	**<0.001**
Margin involvement (no/ yes)	178 (94)/11 (6)	37 (95)/2 (5)	0.866	**2.63 (1.20–5.75)**	**0.016**
Peritoneal involvement (no/ yes)	141 (75)/48 (25)	24 (62)/15 (38)	0.097	**2.17 (1.35–3.49)**	**0.001**
Tumour perforation (no/ yes)	184 (97)/5 (3)	39 (100)/0 (0)	0.305	**8.19 (2.90–23.08)**	**<0.001**
Invasive margin (227)‡ (expansive/ infiltrative)	103 (55)/85 (45)	23 (59)/16 (41)	0.633	**1.75 (1.09–2.80)**	**0.021**
Tumour necrosis (225) (low grade/ high grade)	109 (59)/77 (41)	23 (59)/16 (41)	0.966	1.44 (0.90–2.32)	0.129
Tumour stroma percentage (207) (low/ hig)	126 (72)/48 (28)	28 (85)/5 (15)	0.134	**2.17 (1.30–3.64)**	**0.002**
Mismatch repair status (intact/ deficient)	—	—	—	0.63 (0.31–1.27)	0.198
Immunescore (208) (0/ 1–2/ 3/ 4)	**74 (42)/58 (33)/26 (15)/17 (10)**	**9 (26)/11 (32)/7 (21)/7 (21)**	**0.024**	**0.54 (0.41–0.70)**	**<0.001**

(continued)

	MMR Intact (n = 189)	MMR Eficient (n = 39)	*P**	Cancer-Specific Survival †	*P*
Klintrup-Makinen grade (weak/ strong)	127 (68)/61 (32)	23 (59)/16 (41)	0.304	**2.49 (1.36–4.55)**	**0.003**
CD3 (weak/ strong) Margin (215) Stroma (224) Cancer cell nests (224)	101 (56)/79 (44) **96 (52)/89 (48) 130 (70)/55 (30)**	17 (49)/18 (51) **11 (28)/28 (72) 16 (41)/23 (59)**	0.413 **0.007 0.001**	—	—
CD8 (weak/ strong) Margin (216) Stroma (221) Cancer cell nests (222)	96 (52)/89 (48) **107 (60)/72 (40) 139 (76)/44 (24)**	20 (54)/17 (46) **22 (58)/16 (42) 22 (56)/17 (44)**	0.521 **0.009 0.013**	—	—
CD45R0 (weak/ strong) Margin (217) Stroma (224) Cancer cell nests (224)	97 (54)/82 (46) **90 (49)/95 (51) 138 (75)/47 (25)**	15 (40)/23 (60) **11 (28)/28 (72) 22 (56)/17 (44)**	0.100 **0.020 0.023**	—	—
FOXP3 (weak/ strong) Margin (216) Stroma (220) Cancer cell nests (219)	101 (57)/77 (43) 103 (57)/78 (43) 90 (50)/91 (50)	25 (66)/13 (34) 28 (72)/11 (28) 20 (53)/18 (47)	0.306 0.086 0.745	—	—
CRP (mg/L)ᵠ	**8 (6–18)**	**20 (5–40)**	**0.021ω**	—	—
Albumin (g/L)	**40 (37–42)**	**37 (34–42)**	**0.006**	—	—
mGPS (0/ 1/ 2)	**114 (60)/58 (31)/17 (9)**	**17 (44)/13 (33)/9 (23)**	**0.011**	**2.49 (1.36–4.55)**	**0.003**
NLR (199)	**3.3 (2.2–4.6)**	**4.4 (3.2–5.8)**	**0.005**	—	—
NLR (<5/≥5) (199)	128 (78)/36 (22)	23 (66)/12 (34)	0.122	0.82 (0.34–1.97)	0.657

* Chi-square test. † Univariate cox regression anaylsis. ‡number of patients when incomplete data available. ᵠ Median value (interquartile range) given.
ω Non-parametric test. mGPS – modified Glasgow Prognostic Score. NLR – neutrophil:lymphocyte ratio

MMRd did not influence the effect of a high TSP or an infiltrative margin on CSS. Furthermore, MRRd was not associated with improved CSS in patients with low Immunoscore or KM score, however was associated with increased CSS in patients with mGPS ≥1 (mean CSS: 129 (95% CI 107–151) months vs. 104 (86–122) months, p = 0.051) (Figure). MMRd was associated with greater 5-year CSS in patients with mGPS≥1 (81%, vs. 60%), identical to patients with mGPS = 0



	Number at risk	Mean survival (95% CI)	5 year survival (%)	*P* (compared to mGPS=0)
mGPS=0	131	143 (132-154)	81	-
mGPS > 0 and MMR competent	75	104 (86-122)	60	<0.001
mGPS > 0 and MMR deficient	22	129 (107-151)	81	0.956

Figure 1: The relationship between modified Glasgow Prognostic Score, mismatch repair status and cancer-specific survival in patients undergoing elective, curative colorectal cancer resection.

CONCLUSION: MMRd was not associated with survival independent of coordinated, adaptive local immunity. Of interest however, despite being associated with innate systemic immune responses, MMRd appeared to protect against the adverse impact of systemic inflammation on survival. The present results suggest a more complex relationship between MMRd and host anti-tumour immunity than previously suspected.

Su1786

Laparoscopic Ventral Mesh Rectopexy Compared to Stapled Trans-Anal Rectal Resection (STARR) to Treat Internal Rectal Prolapse: A Matched Cohorts Study

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BACKGROUND: Laparoscopic Ventral Mesh Rectopexy (LVR) corrects both, internal and external rectal prolapse, improving obstructed defaecation symptoms (ODS) and faecal incontinence. Similarly, Stapled Trans-Anal Rectal Resection (STARR) allows resolution of ODS. However data from retrospective series or prospective trials comparing the two procedures for internal rectal prolapse (IRP, defined as recto-rectal or recto-anal intussusception) are absent. In this matched cohorts study we compared outcomes in terms of surgical complications and functional results of LVR and STARR in order to better understand the ideal surgical approach for IRP.

PATIENTS AND METHODS: All patients underwent preoperative evaluation with defaecating proctography or pelvic dynamic MRI. Only patients with recto-rectal or recto-anal intussusception, rectocoele with or without enterocoele or sigmoidocoele were considered from our prospectively kept database. Patients with concomitant

middle and anterior pelvic compartment prolapses, were excluded. Two groups of patients were considered according to the surgical technique (LVR or STARR) and matched for demographics, symptoms and characteristics of the prolapse. Only patients with a minimum of 1 year follow-up were considerd. End-points were surgical complications and functional results expressed as Wexner Constipation Score (WCS) and Faecal Incontinence Severity Index (FISI).

RESULTS: Twenty-seven patients who underwent LVR were compared to 27 patients who underwent STARR.

After LVR, overall complications rate was 15% similar to STARR (11%), all minor.

After LVR, WCS significantly improved to 5 ± 3 from preoperative 15 ± 5 (p 0.03). Constipation improved in 89% and was cured in 81%. Similarly, after STARR, WCS score significantly improved to 6 ± 5 from preoperative 16 ± 11 (p = 0.03). Recurrence rate was 22%. Constipation improved in 85% and was cured in 78%. No significative differences were observed between the two groups.

Considering incontinence, after LVR the FISI score significantly improved to 2 ± 2 from preoperative 7 ± 3 (p 0.03). Incontinence improved in 90% and was completely cured in 90%.

After STARR, the FISI score improved to 4 ± 2 from preoperative 8 ± 5 (p 0.06). Incontinence improved in 54% and was completely cured in 45%. These percentages were significantly lower compared to those observed after LVR.

CONCLUSIONS: LVR and STARR seems to be equally valid to treat constipation associated to IRP, but LVR has greater chances to cure incontinence.

Su1787

Lubiprostone (Amitiza) Activates Cellular Prostanoid Signaling to Enhance Intestinal Motility in Human Colon

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BACKGROUND AND AIMS: Lubiprostone as a prostaglandin E derivative can activate chloride channels in bowel epithelia to stimulate intestinal secretion. It is widely applied for the treatment of adult chronic idiopathic constipation and irritable bowel syndrome with constipation in adult women. Clinic therapies of lubiprostone showed it can induce some side effects, such as nausea, diarrhea, abdominal pain and bloating and dyspnea. The study aims to investigate mechanism of the side effects in human colonic motility.

METHODS: Immunoflorescence staining with EP receptor antibodies was performed in the cryostat-sections of human colon. Colonic motility and pharmacological examinations were analyzed with organ bath system and human colonic longitudinal and circular axe muscle strips (LAMSs and CAMSs that obtained from colonic and rectum surgical operations of the patients.

RESULTS: Immunostaining showed that 325 of 598 submucosal and 471 of 633 myenteric neurons and their nerve fibers are immunoreactive for Anti-Hu and EP4 receptor. EP4 receptor immunopostive neurons co-expressed choline acetyransferase (ChAT) and substance P in myenteric plexus. Bath application of lubiprostone increased the amplitude of spontaneous contractile activity and lift baseline tension in dose-dependent manner in 17of 24 LAMSs from 5 male and 7 female patients. This action was suppressed by pretreatment with 10 μM SC19220, an EP1 antagonist. Electrical field stimulation (EFS) evoked contracting amplitudes of LAMSs were enhanced by lubiprostone in dose-dependent manner in 21of 24 LAMSs. The EFS-evoked responses were suppressed by preincubation with 10 μM L161980, an EP4 antagonist, but not by the SC19220. These EFS-evoked responses also were inhibited by pre-application of 2 μM cAMPS-Rp, a cAMP antagonist, and abolished by 1 μM tetrodotoxin (TTX). Pretreatment with atropine (10 μM), the neurokinin 1 antagonist, CP96345 (10 μM), or the neurokinin 2 antagonist, GR159897 (20 μM), suppressed enhancement effect of lubiprostone on EFS-evoked contractions. PGE2 (30 nM–1 μM) mimicked the actions of lubiprostone in the LAMSs. Application of lubiprostone did not alter the spontaneous or EFS-evoked contractile activity of 28 colonic CAMSs from 8 male and 6 female patients.

CONCLUSION: Lubiprostone can activate cellular prostanoid-cAMP signaling to enhance myogenic motility via EP1 receptor and neurogenic contracting responses via EP4 receptor in the human colon. The result suggested that side effects of lubiprostone may originate from its activating actions in EP receptors of enteric neurons and smooth muscles. Selective EP1 and EP4 antagonists may prevent the side effects of lubiprostone in clinic treatments.

Su1788

Iatrogenic Splenic Lesions in Surgery of Colorectal Cancer: Impact Onto the Early Postoperative and Oncological Long-Term Result

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Consequences of splenectomy in surgery for colorectal cancer (Ca) have not sufficiently investigated yet since (under normal circumstances) it is not substantial part for extended radicalness. Therefore, it appears to be of great interest what the early postoperative & oncosurgical long-term outcome of iatrogenic lesions of the spleen followed by splenectomy or reconstruction (if possible) during surgery of colorectal Ca is.

METHODS: From 01/01/2000–12/31/2004, data obtained from 45,265 patients with colorectal Ca in a prospective multicenter observational study who had undergone tumor resection with curative or pal¬liative intention were analyzed with regard to early postoperative (surgical) results & survival rates affected by iatrogenic splenic lesions.

RESULTS: In 638 patients (1.4%), iatrogenic splenic lesion occurred. In more than 80% of cases, spleen was injured in surgery of Ca of the left hemicolon & rectum. Logistic regression indicated that the crucial risk factor for this lesion was mobilization of the left colonic flexure. 126 patients (0.3%) underwent splenectomy whereas in 512 cases, spleen could be preserved. Morbidity was significantly lower without (36.0%) vs. with splenectomy (47.6%) or preservation of the spleen (48.6%), respectively. Rate of anastomotic insufficiency with need for surgical re-intervention was the highest in splenectomized patients (7.9%) whereas this rate was significantly lower in cases with splenic lesion but possible preservation of the organ (3.3%; $p = 0.003$). Considering the overall hospital lethality of 3.1%, the specific lethality for splenectomy cases was significantly increased (11.9%/ preservation of the spleen, 4.7%; $p < 0.0001$; no splenic lesion, 3.0%). 565 subjects agreed to register follow-up data; in 564 cases with iatrogenic splenic lesion, these data were investigated resulting in a follow-up rate of 99.8% (median follow-up period, 50.2 months). The median overall 5-year survival was 4.8 years (group I, splenic lesion with splenectomy) but it was significantly longer (8 years) in group II (preservation of the spleen), $p = 0.009$, & there was no difference between group II & III (control with no splenic lesion). Multivariate Cox regression analysis elucidated that iatrogenic splenic lesion with splenectomy can be considered an independent risk factor for a worse oncosurgical outcome.

CONCLUSIONS: Iatrogenic lesion of the spleen requiring splenectomy in colorectal Ca surgery is a significant risk factor for a worse early postoperative surgical result (higher morbidity, lethality, rate of anastomotic insufficiency) and long-term survival, in particular, comparing the group of splenectomized patients to those with organ preservation in splenic lesion. However, according to the results, spleen-preservation should be always attempted to avoid disadvantageous effect onto the outcome.

Su1789

Effect of Delay in Surgical Treatment of Colon Cancer on Survival

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BACKGROUND: There has been minimal research on the impact of delay in definitive surgical treatment of colon cancer on patient outcomes. We investigated the time intervals between the diagnosis and the definitive surgical treatment of colon cancer, factors associated with delay, and the effect of delay on survival.

METHODS: We used the California Cancer Registry database to identify patients 40 years or older who were diagnosed with colon cancer from 1996 to 2005 and underwent colon cancer surgery. Stage IV colon cancers were excluded to focus the analysis on outcomes for surgical treatments with curative intent. Emergent and urgent cases, defined as having time between diagnosis to surgery interval ≤ 1 day and 2–7 days, respectively, were excluded to assess outcomes of elective cases. Cox proportional hazards model was used to investigate the impact of treatment delay time (TDT), defined as time interval between the diagnosis and the definitive surgical treatment, on five-year overall and disease-specific survival. Covariates adjusted for in multivariate analysis were cancer stage, right vs. left-sided cancer, age, gender, race, socioeconomic status (SES), insurance status, and marital status.

RESULTS: A total of 24,351 patients matched the inclusion criteria. Treatment delay time of 6 to 12 weeks (12.8% of cases) was associated with 26% increased risk of overall mortality (HR 1.26, $p < 0.0001$, CI 1.18–1.36) and 14% increased risk of mortality due to colon cancer (HR 1.14, $p = 0.0259$, CI 1.02–1.29) when compared to patients with TDT < 6 weeks. Survival was even worse with TDT ≥ 12 weeks (2.7% of cases) with 62% and 55% increased risk of overall and cancer-specific mortality, respectively ($p < 0.0001$). Significant factors associated with treatment delay time ≥ 6 weeks were older age (40–49 years, 10.6%, compared with 70–79 years, 15.6%), African American race (African American, 22.2% compared with non-Hispanic White, 14.5%), low SES (lowest SES, 19.1%, compared with highest SES, 13.0%), stage I cancer (stage I, 22.2% compared with stage II and III, 12.3% and 13.4%, respectively), and left-sided cancer (left-sided cancer, 18.1% compared with right-sided cancer, 13.6%). Impact of treatment delay on cancer-specific mortality was most pronounced in stage II cancers (delay 6–12 weeks, HR 1.30, $p = 0.0171$ and delay ≥ 12 weeks, HR 1.99, $p = 0.0002$) and T4 tumors (delay 6–12 weeks, HR 1.35, $p = 0.0027$ and delay ≥ 12 weeks, HR 1.42, $p = 0.0298$).

CONCLUSIONS: Delays of 6 weeks or longer in definitive surgical treatment of colon cancer after diagnosis are associated with increased mortality. It is unclear whether this reflects neoplastic progression or other unrecognized factors associated with delay. Until this is clarified, it may be advisable to encourage patients with colon cancer to initiate surgical treatment without significant delay.

Su1790

Excision and Revision of Ileal Pouch-Anal Anastomosis: Insights from 308 NSQIP Cases

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PURPOSE: Ileal pouch-anal anastomosis (IPAA) is the gold-standard surgical treatment for medically refractory ulcerative colitis. However, small proportions of patients will develop complications requiring ileal pouch excision or revision. Currently only single institution series inform decision-making surrounding these uncommon procedures. We aimed to describe differences in short-term post-operative outcomes associated with pouch excision or revision procedures using a large national database.

METHODS: Using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database from 2005–2011, we identified all patients who underwent ileal pouch excision (PEx) or pouch revision via a combined abdominoperineal approach (AP) or perineal only approach (PR) with Current Procedural Terminology (CPT) codes. We compared baseline characteristics, diagnoses, and short-term outcomes across these procedures using simple descriptive statistics.

RESULTS: Of 348,221 colorectal operations, we identified 308 cases of pouch excision or revision: 218 excisions and 90 revisions (23 AP, 67 PR). AP patients were younger (36.4 vs. 47.0 (PEx) and 42.2 (PR) years, $p = 0.003$), more likely to be male (60.9% vs. 54.6% (PEx) and 35.8% (PR), $p = 0.017$), and of similar BMI (24.5 kg/m^2). We found no difference between the groups in regards to other pre-operative characteristics including chronic steroid use, chemotherapy, radiation therapy, weight loss, transfusion, sepsis, prior operation within 30-days, creatinine, or albumin. Pre-operative diagnoses were heterogeneous and commonly missing; just over half (53.5%) had a specific diagnosis reported. The most common diagnoses were fistula/infection, chronic ulcerative colitis, and Crohn's disease. Chronic ulcerative colitis was the most common diagnosis in both PEx (11.5%) and AP (17.4%), while pouch-vaginal fistulas was the most common diagnosis in the PR (19.4%) patients. Thirty-day outcomes are presented in Table 1. PR patients had shorter operative times (102 vs. 244 (PEx) and 236 (AP) minutes, $p < 0.001$), fewer surgical site infections (7.5% vs. 21.6% (PEx) and 13% (AP), $p = 0.03$), and shorter length of stay (4.6 vs. 9.6 (PEx) and 11.0 (AP) days, $p = 0.005$). When comparing PEx to only AP, the only statistically significant difference in short-term outcomes was increased transfusions in the PEx patients (21.6% vs. 0% (AP), $p = 0.045$). The only 2 deaths occurred in the PEx group.

CONCLUSIONS: This national cohort represents one of the largest series of reoperative procedures for failed or failing IPAA reported to date. Pouch excision and revision procedures are rare, have acceptable operative morbidity, and low operative mortality. These data can help inform surgeons and gastroenterologists when counseling patients with respect to complications related to IPAA and expected outcomes of reoperative procedures.

Table 1: 30-day surgical outcomes comparing IPAA reoperative procedures.[1,4]

Variable	Pouch Excision[2] (n=218)	Abdominoperineal Pouch Revision[2] (n=23)	Perineal Pouch Revision[2] (n=67)
Intra-operative transfusion, any	21.6%[3]	0%[3]	2.4%
Total operation time, minutes [SD][4]	244.2 [102.9]	236.3 [98.4]	102.4 [91.1]
Any surgical site infection	21.6%	13.0%	7.5%
Surgical site infections			
Superficial	10.1%	4.4%	4.5%
Deep incisional SSI[4]	1.4%	0%	1.5%
Organ/space SSI[4]	11.0%	8.7%	1.5%
Dehiscence	0%	0%	3%
Urinary tract infection	4.6%	0%	1.5%
Acute renal failure	0%	0%	1.5%
Any venous thromboembolism	1.8%	0%	1.5%
Bleeding	6.4%	4.4%	0%
Sepsis	11.5%	0%	4.5%
Post-operative length stay, days [SD][4]	9.6 [10.0]	11.0 [12.3]	4.6 [15.0]
Return to the operating room	2.8%	10.5%	4.4%
30-day mortality	0.9%	0%	0%

1. Data Source: American College of Surgery National Surgical Quality Improvement Program from 2005 to 2011
2. Proportions are presented for categorical data and means with standard deviation for continuous data.
3. Comparing pouch excision to abdominoperineal pouch revision, using chi-squared test, there was statistically significantly more transfusions in the pouch excision group (p=0.045).
4. Key: IPAA = ileal pouch-anal anastomosis, SD = standard deviation, SSI = surgical site infection.

Su1791

Colorectal Cancer in the Young: Does the Extent of Resection Affect Outcomes?

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Patients aged 40 or younger who are diagnosed with colorectal cancer have additional years in which to develop metachronous cancers, and have a higher likelihood of having an underlying genetic mutation, causing some to advocate a more extensive resection in this group of patients. The purpose of this study was to examine the long term oncologic outcomes of CRC in patients diagnosed at age of 40 or younger. We also sought to compare the outcomes according to the type of resection performed (segmental versus extensive resection).

All patients ≤ 40 years old diagnosed with CRC from 2000–2011 within our health region were identified through the Provincial Cancer Board Registry. Patients with a diagnosis of ulcerative colitis, familial polyposis syndrome cancers other than adenocarcinoma, and those undergoing transanal or endoscopic excision were excluded. The patients'demographics, treatments and surveillance data were extracted from the patients charts and the electronic medical record.

75 patients met our inclusion criteria. The mean age was 35.5 and 53% were females. The majority of cancers were located in the right colon (40.0%) or rectum (35.0%). Emergency resection was required in 34.7% of patients. Thirty-nine (52%) of patients presented with stage III cancer. The majority of patients (62 patients) had symptoms on presentation with CRC. A segmental resection was performed in 80% of patients. The median follow-up was 65.5 months. During the study period, 23 patients developed metastatic disease. A total of 16 patients died of their disease at a mean of 39.5 months (range: 5–77) post-operatively. During the follow-up period, 69.2% of patients were cancer-free. Locoregional recurrence occurred in 5 patients, 4 of which had a segmental resection for their primary CRC, and all 5 of those patients had stage III CRC (p = 0.30). Only one of those patients had resectable disease. No metachronous colon cancer or high risk colonic polyps were detected on surveillance colonoscopies (SC). The interval for SC was variable (18.7% annual and 46.7% every 2–3 years). On univariate analysis, the overall survival (p = 0.011) and local recurrence (p = 0.017) were found to correlate with the extent of surgery. Distant metastasis (p = 0.067) did not appear to be statistically significant on univariate analysis.

In this study, the majority of patient ≤ 40 years of age with CRC were symptomatic and had advanced stage cancer at presentation. They often required emergency resection

which may have affected their prognosis. Despite the majority of patients having had segmental resections, there were no metachronous colon cancers identified. There was a higher risk of loco-regional recurrence and decreased overall survival in the segmental resection group.However, a segmental resection with close colonoscopic surveillance appears to be an acceptable treatment in this population.

Su1792

Colonic Lumen Obliteration Following Colonic Lavage Treatment for Infectious Colitis

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INTRODUCTION: We present two cases of colonic lumen obliteration following colonic lavage treatment for infectious colitis. This complication of lavage therapy for *Clostridium Difficile* has not been previously described.

CASES: The first patient is a 52-year-old woman who underwent diverting loop ileostomy and subsequent colonic lavage after failing medical treatment for fulminant *C. difficile* colitis. After two weeks of antegrade colonic lavage with Vancomycin, she was discharged. Prior to ileostomy takedown three months later, contrast enemas through rectum and distal limb of loop ileostomy revealed strictures at the descending and sigmoid colon and total lumen obstruction at the distal descending colon. She underwent resection of the descending and sigmoid colon and pathology revealed two strictures of the colonic lumen down to 0.3 cm.

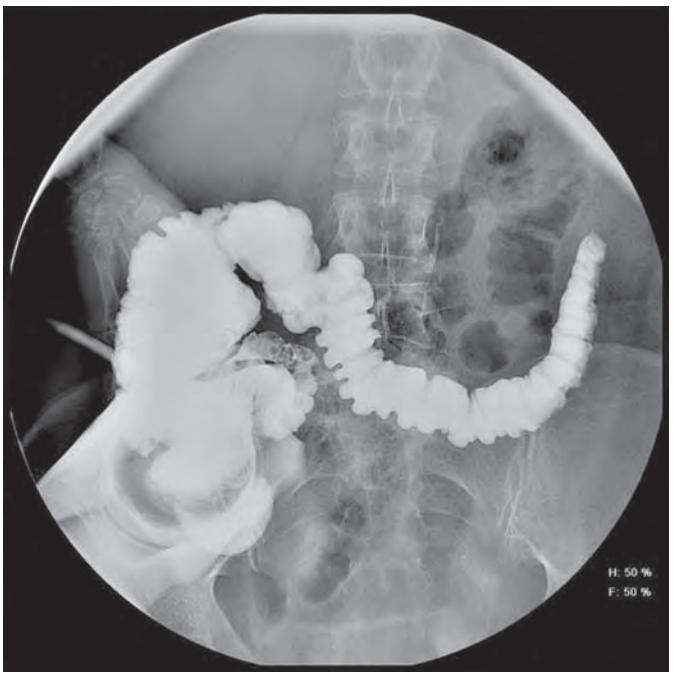

Figure 1: First patient: Hypaque enema through distal limb of loop ileostomy revealed distal colonic obstruction.

The second patient is a 58-year-old woman who underwent diverting loop ileostomy and colonic lavage for fulminant *C. difficile* colitis following an unrelated spine operation. She recovered and was discharged after two weeks of antegrade colonic lavage with Vancomycin and intravenous Metronidazole. Three months later colonoscopy revealed colitis with loss of vascularity, erythema, and friability of the mucosa, and endoscopy was aborted at the splenic flexure due to risks of perforation. Biopsies showed no evidence of infectious colitis, and diagnosis of diversion colitis was made. She underwent ileostomy takedown the following day. Postoperatively, she developed obstipation and abdominal pain with distension secondary to colonic obstruction. Operative exploration revealed ischemia secondary to transverse colon obstruction. An extended right hemicolectomy with ileostomy was performed. In preparation for reestablishment of intestinal continuity 3 months later, a contrast enema showed no evidence of obstruction with contrast terminating at the splenic flexure. At reoperation, however, when attempting to close the ileostomy, complete obliteration of the transverse colon lumen was found, necessitating completion transverse colectomy and ileo-left colonic anastomosis. Pathology revealed fibrous obliteration of the colonic lumen over a 7 cm segment.

Figure 2: Second patient: Surgical specimens demonstrating colonic lumen obliteration.

CONCLUSION: Colonic lumen obliteration is a potential complication of antegrade colonic lavage with Vancomycin for *C. difficile* colitis. All patients who undergo this therapy for *C. difficile* colitis should have verification of pan-colonic luminal patency prior to consideration of reestablishment of intestinal continuity.

Su1793

Subclinical Myopathy and Colorectal Cancer: Identification and Role of New Muscle Damage and Regeneration Biomarkers

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BACKGROUND: Skeletal muscle is the major reservoir of body proteins and it can be particularly affected in conditions associated to altered protein turnover and metabolism such as cancer. Although severe wasting is seen primarily in patients with advanced malignancy or cachexia, some of them present degree of wasting at clinical presentation.

MATERIALS AND METHODS: We performed morphometric studies and immunohistochemical analyses on intraoperative rectus abdominis muscle biopsies from 54 consecutive weight stable colorectal patients and 37 weight-stable patients operated for non-inflammatory benign diseases with no signs of muscle weakness or myopathies.

We also performed analyses on serum samples collected prior to surgery. We tested markers of inflammation (C Reactive Protein, CRP), muscle enzymes, (Creatin Kinase, CK), soluble isoform of NCAM), and markers of protein turnover. We also performed follow-up visits of all patients and controls to collect clinical outcome data.

RESULTS: In cancer patients, we observed a subclinical myopathy characterized by an abnormal distribution of myonuclei relocated from the periphery inside the myofiber, and by the presence of regenerating muscle fibers. The percentage of myofibers with abnormally located myonuclei was significantly higher in patients (median = 9%, IQR: 3.7–18.8) compared to controls (median = 2.7%, IQR: 1.7–3.2) (p = 0.0002). Analyses on serum samples showed that in the absence of systemic inflammation, in the prevalence of cancer patients the levels of albumin and prealbumin were below the normal range (albumin 35–53 g/L; prealbumin 200–400 mg/L), and the mean value was significantly lower compared to that detected in controls (albumin: 34.82 ± 5.8 g/L vs 45.2 ± 5.3, p < 0.01; prealbumin: 174.38 ± 57.86 mg/L vs 264.00 ± 69.73, p < 0.001) (Figure 1). Follow-up was 38 ± 12 months. Deceases in patients' group were 16.6% (9/54) and cancer relapse occurred in 29.6% (16/54) patients. We found an inverse correlation between the number of abnormally nucleated myofibers and the presence of lymph node metastasis (N+) (ñ) = –0.64 (p = 0.002). Cancer relapse was correlated with low serum levels of prealbumin (156.59 ± 44.22 mg/L in cancer relapse vs 190.62 ± 57.23 mg/L in patients without relapse; p = 0.08) (Figure 2).

Fig. 1 Preoperative serum levels of protein turnover biomarkers in 54 colorectal cancer patients and 37 controls

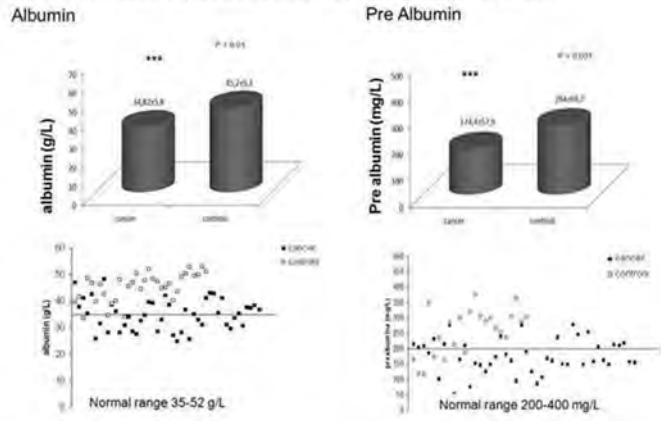

Fig. 2 Correlation between myopathy markers and clinical outcome in 54 colorectal cancer patients and 37 controls

	Internally nucleated myofibers (%) Median (IQR)	p-value
Age (ρ)	-0.14	0.33
Sex M	16.0 (8.7-22.6)	0.11
Sex F	9.1 (5.1-16.9)	
BMI (ρ)	0.21	0.14
pT 1-2	15.0 (6.0-20)	0.96
pT 3-4	12.6 (6.6-21.2)	
pN 0	15.5 (8.2-22.6)	0.05
pN 1-2	7.1 (4.6-18.3)	
N+ (ρ)	-0.30	0.03
pM 0	12.8 (6.0-21.5)	0.95
pM 1	19(10.9-19.7)	
Perivascolar invasion present	12.8 (8.4-21.0)	0.13
Perivascolar invasion absent	6.6 (4.9-16.6)	

Data at time of muscle biopsy (cancer diagnosis)

	Relapse	No relapse	P value
Internally nucleated myofibers (mean±SD, %)	13,20±10,44	16,20±11,51	0,42
Myofiber diameter (mean±SD, µm)	51,82±7,55	54,54±9,17	0,30
Lymph node metastasis (mean±SD, %)	46	19	
Serum albumin (mean±SD , g/L)	33,07±6,5	36,09±5,57	0,16
Serum prealbumin (mean±SD , mg/L)	156,59±44,22	190,62±57,23	0,08

Cancer patients follow-up: 3,2±1,1 yrs (mean±SD)

- cancer relapse 16/54 (29,6%)
- cancer death 9/54 (16,6%)

CONCLUSIONS: Colorectal cancer patients have a subclinical myopathy characterized by myofibers with internally located myonuclei and signs of regeneration. In the absence of inflammation, cancer patients show low levels of prealbumin and albumin as markers of altered protein turnover. Up to now our data indicate the myopathy and altered protein turnover appear to be associated to an early stage of colorectal cancer; in particular, relocation and redistribution of myofiber nuclei seem to be associated with better disease prognosis, while altered protein turnover seems to be predictive for colorectal cancer relapse.

Su1794

Impact of Prostate Cancer Treatment on the Outcome of Ileal Pouch-Anal Anastomosis

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BACKGROUND: Prostate cancer can occur in patients with restorative proctocolectomy and ileal pouch-anal anastomosis (IPAA) for patients with refractory ulcerative colitis (UC) or colitis-associated neoplasia. Impact of prostate cancer treatment (prostatectomy and/or brachytherapy) on the ileal pouch function is not clear.

METHODS: All IPAA patients undergoing prostate cancer treatment were identified from our electronic medical record system with e-search. Pre-treatment and post-treatment pouch function and quality of life were compared.

RESULTS: A total of 30 consecutive, eligible patients were included, with a mean age of 62.5 ± 7.9 years. Ten (33.3%) patients had a family history of cancer. The underlying gastrointestinal diseases were UC (n = 27), colorectal cancer (n = 2), and familial adenomatous polyposis (n = 1). The ileal pouch was constructed prior to the diagnosis of prostate cancer in 24 (80%). Four patients (13.3/%) underwent pouch surgery after prostatectomy and 2 (6.7%) had synchronous prostatectomy and pouch construction. Treatment modalities of prostate cancer included prostatectomy without external bean radiation (n = 22), brachytherapy (n 5), watchful waiting (n = 2), and hormonal therapy (n = 1). The median length of follow-up was 6 years (1–15). Sixteen patients (53.3%) had complete data on pre- and post-treatment pouch function and pouch-related quality of life. No statistically significances were noticed in daytime bowel movements, nighttime bowel movements, Cleveland Clinic Global Quality of Life Score, daytime seepage, and nighttime seepage (table). Pouch excision and permanent diversion were required in two patients who developed pouch failure, respectively.

Table: Comparison of Pouch Function and Quality of Life Before and After Treatment (N = 16)

Variables	Before Treatment	After Treatment	P-Value
Bowel movements during daytime	5 (3–12)	6 (2–12)	0.65
Bowel movements at night	2 (0–6)	3 (0–10)	0.13
Total bowel movements	7 (3–15)	7 (0–18)	0.84
Current quality of life	8 (5–10)	8 (5–10)	0.75
Current quality of health	8 (5–10)	8 (1–10)	0.32
Current energy level	8 (1–10)	8 (3–10)	0.81
CGQL	0.8 (0.4–1)	0.8 (0.43–1)	0.44
Nighttime seepage	10 (62.5%)	9 (56.2%)	1
Daytime seepage	8 (50%)	7 (43.8%)	1

CGQL: Cleveland Clinic Global Quality of Life Score; Numbers are medians with ranges in parentheses.

CONCLUSION: Treatment for prostate cancer did not appear to have a negative impact on the pouch function and quality of life in patients with an ileal pouch-anal anastomosis.

Su1795

Cognitive Changes After Surgery in the Elderly: Does Minimally Invasive Surgery Influence the Incidence of Postoperative Cognitive Changes Compared to Open Colon Surgery?

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BACKGROUND: Post-operative delirium (POD) in the elderly is a growing concern. Data regarding significant differences in postoperative cognitive dysfunction (POCD) in elderly undergoing laparoscopic versus open colon resection is not well established.

OBJECTIVES: The goal of this study was to compare the incidence of POCD in laparoscopic versus open colon surgery in an elderly population.

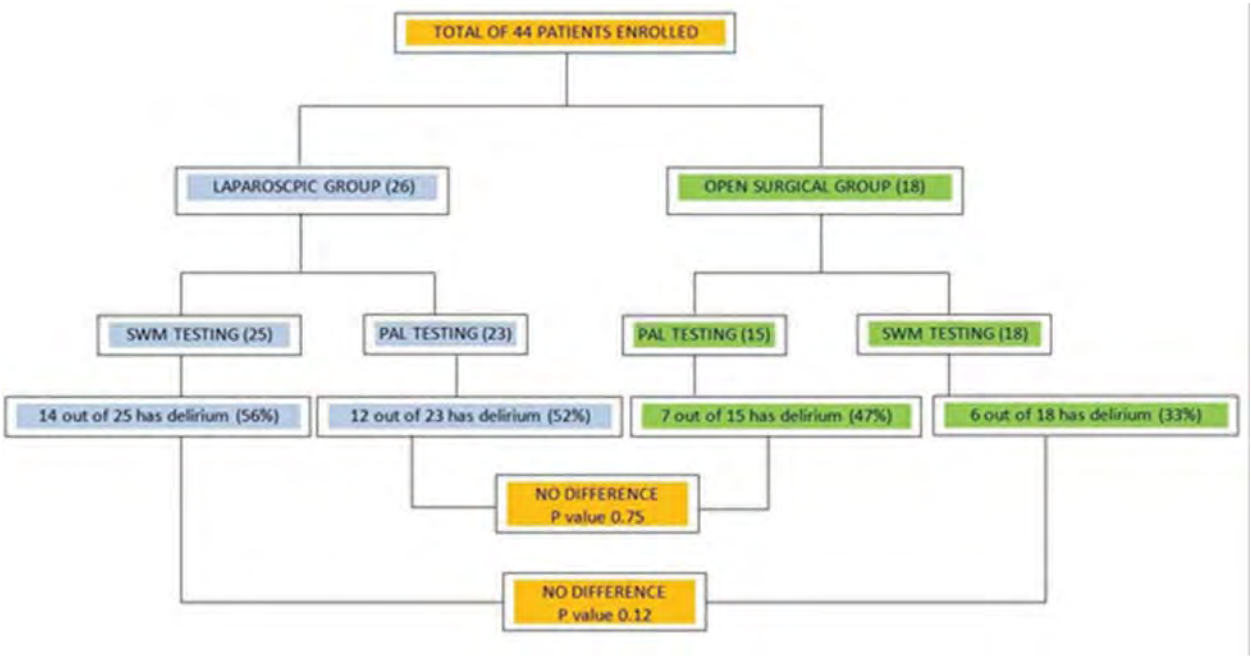
DESIGN AND SETTING: A prospective, non-randomized pilot study was conducted at an urban tertiary care hospital.

PARTICIPANTS: Patients aged 65 and above, without documented dementia, undergoing elective colon surgery.

MEASUREMENTS: We collected demographic and clinical data, including age, sex, polypharmacy, and comorbidities. Subjects underwent pre- and post-op CANTAB (Cambridge Neuropsychological Test Automated Battery) testing. Worsening individual scores from Paired Associated Learning (PAL) and Spatial Working Memory (SWM) portions of CANTAB determined the presence of POCD. Inflammatory cytokines (i.e., IL-6) levels were measured pre and post-operatively.

RESULTS: We enrolled 44 subjects (26 laparoscopic and 18 open surgery). The two groups did not differ significantly in age, sex, polypharmacy, and comorbidities. Average incidence of POCD was 47%. PAL scores worsened in 12/23 (52%) in the laparoscopic group and 7/15 (47%) in the open group. These group differences lacked statistically significance (P = 0.75). SWM scores worsened in 14/25 (56%) in the laparoscopic group and 6/18 (33%) in the open group; also not statistically significant (P = 0.12). No age difference occurred between the "worsened scores" group and "stable scores" group; older age was not associated with POCD. IL-6 levels were higher in the open vs. laparoscopic group (P < .0001).

CONCLUSION: In this pilot study, the average incidence of POCD was not statistically different between elderly subjects undergoing open vs. laparascopic surgery. Age did not influence the occurrence of POCD. Although inflammatory markers were significantly higher in the open group, consistent with a higher degree of stress response, the open group did not have higher rates of delirium. This association is worth investigating in a larger sample size.



Su1796

Irreversible Electroporation: An Institution Experience

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BACKGROUND: Irreversible electroporation (IRE) is a tumor ablation technique in which short, high-voltage pulses are applied to tumors to permeabilize the cell membranes. Since no thermal energy is created, it can be used close to vital structures. We report our experience with this novel technique in a wide array of anatomic locations and on a diversity of oncologic processes.

METHODS: We performed a retrospective data review of all IRE cases performed at our institution from September 2010 to September 2013. These patients were evaluated for perioperative morbidity, mortality, and oncologic outcome. A total of 28 IRE procedures on 27 patients were evaluated.

RESULTS: 27 Patients (11 women and 16 men) underwent IRE by either surgeon (16 open operations) or interventional radiologist (12 CT guided percutaneous procedures). The median age was 63 years (range 29 to 82 years) and median BMI of 30.7. IRE procedures were performed in the following anatomic locations: 9 liver, 7 pancreas, 7 pelvis, 2 retroperitoneal, 1 lung, 1 chest wall, and 1 mesentery. The lesion types consisted of 14 metastases, 8 primary tumors, 5 tumor recurrences, and 1 lesion not confirmed malignant. Three open procedures were performed for margin accentuation prior to resection (including a pelvic sarcoma, recurrent bladder cancer, and pancreatic cancer). One treated the IVC margin of a previous radiofrequency ablation treatment site in the liver. The remaining 24 procedures attempted complete ablation of the index lesion. Lesions ranged from 1.0 to 6.0 cm. Patients treated percutaneously had a median hospital stay of 1 day; the median hospital stay for the surgical (laparotomy) patients was 9 days. The overall 30-day mortality was 0% and IRE related complications occurred in 8 patients. Complications included two patients with muscle weakness, one gastric outlet obstruction, one intragastric hematoma, one pancreatic fistula, one small bowel obstruction, and one episode of urinary retention following pelvic IRE. Another patient experienced complications of obstructive jaundice, portal vein thrombosis, and an IRE site abscess. Six patients developed evidence of disease recurrence at the IRE site. The overall median length of follow-up is 8 months (range 1 to 30 months).

CONCLUSION: Our comprehensive early experience suggests that IRE is safe and feasible for a wide array of oncologic processes and in multiple anatomic locations. Several pitfalls have now been identified to prevent unnecessary morbidity. Our data suggests a local control benefit but we cannot report on possible survival benefit due to the limited number of patients and different malignancies treated. Overall this technology is a promising new tool; however further trials are needed to better understand the possible benefits.

Su1797

Rare But Significant Problems Associated with CT Scans in the Diagnosis of Appendicitis

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BACKGROUND: Acute appendicitis is one of the most common surgical emergencies. There is no standardized diagnostic approach to the disease. Our study evaluated all patients given the diagnosis of appendicitis and reviewed their diagnostic workup and clinical outcomes.

PATIENTS AND METHODS: We retrospectively reviewed all adult patients given an ICD-9 code for appendicitis at a single institution between January 2000 and September 2010. Complication rates, time to the operating room (OR) and length of hospital stay (LOS) were compared between patients who received a CT scan and those who did not during the hospitalization for appendicitis.

RESULTS: Three thousand six hundred and ninety-seven patients were identified by ICD-9 code. Three thousand and seventy patients underwent appendectomy, with 2840 patients having a preoperative CT scan and 430 patients without a CT scan. Average time from Emergency Department (ED) to the OR was found to be statistically longer for patients who underwent a CT scan (10 hrs: 3, 1548) versus those who did not have a CT (6 hrs: 2, 262) ($p < 0.0001$). We evaluated the cohort for postoperative complications, specifically the pulmonary diagnoses of pneumonia and ARDS. There were 19 patients who had the complication of pneumonia and 4 patients who were diagnosed with ARDS. Patients who underwent a CT scan had a statistically higher number of both complications ($p < 0.0001$). Sixteen of the 19 patients with pneumonia had CT scans. Fifteen of the 16 patients (93.75%) had been given oral contrast; this was found to be statistically significant ($p < 0.0001$). All cases of ARDS occurred in patients who had CT scans, and all four ARDS patients received oral contrast. While the LOS was not statistically different between the CT and non-CT cohorts, there was a significant difference in length of stay when the cohort was divided by the presence or absence of the complication pneumonia. Patients with pneumonia after their appendectomy had a median LOS of 7 days (1, 57) as opposed to appendectomy patients without pneumonia whose median LOS was 1 day (1, 109) ($p < 0.0001$).

CONCLUSIONS: The diagnosis of acute appendicitis is nearly universally accompanied by a CT scan. The utility of this diagnostic modality is undeniable. The use of oral contrast is not necessary for an accurate diagnosis of appendicitis and may be associated with higher complication rates, longer hospital stays and poor outcomes.

Su1798

Simultaneous Incisional Hernia Repair and Colorectal Surgery: A Case-Matched Study from the ACS-NSQIP

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PURPOSE: Colorectal surgery (CRS) is associated with high incidence of incisional hernia (IH) however simultaneous repair remains is challenging. In this study we evaluated complications and short-term outcomes of patients undergoing simultaneous CRS and IH, and compared the results to case matched group of patients using a large nationwide database.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database was queried for patients who underwent simultaneous CRS and IH and were matched 1:2 to patients underwent CRS alone between 2005 and 2010. Patients were identified using primary and secondary Current Procedural Terminology (CPT) codes. Patients with body mass index (BMI) between 18 to 50 kg/m^2 and an American Society of Anesthesiologists (ASA) score between I–IV were included in the analysis. The matching criteria were: type of surgical procedure, diagnosis and ASA score. Short-term (30-day) postoperative morbidity and mortality were compared between the groups.

RESULTS: There were 2075 patients in the simultaneous CRS and IH group, and were matched to 4150 patients with CRS alone. Mean operative time (170 ± 86.8 vs. 148 ± 76.3 minutes, $p < 0.001$) and length of hospital stay (9 ± 10 vs. 9 ± 11.2 days, $p = 0.012$) were significantly longer in the simultaneous CRS and IH group. Overall morbidity and mortality rates were similar between the two groups (table). Individual complications were comparable between the groups with an exception of cerebrovascular accident which was higher in simultaneous CRS and IH group (OR 1.839, $p = 0.016$).

CONCLUSION: Simultaneous incisional hernia repair during colorectal surgery does not increase short term complications in terms of overall morbidity and mortality based on the results from the nationwide database. Prospective studies with long term follow-up are needed to monitor long term effects of simultaneous incisional hernia repair and colorectal surgery.

Table: Results of Risk-Adjusted Analysis Comparing Concurrent Colorectal Surgery and Ventral Hernia Repair and Colorectal Surgery Alone

Outcome	Univariable OR (95% CI)[a]	P-Value	Multivariable OR (95% CI)[b]	P-Value
Length of hospital stay, days	1.053 (1.014–1.093)	0.007	1.049 (1.011–1.088)	0.012
Operative time, min	1.152 (1.122–1.183)	<0.001	1.116 (1.087–1.145)	<0.001
Superficial SSI	1.052 (0.875–1.265)	0.59	0.985 (0.864–1.122)	0.82
Deep SSI	1.635 (1.109–2.411)	0.013	1.290 (0.980–1.697)	0.07
Organ space SSI	1.141 (0.874–1.491)	0.33	1.106 (0.915–1.336)	0.3
Return to operating room	1.027 (0.747–1.412)	0.73	1.020 (0.883–1.180)	0.78
CVA	2.008 (1.002–4.023)	0.049	1.839 (1.119–3.022)	0.016
Wound disruption	1.443 (0.992–2.098)	0.055	1.189 (0.912–1.550)	0.2
Mortality	0.802 (0.571–1.126)	0.2	0.871 (0.684–1.109)	0.26
Morbidity	1.159 (1.031–1.303)	0.014	1.082 (0.995–1.176)	0.07

CVA: Cerebrovascular accident; SSI: Surgical site infection; CI: Confidence Interval; a MR = Median Ratio = proportional increase in median LOS or Op Time corresponding to concurrent CRS and VHR relative to CRS alone; derived using Linear Regression of a log2 transformed outcome. OR = Odds Ratio = proportional increase in the odds of the yes/no outcome corresponding to concurrent CRS and VHR relative to CRS alone; derived using logistic regression. b Multivariable analyses adjust for gender, BMI, diabetes mellitus, history of COPD, hypertension as covariates.

Su1799

Ex-Vivo Feasibility Testing of Transanal Specimen Extraction During Colon Resection Using a Transanal Endoscopic Surgery (TES) Proctoscope

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INTRODUCTION: Laparoscopic-assisted colon resection traditionally requires creation of a small laparotomy for specimen extraction. Transanal extraction of the specimen obviates the need for such an incision, and several studies have described the use of a transanal endoscopic surgery (TES) proctoscope to serve as a conduit for this technique. In this study, we performed an ex-vivo experiment to determine the feasibility of extracting resected colon segments through a TES proctoscope.

METHODS: Patients undergoing elective colon resections for both benign and malignant disease were studied under an IRB-approved protocol. After the colon segment was resected in the normal fashion (either laparoscopically or open), it was passed off the operative field for testing. We then attempted to pass the specimen through a commercially-available TES proctoscope with a 4 cm inner diameter and 15 cm length using a laparoscopic grasper. If resistance was encountered during passage, the test was considered a failure. To test the feasibility of using variably sized extraction tubes, the specimen was also passed through 15 cm long PVC-tubing segments with 1.25 inch (3.1 cm) and 2 inch (5.1 cm) diameters. Associations between patient variables and ability of the specimen to pass through the TES proctoscope were tested using a bivariate Pearson's correlation.

RESULTS: Extraction tests were performed on 21 resected colon specimens. Indication for resection was colon cancer or polyps in 10 cases, recurrent diverticulitis in 9 cases, Crohn's disease in 1 case, and ulcerative colitis in 1 case. The anatomy of the resection was the sigmoid colon in 13 cases, a hemicolectomy in 5 cases, a total proctocolectomy in 2 cases, and a proctectomy in 1 case. Mean patient age was 55 ± 14, BMI was 26 ± 6 kg/m^2, 13 (62%) were female, and 15 (71%) had received preoperative mechanical bowel preparation. Mean colon specimen length was 30 ± 33 (range: 10–150) cm and mean width (including mesentery) was 5.6 ± 1.9 (range: 3–9) cm. Nine (43%) specimens were able to pass through the 4 cm diameter TES proctoscope without significant resistance. Six (29%) were able to pass through the 3.1 cm diameter tube, while 14 (67%) passed through the 5.1 cm diameter tube. Specimens from patients with higher BMIs were less likely to pass through the TES proctoscope ($r = -.48$, $p = .03$) and wider specimens were also less likely to pass ($r = -.51$, $p = .03$). Longer specimens were less likely to pass successfully at a trend level ($r = -.39$, $p = .08$).

CONCLUSIONS: In an ex-vivo experiment, less than 50% of colon specimens were able to be passed through a standard TES proctoscope. Increased specimen width and length, as well as patient BMI, were predictive of passage failure. Use of a TES proctoscope to facilitate transanal specimen extraction may not be a feasible technique for the majority of colon resections.

Clinical: Esophageal

Su1800

Upper Endoscopy and Barrett's Esophagus: Back to Basics

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BACKGROUND: Endoscopy is the key test for the diagnosis of Barrett Esophagus (BE). The diagnosis is based on the visualization of salmon colored mucosa on the background of the squamous epithelium, and on properly executed biopsies for pathologic confirmation.

AIMS: The aims of this study were to determine: (a) the sensitivity of visual inspection for the diagnosis of BE as compared to the pathology results; and (b) how often a proper description of the BE was done.

METHODS: Review of a prospectively set database. We evaluated the endoscopic findings of 243 patients in whom the endoscopist thought that BE was present and compared them to the pathology results. In addition, we assessed how often the suspected BE was described and the proper biopsy protocol followed.

RESULTS: The presence of BE was confirmed in 93 of the 243 patients (38.3%). Metaplasia was present in 88.2% and low grade dysplasia in 11.8%. The length of the segment was described in 68.3% of patients (63.4% short segment and 4.9% long segment). In 31.7% of patients the endoscopist thought that BE was present but no description was given. An average of 3.5+2.3 biopsies were taken.

CONCLUSIONS: The results of this study showed that: (a) the visual inspection for the diagnosis of BE had a low sensitivity; (b) a proper description of the BE was not done in 1/3 of patients. This study suggests the need for more strict observation of the AGA guidelines by physicians performing upper endoscopy.

Su1801

A Large, Single-Surgeon Experience with Laparoscopic Redo Fundoplication: Operative Technique and Long-Term Outcomes

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BACKGROUND: Gastroesophageal reflux (GER) is one of the most common gastrointestinal complaints worldwide with more than 24,000 anti-reflux operations being performed annually in the US. Approximately 10% of these patients require reoperation. The aim of this study was to review the outcomes of patients undergoing laparoscopic redo fundoplication.

METHODS: Retrospective review of patients undergoing laparoscopic redo fundoplication from 1999 to 2011 by a single surgeon.

RESULTS: 135 patients (70 men, mean age 42 [range: 26–68] years) underwent laparoscopic redo fundoplication following a standardized technique (Figure). Operative indications included dysphagia (n = 67, 50%), recurrent GER (n = 62, 46%), and bubble syndrome (n = 6, 4%). Median time to reintervention was 25 months. Median operative time was 120 (range: 45–270) minutes, intraoperative complication rate was 11%, and conversion rate was 4% (n = 6). All patients underwent intraoperative endoscopy. The most common cause of operative failure was proximal migration of the gastroesophageal junction and fundoplication (41.5%). 77% underwent a redo 360° fundoplication and 23% a 270° wrap. Median hospital stay was 3 (range: 2–8) days. At a median follow-up of 28 months, 6% of patients were receiving proton-pump inhibitors; and no dysphagia or symptoms of bubble syndrome or delayed gastric emptying were reported. No correlation was found between preoperative symptoms and type of operative failure (Table).

Table 1: Essential Operative Steps

1. Dissection between the undersurface of the liver and anterior surface of the fundoplication to identify the right crus first.
2. Circumferential dissection of the esophageal hiatus starting posteriorly.
3. Full takedown of the fundoplication.
4. Obtain a minimum of 4–5 cm of intra-abdominal esophagus.
5. Verify full transection of the sort gastric vessels.
6. Crural closure and redo fundoplication over a 60Fr boogie.
7. Intraoperative endoscopy to assess the configuration of the new fundoplication and rule-out gastroesophageal injury.
8. Bilateral fixation of the fundoplication to the crura to prevent migration, rotation, and herniation.

Table 2: Findings

Age (years)	42
Gender (M/F)	70/65
Operative indication: Dysphagia Recurrent GE reflux	67 (50%) 62 (46%)
Median operative time (minutes)	120 (45–270)
Conversion rate	6 (4.7%)
Operative failure mechanism* Proximal migration of the gastroesophageal junction and fundoplication (IA) (II) Paraesophageal hernia with intra-abdominal GE junction and fundoplication \"Fundoplication\" constructed with the gastric body (III) Proximal migration of the gastroesophageal junction with an intra-abdominal fundoplication (IB)	41.5% 28% 21% 9%
Complications Left pneumothorax Gastric perforation Right pneumothorax Splenic laceration	15 (11%) 9 3 2 1
Median time to reoperation (months	25 (0.07–106)

GE: gastroesophageal; *according to the Horgan classification

CONCLUSIONS: Laparoscopic redo fundoplication is a feasible, safe, and effective treatment for persistent and recurrent symptoms after primary anti-reflux surgery. Following a standardized operative technique with intraoperative endoscopy, we have shown good results at long-term follow-up.

Su1802

Endoscopic Suturing Versus Endoclip Closure of Mucosotomy in POEM: A Case-Control Study

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INTRODUCTION: Per-oral endoscopic myotomy (POEM) is establishing itself as an elegant minimally invasive treatment of achalasia. One of the crucial steps of the procedure is obtaining adequate mucosal closure. Traditionally, endoclips have been used for a secure closure but these can be difficult to apply in some situations. A recently described alternative closure is endoscopic suturing using proprietary devices. This abstracts illustrates our experience with the OverStitch endoscopic suturing device during POEM cases.

METHODS: Endoscopic suturing was used during 10 of the 105 POEM cases in our series (9.5%) for a variety of indications. In order to evaluate the efficacy and cost of this new technology, a retrospective case-control study was performed. Of the 10 cases, 5 cases were eliminated for the following reasons: in 2 cases the mucosotomy was closed with endoscopic suturing and clips, in 2 cases a concomitant inadvertent mucosotomy was also sutured, and in 1 case the closure time was not recorded. The 5 cases in which the mucosotomy was repaired with the OverStitch device were included in the study. These were matched to 5 cases in which conventional closure of the mucosotomy was obtained with clips. The matching criteria included: 1) patient age (±10 years), 2) surgery within 12 months, 3) achalasia Chicago type, and 4) achalasia pre-operative stage.

For the 5 POEM with endoscopic suturing closure and the 5 controls we collected demographic information, preoperative achalasia type and stage, closure time, number of clips or sutures, short/long term complications, length of stay (LOS), instrument-related and operating room (OR)–related costs. Independent sample t-test and chi square were performed when appropriate.

RESULTS: The OverStitch and control group were not statistically different in terms of age (p = 0.71), BMI (p = 0.36), Eckardt score (p = 0.5), achalasia type (p = 1.0), achalasia score (p = 1.0) and LOS (p = 0.21). The average number of clips used was 5 (range: 3–7) and the average number of figure-of-eight OverStitch sutures was 2 (range: 1–3). No closure-related complications were recorded. The closure time was significantly shorter with endoclips (16 ± 12 min) than with OverStitch (33 ± 11 min) with a p = 0.047. The total closure cost showed a trend towards lower cost with clips ($1,502 ± 849) vs. OverStitch ($2,521 ± 575) with a p = 0.057.

	Endoclips (Average ± Standard Deviation)	OverStitch (Average ± Standard Deviation)	p-Value
Closure time (min)	16 ± 12	33 ± 11	0.047
Instrument cost (USD)	703 ± 327	873 ± 39	0.282
OR cost (USD)	799 ± 596	1648 ± 548	0.047
Total cost (USD)	1502 ± 849	2521 ± 575	0.057

CONCLUSION: Adequate closure of POEM mucosotomy can be obtained both with conventional endoclips and OverStitch. Overall, closure time is shorter and instrument cost is lower with endoclip closure. A caveat is that suture closure in our series was mainly used for cases where clip closure was considered to be difficult or not possible. Endoscopic suturing may therefore be best used for difficult mucosotomy closures or full-thickness perforations in which endoclip closure could be difficult, impossible or more tenuous.

Su1803

Is Gastric Decompression Necessary After Esophagectomy and Esophagogastrostomy

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BACKGROUND: Gastric decompression (GD) with nasogastric (NG) tube is considered to be necessary after esophagectomy and esophagogastrostomy because it can prevent the dilation of intra-thoracic stomach (ITS) and the postoperational Gastroesophageal reflux (GER). Thus it might be useful to prevent the anastomostic leakage. But the use of NG tube will bring about numerous complications and worsen the gross experience of patients. If we can limit the dilation of intra-thoracic stomach and alleviate GER with tubular gastroplasty and ITS emdedding with a medical sealant glue, is gastric decompression with NG tubes still Necessary?

METHODS: 150 patients with esophageal cancer were randomly divided into groups with gastric decompression (GD group) and without gastric decompression (NGD group) after surgery. According to the incision chosen, patients in each group were subdivided into Sweet group and Ivor Lewis group. In the operation, all patients received tubular gastroplasty, and a medical sealant glue was used to fix the stomach into mediastinum. The variables recorded for each patient included the gross feeling (with a 1–10 score system), the minimun diameter of ITS on the level of inferior pulmonary vein (with CT), the severity of GER (with Reflux Symptom Questionnaire), the need for placing/replacing the NG tube, the need for gastrointestinal prokinetic drugs, as well as the duration of postoperative hospitalization, pulmonary complications, anastomosis leak.

RESULTS: After stratified analysis of operation mode, we found the gross feeling of patients is significantly worse in GD group (p < 0.05). No difference was found in severity of GER, dilation of ITS, occurrence of complications, as well as the need for gastrointestinal prokinetic drugs and placing/replacing the NG tube between two groups.

CONCLUSIONS: With the use of tubular gastroplasty and ITS emdedding, Gastric decompression with NG tube is not necessary to be considered as a routine treatment after esophagectomy and esophagogastrostomy.

Su1805

Survival Following Neoadjuvant Chemotherapy in Esophagogastric Cancer: Evolving Improvements and Survival

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INTRODUCTION: Neoadjuvant chemotherapy has been introduced for treating stage II and III esophagogastric cancer, but there is little data on differing chemotherapies and its impact on cancer staging and resection rates. As incidence increases in the developed world, individual regimes need to be assessed for their effect on survival.

AIM: To examine the effect of changes in chemotherapy from 5FU based infusional chemotherapy (ECF) versus capecitabine chemotherapy on survival rates following diagnosis.

METHOD: A retrospective analysis was performed of all patients who underwent neoadjuvant chemotherapy for stage II and III oesophagogastric cancer at a single UK cancer centre between 2000 and 2010. Survival analysis was performed comparing two groups: prior to introduction of capecitabine (ECF) and following its introduction (ECX) using Kaplan Meier and differences between groups compared using log-rank.

RESULTS: Between Jan 2000 and Feb 2010 a total of 145 patients underwent neoadjuvant chemotherapy for esophagogastric cancer. Of these 35 received 5FU infusion based chemotherapy (group 1) prior to 2004 and 110 received capecitabine based chemotherapy (group 2). Resection rates were 94.3% for group 1 and 95.5% for group 2. Median survival improved from 27.8 months for group 1 to 34.8 months for group 2 (3 year survival 37% versus 48%) although this was not statistically significant (p = 0.15).

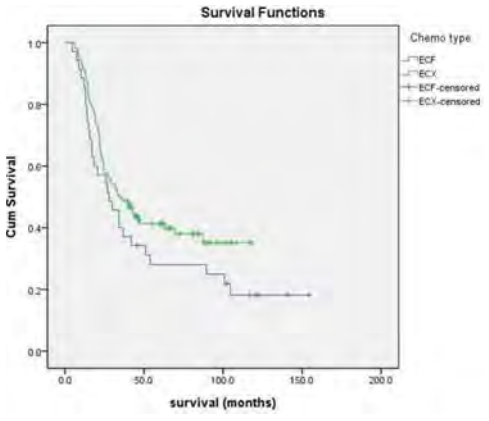

Figure: Kaplan-Meier curve showing survival of patients with stage II/III esophagogastric cancer by type of neoadjuvant chemotherapy.

CONCLUSION: The change in neoadjuvant chemotherapy resulted in a non-significant improvement in median survival for patients with esophagogastric cancer. The work needs to be repeated in large cohorts to clarify if a true difference exists, although the data suggests capecitabine may be more efficacious.

Su1806

Endolumenal Stent Suture-Fixation Compared to Endoscopic Clips for Prevention of Esophageal Stent Migration During Prolonged Dilatation in Recurrent Achalasia

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BACKGROUND: Treatment of esophageal achalasia such as myotomy or pneumatic dilatation appears to be effective in many patients. However, due to several reasons some patients present with treatment failure and recurrent symptoms. We have started to use short-term implantation of a self-expandable metal stent (SEMS) in patients with recurrent achalasia. The aim of this study was to assess the effectiveness of prolonged stent dilatation in this specific group of patients. As migration of stents placed at the lower esophageal sphincter (LES) is expected to be high, we further evaluated the use of endolumenal stent suture-fixation (ESSF) compared to endoscopic clip attachment to prevent stent migration.

PATIENTS AND METHODS: Patients diagnosed with recurrent achalasia were allocated for prolonged dilatation using short-term SEMS implantation. Under general anesthesia, in supine position, and with fluoroscopic guidance large diameter fully covered esophageal stents (30 mm × 80 mm, Niti-S stent, Taewong Medical, Seoul, Korea) were placed across the esophagogastric junction. To prevent migration, stents were attached to the esophageal wall with either two or three endoscopic clips (group A: n = 4) or by ESSF (group B: n = 4) using an endoscopic suturing system (OverStitch™, Apollo Endosurgery, Austin, TX). Patients were put on double-dose PPI. After gastrografin esophagogram on the following morning, patients were scheduled to have stent removal after four to seven days.

RESULTS: Eight patients (median resting LES pressure of 43 mmHg, residual LES pressure of 47 mmHg) were treated by prolonged dilatation. Patients had an initial median Eckardt score of 4 (range: 4–9). Stent placement was performed without complications in all patients. The esophagograms on the first day found, that the large diameter esophageal stents have migrated into the stomach in three of the four patients in group A (75%) where clip attachment were used. On the other hand, ESSF (group B) prevented early stent migration in all patients when endolumenal sutures were used. At the 3-month follow-up Eckardt score had improved in all but one patient (median 2, range: 1–5). Postinterventional manometry has been scheduled after 6-months.

CONCLUSION: Prolonged dilatation of the LES might be an interesting therapeutic alternative to treat patients with recurrent achalasia. Additionally, in contrast to endoscopic clip attachment ESSF appears promising to prevent early stent migration at difficult locations.

Su1807

Peroral Endoscopic Myotomy (POEM) Is Well-Suited to Control Dysphagia and Chest Pain in Achalasia Patients

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BACKGROUND: Peroral endoscopic myotomy (POEM) is a promising new technique for performing a Heller myotomy through the endoscopic route. This approach challenges the previous standard treatment, laparoscopic Heller myotomy (LHM).

PATIENTS AND METHODS: Between March and November 2013 we performed POEM procedures in altogether 17 patients for different types of achalasia (n = 5 type I, n = 3 type II, n = 6 type III, n = 2 EGJ outflow obstruction, n = 1 distal esophageal spasm, DES). Four patients had undergone specific pre-treatment for achalasia (n = PD, n = 1 BTx, n = 1 LHM). Three patients had undergone previous surgery (subtotal gastrectomy, Lap. Nissen, Lap. Toupet for upside-down-stomach).

RESULTS: The POEM procedure was successfully completed in all cases, irrespective of types of achalasia, endoscopic pre-treatmentand previous upper GI surgery. POEM was also successful in patients after previous upper GI surgery. One myotomy (re-do after failed LHM) was performed as posterior approach. One myotomy (for DES) was performed as long (20 cm) esophageal myotomy. The mortality was nil. There was one major complication with severe bleeding from an EGJ vein during myotomy (managed conservatively). POEM lead to good control of dysphagia in the short-term (3 months follow-up). There was significant improvement of the Eckardt-scores from median 8 to 1 in all patients (p = 0.001). All patients suffering from chest pain prior to the operation (n = 9) reported about improvement or complete remission of this symptom. The IRP of the LES was significantly decreased from mean 30.8 to 12.5 mmHg (p = 0.001). However, in three patients, the Eckardt score deteriorated during further follow-up. Two patients receive dilation with 20mm Ballon. Only one of the patients (the one having received POEM after failed LHM, 5.9%) had mild reflux symptoms (well controlled with PPI). None of the patients had esophagitis on re-endoscopy (0%). Two patients had acid exposure in the esophagus on pH-metry (11.8%).

CONCLUSION: Short-term (3 months) results of POEM are promising with good control of dysphagia. Clinical reflux symptoms are rare, but some patients have acid exposure on pH-metry. POEM may be superior to LHM with respect to control of concomitant chest pain.

Su1808

Intraoperative High Resolution Manometry to Calibrate Laparoscopic Nissen Fundoplication: Comparative Analysis with Standard Bougie Calibration

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AIM: To analyze manometric changes of the lower esophageal sphincter (LES) during laparoscopic Nissen fundoplication (LNF). To compare the functional results of intraoperative calibration with high resolution manometry (HRM) with those after standard bougie calibration.

METHOD: Ten patiens submitted to LNF were intraoperatively calibrated both with Maloney bougie and with HRM to obtain the reference pressure values to tailor HRM calibration. 44 patients were randomized to HRM calibration or standard calibration. In the first group, a HRM catheter was introduced preoperatively. All LES pressure and length values were recorded in the different phases of the operation, and both crural closure and fundoplication were tailored with after previously measured values. In the second group intraoperative calibration of crural closure and fundoplication was performed with an intraluminal 52–60 French Maloney bougie. All patients were submitted to a functional esophageal study one year after the operation. The study was approved by the Institutional Ethics Committee.

RESULTS: There were no preoperative differences between both groups in pHmetric of manometric parameters. Patients submitted to HRM calibration showed an increase in mean LES pressure from 7.21 mm Hg before starting the operation, to 9.94 mm Hg after introducing CO2 pneumoperitoneum, 16 mm Hg after crural closure, 24 mm Hg after fundoplication and 25.73 mm Hg at the end of the operation and CO2 evacuation. The initial mean LES length was 3.15 cm, 3.7 cm after CO2 introduction, 5.1 cm after crural closure, 4.88 cm after fundoplication completion and 4.48 cm after CO2 evacuation, for a total mean increase of 1.33 cm.

At one year from the operation, patients submitted to HRM calibration had a better pHmetric result with a mean DeMeester's score of 8.24 vs 23.05 (p = 0.039) and a mean acid exposure of 1.57% vs 5.7% (p = 0.017). Mean LES pressure was slightly higher for HRM calibrated patients, 12.04 vs 11.12 mm Hg, p = 0.04, as well as total LES length. 3.97 cm vs 3.48 cm, p = 0.4, and intraabdominal LES length, 2.5 vs 1.9 cm, p = 0.2.

CONCLUSIONS: Intraoperative calibration of LNF with HRM gets better functional results than standard calibration using intraesophageal bougie. Both reflux control and pressure and length of LES are better when calibration is performed with HRM.

Su1809

Impact of Peri-Operative Nutrition and Weight Loss in Resected Gastroesophageal Junction Cancers

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INTRODUCTION: The long-term prognostic impact of malnutrition in patients with gastroesophageal junction (GEJ) cancers is not well defined. This study evaluates perioperative nutrition and outcome in patients undergoing resection for GEJ cancers.

METHODS: From 2000–2013, a prospectively maintained, single institution database of patients undergoing surgery for GEJ cancers was reviewed. Perioperative nutrition parameters were analyzed, with overall survival (OS) and disease free survival (DFS) as primary outcomes. Weight loss was calculated from date of surgery to first post-discharge clinic visit.

RESULTS: 202 patients were referred for surgical evaluation of GEJ tumors; of these 192 (95%) underwent resection and comprise the study cohort. The median age was 65 years, and 168 (88%) were male. 125 (71%) were overweight or obese, with BMI > 25. The majority had adenocarcinoma (N = 189, 98%). Most (N = 93, 52%) were moderately-differentiated; 71 (40%) were poorly differentiated.

188 (98%) patients had a feeding jejunostomy tube placed at the time of resection. The median pre-operative albumin level was 4.1 (range: 2.9–4.8). 84 (45%) were discharged with tube feeds. Of patients with perioperative weight recorded, 143 (93%) experienced weight loss, with 61 (43%) losing 5–10% of their pre-operative weight, and 58 (41%) losing > 10%. The median weight loss was 7.7 kg (range: 0.4–23.2), after a median 24 days post-surgery (range: 5–244 days). Eleven patients gained weight following surgery, median gain of 4.6 kg at 22 days.

Median follow-up for the cohort was 14 months (range: 0.3–144 months). Univariate analysis demonstrated that pre-resection albumin level impacted overall survival; however, this was not significant on multivariate analysis. Multivariate analysis also did not demonstrate that %weight loss, pre-operative BMI, operative factors, or presence of tube feeds at time of discharge impacted either OS or DFS.

CONCLUSION: Although perioperative weight loss is concerning, this did not impact OS or DFS.

Su1810

Factors Contributing to Foregut Failure After Esophageal Cancer Resection

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INTRODUCTION: Long-term survivors after esophageal cancer resection (ECR) have significantly lower quality of life (QOL) than survivors after resection of other cancer sites, and inferior QOL after ECR is strongly associated with impairment of swallowing function. However, the etiology and frequency of delayed foregut function has received little systematic study to date.

METHODS: 205 consecutive patients submitted to ECR with gastric conduit reconstruction between 2004–2013 and who survived the early postoperative period form the basis of this report. Patients who were unable to re-establish ad lib nutritional intake per os by 3 months postoperatively were considered "Foregut Failures" (FF) and the factors associated with FF were analyzed in detail.

RESULTS: The overall incidence of FF in this study population was 28/205 (14%), and the risk of FF was significantly associated ($p < 0.01$) with specific postoperative complications, as detailed in the table that follows.

Complication	# (%) Patients with Complication	# (%) with FF	# (%) with Eventual Resolution of FF
Conduit necrosis (CN)	8 (4%)	8/8 (100%)	3/8 (38%)
Anastomotic leak without CN	34 (17%)	7/34 (21%)	4/7 (57%)
Recurrent laryngeal nerve (RLN) paresis without aspiration	15 (7%)	1/15 (7%)	1/1 (100%)
RLN paresis with aspiration	10 (5%)	7/10 (70%)	6/7 (86%)
Aspiration without RLN paresis	8 (4%)	3/8 (38%)	2/3 (67%)
Prolonged delayed gastric emptying (DGE)	13 (6%)	10/13 (77%)	7/10 (70%)
Anastomotic stricture	57 (28%)	11/57 (19%)	10/11 (91%)

CONCLUSION: Anastomotic leaks and strictures are relatively common complications but infrequently cause FF, especially when they occur in the absence of other complications. CN, RLN paresis with aspiration, and prolonged DGE are relatively infrequent complications, but have a high rate of FF. Both primary prevention and early, aggressive diagnosis and treatment of CN and RLN paresis can reduce the FF rate of CN and RLN paresis with aspiration. While there is no effective preventative or treatment strategy for prolonged DGE, the prognosis for recovery of FF with this complication is good.

Su1811

Antireflux Surgery for Control of Reflux and Protection of the Neosquamous Mucosa After Endoscopic Therapy

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INTRODUCTION: Barrett's esophagus develops as a consequence of gastroesophageal reflux, and after mucosal resection or ablation control of reflux may be important to prevent recurrence of Barrett's. The aim of this study was to evaluate the efficacy of an antireflux operation for preventing recurrence of intestinal metaplasia after endoscopic therapy for dysplastic Barrett's or superficial esophageal adenocarcinoma.

METHODS: A retrospective chart review was performed of all patients that underwent antireflux surgery after endoscopic therapy for Barrett's esophagus (BE) or superficial esophageal adenocarcinoma.

RESULTS: There were 9 patients, 6 males and 3 females, with a median age of 70 years. All patients had a Nissen fundoplication after complete resection and/or radiofrequency ablation (RFA) of all intestinal metaplasia had been accomplished. Ablation was performed after endoscopic mucosal resection for intramucosal cancer and BE in 5 patients and for BE with high grade dysplasia in 4 patients. Patients had a median of 2 ablations (range: 1–5) prior to complete eradication. The median time from eradication of all intestinal metaplasia to Nissen fundoplication was 8 months. The median follow-up since fundoplication was 22 months. In 8 patients a follow-up endoscopy has been done and 75% (6/8) have remained free of intestinal metaplasia. There were two patients with recurrent BE that was eradicated with a single additional ablation and are currently in remission. Two patients were noted to have a small recurrent hernia on surveillance endoscopy and one of these patients had recurrent intestinal metaplasia.

DISCUSSION: Antireflux surgery after RFA may augment the durability of the ablation treatment. In our study 75% of patients remained free of metaplasia or dysplasia at a median of 22 months after Nissen fundoplication. The addition of an antireflux operation to the ablative treatment of metaplasia or dysplasia may offer the best long-term control of reflux and preservation of the neosquamnous mucosa.

Su1812

Peroral Endoscopic Myotomy (POEM) Offers Consistent Success Rates for All Achalasia Types

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BACKGROUND AND OBJECTIVE: Type III achalasia, characterized by presence of esophageal spasms, is a difficult subtype to treat endoscopically or surgically. Previous studies have shown Laparoscopic Heller Myotomy (LHM), often considered the gold standard treatment for achalasia, to have a 30% failure rate for Type III patients. Current treatment options target the lower esophageal sphincter (LES), but not the full-length spastic muscle contractions of the esophagus. POEM offers the ability to perform a long myotomy, which may provide relief for patients suffering esophageal spasms. This study aims to evaluate whether POEM will have equally successful outcomes for all three subtypes of achalasia.

METHODS: Institutional review board-approved prospective analysis of 35 consecutive patients who underwent POEM. Patients diagnosed with achalasia via high resolution manometry were divided into the three Chicago types. Outcomes at 3 weeks, 3 and 6 months, 1 and 2 years were analyzed. Remission was defined as an Eckardt score of 3 or less. Study includes all clinically available data and quality of life (QoL) responses from August 2011.

RESULTS: Mean pre- and post-operative Eckardt Scores were 6.9 ± 2.5; 1.0 ± 1.4 (Type I; $p < .001$), 6.9 ± 2.4; 0.7 ± 0.8 (Type II; $p < .001$), and 6.3 ± 3.1; 0.6 ± 1.0 (Type III; $p < .001$). Per most recent Eckardt score, 8/8 Type I, 13/13 Type II, and 9/9 Type III are in remission. Preoperative LES resting and relaxed pressures were 28.3 ± 20.2; 17.8 ± 16.1 mmHg (Type I), 38.0 ± 17.6; 18.9 ± 13.6 mmHg (Type II), and 23.9 ± 14.3; 9.4 ± 10.5 mmHg (Type III), respectively. The average length of myotomy was 10.0 cm for Type I and II, and 18.1 ± 5.1 cm for Type III. Pre- and post-operative Endoflip measurements were 7.8 ± 3.4; 10.4 ± 4.4 mm (Type I), 5.7 ± 3.0; 9.9 ± 5.3 mm (Type II), and 6.0 ± 3.4; 11.3 ± 6.1 mm (Type III). The average procedure time was 148 ± 45 minutes (Type I), 107 ± 40 minutes (Type II), and 168 ± 72 minutes (Type III). Average follow-up months were 8.1 ± 4.7 (Type I), 6.8 ± 6.7 (Type II), and 4.6 ± 4.3 (Type III). QoL trended towards significant improvement in multiple variables in all three subtypes. There were equal numbers of previous interventions among all groups. Patient demographics including age, sex, BMI and ASA class were comparable.

CONCLUSION: POEM has demonstrated equally successful outcomes for all three subtypes of achalasia. POEM may offer an attractive alternative to LHM for patients with Type III achalasia.

Su1813

Atrial Fibrillation Is a Rare Complication After Robotic Assisted Ivor Lewis Esophagectomy

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BACKGROUND: Atrial fibrillation has historically been a common complication after esophagectomy. It has even been considered a clinical hallmark for anastomotic leak after open esophagectomy. With the emergence of minimally invasive techniques, the relevance of atrial fibrillation as a predictor of esophageal leak is unknown. We thus examined rates of atrial fibrillation following robotic-assisted Ivor-Lewis esophagectomy (RAIL) at a high-volume tertiary-care referral cancer center.

METHODS: We retrospectively evaluated patients who underwent RAIL for pathologically confirmed esophageal malignancy and assessed demographics and intraoperative outcomes relative to atrial fibrillation. Age, body mass index (BMI), neoadjuvant therapy (NT), operative details, and length of stay (LOS) were assessed. Statistics were calculated using student's t-test and chi-square test with significance value of $p < 0.05$.

RESULTS: 136 patients (109 male/27 female), average age 67 years, were evaluated. 17 (12.5%) patients developed post-operative atrial fibrillation. None of the patients who had atrial fibrillation developed a leak. Of the patients with atrial fibrillation, 13 (76%) were male with a median BMI of 28. 12 (71%) received NT. The median operative time was 381 minutes with a median blood loss of 125 cc. The median LOS was 11 days. There were 119 patients (96 male/23 female) without atrial fibrillation with an average age of 70 years and a median BMI of 28. There were 4 leaks in this cohort. NT was given to 92 (77%) of patients. The median operative time was 409 minutes with a median blood loss of 150 cc. The median length of stay was 9 days. When the two cohorts were compared, the only statistically significant difference was operative time $p < 0.003$. There was no significant difference in gender, age, blood loss, LOS, or receipt of NT.

CONCLUSIONS: We demonstrate that atrial fibrillation is an uncommon occurrence after RAIL. The low leak rate limits our ability to comment on the clinical relevance of atrial fibrillation as a predictor of anastomotic leak but in this series it does not appear to be predictive of a leak.

Su1814

Surgical Remediation for Symptomatic or Anatomic Failure After TIF (Transoral Incisionless Fundoplication)

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BACKGROUND: TIF (Transoral Incisionless Fundoplication) is a minimally invasive technique for the management of gastroesophageal reflux disease (GERD). The long-term outcomes of this procedure are unknown and there are few reports of surgical remediation for symptomatic or anatomic failure after TIF.

METHODS: Six patients with intractable foregut symptoms after TIF underwent surgical remediation between June 2011 and September 2013. Data were obtained by retrospective chart review. Nature of symptoms, anatomic abnormality, surgical technique and outcomes were analyzed.

RESULTS: The patients (4 female and 2 males; mean age 56.8 years) presented after a median of 19 months following TIF. Presenting symptoms were persistent reflux (n = 4) and severe dysphagia (n = 2). Contrast esophagram and EGD characterized two patients as having normal post-TIF anatomy and four as having anatomic failure (hiatal hernia [n = 2], multiple esophageal diverticula [n = 1] and long distal esophageal stenosis believed due to chronic microperforation [n = 1]). All patients underwent a laparoscopic takedown of the prior endoscopic fundoplication and removal of all fasteners. Four patients underwent Nissen fundoplication, two with hiatal hernia repair. One patient underwent stapled resection of multiple esophageal diverticula, each found to have a fastener at its apex. One patient with long esophageal stricture required myotomy of the thickened and stenotic esophageal wall. Mean operative time was 170 minutes and mean length of stay 4.5 days (range: 2–15 days). There were no major perioperative complications and no mortality. The patient with esophageal stenosis required a dilatation at three months post operatively. At follow-up, three patients have persistent complaints of chest pain (n = 1) and dysphagia (n = 2).

CONCLUSION: Anatomic distortion of the distal esophagus after TIF can be significant, making remedial operation complex and technically challenging. Long term benefits of this procedure need to be assessed closely in light of these failures.

Su1815

Hiatal Hernia Repair in Bariatric Surgery Patients: The Impact of Preoperative Imaging

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Hiatal hernias in onese and morbidly obese patienst seeking bweight loss surgery have repaorted to occur at a rate of nearly 40%. Based on the International Sleeve Gastrectomy Expert Panel Consensus Statement of 2012, our group started routine imaging evaluations, either UGI or CT, of sleeve gastrectomy patients. Our Roux-en-Y gastric byapss patients were not routinely evaluated with either CT or UGI. Hiatal hernias were routinely repaired when they wereeidentified. We looked at the effect of imaginag on the rate of repair. Chi square was used to compare the gropups. The rate of hiatal hernia repair in the sleeve gastrectomy group was 32%. The rate of the gastric byp[ass group was significantly less at 16%. This result suggsts that routine evaluation for hiatal hernia is justified in all bariatric surgery patients.

Table: Hiatal Hernia Repair: Impact of Preoperative Imaging

	RNY	Sleeve
Repair	50	66
No Repair	260	141

Chi-square P-value = 0.000026

Su1816

Quality of Life After Paraesophageal Hernia Repair: Does Fundoplication Help?

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OBJECTIVE: The objective is to determine whether patients had better quality of life (QOL) related to Gastro-Esophageal Reflux Disease (GERD) when undergoing paraesophageal hernia (PEH) repair with fundoplication compared to repairing the PEH alone.

BACKGROUND: Very few studies have been performed comparing the outcome and necessity of performing a fundoplication while repairing a PEH. Even less research is available comparing the long-term quality of life benefits of performing a fundoplication versus a PEH repair alone in controlling reflux symptoms.

DESIGN: A prospective paraesophageal hernia database is maintained on all patients who underwent PEH repair. A questionnaire was derived from the Quality of Life in Reflux and Dyspepsia (QOLRAD) and Frequency Scale for Symptoms of GERD (FSSG) questionnaires to assess for continued symptoms of reflux despite surgical treatment. Patients from the database were then contacted to answer the survey questions. Fisher's exact test was used to compare the incident of each symptom between the fundoplication group and the PEH repair only group.

SETTING: This study was performed at a tertiary academic hospital.

PATIENTS: Patients who underwent surgery for an intrathoracic stomach or paraesophageal hernia were included. Between 2004 and 2013, 110 patients underwent PEH repair with fundoplication and 42 patients had PEH repair alone.

OUTCOME MEASURES: Quality of life after the initial surgery and need for further procedures or medications were measured.

RESULTS: The response rate was 49% in the PEH repair with fundoplication group with a median follow-up time of 7½ years and 43% in the PEH repair alone group with a median follow-up time of 4 1/3 years. Significantly more patients woke up at night due to reflux symptoms ($p = 0.03$) and found themselves coughing around mealtime ($p = 0.05$) in the fundoplication group compared to the PEH repair alone group. In the PEH repair only group, daytime regurgitation and dysphagia to solid foods were trending near statistical significance ($p = 0.06$). 18% of patients in the fundoplication group admitted to taking some type of antacid medications, while 6% of patients in the PEH repair group did, despite a similar percentage of patients complaining of regurgitation or heartburn pre-operatively between the two groups (41% to 39% for regurgitation and 68% to 61% for heartburn, respectively). There were 2 patients in both groups that had to have additional procedures (EGD +/– dilatation) for symptoms.

CONCLUSIONS: In patients presenting with symptoms related to paraesophageal hernia itself, there is no added benefit of combining fundoplication with regard to long-term quality of life.

Clinical: Hepatic

Su1817

Determinants of Repeat Curative Intent Surgery in Colorectal Liver Metastasis

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INTRODUCTION: Following curative intent surgery (CIS) for colorectal liver metastasis (CRLM), repeat CIS for recurrence improves survival. The factors associated with repeat CIS are not widely reported.

METHODS: An institutional database (January 2002–December 2012) was reviewed to evaluate factors influencing repeat CIS following initial CIS for CRLM. A policy of aggressive repeat CIS was utilized whenever possible, including potential repeat liver/lung resection/ablation or cytoreductive surgery/HIPEC.

RESULTS: 183 patients with CRLM underwent CIS (liver resection, ablation, or both). Median follow-up and disease-free interval (DFI) was 28 and 16 months, respectively. After initial CIS, 102 (56%) patients recurred. 53 (52%) of these patients were able to undergo second CIS. After second CIS, 33 (62%) patients developed a second recurrence and in 13 (39%) patients a third CIS was possible. A few patients underwent additional repeat CIS procedures with one patient undergoing a total of 7 CIS procedures over 8 years. There was a significant decrease between DFI following first and subsequent CIS (1st CIS vs. 2nd CIS vs. ≥ 3rd CIS [20 vs. 15 vs. 8.5 months], $p = < 0.0001$). Overall 5-year survival in all patients was 51%, while patients who recurred had a 5-year survival of 67% if they underwent repeat CIS vs. 7.8% if they could not undergo repeat CIS. After adjusting for potential confounders, second CIS was less likely with increasing number of tumors (OR 0.43, $p < 0.0001$) and with node negative primary tumors (OR 0.28, $p = 0.042$). Receipt of adjuvant chemotherapy (OR 7.03, $p = 0.046$) was associated with increased likelihood of repeat CIS, while increasing DFI (OR 1.05, $p = 0.071$) and response to initial neoadjuvant chemotherapy (OR 3.26, $p = 0.087$) approached significance.

CONCLUSION: Despite high recurrence and decreasing DFI, repeat CIS provides a survival benefit with 5-year overall survival of 67%. The number of tumors at the time of recurrence, nodal status of the primary colorectal tumor and receipt of adjuvant therapy after the first CIS were significant predictors of repeat CIS.

Su1818

Quantitative Fractional Analysis of NSQIP Complications After Open Hemihepatectomy in Patients Suitable for Laparoscopic Hemihepatectomy: Burden of Incisional Complications

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INTRODUCTION: Open hemihepatectomy (OH) is a standard major liver procedure. Laparoscopic hemihepatectomy (LH) has been introduced but its advantages over (OH) are unclear. When centers begin doing LH there is selection of cases which are suitable for LH. While appropriate this makes it difficult to obtain a cohort of OH cases to compare to LH cases within such centers. The purpose of this study was to provide such a cohort for comparison from a center which still almost exclusively performs OH and do so using quantitative methods for evaluating complications.

METHODS: An audit of OHs from 2002 to 2013 was performed. Inclusion/exclusion criteria were established to eliminate patients who would not have been suitable for LH or who had additional procedures which themselves might be associated with complications (Table 1). Complications were recorded by National Surgical Quality Improvement Program (NSQIP), severity was graded by the Modified Accordion Grading System, and burden calculated using previously derived weighting factors.

RESULTS: 96 patients, 59.2 yr ± 13.2 (SD), 54% female, BMI 28.24 ± 5.8 (SD) had 75 right OH and 21 left OH. 84% were performed for cancer, and of these 57% were for metastatic colon cancer, 33% for primary liver cancers, and 9% for other metastatic tumors. The R1 rate for metastatic colon cancer and primary liver tumors were 2/46 (4.3%), and 4/27 (14.8%), respectively. Median LOS was 7 days. 32 complications occurred in 96 patients (33%). Complication results weighted by severity are shown in Table 2. Grade 2 complications were the most common (53.1%) and also accounted for the most weighted burden (42.9%). Organ space surgical site infections (SSI) were the most common complication accounting for 15.6% of all complications and 20.2% of burden. Incisional complications (superficial and deep SSI) accounted for 21.9% of complications and 13.0% of weighted burden. The average burden of highest grade complications in all 96 patients, postoperative morbidity index (PMI) was 0.071. There were no postoperative deaths.

CONCLUSIONS: OH performed on patients suitable for LH has a low PMI. Most complications are low grade (1 and 2), but organ space SSI is the most common and severe complication. Incisional complications account for 13% of burden and it is here that LH has the best chance of reducing burden. R1 rate is low for metastatic colon cancer and LH must be able to match such results for it to be effective especially as there was no selection in this cohort for tumor size, number, or location.

Table 1: Inclusion/Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Hemi hepatectomy	Significant evidence of chronic liver disease i.e. cirrhosis, varices or portal hypertension
± Laparoscopic staging ± mobilization	Emergency hemi-hepatectomy
± Caudate lobe resection	Formal tri-sectionectomy
± Minor extension into segment 4 < 2 cm	Two stage hepatectomies/multiple procedures on the liver
± Wedge excisions of lesions not > 2 cm in any dimension	Any formal resection of other segments or wedge resections > 2 cm maximum diameter
± Radiofrequency ablation (RFA) of margins or surface lesions	Hepaticojejunostomy
± Node biopsies	Interstitial ablations
± Diaphragm excision with primary repair	Any laparoscopic procedure beyond mobilization i.e. taking of caudate veins, portal dissection, parenchymal transection
± Adhesiolysis	Formal portal node dissection
± Portal vein embolism	Previous biliary-enteric anastomosis
± Intra op cholangiography ± intra op choledoscopy	Diaphragm repair requiring mesh or graft
	Any secondary procedure bowel resection, hernia repair, gynecologic or urologic procedure
	Resection of adjacent organ or part of adrenal, duodenum, colon or stomach

Table 2: Complications Classified by Severity Grades, Weighted Results

	Severity Grade							
Post-Op Complication	**1**	**2**	**3**	**4**	**5**	**6**	**Weighted Complication Burden**	
Sevrity Weight	**0.11**	**0.26**	**0.37**	**0.6**	**0.79**	**1**	**n**	**%**
Postop Superficial Incisional SSI	0.44	0.52					0.96	9.3
Superficial Incisional SSI PATOS								
Postop Deep Incisional SSI			0.37				0.37	3.6
Deep Incisional SSI PATOS								
Postop Organ Space SSI			1.48	0.6			2.08	20.2
Organ Space SSI PATOS								
Postop Wound Disruption								
Postop Pneumonia		0.26					0.26	2.5
Pneumonia PATOS								
Postop Unplanned Intubation				1.2			1.2	11.6
Postop Pulmonary Embolism								
Postop On Ventilator > 48 hrs				1.2			1.2	11.6
Postop Progressive Renal Insufficiency								
Postop Acute Renal Failure				0.6			0.6	5.8
Postop Urinary Tract Infection		1.04					1.04	10.1
Postop Myocardial Infarction		0.26					0.26	2.5
Postop Bleeding/Transfusions		0.78					0.78	7.6
Postop DVT		0.78					0.78	7.6
Postop Sepsis								
Postop Septic Shock		0.78					0.78	7.6
Postop Cardiac Arrest Requiring CPR								
Postop Other Occ								
Sort by grade,n	0.44	4.42	1.85	3.6			10.31	100
Sort by grade,%	4.3	42.9	17.9	34.9			100	

Abbreviations: SSI (surgical site infection), PATOS (present at time of surgery), DVT (deep venous thrombosis)

Su1819

Fibrosis, Cirrhosis and Mortality Following Hepatic Resection for Hepatocellular Carcinoma: Analysis of the National Cancer Data Base

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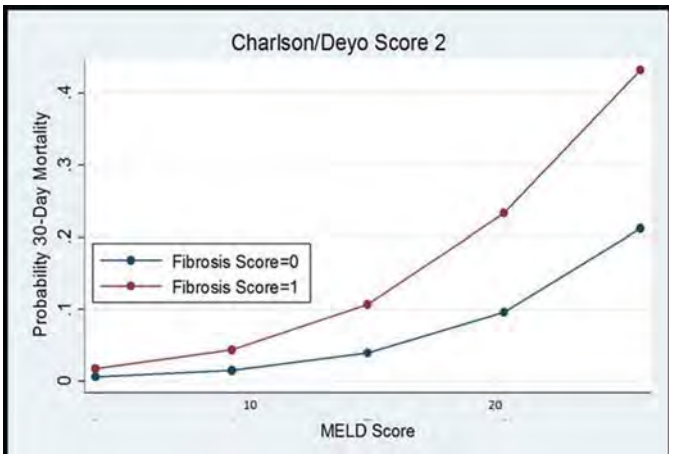
INTRODUCTION: Underlying liver disease and portal hypertension limit surgical treatment options for hepatocellular carcinoma (HCC), as these patients are high-risk for complications. We hypothesize that hepatic fibrosis and cirrhosis increase the probability of post-resection 30-day mortality.

METHODS: The National Cancer Data Base (NCDB) was queried for all cases of HCC from 1998–2011. Hepatic fibrosis was measured using the Ishak scale (0 = no fibrosis and 1 = bridging fibrosis and cirrhosis). Comorbid conditions were classified using the Charlson/Deyo scores (0, 1, 2) and the model for end-stage liver disease (MELD) score was calculated as a measure of liver function. Hepatic resection was coded as segmentectomy, lobectomy or extended lobectomy. Patients undergoing liver transplantation and those without a fibrosis score were excluded. Outcomes of interest included 30-day readmission and 30-day mortality. Logistic regression was used to identify predictors of mortality. Receiver operating characteristic graphs and area under the curve (AUC) were used to validate the predictive accuracy of the models.

RESULTS: Of 15,901 HCC patients that underwent resection, 2304 had a fibrosis score; 103 patients (4.5%) died within 30 days following resection. The patients who died were older (66 vs. 62 years), had a Charlson/Deyo score >1 (64% vs. 50%), had hepatic fibrosis (51% to 37%), had a HCC stage >1 (66% vs. 56%) and underwent major anatomical resections (43% vs. 31%). On multiple regression analysis, predictors of mortality included Charlson/Deyo score 2 (OR 2.02, 95% CI: 1.19–3.43), fibrosis score 1 (OR 1.76, 95% CI: 1.12–2.80), MELD (2.68, 95% CI: 1.61–4.47) and anatomic lobectomy (OR 1.79, 95% CI: 1.13–2.83). Using this model, the probability of 30-day mortality (see Figure) for a patient (Charlson/Deyo score 2) with a MELD score = 8 increases from 5.0% (95% CI: 0.4–9.6) to 11.4% (95% CI: 3.0–19.6) once fibrosis is detected. If MELD score is increased to 16, the probability rises from 8.5% without fibrosis to 19.8% with fibrosis (95% CI: 7.4–31.4). The AUCs for the models with and without fibrosis were 0.87 (95% CI: 0.82–0.93) and 0.84 (95% CI: 0.77–0.92), respectively.



CONCLUSION: The combination of underlying liver disease and comorbid conditions significantly increase the risk of 30-day mortality in hepatocellular carcinoma patients undergoing resection. The presence of bridging fibrosis and cirrhosis may not alter the surgical approach in lower risk (i.e. lower MELD score) patients. However, for patients considered borderline candidates for resection, a preoperative biopsy of the noncancerous hepatic parenchyma may provide additional prognostic information to both the surgeon and patient.

Su1820

Liver Transplantation for Unresectable Intrahepatic Cholangiocarcinoma: Improved Outcomes with Neoadjuvant Therapy

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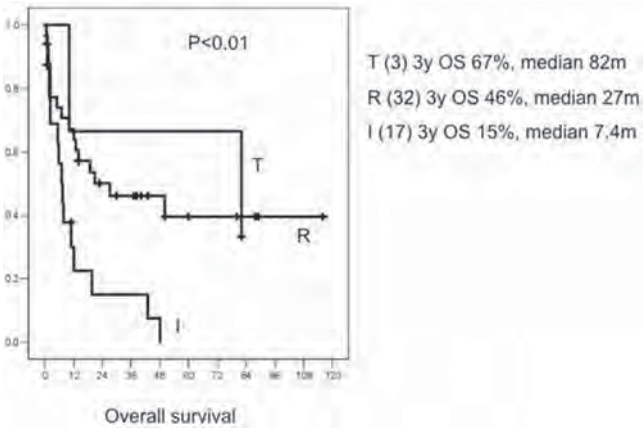
INTRODUCTION: The incidence and mortality of intrahepatic cholangiocarcinoma (ICC) is increasing in the US and worldwide. Although complete surgical resection represents the only curative therapy for ICC, many patients present with advanced stage, unresectable disease. The use of neoadjuvant therapy prior to orthotopic liver transplantation (OLT) for ICC was recently demonstrated to improve disease-free survival compared to surgical resection in selected patients. The purpose of this study was to compare the long-term outcomes for patients with ICC treated with surgical resection, neoadjuvant therapy followed by OLT, or liver directed therapy in the form of hepatic artery embolization.

METHODS: To ensure adequate follow-up, patients with ICC were reviewed at a single institution between January 2003 and December 2011. Clinical and pathologic data were collected retrospectively for patients who underwent either non-transplant resection (n = 36), neoadjuvant therapy followed by OLT (n = 3), or hepatic artery embolization (n = 17). Overall survival was calculated from the date of operation or first treatment to the date of last follow-up or death. Actuarial survival was compared among the treatment groups with log-rank testing.

RESULTS: Three year overall survival was 67% for patients after OLT, 46% after non-transplant resection, and 15% after hepatic artery embolization. Median survival was 82 months, 27 months and 7.4 months, respectively ($p < 0.01$, Figure). Median follow-up was 47 months after OLT (1–79), 50 months after resection (1–116) and 5.9 months after embolization (0.6–48). Median tumor diameter was 6.5 cm (range: 1.8–18.2 cm). A margin-negative (R0) resection was accomplished in only 11 pts (30%) within the non-transplant resection group; post-operative morbidity was observed in 23 patients (64%) after surgical resection.



CONCLUSIONS: OLT after neoadjuvant therapy for unresectable ICC is associated with significantly improved overall survival compared to other treatment modalities. OLT should be considered a treatment option for carefully selected patients with unresectable ICC.

Su1821

Morbid Obesity Does Not Adversely Affect Mortality or Length of Hospital Stay After Liver Resection: 14 Year Retrospective Analysis

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INTRODUCTION: Obesity is an important co-morbidity present in modern day surgical patients. In addition to affecting wound healing, obesity can present technical difficulties and has an apparent effect upon outcomes due to concomitant liver disease in patients undergoing liver resections. This study was undertaken to test whether morbid obesity affects early outcomes of selected major liver surgeries and if that effect has changed over the observed time period.

METHODS: The National Inpatient Sample database was queried for all records who had their primary or secondary procedure recorded as hepatic lobectomy (ICD 50.22) or partial hepatectomy (ICD 50.3) or both. The records were

then classified into patients with or without morbid obesity (ICD 278.01). Means were calculated for every year from 1998 to 2011 for mortality rate and length of hospital stay. Chi square test was used to test for significance in difference in mortality and Weighted T-test was used to test for significance in difference in lengths of stay.

RESULTS: The number of partial hepatectomy or hepatic lobectomy procedures recorded increased 1426 to 3206 (2.25 fold) from 1998 to 2011 (1426 to 3206, 2.25 fold).

This increase was more prominent in the morbidly obese population (13 to 319, 24.5 fold). Non obese patients who underwent surgery during the first half of the decade, 1998 to 2004 had higher mortality compared to those in the second half, 2005 to 2011 (4.23%, 312/7384 vs 2.84%, 339/11941 and 6.69%, 262/3915 vs 4.91%, 243/3949) for hepatic lobectomy and partial hepatectomy respectively ($p < 0.001$ for both). This difference was not significant in the morbidly obese population. Partial hepatectomy in the obese population demonstrated reduced mortality in the first half of the decade (6.69 vs 0%) only, while "hepatic lobectomy" had reduced mortality in morbidly obese in the second half of decade (2.84% vs 0.77%), but only compared to the non-obese population. Morbidly obese patients had reduced mortality and length of stay for hepatic lobectomy (0.96%, 11/1144 vs 3.37%, 651/19325, $p < 0.001$ and 7.31 vs 9.32 days, $p < 0.001$) and partial hepatectomy (2.4%, 9/370 vs 5.7%, 505/8864, $p < 0.001$ and 8.5 vs 9.9 days, $p < 0.01$).

CONCLUSION: Morbid obesity did not increase mortality and length of stay after liver resection surgery. Surprisingly, both mortality and length of stay were lower in obese patients undergoing major liver surgeries. While mortality has improved with time in the non-obese population after liver resection, this has not been the case with the morbidly obese population.

Clinical: Pancreas

Su1822

Who Travels for Cancer Care? Regionalization of Pancreatectomy in Massachusetts

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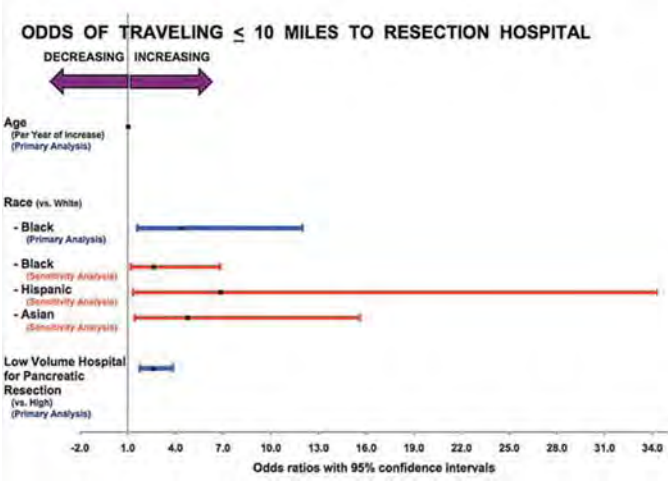
BACKGROUND: Improved outcomes for technically complex procedures have been reported for high-volume centers and surgeons. However, the magnitude and effect of regionalization of pancreatic cancer surgery has not been well characterized.

METHODS: Retrospective observational cohort review of Massachusetts Department of Public health (MA-DPH) Inpatient Hospital Discharge Database (HDD). Admissions between 2005 and 2009 for pancreatic malignancy identified by ICD-9 were included. Patients without pancreatic resections or with missing or out-of-state ZIP codes were excluded. Hospitals were divided into high volume (≥11 cancer pancreatectomies annually) or low volume (< 11 cancer pancreatectomies annually). Traveling distance was calculated as center-to-center geodetic distance between ZIP codes. Outcomes of interest included length of stay (LOS), perioperative mortality, hospital volume status, and distance traveled to treating hospital. Univariate analyses were performed for patient demographics. Multivariate logistic regression was used to identify independent predictors.

RESULTS: 704 patients met inclusion criteria and were largely white (87.2%) with median age of 65 years. Median ZIP code income was $54,677. Distance traveled for resection varied from 0 to 112 miles (median 15.4). Median LOS was 8.0 days. Odds of traveling > 10 miles for resection was higher among men ($p = 0.0319$), patients less than 65 years of age ($p = 0.0392$), and patients residing in ZIP codes with income > 2x the poverty line ($p = 0.0130$). Patients traveling more than 10 miles were more likely to receive care at high-volume hospitals. However, after adjustment, traveling for resection per se did not result in independently improved outcomes.



CONCLUSION: Most Massachusetts pancreatic cancer patients traveled more than 10 miles for resection. Patients who were younger, white, male, or residing in higher income areas were more likely to travel for care, suggesting demographic differences between travelers and nontravelers. Our data suggest some of the described volume effect on pancreatic cancer surgery may be due to patient selection rather than hospital or surgeon expertise.

Su1823

Predictors and Diagnostic Strategies of Early Stage Pancreatic Ductal Adenocarcinoma: A Retrospective Review

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BACKGROUND: Pancreatic cancer is the fifth cause of cancer death in Japan. Survivors after resection of pancreatic ductal adenocarcinoma (PDAC) have been gradually increasing, while most PDACs are still diagnosed at advanced stages. To improve the prognosis of the patients with PDACs, establishment of the strategy for early diagnosis is urgently needed. The aim of this study was to clarify the characteristics and diagnostic processes of early stage PDACs.

METHOD: Medical records of consecutive 299 patients who underwent curative resection (R0, R1) for PDACs between 1994 and 2013 were retrospectively reviewed. Clinical characteristics were compared between early stage (stage 0–I according to Japanese General Rules for Pancreatic Cancer) and advanced stage (stage II–IVa) PDAC groups and diagnostic processes were also analyzed.

RESULTS: Twenty-four of 299 patients (8%) had early stage PDACs (11 stage 0 and 13 stage I). The proportions of the early stage PDACs during the first and second half decade were 6% (4/64) and 9% (20/235), respectively (P = 0.80). The survival time of the patients with early stage PDACs was significantly longer than that with advanced stage PDACs (P < 0.01). Univariate and multivariate analyses revealed that the presence of intraductal papillary mucinous neoplasm (IPMN) (P < 0.01), history of pancreatitis (P < 0.01), and history of extrapancreatic malignancies (P = 0.01) were independent predictive factors for the diagnosis of early stage PDACs. Sensitivities of computed tomography (CT), magnetic resonance imaging/cholangiopancreatography (MRI/MRCP), endoscopic ultrasonography (EUS), and cytological examination during endoscopic retrograde pancreatography (ERP cytology) to diagnose early stage PDACs were 29%, 35%, 33%, and 65%, respectively. In early stage group, 10 of 24 patients had IPMN and 9 had a history of pancreatitis. ERP cytology could serve the preoperative diagnosis of PDAC in 13 of 24 patients, and 9 PDACs (38%) were diagnosed only by ERP cytology.

CONCLUSION: Detailed examination using ERP cytology in patients with IPMN or pancreatitis may contribute to the early diagnosis of PDAC.

Su1824

Impact of Preoperative Biliary Drainage on Short- and Long-Term Outcome After Pancreaticoduodenectomy for Cancer of the Head of Pancreas

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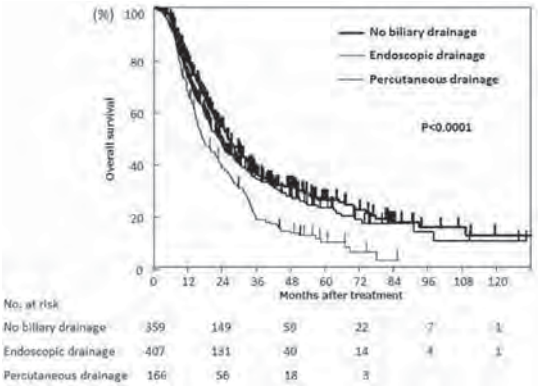
BACKGROUND: Recent reports have suggested that preoperative biliary drainage (PBD) increases the perioperative morbidity rate of pancreaticoduodenectomy (PD). However, the effect of PBD on long-term outcome after PD for pancreas head cancer (PHCA) still remains unclear.

AIMS: To evaluate the impact of PBD on short- and long-term surgical outcome in patients with PHCA undergoing PD.

METHODS: Retrospective analysis was performed in 932 patients with PHCA who underwent PD with R0 or R1 resection between 2001 and 2012 at 7 high-volume surgical institutions in Japan.

RESULTS: 166 patients (18%) underwent preoperative percutaneous transhepatic biliary drainage (PTBD), 407 patients (44%) underwent preoperative endoscopic biliary drainage (EBD), and 359 patients (39%) had no-PBD. The incidence of infectious complications after PD in the patients who underwent preoperative PTBD was significantly higher than those in the patients who had EBD and no-PBD (30%, 20%, and 18%, p = 0.010). There were no differences in the incidence of postoperative pancreatic fistula (12%, 9%, and 9%; P = 0.498), severe complication (25%, 21%, and 17%; p = 0.117), and 30-day mortality (0%, 0.9%, and 0.3%; P = 0.169) among three groups.

Patients who underwent preoperative PTBD had significantly poorer survival than those with EBD and no-PBD (16.7 months, 22.3 months, and 25.7 months; p < 0.0001) (Fig). Multivariate analysis revealed that independent prognostic factors included age (P = 0.003), blood loss (P < 0.001), tumor size (p = 0.016), tumor differentiation (p < 0.001), lymph node metastasis (p < 0.001), surgical margin status (p = 0.004), adjuvant chemotherapy (p < 0.001), and type of preoperative biliary drainage (p = 0.015). Furthermore, preoperative PTBD group had significantly higher incidence of peritoneal metastasis as a primary site of recurrence compared with EBD and no-PBD group (26%, 14%, 16%; p = 0.017). Multivariate analysis demonstrated that independent risk factors for peritoneal metastasis as a primary site of recurrence included surgical margin status (p < 0.001), and preoperative PTBD (p = 0.005).



CONCLUSIONS: Preoperative PTBD, but not EBD had negative impact on short- and long-term surgical outcome in the patients undergoing PD for PHCA. Poorer prognosis of the patient undergoing preoperative PTBD might be associated with peritoneal metastasis. These suggest that preoperative PTBD should be avoided whenever possible in patients with potentially resectable PHCA.

Su1825

Detailed Analysis of EMT and Tumor Budding Identifies Predictors of Long Term Survival in Pancreatic Ductal Adenocarcinoma

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BACKGROUND AND AIM: Pancreatic ductal adenocarcinoma (PDAC) is characterized by aggressive biology and poor prognosis even after resection. Long term survival is very rare and cannot be reliably predicted. Experimental data suggest an important role of epithelial-mesenchymal transition (EMT) in invasion and metastasis of PDAC. Tumor budding is regarded as the morphologic correlate of local invasion and cancer cell dissemination. The aim of this study was to evaluate the biologic and prognostic implications of EMT and tumor budding in PDAC of the pancreatic head.

METHODS: Patients were identified from a prospectively maintained database and baseline, operative, histopathologic and follow-up data extracted. Serial tissue slices stained for Pan-Cytokeratin (PCK) served for analysis of tumor budding, and E-Cadherin (ECad), Beta-Catenin (BCat) and Vimentin (VIM) staining for analysis of EMT. Baseline, operative, standard pathology and immunohistochemical parameters were evaluated for prediction of long term survival (≥30 months) in uni- and multivariate analysis.

RESULTS: Intra- and intertumoral patterns of EMT marker expression and tumor budding provide evidence of partial EMT induction at the tumor-host interface. Lymph node ratio (LNR) and E-Cadherin expression in tumor buds were independent predictors of long term survival in multivariate analysis.

CONCLUSIONS: Detailed immunohistochemic assessment confirms a relationship between EMT and tumor budding at the tumor-host interface. A small group of patients with favorable prognosis can be identified by combined assessment of LNR and EMT in tumor buds.

Su1826

Increased Number of Perineural Invasion Is Independently Associated with Poor Survival of Patients with Resectable Pancreatic Cancer

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BACKGROUND: Although perineural invasion (PNI) in pancreatic cancer has been reported to be a risk factor of poor outcome, its diagnostic criteria and the optimal cutoff values for predicting prognosis has remained controversial.

PURPOSE: The purpose of this study was to investigate the impact of the number of PNI in resected specimen on survival of patients underwent surgical resection for pancreatic cancer.

METHODS: Two hundred and two patients with pancreatic cancer who underwent surgical resection between 1999 and 2013 were eligible for this study. Histological assessment of PNI was performed by reviewing all of the Hematoxylin and Eosin stained slides with pancreatic cancer cells and the number of PNI was determined by counting every nerve fiber with PNI in these slides. The relationships between clinicopathological factors including the number of PNI and overall survival (OS) were analyzed with univariate and multivariate analyses.

RESULTS: PNI was observed in 190 of 202 (94%) patients and median number of PNI was 25 (range: 0–441). The number of PNI was significantly associated with residual tumor factor ($P = 0.0003$), UICC T factor ($P < 0.0001$), lymph node metastasis ($P < 0.0001$), UICC stage ($P < 0.0001$). Univariate analysis revealed that lack of postoperative adjuvant chemotherapy ($P = 0.0001$), R1 resection ($P < 0.0001$), moderately or poorly differentiated adenocarcinoma ($P = 0.004$), UICC pT3 ($P = 0.03$), lymph node metastasis ($P = 0.001$) and elevated postoperative serum CA19-9 level (> 37 U/ml) ($P < 0.0001$) were significantly associated with shorter OS. In addition, significant differences in OS were found between two groups divided on the basis of the median number of PNI (≥25 vs. 25 >) ($P < 0.0001$) and among three groups divided on the basis of tertile (≥40 vs. 40-14 vs.14≥) ($P < 0.0001$). In multivariate analysis, lack of postoperative adjuvant chemotherapy (hazard ratio [HR], 2.33: 95% confidence interval [CI], 1.39–3.79; $P = 0.001$), moderately or poorly differentiated adenocarcinoma (HR, 1.71; 95% CI, 1.12–2.70; $P = 0.01$), R1 resection (HR, 1.91; 95% CI, 1.23–2.95; $P = 0.004$), elevated postoperative serum CA19-9 level (>37 U/ml) (HR, 2.94; 95% CI, 1.93–4.47; $P < 0.0001$) and increased number of PNI (≥25) (HR, 2.53; 95% CI, 1.58–4.18; $P < 0.0001$) were identified as independent risk factors of shorter OS.

CONCLUSION: Increased number of PNI was independent risk factor of poor survival in patients with resectable pancreatic cancer, and it may contribute to establishment of new therapeutic strategy, as postoperative treatment can be optimized based on its value.

Su1827

Prediction of Islet Yield in Patients Undergoing Total Pancreatectomy with Islet Autotransplantation (TPIAT) for Non-Calcific Chronic Pancreatitis (NCCP) Using Contrast Enhanced MRI and Secretin Stimulated MRCP (sMRCP)

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BACKGROUND AND AIM: Insulin independence after TPIAT is impacted by the number and quality of islets transplanted. Contrast enhanced MRI with sMRCP offers a safe and non-invasive modality to diagnose chronic pancreatitis. In this study, we aimed to correlate the islet yield with the parenchymal imaging findings on MRI and ductal changes on sMRCP within the subpopulation of patients undergoing TPIAT for non-calcific chronic pancreatitis (NCCP).

METHODS: Adults patients with NCCP undergoing TPIAT, between 2008 and 2013 were included if they had a contrast enhanced MRI with sMRCP within a year of surgery. An experienced radiologist blinded to islet yield data following TPIAT determined the presence or absence of qualitative MRI features including atrophy (defined as antero-posterior (AP) diameter <20 mm), main pancreatic duct (MPD) irregularity, MPD stenosis, MPD dilation, presence of side branches, and abnormal duodenal filling after secretin injection. Chi square analysis was performed to determine if presence or absence of individual features was associated with high islet yield (>300,000 IEQ or >5,000 IEQ/kg). In addition, AP diameter (as a continuous variable) was correlated with total islet equivalents isolated (IEQ), islet equivalents per kilogram (IEQ/Kg) and digestive tissue volume in univariate linear regression and a multivariate regression model controlling for demographic variables (age, sex, history of smoking, and body mass index). Continuous variables are expressed in mean ± standard deviation (SD).

RESULTS: 63 patients (54 females (85%), mean age 37.7 ± 11.7) with NCCP with pre TPIAT contrast enhanced MRI with sMRCP were included in this study. Patients had a mean islet yield at procurement of 327,506 ± 151,641 islet equivalents (IEQ) and 4,688 ± 2,108 IEQ/kg body weight (IEQ/kg). Presence or absence of any single MRI feature (atrophy or ductal changes) did not adequately predict high islet yield. However, AP diameter significantly correlated with total IEQ (r = 0.36, p = 0.004 [figure]) and IEQ/kg (r = 0.32, p = 0.01), but also with higher digest tissue volume (r = 0.33, p = 0.008); these findings remained significant after taking into account patient age, sex, smoking status, and BMI.

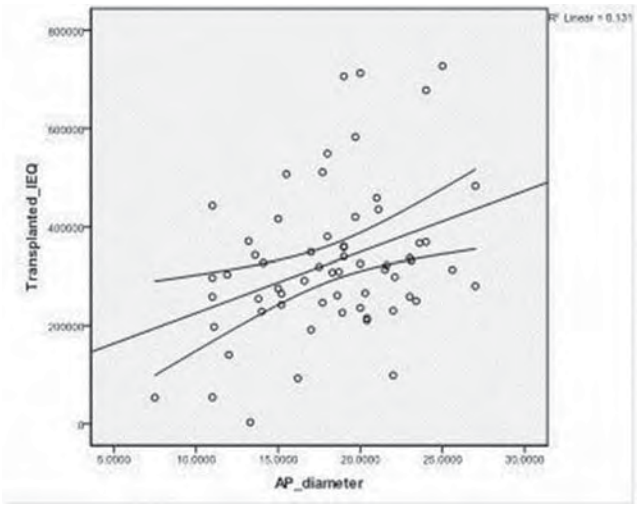

Figure: Total IEQ vs. AP diameter.

CONCLUSION: In patients with NCCP, greater AP diameter on contrast enhanced MRI/sMRCP was associated with higher islet yield. Because islet mass transplanted is a major determinant of later insulin use, these results suggest that MRI/sMRCP may offer an additional tool to aid in counseling prospective TPIAT patients with NCCP on diabetes risk after surgery.

Su1828

Division of the Pancreas During Distal Pancreatectomy: A Reliable and Simple Technique Which Results in a Very Low Fistula Rate

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BACKGROUND: Pancreatic fistula (PF) is the Achilles heel of pancreatic surgery. It is commonly reported to occur in the range of 10–50% of the time after distal pancreatectomy (DP). Many different techniques have been used and described in great detail, all in an effort to decrease the occurrence of PF as this is the driver of most of the major complications seen after this procedure. This report describes the technique and outcomes of a gradual stepwise compression technique using a linear stapler with staple line reinforcement for pancreatic transection during open or laparoscopic DP which has resulted in a very low PF rate.

METHODS: Over a 5-year period (Sept 2008 to Sept 2013), 136 patients underwent DP using the gradual stepwise compression technique with linear stapler and staple line reinforcement by two surgeons. The gradual stepwise compression technique involves a circumferential control of the pancreas at the appropriate location with application of a linear cutting stapling device with staple line reinforcement material applied to the jaws. The stapler is then closed in a very slow and methodical fashion over the course of a 3–5 minute period. The stapler is then fired and the staple line is inspected. The splenic vasculature is generally included with an en bloc stapling technique.

A laparoscopic, hand assist, and open approach was used in 121 (89%), 9 (6.6%), and 6 (4.4%) of the patients respectively. There were 64 (47%) males and 72 (53%) females with an average BMI of 28.2 ± 5.9. The average estimated blood loss was 245mL and operative time was 210 minutes. Indications for surgery include pancreatic adenocarcinoma, other neoplastic, cystic disease, and neuroendocrine, and benign in 38 (28%), 28 (21%), 27 (20%), 25 (18%), and 18 (13%) respectively. The average length of stay was 5.2 days.

RESULTS: Pancreatic fistula was seen in a total of 16 (11.8%) patients including Grade A, B, and C in 9 (6.6%), 2 (1.5%), and 5 (3.7%). 90-Day minor and major morbidity was seen in 32 (23%) and 19 (13.7%) patients respectively. There were no mortalities.

DISCUSSION: Division of the pancreas during DP using a gradual stepwise compression technique as described above results in a very low clinically significant PF rate (5.2%). This correlated to low morbidity with minimal recovery time for this patient group and is a very reliable and simple method of closure of the pancreatic remnant during open or laparoscopic distal pancreatectomy.

Su1829

Middle Segmental Pancreatectomy: A Retrospective Study of 76 Cases in a High-Volume-Center in China

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OBJECTIVE: To clarify whether middle segmental pancreatectomy (MSP) is safe and effective for lesions located in the mid-portion of the pancreas.

BACKGROUND: MSP removes lesions in the neck or body of the pancreas and minimize the parenchyma loss. The perioperative courses and outcomes of the procedure are conflicting.

METHODS: Perioperative courses, short-term and follow-up results of patients who underwent MSP between 2004 and 2013 at the the First Affiliated Hospital of Nanjing Medical University were compared to those of a control group of patients who underwent distal pancreatectomy (DP).

RESULTS: An aggregated 76 patients underwent MSP (Female:Male = 48:28, median age of 52). The main indications included serous cystadenoma (SCN) (n = 23), mucinous cystadenoma (MCN) (n = 8), pancreatic neuroendocrine tumors (pNETs)(n = 18), solid-cystic papillary tumor (SPT) (n = 12), and intraductal papillary mucinous neoplasm (IPMN) (n = 7). Among them, 3 case were reconstructed as the Omega type of pancreaticojejunostomy, and the rest with closure of the proximal stump plus distal remnant pancreaticojejunostomy. When compared to the cohort of 168 DP, MSP showed no difference in the pre- and post-operative hospital stay and reoperation rate. MSP required longer operation time (MSP:DP = 228.6: 186.1 min, p = 0.000), and less intraoperative blood loss (MSP: DP = 246.7:392.2 mL, p = 0.002). The perioperative motality was zero in both groups. There was no difference in overall morbidity, overall pancreatic fistula (32.9% in MSP and 45.3% in DP), and postpancreatectomy hemorrhage (6.5% in MSP and 2.4% in DP). However MSP demonstrated lower incidence of the International Study Group on Pancreatic Fistula (ISGPF) Grade A (MSP:DP = 1.3%:11.3%, p = 0.008). After a median follow-up of 21 months, MSP resulted in a lower risk of endocrine insufficiency than that of DP (MSP:DP = 4.3%:24.7%, p = 0.001) but no significant difference in exocrine failure. None recurrence of the low-grade malignancies, such as SPT, IPMN and pNETs, were detected during the follow-up.

CONCLUSION: MSP is a safe and effective treatment for selected lesions in neck and proximal body of the pancreas with better preserved endocrine function.

Su1830

Is Partial Resection of Portal or Superior Mesenteric Vein Justified for Patients with Pancreatic Head Carcinoma?

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INTRODUCTION: The prognostic impact of PV/SMV resection for pancreatic head carcinoma is still controversial. The aim of this study was to determine whether portal or superior mesenteric vein (PV/SMV) resection is justified for patients with pancreatic carcinoma who underwent pancreatoduodenectomy.

METHODS: Of 1,451 consecutive patients with pancreatic carcinoma underwent tumor resection at 7 high-volume surgical institutions between 2001 and 2012, 937 patients who underwent pancreatoduodenectomy were analyzed retrospectively. These patients were classified into three groups according to preoperative multi-detector row computed tomography (MDCT) findings reported by National Comprehensive Cancer Network; resectable tumor (R group), borderline resectable tumor of PV/SMV involvement (BR-P group), and borderline resectable tumor of arterial abutment (BR-A group). Clinicopathological factors were compared between patients who did and did not undergo PV/SMV resection using univariate and multivariate analysis.

RESULTS: Of the 937 patients, 435 patients (46%) underwent partial resection of the PV/SMV and the remaining 501 patients (54%) did not. Patients who underwent PV/SMV resection had more advanced tumor and required more operative time and more blood loss for tumor resection. However, the frequency of mortality and morbidity did not differ between the two groups. Univariate survival analysis revealed that there was a significant difference in overall survival between the two groups ($P < 0.001$). However, no significant differences of overall survival between the two groups were found among the subgroup of R group, BR-P group, and BR-A group and PV/SMV resection was not an independent prognostic factor of overall survival by multivariate analysis. Among 435 patients who underwent PV/SMV resection, multivariate analysis demonstrated that preoperative MDCT findings BR-A ($P = 0.021$), preoperative serum CA19-9 level ($P < 0.001$), blood transfusion ($P = 0.020$), postoperative complication ($P < 0.001$), use of postoperative adjuvant chemotherapy ($P < 0.001$), pathological PV/SMV invasion ($P = 0.048$), and lymph node status ($P = 0.041$) was independent prognostic factors. R group and BR-P group had a favorable median survival time with additional adjuvant chemotherapy (median survival time 43.7 months and 29.7 months, respectively). However, median survival time of BR-A group was only 18.6 months despite of administration of adjuvant chemotherapy.

CONCLUSION: Resection of the PV/SMV, if no arterial abutment is found, provides an adequate survival benefit to patients with pancreatic head carcinoma without increased mortality and morbidity. Subsequent adjuvant chemotherapy is mandatory for patients who undergo PV/SMV resection.

Su1831

Perioperative and Long Term Outcome After Extended (Portal Vein, Multivisceral) Resection for Cancer of the Pancreatic Head

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INTRODUCTION: Complete resection is established as the only potential chance for cure in patients with pancreatic cancer (PaCa). In contrast to extended lymphadenectomy, the influence of locally extended resection (portal vein, multivisceral) on perioperative morbidity and oncologic outcome remains less clear. We thus investigated perioperative and long-term outcome after standard pancreatic head resections (SPR), additional portal vein (PVR)- and multivisceral resections (MVR).

METHODS: Clinicopathologic, perioperative and survival data from patients who underwent pancreatic head resection (PHR) for PaCa from 1994 to 2011 were analyzed (prospective pancreatic database).

RESULTS: PHR for PaCa was performed in 291 patients. Of those, 170 (58%) underwent SPR, 103 (35%) additional PVR, and 18 (6%) had MVR. Additional organs resected were colon (n = 7), liver (n = 5), stomach (n = 5), and small bowel (n = 1). Operation time was significantly longer in MVR and PVR with a median time of 469 and 472 minutes, compared to SPR (428 min; $p = 0.01$). Overall morbidity was slightly higher after MVR (72%) compared to PVR (55%) or SPR (50%; $p = 0.15$). Patients who received MVR had a significantly higher in-hospital mortality of 11% compared to 4.7% in SPR and 0% in PVR ($p = 0.02$). Nodal status did not differ in the three groups, whereas more patients in the MVR-group had tumor-negative resection margins (89% vs 65%/74%; $p = 0.06$). The 3- and 5-year survival after SPR was 28% and 21%, respectively. Survival was slightly lower

in PV with (19% and 10%) and lowest in MV (17% and 8%; p = 0.15). Node negative patients with free margins survived substantially longer with a 3- and 5-year survival rate of 41% and 30% respectively (p = 0.001 vs positive nodes or margins). Multivariate survival analysis identified margin positive resection, intraoperative blood transfusions and MVR as significant, independent risk factors for poorer overall survival.

CONCLUSION: Multivisceral pancreatic head resections imply increased perioperative morbidity, higher mortality and inferior survival. Portal vein resections however, can be performed safely to reach margin free resection, and its survival benefits.

Su1832

The Impact of Pancreatic Fistula Grade C on Survival After Pancreatic Resection; Analysis of 1,015 Patients with Pancreatic Cancer in Multicenter Study

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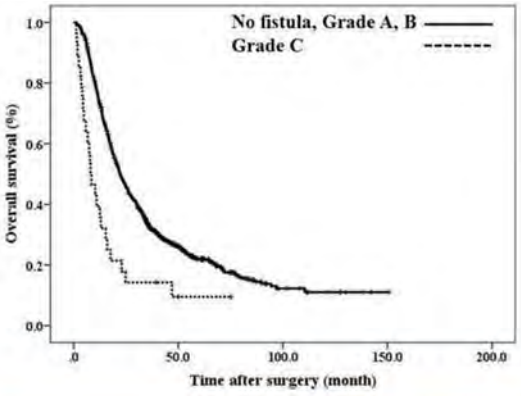
BACKGROUND: Several studies demonstrated that postoperative complications after pancreatic resection for pancreatic cancer adversely affect survival outcome. Pancreatic fistula grade C is one of the most serious complications after pancreatic resection. However, it remains unclear whether pancreatic fistula grade C affects long-term outcome after resection for pancreatic cancer.

AIMS: The aim of this study is to elucidate the adverse effect of pancreatic fistula grade C on recurrence and survival after resection for pancreatic cancer by a survey of high volume center of pancreatic resection in Japan.

METHODS: Medical records were reviewed in 1,015 patients with pancreatic cancer who underwent pancreatic resection between 2001 and 2010 at 7 high-volume surgical institutions in Japan. Pancreatic fistula was defined based on the International Study Group on Pancreatic Fistula (ISGPF) guideline.

RESULTS: Overall morbidity following pancreatic resection was 42.6%, and 30-day mortality was 0.3%. Pancreatic fistula occurred in 22.9% (232 of enrolled 1,015 patients); grade A 9.4%, grade B 10.7%, grade C 2.8%. Concerning with disease-free survival, patients with pancreatic fistula grade C had a significantly shorter time to recurrence than those without it (5.8 vs. 12.6 months, p = 0.019). Concerning with overall survival, patients with pancreatic fistula grade C had a significantly poorer survival than those without it (8.1 vs. 22.3 months; median survival, 14.3 vs. 32.6% months; 3-year survival, p < 0.0001). Pancreatic fistula grade C was an independent prognostic factor after multivariate analysis (hazard ratio 2.49; 95% confidence interval 1.56–3.96; P < 0.001). Moreover, independent prognostic significance was also detected for glasgow prognostic score (GPS) 2 (P = 0.021), blood transfusion (P < 0.001), International Union Against Cancer (UICC) pT3 or T4(P = 0.003), pathological plexus invasion (P = 0.001), lymph node status (N1) (P = 0.024), no adjuvant therapy (P < 0.001). Furthermore, multivariate analysis demonstrated that independent risk factors for pancreatic fistula grade C was glasgow prognostic score (GPS) 2 (hazard ratio 5.37; 95% confidence interval 1.31–22.0; P = 0.019) and male (hazard ratio 6.02; 95% confidence interval 1.77–20.5; P = 0.004).



	No. of patients	Median survival time (months)	P value
Pancreatic fistula Grade C			
Yes	28	8.1	< 0.001
No	987	22.3	

CONCLUSIONS: pancreatic fistula grade C had a significant impact on the long-term survival of patients with pancreatic cancer. The improvement of operative procedure or perioperative management to reduce the incidence of pancreatic fistula grade C may lead to a favorable survival in these patients.

Su1833

Nodal Counts and Lymph Node Ratio Impact Survival After Distal Pancreatectomy for Pancreatic Adenocarcinoma

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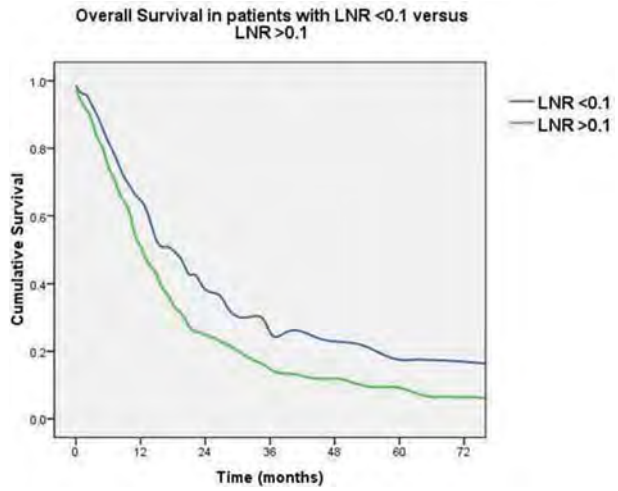
BACKGROUND: The number of lymph nodes required for accurate staging after distal pancreatectomy for pancreatic adenocarcinoma is unknown. We evaluated the impact of total number of lymph nodes examined (NNE) and the lymph node ratio (LNR-positive nodes/total nodes examined) on survival in patients undergoing distal pancreatectomy for pancreatic adenocarcinoma.

METHODS: The Surveillance, Epidemiology and End Results (SEER) database was used to identify 1473 patients who underwent distal pancreatectomy for pancreatic adenocarcinoma from 1998–2010. Data for patient age, gender, tumor stage, tumor grade, histology, NNE and LNR was studied for each patient to evaluate 5-year overall survival using log-rank tests and Kaplan-Meier survival estimates.

RESULTS: The median NNE was 8. No nodes were examined in 232 (16%) of patients and 843 (57%) had < 10 NNE. The 10 LN cut off was statistically determined by testing each cut off from 1 onward to see where the KM curves diverged and were associated with a high enough chi-squared value and $p < 0.05$. Of patients who had at least one node examined, 612 (49%) were node positive. In the node negative subset, median and 5-year overall survival for patients with ≤10 NNE was significantly worse than patients with >10 NNE (16 vs. 20 months and 13% vs. 19% respectively, $p < 0.011$). For node positive patients there was no difference in survival between patients with one or greater number of nodes involved. Patients with LNR ≤ 0.1 had better 5-year overall survival compared with patients with LNR > 0.1 (17% vs. 6%, $p = 0.002$)



Kaplan Meier curve showing the 5-year overall survival in patients with LNR ≤ 0.1 and LNR > 0.1, (17% vs. 6%, $p = 0.002$).

DISCUSSION: Patients with pancreatic cancer undergoing distal pancreatectomy should have at least 10 lymph nodes examined to avoid understaging. For node positive patients, LNR may be a better prognostic indicator than total number of positive nodes.

Su1834

A National Perspective of Invasive Intraductal Papillary Mucinous Neoplasm (IPMN)

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OBJECTIVES: Great understanding of IPMN has occurred in the last two decades, however questions remain which cannot be adequately answered by currently available institution-based literature. Specifically, 1) What are predictors of survival in these malignancies? 2) What is the impact of adjuvant therapy in this cohort? 3) How do outcomes compare to standard pancreatic ductal adenocarcinoma (PDAC)? A large scale assessment of invasive IPMN using a national dataset would provide greater clarity to these clinical dilemmas.

METHODS: Surgical patients from the National Cancer Database (NCDB) with histologically confirmed invasive IPMN were studied from 1998–2005 and compared to those with PDAC. Patients were excluded if they received preoperative systemic or radiation therapy, or if they died within 30 days of the operation. Survival was assessed using the log-rank test statistic and Cox regression.

RESULTS: 1739 patients underwent pancreatic resection for invasive IPMN (54% N0, 70% R0, median tumor size = 3.5 cm). 31% of patients were Stage 1, 33% Stage 2, 20% Stage 3, 11% Stage 4, and 5% were unclassified. For the overall cohort, median, 1-yr, and 5-yr survivals were 26.7m, 74%, and 32%. Adjuvant therapy was used in 45% of patients (24% in Stage 1 vs. 58% in Stages II–IV). The majority of treated patients received combined Chemo/XRT (70%). When assessed by Cox regression, improved survival for invasive IPMN was associated with receipt of adjuvant therapy (HR = 0.76; $p < 0.001$), treatment at academic facilities, low grade tumors, N0 status, R0 resection, lower AJCC stage, and younger age. Furthermore, Cox models by stage revealed a survival advantage associated with adjuvant therapy in patients with Stage II–IV disease (HR 0.66; $p < 0.001$), but not in Stage I (HR 1.21; $p = 0.223$). IPMN had significantly better stage-adjusted survival than PDAC (Table).

Table: Median Survival in IPMN and PDAC According to AJCC Stage

	IPMN	PDAC	
Stage	Median survival (m)		P-Value
I	80.4	24.6	<0.001
II	24.1	17.6	<0.001
III	16.8	14.4	0.010
IV	10.1	9.8	0.318
Overall	26.7	16.2	<0.001

CONCLUSIONS: Invasive IPMN appears to be more indolent than standard PDAC, even after stage adjustment. Overall, adjuvant therapy improves survival for invasive IPMN, especially in higher-staged disease (by 34%). However, this benefit is not evident in early stage disease, negating the necessity of post-operative therapy in these situations.

Su1835

Improvement in Pancreatectomy Outcomes: Lessons Learned from Applying Evidence-Based Practice

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BACKGROUND: Morbidity following pancreatectomy remains significant despite improvements in patient selection and operative mortality. We set out to determine the impact of an evidence-based and specialized multidisciplinary program including surgeons, residents, anesthesiologists, and nurses on outcomes following pancreatectomy.

METHODS: A retrospective analysis of prospective institutional pancreatectomy and ACS-NSQIP databases were reviewed to identify patients who had undergone elective pancreatectomy from 9/2007 to 12/2012. The initiation of our multidisciplinary program in 2010 included judicious perioperative fluid management and transfusion practices, evidence based drain and catheter management, and an orientation and teaching program for nursing staff to facilitate standardized postoperative patient protocols. Multivariate linear or logistic regression was used where appropriate to determine if there was an improvement in operative outcomes over time after adjusting for significant patient-specific variables. Endpoints of interest included operative time, length of stay, rate of ICU admission, transfusion rate, and incidence of operative complications.

RESULTS: Complete information was available for 226 patients who underwent pancreatectomy during the time period analyzed, including pancreaticoduodenectomy/total pancreatectomy (n = 147) or distal pancreatectomy (n = 79). There were 160 patients who experienced a complication (morbidity rate = 70.8%) and 8 patients died within 90 days (mortality rate = 3.5%). To control for patient-specific variables, multivariate analysis was performed for each individual operative outcome. When controlling for these factors, operative year was an independent predictor of improved outcomes—reduced operative time, length of stay, ICU admissions, transfusions, and complications. When adjusting for significant preoperative and intraoperative variables over time, there remained a significant improvement in all endpoints (Table).

CONCLUSIONS: Following the implementation of an evidence-based pancreatectomy program, there was a significant reduction in operative time, length of stay, the rate of ICU admission, blood transfusion, and complications. Multidisciplinary programs using evidence-based guidelines can help reduce operative complications and improve outcomes in pancreatectomy.

Table: Logistic Regression Analysis of Changes in Operative Outcome Measures Over Time

Year	Number of Cases	Mean Operative Time (min)*	Mean Length of Stay (days)*	ICU Admission (%)	Complication Rate (%)	Transfusion Rate (%)
2007	14	490.5	24.7	50	85.7	71.4
2008	37	455.7	23.0	27	78.4	48.7
2009	47	420.9	21.3	32	76.6	40.4
2010	38	386.1	19.6	26	65.8	34.2
2011	44	351.3	17.9	20	65.9	45.5
2012	46	316.5	16.2	17	63.0	10.9
p-value		<0.0001	<0.0001	<0.0001	0.022	0.033

*Means are adjusted from multivariate linear regression model to be independent of patient-specific factors **p-values from multivariate models for year of operation

Su1836

Gastrectomy Is Not a Risk Factor for Pancreatic Cancer: A Meta-Analysis of Case-Control Studies

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INTRODUCTION: Pancreatic cancer is common in the developed world. Several risk factors for pancreatic cancer have been identified. Recent studies have evaluated gastrectomy as a risk factor for pancreatic cancer. We conducted a meta-analysis of case-control studies to assess the role of gastrectomy as a risk factor for pancreatic cancer.

METHODS: Pubmed, Embase, Web of Knowledge, reference lists of retrieved articles and conference abstracts were searched for relevant studies (Search date Sept 2013). Case control studies with gastrectomy for benign diseases were included. Gastrectomy for malignant conditions was excluded. Standardized forms were used to extract data. Data was extracted by two reviewers independently. Odds ratio was calculated using comprehensive Meta-analysis software. Newcastle-Ottawa Scale (NOS) was used to assess the quality of study. Heterogeneity was also assessed. Random effects model was used for pooling the data.

RESULTS: Eleven case-control studies were included in this study (3951 cases/9609 control). Studies were reported from USA (6), Europe (4) and Taiwan (1). Seven studies included hospital based controls and 4 included population based controls. The sample sized ranged from 142 to 720 (cases) and 180 to 2098 (control). The age of the patients ranged from 20–79 yrs. The risk of pancreatic cancer was not increased in patients with prior history of gastrectomy (OR 1.39; 95% CI, 0.95–2.03, p = 0.09). Subgroup analysis based on the geographical location revealed the risk was not increased in the USA (OR 1.65; 95% CI, 0.96–2.82, p = 0.068) or Europe (OR 1.13; 95% CI 0.61–2.08, p = 0.07). Subgroup analysis for Asia was not performed as there was only one study. Subgroup analysis based on the design of the study (population based control or hospital based controls) showed no significant difference. As per Newcastle-Ottawa Scale, nine studies were of high quality (7 or more NOS points) and two were of low quality (6 NOS points). Subgroup analysis based on quality did not show any significant difference. Moderate heterogeneity was present (I square = 56%) and thus random effects model was used for analysis.

CONCLUSION: A prior history of gastrectomy for benign gastric disorders is not associated with an increased risk for pancreatic cancer.

Su1837

Readmission and Prolonged Hospital Stay After Distal Pancreatectomy: Advantage Laparoscopic Approach

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BACKGROUND: Several studies have demonstrated shorter hospital stay after laparoscopic distal pancreatectomy (LDP) compared to open approaches (ODP), yet few have considered readmission and its effect on total hospital days. The aim of this study was to evaluate the hospital days required after distal pancreatectomy and assess the value of laparoscopic approaches.

METHODS: A retrospective review of patients undergoing distal pancreatectomy at a single institution from 2004 through 2012. Patients with adjacent organ resection were excluded. Clinicopathologic and outcomes data were recorded and index length of stay, 30-day readmission and total hospital days (index admission days + readmission days) were calculated. Prolonged hospital stay was defined as >10 days.

RESULTS: 580 patients underwent distal pancreatectomy with either a laparoscopic (n = 238) or open (n = 342) approach. Patients were similar with respect to age (59 vs. 57 years), BMI (29 vs 29) and gender (54% vs 51% female), however the ODP group was more likely to have malignant diagnoses (28% vs 38%, p = 0.008). Readmission rates were not different between LDP and ODP (17% vs. 16%, p = 0.73). Median initial hospital stay (5 vs. 7 days, p < 0.001), occurrence of prolonged hospital stay (19% vs. 28%, 0.008) and median total hospital days (5 vs. 7 days, p < 0.001) were less for LDP.

CONCLUSIONS: Laparoscopic approaches for distal pancreatectomy result in shorter hospital stay, decreased occurrence of prolonged hospital stay, and less total hospital days without differences in readmission rates. Whereas selection bias may affect these results, these findings further support possible advantages of laparoscopic approaches.

Su1838

The Changing Spectrum of Surgically Treated Cystic Neoplasms of the Pancreas

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INTRODUCTION: Pancreatic cystic lesions are divided into four main types: serous, mucinous, solid pseudopapillary, and intraductal papillary mucinous neoplasm (IPMN). While the incidence of pancreatic cystic lesions has steadily increased, we sought to evaluate the changes in their surgical management.

METHODS: Patients with pancreatic cystic lesions who underwent surgical resection from 2003 to 2013 were identified (modern cohort), and clinicopathologic factors were analyzed and compared to a similar cohort of patients from 1992 to 2002.

RESULTS: There were 134 patients, median age 66 years (range: 18–88), with pancreatic cystic lesions who underwent surgical resection from 2003 to 2013, compared to 73 patients from 1992 to 2002. Patients were predominately female in both populations (67% vs. 67%, p = 0.99). Pathology included: 18 serous, 47 mucinous, 11 pseudopapillary and 58 IPMN. There were significantly fewer serous lesions (13% vs. 36%, p < 0.001) and more IPMN (43% vs. 25%, p = 0.008). Malignancy was noted in 17% of the mucinous lesions and 38% of the IPMNs. While abdominal pain was the most common presenting symptom in both populations, it was less common in the modern cohort (48% vs. 64%, p = 0.01). 62 lesions were noted incidentally. The most common preoperative imaging was a CT scan (98%), although 66% underwent EUS and 63% biopsy. Surgical resection included: 62 pancreaticoduodenectomies, 64 distal pancreatectomies, 4 central pancreatectomies, 1 total pancreatectomy, and 3 other procedures. In comparison, pancreaticoduodenectomy was significantly more common in the modern cohort (46% vs. 27%, p = 0.008), while distal pancreatectomy decreased in frequency (48% vs. 59%, p = 0.13). Post-operative complication rates were similar (32% vs. 27%, p = 0.42), and peri-operative mortality rates were comparable (3% vs. 4%, p = 0.67). Pancreatic fistula rates were slightly less common in the modern cohort (4% vs. 10%, p = 0.085). Other complications included: 7 intra-abdominal abscesses, 3 GI bleeds, 5 with delayed gastric emptying, 6 urinary tract infections, 2 pneumonias, and 7 wound infections.

CONCLUSION: There has been a dramatic change in surgically treated pancreatic cystic tumors at our institution over the past two decades. Whereas in the first decade serous lesions were most common, the second saw IPMN's being most common while mucinous and solid pseudopapillary lesions remained constant. Our data suggests that the incorporation of new imaging and diagnostic tests has led to greater detection of cystic tumors and a decreased rate of resection of those that do not need surgical intervention. Therefore, all patients with cystic pancreatic lesions should undergo a focused CT-pancreas and EUS-FNA to select those that would benefit from surgical resection.

Su1839

Regional Hospital Charges for Pancreaticoduodenectomy in Florida: Location Matters

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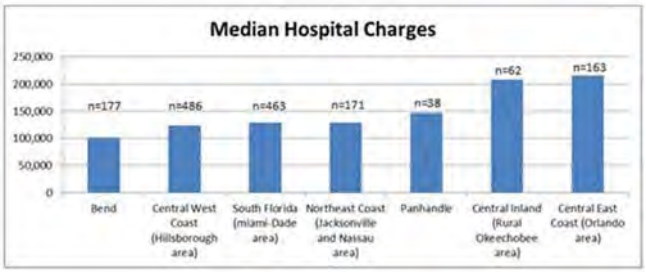
INTRODUCTION: Concentration of care with regionalization of care for any operation raises potential for regional differences in cost of care and outcome. This study was undertaken to determine if charges and outcome after pancreaticoduodenectomy vary by region in Florida, and if so, are charges and outcome related?

METHODS: Inpatient data for pancreaticoduodenectomy in Florida during 2010–2012 were obtained from the Florida Agency for Health Care Administration. Seven geographically different regions were designated based on cost of living index and urban to rural population ratio. Hospital charges (adjusted to 2012 dollars), length of stay, in-hospital mortality, and the frequency with which surgeons undertook pancreaticoduodenectomy were evaluated for these regions.

RESULTS: The median hospital charges for pancreaticoduodenectomy from region to region ranged from $101,436 to $214,971 (Figure). Median hospital charges by the regions correlated positively with LOS (p < 0.0001) and in-hospital mortality (p < 0.03) and negatively with the more frequently with which pancreaticoduodenectomy was undertaken in the regions (r = 0.43; p < 0.0001). Among the regions, the lower the median hospital charges, the more high-volume surgeons were undertaking pancreaticoduodenectomy (p < 0.001).



CONCLUSIONS: There are tremendous regional differences for hospital charges with pancreaticoduodenectomy in Florida, with one region charging over double that of another. The regions with lower median charges had more high-volume surgeons, shorter hospital stays, and lower in-hospital mortality rates. Regional differences in cost and quality of care need to be studied and abrogated to provide uniform optimal care.

Clinical: Small Bowel

Su1840

The Surgical Apgar Score Is Associated with the Need for Post-Operative ICU Admission

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BACKGROUND: The surgical Apgar score (SAS) is a 10-point scoring system calculated with limited intra-operative data (blood loss, lowest mean arterial pressure, lowest heart rate), that predicts postoperative morbidity and mortality. This study evaluates whether SAS may be used to predict the need for post-operative ICU stay.

METHODS: We prospectively collected data on demographics, medical history, type of surgery, and post-operative outcomes for any veteran undergoing general surgery during the period Oct 2006–Jul 2009 at the New York Harbor VA Medical Center. We categorized patients into 4 groups according to SAS. Differences between SAS groups were evaluated with Pearson's $\chi 2$ and ANOVA as appropriate. The study end-points were length of post-operative stay in the ICU and need for transfer or re-admission to the ICU.

RESULTS: During the study period 2198 patients underwent general surgery. After exclusion of patients with pacemakers and/or missing variables, 2125 were available for analysis (SAS ≤4: n = 29; SAS 5–6: n = 227; SAS 7–8: n = 797; SAS 9–10: n = 1072). Demographics and baseline characteristics, intra-operative and post-operative outcomes are summarized in Table 1. Patients in the lower SAS groups had worse functional status, higher ASA score and higher number of existing comorbidities. SAS scores were lower after major or extensive surgery. Low SAS scores were associated with significant post-operative morbidity and 30-day mortality. Poor SAS were associated with high probability of ICU admission (79% vs. 57.3% vs. 34.3% vs. 17.0%, $p < 0.001$). This association was maintained in a logistic regression controlling for sex, age, ASA, and other comorbidities, with SAS being the strongest predictor of prolonged ICU stay with a beta coefficient of –0.17 ($p < 0.01$). Among the 608 (28.6%) patients admitted to the ICU, a low SAS was associated with longer ICU stay (mean 17.3 vs. 14.6 vs. 9.7 vs. 9.9 days, $p = 0.009$). Of the 1517 (71.4%) patients initially admitted to the regular floor, 148 (9.8%) required subsequent ICU admission. Among patients initially triaged to the regular floor, SAS was strongly associated with need for subsequent admission to the ICU (100%, 49.5%, 13.4, and 2.7% for SAS 0–4, 5–6, 7–8, and 9–10, respectively ($p < 0.001$).

Table 1

Group	Apgar 0–4, N = 29 1.4%	Apgar 5–6, N = 227 10.7%	Apgar 7–8, N = 797 37.5%	Apgar 9–10, N = 1072 50.4%	P-Value
Age (years)	69.3 ± 12.1	66.9 ± 13.4	63.5 ± 14.3	63.5 ± 14.4	0.001
Proportion male	28 (96.6%)	216 (95.2%)	731 (91.7%)	977 (91.1%)	0.17
Functional status					
Independent	8 (27.6%)	132 (58.1%)	675 (84.7%)	1011 (94.3%)	
Partially dependent	7 (24.1%)	44 (19.4%)	79 (9.9%)	47 (4.4%)	<0.001
Totally dependent	14 (48.3%)	51 (22.5%)	43 (5.4%)	14 (1.3%)	
ASA classification					
ASA 1	0	0	29 (3.6%)	62 (5.8%)	
ASA 2	0	18 (7.9%)	170 (21.3%)	296 (27.6%)	
ASA 3	8 (27.6%)	117 (51.5%)	506 (63.5%)	663 (61.8%)	<0.001
ASA 4	19 (65.5%)	82 (36.1%)	87 (10.9%)	51 (4.8%)	
ASA 5	2 (6.9%)	10 (4.4%)	5 (0.6%)	0	
Pre-Operative Conditions					
Severe COPD	9 (31.0%)	42 (18.5%)	107 (13.4%)	91 (8.5%)	<0.001
Non-diabetic	22 (75.9%)	160 (70.5%)	622 (78.0%)	899 (83.9%)	
Diabetic—oral meds	2 (6.9%)	32 (14.1%)	106 (13.3%)	112 (10.4%)	<0.001
Diabetic—insulin	5 (17.2%)	35 (15.4%)	69 (8.7%)	61 (2.9%)	
Prior MI	2 (6.9%)	8 (3.5%)	6 (0.8%)	5 (0.5%)	<0.001
CHF within 30 days prior OR	4 (13.8%)	9 (4.0%)	16 (2.0%)	5 (0.5%)	<0.001
Acute renal failure	3 (10.3%)	17 (7.5%)	5 (0.6%)	2 (0.2%)	<0.001
Dyspnea					
None	18 (62.1%)	197 (86.8%)	733 (92.0%)	1031 (96.3%)	
Minimal exertion	7 (24.1%)	18 (7.9%)	45 (5.6%)	37 (3.5%)	<0.001
Rest	4 (13.8%)	12 (5.3%)	19 (2.4%)	3 (0.3%)	
Outcomes					
Overall morbidity	15 (51.7%)	97 (42.7%)	151 (18.9%)	63 (5.9%)	<0.001
Number of complications	1.24 ± 1.6	0.83 ± 1.2	0.34 ± 0.9	0.09 ± 0.4	<0.001
30-day mortality	5 (17.2%)	28 (12.3%)	21 (2.6%)	3 (0.3%)	<0.001
Admission to ICU after surgery	23 (79%)	130 (57.3%)	273 (34.3%)	182 (17.0%)	<0.001
Initial length of ICU stay (days)	17.3 ± 21.2	14.6 ± 20.0	9.7 ± 15.3	9.9 ± 15.4	0.009

CONCLUSIONS: In our experience SAS was associated with need for ICU admission and length of ICU stay. Furthermore, poor SAS was strongly associated with need for ICU admission in patients initially triaged to regular floor after surgery.

Su1841

Superior Mesenteric Artery Syndrome As Potential Cause of Antireflux Surgery Failure

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BACKGROUND: Superior mesenteric artery syndrome (SMAS) is characterized by upper gastrointestinal symptoms, such as nausea, food regurgitation, vomiting, post prandial epigastric pain and weight loss. SMAS is commonly not recognized and many patients are considered as affected by gastro-esophageal reflux disease or specific gastrointestinal motility disorders. For this reason its diagnosis is frequently delayed, resulting in ineffective symptomatic therapies and inappropriate investigations. We aimed to investigate the occurrence of this misdiagnosis in a large group of patients who underwent surgical treatment for SMAS. Moreover, we assessed medical history and final outcome.

METHODS AND PATIENTS: 27 consecutive SMAS patients who underwent surgical correction (duodenojejunostomy or duodenojejunostomy+duodenum resection) between 2008–2013 have been enrolled in this study. Six patients had a previous fundoplication which had been performed elsewhere. Two patients had more than one antireflux procedure.

Demographic and clinical data (weight, BMI, medical therapy, symptom duration) were prospectively collected. Symptoms were scored by using a detailed lickert-scale based questionnaire for vomiting, nausea, epigastric pain, regurgitation and post-prandial bloating. Before the surgical treatment for SMAS, all patients have been investigated with CT and/or MR angiography with multi-planar three-dimensional reconstructions, endoscopy, barium swallow, esophageal manometry and 24 hour pH-monitoring.

RESULTS: All six patients were PPI no-responders before the antireflux surgery and had persistent symptoms after the previous fundoplication. The median of symptom duration was 90 months. At SMAS preoperative evaluation, 5 patients had negative 24 hour pH-monitoring and normal LES resting pressure. Mean aorto-mesenteric angle was 21° ± 1.8 and distance 6 ± 2.1 mm. In all patients a duodenojejunostomy was performed: in 5 patients a distal duodenum resection was added.

The morbidity and mortality of SMAS surgery were nil. At a median follow-up of 48 months (IQR: 37–55), the median of symptom score was significantly lower after surgery (28 vs 8; $p < 0.001$). In all patients the symptoms score increased after SMAS surgery. There was a significant improvement in patients' weight (52 ± 1 kg vs 57 ± 9 kg $p < 0.01$) and BMI (18.5 ± 3.4 kg vs 20.6 ± 3.4 kg; $p < 0.01$) and there was a significant decrease of anti-reflux medications use ($p < 0.01$).

CONCLUSIONS: Patients with long lasting nausea, vomiting and gastroesophageal reflux who are not responding to PPI therapy should be carefully considered for possible SMAS before performing an antireflux procedure. Moreover, patients who underwent a fundoplication and still remained symptomatic reporting gas-bloat syndrome or persistent reflux should be addressed to a study of the duodenum for a possible presence of SMAS.

Su1842

Pancreas Sparing Partial Sleeve Duodenectomy (PSD) for Non-Ampullary Duodenal Neoplasia

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BACKGROUND: Duodenal neoplasia is being increasingly diagnosed due to prevalence of screening upper gastrointestinal endoscopy. As our expertise with endoscopy has grown we have moved away from performing radical duodeno-pancreatic resections for these lesions. Large and/or endoscopically unresectable lesions will require surgical intervention. PSD involves separating the duodenum from the head of the pancreas and thus allowing pancreas preservation. The objective of this study was to evaluate our outcomes with pancreas sparing partial sleeve duodenectomy (PSD) for non ampullary duodenal neoplasia which were too large for simple wedge duodenal resections.

METHODS: A retrospective review of medical records of patients with non ampullary duodenal neoplasia which underwent partial sleeve duodenectomy from August 2008 to September 2013 was performed. Pathological characteristics of the lesions, surgical approach, technique depending on location, and outcomes were analyzed.

RESULTS: Twenty patients with non ampullary duodenal neoplasia were identified (13 men, 7 women, mean age of 70 years). Surgical approach was laparoscopic (n = 17), open (n = 2) and hand assisted (n = 1) with either a distal PSD (n = 13) or proximal PSD (n = 7). Reconstruction was performed via a side to side stapled duodenojejunostomy (n = 13), end to side hand sewn duodenojejunostomy (n = 4), end to end duodenojejunostomy (n = 1), stapled gastrojejunostomy (n = 1) and hand sewn gastrojejunostomy (n = 1). Pathology of these duodenal lesions revealed tubulovillous adenoma (n = 8), neuroendocrine tumors (n = 4), adenocarcinoma (n = 3), tubular adenoma (n = 2), leiomyoma (n = 1), lymphangiolipoma (n = 1) and chronic duodenitis (n = 1). Mean operative time was 259 minutes and mean length of stay was 6 days (range: 3–15 days). Morbidity was 15% with no thirty day periprocedural mortality.

CONCLUSION: Pancreas sparing partial sleeve duodenal resection for neoplasia requires advanced laparoscopic skills but is technically feasible and has acceptable morbidity. Pancreas preservation obviates the need for a pancreatic duct-enteric anastomosis and its attendant complications.

Table: Patient Demographics, Technique, and Outcomes

Patient	Age	Sex	Approach	Resection	Reconstruction	Final Pathology	LOS	Complications
1	70	F	Lap	D1/D2/Pylorus	BII, Stapled GJ	5 cm TA	3	None
2	77	F	Lap	D1/D2	Hand sewn end/side DJ	3.5 cm TVA	8	Deconditioning
3	78	M	Lap	D1/D2	Hand sewn end/side DJ	2 cm Carcinoid	6	None
4	19	F	Hand assist	D3/D4	Stapled side/side DJ	8.5 cm Lymphangiolipoma	9	DGE, Pancreatic Fistula
5	90	M	Lap	D3/D4	Stapled side/side DJ	T1b Adenocarcinoma	5	None
6	77	M	Lap	D3/D4	Stapled side/side DJ	5 cm TVA	8	None
7	75	M	Lap	D3/D4	Stapled side/side DJ	6.5 cm TVA	4	None
8	79	F	Lap	D3/D4	Stapled side/side DJ	2.4 cm leiomyoma	3	None
9	84	M	Lap	D3/D4	Stapled side/side DJ	T3 Adenocarcinoma	6	None
10	49	F	Lap	D3/D4	Stapled side/side DJ	5 cm TVA	4	None
11	84	M	Lap	D1/D2	Hand sewn end/side DJ	Duodenitis	6	None
12	63	M	Lap	D3/D4	Stapled side/side DJ	4 cm TVA with HGD	4	None
13	76	M	Lap	D3/D4	Stapled side/side DJ	T1b Adenocarcinoma	6	None
14	76	M	Lap	D1/D2	Hand Sewn GJ	0.9 and 0.5 cm Carcinoid	15	DGE
15	66	F	Lap	D3/D4	Stapled side/side DJ	5 cm TVA with HGD	5	None
16	55	M	Lap	D1/D2	Stapled side/side DJ	0.7 cm Carcinoid	4	None
17	66	M	Lap	D1/D2	Hand sewn end/side DJ	0.7 cm Carcinoid	4	None
18	79	M	Lap	D3/D4	Stapled side/side DJ	3.5 cm TVA	4	None
19	64	M	Open	D3/D4	Stapled side/side DJ	No residual TA	7	None
20	82	F	Open	D3/D4	Hand sewn end/end DJ	2 cm TVA	5	None

BII: Billroth II Gastrectomy; GJ: Gastrojejunostomy; DJ: Duodenojejunostomy; TA: Tubular Adenoma; TVA: Tubulovillous Adenoma; HGD: High-Grade Dysplasia; DGE: Delayed Gastric Emptying

Su1843

Lodged Foreign Bodies in the Small Bowel: Proceed to Surgery or Perform Double Balloon Enteroscopy First?

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BACKGROUND: Double Balloon Enteroscopy (DBE) is a surgery sparing procedure to remove ingested foreign bodies which pass beyond the duodenum but have prolonged small bowel passage or get lodged in the small bowel.

AIM: To investigate the outcome and safety of DBE for removal of ingested foreign bodies from the small bowel.

METHODS: 1296 patients underwent 1747 DBE between February 2009 and September 2013 at a single tertiary center of which 22 patients underwent 20 upper DBE and 13 lower DBE for removal of ingested foreign bodies. Data was abstracted by retrospective chart review. Primary outcome was the retrieval success and secondary outcome the complication rate.

RESULTS: 22 patients (mean age 54.3 years, SD 19.1) underwent DBE for retrieval of a pill camera (n = 12), distal migrated biliary or pancreatic stents (n = 5) and accidently or in suicidal attempt ingested foreign bodies (spoon, nail, fish hook) (n = 5). 12 patients (57%) underwent a CT scan prior DBE to localize the foreign body (pill camera n = 2, stent n = 5, ingested foreign body n = 5). Only 7 patients had known underlying medical conditions affecting the small bowel (Crohn's disease n = 3, previous bowel surgery n = 4). In addition to 3 patients with known Crohn's disease DBE diagnosed 4 additional patients with small bowel Crohn's disease, 7 non-steroidal anti-inflammatory drug (NSAID) inducing strictures and 1 anastomotic stricture.

Retrieval of the foreign body was successful in 19 patients (86%) using Roth net (50%), snare (30%) or forceps (20%). 6 patients required small bowel balloon dilation prior removal of the foreign body. 3 patients (13%) (2 pill camera and 1 nail) failed retrieval of the foreign body. Two underwent surgery and 1 patient (ingested nail) who was not a surgical candidate due to frozen abdomen passed the nail spontaneously at a later point.

Of 33 DBE 1 procedure (3%) was complicated by small bowel perforation following a successful removal of the pill camera lodged at a Crohn's stricture requiring emergent surgical intervention.

LIMITATIONS: Single center, retrospective study, heterogeneous patient population.

CONCLUSION: To our knowledge this is the largest cohort study of patients with lodged foreign bodies in the small bowel who underwent DBE. DBE has a high success rate of foreign body retrieval in light of a relative low complication rate.

DISCUSSION: A success rate of 86% with a complication rate of 3% justifies patient transfer to a high expertise DBE center for removal of lodged foreign bodies in the small bowel prior attempting a surgical intervention as long as the patient remains stable.

Su1844

Duodenal Adenocarcinoma: Has Survival Outcome Profile Changed in Recent Years?

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INTRODUCTION: Duodenal adenocarcinoma is rare, therefore, little is known about its natural history or prognostic factors for survival. Major advancements in adjuvant chemotherapy for upper gastrointestinal cancers were recorded in the last decade. We aimed to evaluate surgical treatment and prognostic factors for survival in patients with duodenal adenocarcinoma in recent years.

METHODS: We retrospectively reviewed all patients who were treated for duodenal adenocarcinoma at our institution between January 2000 and July 2013. Ampullary tumors were excluded.

RESULTS: Of the 39 patients, 21 (53.8%) underwent surgery with curative intent and 6 (15.4%) underwent palliative operation. Of the curative surgery group, 13 underwent pancreaticoduodenectomy (PD) and 8 underwent segmental duodenectomy. R0 resection was achieved in 20 (95.2%) of 21 patients who underwent curative resection. 4 patients received primary systemic chemotherapy for advanced disease. 7 patients declined any treatment due to advanced disease while 1 patient had palliative radiotherapy. The median survival of the entire cohort was 11 months (range: 1–81). Median survival and survival rates for 1-, 3- and 5-year were better for the operative group (14 months, 60%, 35.4% and 12.1%) compared to non-operative group (7 months, 33.3%, 16.7% and 0%). Median survival and survival rates for 1-, 3- and 5-year were better for patients who underwent curative surgery (18 months, 92.9%, 62.5% and 16.7%) compared to palliative surgery group (5.5 months, 33.3%, 6.7% and 0%). Univariate analysis showed that female gender (P = 0.04) and curative resection (P = 0.03) were positive predictors of survival while nodal metastasis (P = 0.0473) and advanced T-stage (P = 0.047) were negative predictors. Only female gender and curative resection were significant predictors of OS on multivariate analysis.

CONCLUSION: Our small series of duodenal adenocarcinoma has shown that overall survival still hinges significantly on achieving curative resection. This argues strongly for early detection when feasible and need to further investigate the role of adjuvant treatment modalities like chemotherapy.

Su1845

Reconstruction After Partial (D2/D3) Duodenectomy Using a Roux-en-Y Lateral Duodenojejunostomy: A Single Center Restrospective Analysis

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INTRODUCTION: Oncologic resections of the D2 or D3 portions of the duodenum that require partial duodenectomy of the anti-mesenteric side can pose a challenging clinical problem. The surgical options include pancreaticoduodenectomy which carries significant morbidity and mortality versus partial duodenectomy that spares the head of the pancreas. In these latter cases the duodenum must be either repaired primarily or reconstructed. Primary repair is often not possible due to loss of extensive portions of the duodenum. Because these types of resections are not common there is a paucity of literature describing methods of reconstruction and their results. We have adopted a method of reconstruction using a Roux-en-Y limb of jejunum to construct a lateral duodenojejunostomy. We sought to report our results in a series of these cases.

METHODS: Retrospective review of patients that underwent partial duodenectomy with Roux-en-Y reconstructions performed between April 1999 and June 2013 by three oncologic surgeons.

RESULTS: Seven patients underwent partial duodenectomy with Roux-en-Y reconstruction. Of these, 3 were males and 4 females with a mean age of 65. Overall, the patients were relatively mal-nourished with a mean perioperative albumin of 3.0. Of the 7 patients, 4 had resection for tumors extrinsic to the duodenum (2 gastric and 2 colonic adenocarcinoma). Three had resections for tumors intrinsic to the duodenum (1 duodenal tubular adenoma and 2 with duodenal adenocarcinoma). One patient with duodenal cancer was resected via this approach because of endoscopic perforation and severe adjacent inflammation. 5 patients were reconstructed via retrocolic Roux-en-Y 2 layer handsewn duodenojejunostomy (D-J) with a 60–70 cm roux limb and 2 via antecolic D-J due to concurrent esophagojejunostomy. Mean estimated blood loss (EBL) was 671 mL with a median operative time of 316 minutes. Post-op complications included 2 intra-abdominal abscesses (1 anastomotic leak) and 1 liver abscess. There were no complications related to injury to the Ampulla of Vater and no mortalities in the post-operative period.

DISCUSSION: In this study we examined cases of patients that underwent partial resection of the anti-mesenteric side of the D2/D3 portions of the duodenum and were reconstructed using a Roux-en-Y duodenojejunostomy. These patients had a variety of pathologic diagnoses and underwent this operation for tumors both extrinsic and intrinsic to the duodenum. When resecting these tumors we always identified the Ampulla of Vater to ensure a safe resection. We found that in cases in which primary repair would compromise the duodenal lumen (resection of more than 1/3 to 1/2 the duodenum), Roux-en-Y reconstruction with a jejunal limb was safe and effective. Our rate of infectious complications was high and may be related to a population of advanced cancer patients.

Clinical: Stomach

Su1846

Single-Stage Revision from Gastric Band to Gastric Bypass or Sleeve Gastrectomy: Six-Month Outcomes

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INTRODUCTION: Laparoscopic adjustable gastric banding (LABG) is a restrictive weight-loss procedure, but can be ineffective or have complications that may require revision. Removal of the band and conversion to either laparoscopic sleeve gastrectomy (LSG) or laparoscopic Roux-en-Y gastric bypass (LRYGB) can be performed in a single-stage procedure, but little is known about the effect on weight loss and the safety of this approach.

OBJECTIVE: To compare the safety and efficacy of single-stage revision from LAGB to either LRYGB or LSG at six months postoperatively.

METHODS: Retrospective analysis was performed on patients who underwent single-stage revision between 2009 and 2013 at a single academic medical center. Patients were followed for six months postoperatively and reassessed for weight loss and complications.

RESULTS: 21 patients underwent single-stage revision from LAGB to LRYGB, and 31 from LAGB to LSG. All cases were completed laparoscopically. The most common indication for surgery was insufficient weight loss in 69%, GERD or esophagitis in 15%, band slip in 12%, and port-related problems in 4%. Preoperative BMI was 41.62 in the LRYGB group and 38.58 in the LSG group ($p = 0.20$). Median length of stay for both groups was 3 days. Three patients in the LRYGB group required reoperation within 30 days, two for leak at the gastrojejunostomy and one for bleeding. No patient in the LSG group required reoperation or had a major complication within 30 days ($p = 0.08$). No patient in either group required readmission or ER visit within 30 days of operation. Two delayed complications were seen in the LSG group, with one developing a stricture requiring stenting at two months postoperatively, and another with a port-site hernia requiring operation at six months postoperatively. At three months postoperatively, percent excess weight loss (%EWL) was 34.32 for LRYGB and 34.41 for LSG ($p = 0.98$). At six months, %EWL was 52.04 for LRYGB and 42.61 for LSG ($p = 0.34$). Loss to follow-up was 38% at six months in both groups.

CONCLUSION: Single-stage revision from LAGB to either LRYGB or LSG is technically feasible, though there appears to be a higher early complication rate with conversion to LRYGB. Weight loss at three and six months postoperatively is equivalent for both operations.

Su1847

Hybrid Push-Pull Endoscopic and Laparoscopic Full-Thickness Resection for the Minimally Invasive Management of Gastric Gastrointestinal Stromal Tumors (GIST)

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BACKGROUND: For Gastrointestinal stromal tumors (GISTs) in the mid portion of the stomach, a laparoscopic wedge resection is straightforward and associated with little morbidity. However, tumors arising in the cardia, at the gastroesophageal junction, or in the pylorus may require a total or partial gastrectomy, major surgery with potential life-long quality of life implications. Highly endophytic tumors are difficult to locate laparoscopically, may require additional gastrotomies, and may necessitate large resections of the surrounding gastric wall. Endoscopic resection of tumors arising from the muscularis propria, while well tolerated, may divide across, and not below the tumor, leaving a positive deep margin at the base of the resection site.

OBJECTIVE: To evaluate a novel, minimally-invasive, hybrid laparoscopic and endoscopic push-pull technique for the management of GISTs not amenable to standard laparoscopic wedge resection.

DESIGN: Retrospective cohort study.

SETTING: Two tertiary-care academic medical centers.

PATIENTS: Patients with gastric GISTs in difficult anatomic location or with predominantly endophytic lesions were evaluated for a push-pull resection. Pre-operative esophagogastroduodenoscopy, endoscopic ultrasound with or without fine needle aspiration, and cross sectional imaging were performed. Eligible patients were offered enrollment and were consented for hybrid and standard management.

INTERVENTIONS: Hybrid endoscopic/laparoscopic resection—the tumor was initially resected endoscopically with surgical assistance; a laparoscopic full thickness resection of the resection site was then performed with endoscopic assistance.

MAIN OUTCOME MEASURES: Technical success, surgical pathology, complications.

RESULTS: Over ten months, four patients with anatomically complex or endophytic GISTs underwent a push-pull hybrid procedure. The mean operative time was 162 min (range: 137–209 min). All procedures were successful without complications or conversion to open resection. GIST was confirmed in each endoscopic resection specimen and in each subsequent laparoscopic full thickness resection. The deep margin in each endoscopic resection was positive, while each subsequent full thickness resection had a negative margin.

LIMITATIONS: Retrospective design, small sample size.

CONCLUSION: The hybrid push-pull approach was safe and effective in the management of gastric GISTs that were endophytic or in anatomically difficult locations. This technique allowed patients to avoid an extensive resection. Endoscopic resection alone was associated with a positive deep margin, which the push-pull technique managed with a laparoscopic, full-thickness, R0 resection site resection. In highly selected populations, this hybrid push pull technique may represent an improvement over standard endoscopic or laparoscopic management for gastric GISTs.

Su1849

Managing Complications After Bariatric Surgery: A Decade of Outcomes After Laparoscopic Intervention

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INTRODUCTION: With obesity rates continuing to rise in the United States, the volume of bariatric operations has been exponentially increasing. A natural consequence of this has been a growing number of revisional surgeries being performed for the management of complications. The objective of this study was to analyze outcomes of laparoscopic intervention for the management of complications after bariatric surgery.

METHODS: A retrospective review of data collected from an academic medical center between 2003 and 2013 was performed. All patients who underwent laparoscopic surgical intervention for the management of a complication after bariatric surgery were included. The efficacy of the intervention and its associated perioperative morbidity and mortality were analyzed. Statistical analysis was performed using two-sample t-test with unequal variance and binary outcomes were compared using Fisher's exact test. GraphPad Software, Inc. 2013 was used. Minimal duration of follow-up was 30 days.

RESULTS: 91 consecutive patients who underwent laparoscopic surgery for obstruction (52.7%), bleeding (15.4%), abdominal pain (18.7%) and leak or band erosion (13.2%) were identified. Mean age was 48 years and 74% of patients were female. The mean body mass index at the time of revisional surgery was 35.7 kg/m^2 and ASA was 2.9. The mean amount of time between index bariatric operation and surgical intervention was 46.4 months. Initial bariatric procedures included gastric bypass (58.2%), band (27.5%), sleeve (8.8%) and vertical banded gastroplasty (5.5%). Mean operative time of all interventions was 112 minutes. There were no conversions to open laparotomy. Average estimate blood loss was 25 cc and two patients required a blood transfusion. Three patients (3%) were monitored in the Intensive Care Unit postoperatively. Mean overall duration of hospital stay was 4 days. The efficacy of the reoperation procedure was 100% for obstruction, bleeding, and abdominal pain. However, the efficacy of laparoscopic revision after leak was 80%, with 20% of patients developing a persistent leak requiring additional stent placement. Overall morbidity of laparoscopic intervention was 4.4%. Complications included stricture, abscess, obstruction and venous thromboembolism. There were no perioperative mortalities.

CONCLUSION: The use of laparoscopic surgery to manage bariatric complications is feasible, safe and effective.

Su1851

Long-Term Outcomes of Combined Endoscopic/ Laparoscopic Intragastric Enucleation of Gastric Stromal Tumors

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PURPOSE: Definitive surgical treatment of gastric myogenic tumors such as gastrointestinal stromal tumors (GISTs) typically involves full thickness resection of the lesion with normal gastric wall as the margin. This is not readily possible with proximal gastric lesions near the gastroesophageal junction, nor necessary for small incidental lesions. We have employed a combined endoscopic/laparoscopic intraluminal technique for selected patients and report long-term surveillance following this novel technique.

METHODS: Retrospective review of patients who have undergone intraluminal laparoscopic resection from 1994 to 2008.

RESULTS: There were 15 patients who underwent intraluminal enucleation followed for a median follow-up of 61 months. There were 8 men and 7 women with a mean age of 62.1 ± 3.38 years. Patients underwent endoscopy for gastrointestinal bleeding in 8 (53%), dyspepsia in 6 (40%), anemia in 6 (40%), and abdominal pain in 4 (27%). Eight lesions (53%) were located in the fundus/cardia, 6 (40%) in the body, and 2 (13%) in the antrum. The mean tumor size was 3.5 ± 0.45 (1.5–7.0) cm. All were GIST lesions with benign histologic features. All operations were successfully completed with no conversion to open procedure, major morbidity or mortality. Complete endoscopic and endosonographic surveillance was accomplished in 14 patients with no recurrence and no symptomatic follow-up in any patient.

CONCLUSION: Enucleation of gastrointestinal stromal tumors can be accomplished with low risk of recurrence when done with a combined endoscopic/laparoscopic intraluminal technique. It should be strongly considered for small, proximal intraluminal tumors.

Su1852

The Study of FDG-PET/CT Sensitivity for Gastric Cancer

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BACKGROUND: FDG-PET/CT was effective tool to detect malignant tumor, however there were a few FDG-PET/CT studies for gastric cancer (GC).

OBJECTIVE: To examine the sensitivity of preoperative FDG-PET/CT for GC.

METHOD: We retrospectively reviewed the clinical records of 65 patients who underwent gastrectomy with lymphnodes (LNs) dissection for GC between 2004 and 2012. The sensitivity of FDG-PET/CT for GC were determined from the results of FDG-PET/CT and pathological findings of resected GC specimens.

RESULT: In primary cancer the sensitivity of FDG-PET/CT was 21% (3/14) in early GC and 82% (40/51) in advanced GC (early vs. advanced cancer, $p < 0.01$). The range of standardized uptake value was between 3.4 and 32. The sensitivity was 68% (26/38) in well-differentiated adenocarcinomas and 48% (13/27) in poorly-differentiated adenocarcinomas. In metastatic LN, the positive FDG-PET/CT findings were detected in 10 of 26 patients who were proven LN metastases in histological examination (38%). Total 185 LNs were proven to histological cancer positive, of which 18 LNs were identified accurate site of metastatic region by FDG-PET/CT (10%). In these 18 metastatic LNs detected by FDG-PET/CT, 16/18 (89%) LNs were larger than 10 mm in diameter. Distant metastatic LNs less than 8 mm in diameter were identified, although the metastatic LNs which were next to FDG positive primary lesion were not identified. There were no positive findings FDG-PET/CT in 4 patients with peritoneal dissemination.

CONCLUSION: Sensitivity of FDG-PET/CT was high for primary lesion of advanced GC but low for early GC, LN metastases, and peritoneal dissemination.

Su1853

Repeated Re-Cycling of Aspirated Digestive Juices to Enzymatically Cleanse Feeding-Decompression Catheters and Return Previously Discarded Secretory Globulins

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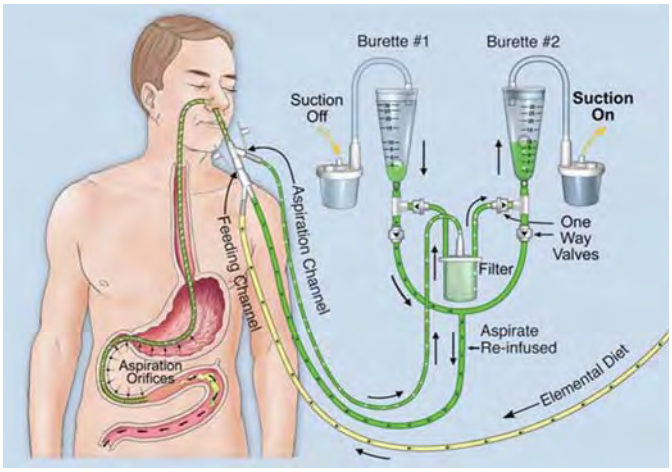
Combined enteral feeding plus decompression catheters are prone to proteinaceous clogging of both their suction and delivery channels, primarily the former. At the same time, proteolytic digestive secretions are removed and discarded by these devices. The aspirate should be re-fed to enzymatically cleanse the catheter's channels. This fluid also contains secretory globulins that should be salvaged to protect the vulnerable patient against invasion by colonic organisms.

The flow of aspirate is usually too sluggish to effectively flush the catheter. The volume of aspirate recycling can be increased by deliberate production of a "controlled leak" between the distal ends of the feeding and suction channels, analogous to an A-V fistula. This increased flow will be totally re-fed, and does not affect the volume lost from the patient.

A Moss® feeding – decompression catheter was modified by micro-drilling an ~0.001-inch diameter passage between the distal feeding and aspiration channels. This increased the volume of aspirate to be recycled for flushing ten-fold, from ~1.5 ml to ~15 ml. This approximately half-filled the 30 ml collection chambers during each 30-second cycle.

A pair of collection burettes were positioned five feet above the patient. Continuous suction was applied alternately, at 30 second intervals, to one or the other of the burettes. These chambers were connect by one-way valves to the catheter's aspiration and feeding channels.

The filtered aspirate was directed for 30 seconds by these one-way valves to the burette on suction for collection and degassing, as well as overflow if necessary to avoid overfeeding. The valves simultaneously directed the flow by gravity of degassed aspirate, which had been collected the previous 30 seconds in the burette now off suction. This joined the continuous 3,000 ml/day flow of elemental diet into the feeding channel.



When total inflow (feedings plus re-fed aspirate) exceeded peristaltic outflow from the duodenal feeding site, the volume rose in the collection burette on suction. Any excess greater than 30 ml overflowed, to be permanently discarded before it could cause local distention and the detrimental consequences of overfeeding.

In our experience, 3–4 liters/day of aspirated digestive secretions were removed and degassed by this automatic system. The volume of permanently removed fluid was only ~200 ml/day following resective thoraco- and/or abdominal surgery, without occurrence of overfeeding.

The degree of expected protection afforded against catheter clogging has not yet been objectively determined.

Su1854

Is There a Benefit to Preoperative Weight Loss Before Undergoing Bariatric Surgery?

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BACKGROUND: Some bariatric surgeons recommend preop weight loss to allow patients to become accustomed to dietary changes and to shrink the liver, improving intraoperative visibility. Few studies have evaluated the effects of preoperative weight loss (PWL) on postsurgical outcomes including long-term percent excess weight loss (EWL), complications, and readmission rate. In this study we aim to quantify the benefits of PWL on post-operative outcomes.

METHODS: A total of 1,655 patients undergoing bariatric surgery at a single academic institution were included in this retrospective analysis. Preoperative data collected included patients' demographic information, and anthropometric features. Positive PWL was defined as preoperative percent weight loss, and negative PWL as preoperative weight gain. Postoperative anthropometric data were collected at 12-months postoperative. Comparison of PWL across surgery types was done using a one-way ANOVA.

RESULTS: There were 1264 patients who underwent laparoscopic Roux-en-Y gastric bypass (RYGB), 235 for laparoscopic sleeve gastrectomy (SG), and 157 for laparoscopic adjustable gastric banding (AGB). Using a one-way ANOVA, we found PWL to be significantly different across surgery types, with 1.55% for RYGB, 1.03% for SG, and 0.60% for AGB. There was no difference in preoperative age, sex, BMI, and excess body weight between patients with positive and negative PWL for each surgery type. When all surgeries were analyzed, 12-month percent excess weight loss was significantly higher for patients with positive PWL vs. those with negative PWL (72.1% vs 68.6%, p = 0.024). 12-month percent excess weight loss was significantly higher for patients undergoing AGB with positive PWL (50.0% vs. 36.6%, p = 0.008). There was no such difference for RYGB and SG. Using a linear regression model showed that patients undergoing AGB, PWL strongly predicted 12-month EWL (b = 1.55, p = 0.02, r2 = 0.053). Incidence of any complication or readmission was not significantly different between patients with positive and negative PWL for each surgery type. However, using a multivariate logistic regression model controlling for preoperative age >50, BMI >50, white race, private insurance, and male sex, we found that low PWL increased chance of any complication after surgery, among all surgery types (OR = 1.35, p = 0.05).

CONCLUSION: Preoperative weight loss can significantly reduce the chance of developing complications after bariatric surgery, as well as improve percent excess weight loss 12-months postoperatively for gastric band patients.

Su1855

Morbidity and Morality Rates After Bariatric Surgery in a Regionalized Surgical Care Program: The Ontario Experience

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INTRODUCTION: As part of the diabetes and obesity prevention strategy in Ontario, the Ministry of Health formed the Ontario Bariatric Network (OBN) in 2009. The OBN introduced the first Bariatric Centres of Excellence program for bariatric surgery in Canada, consisting of 7 hospitals within 4 centers. Since its inception, there has been no systematic, population-based outcomes reported. Our objective was to evaluate the mortality and major morbidity of bariatric surgery in Ontario during the initial years of the implementation of a regionalized surgical care program.

METHODS: Provincial population-based cohort study that included all patients aged >18 years who received a Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG) or laparoscopic adjustable gastric band (LAGB) procedure in the province of Ontario from March 2008 until 2011. for the purposes of weight loss who met National Institute of Health criteria for weight loss surgery. Data was derived from the Canadian Institute for Health Information Discharge Abstract Database and Hospital Morbidity Database. Our patient population was defined using descriptive statistics and compared across procedures using the Pearson's Chi2 test for categorical data and the Kruskal-Wallis test for continuous data. Complication and mortality rates and their confidence intervals were defined by the exact binomial distribution and univariate comparisons of complications and mortality rates between the three bariatric procedures were performed using the Fisher's exact test.

RESULTS: Over the program's initial 4 years, 5,618 procedures (90.5% RYGB, 7.5% SG and 2.0% LAGB) were performed. Mean age was 44.4 +10.3. 81.8% were female. 28.4% of our patient had type 2 diabetes. The overall serious complication rate was 5.3% (95% CI: 4.7–5.9). Complications were most common after RYGB (5.5%; 95% CI: 4.9–6.1) followed by SG (4.3%; 95% CI: 2.6–6.7) and LAGB (0.9%; 95% CI: 0.02–4.9) procedures ($p < 0.05$). Re-operative rate was 0.71% on initial admission. The mortality rate for all procedures was 0.12% (95% CI: 0.05–0.26), greatest in patients who underwent SG at 0.24% (95% CI: 0.01–1.31), followed by RYGB at 0.12 (95% CI: 0.04–0.26), and LAGB at 0%, but these differences were not statistically significant (p = 0.503).

CONCLUSIONS: Major morbidity and mortality in patients undergoing bariatric surgery since the inception of the Ontario Bariatric Network centre of excellence model is relatively low. The rates are comparable to other major population-based reports on bariatric surgery.

Translational: Other

Su2098

Use of Porcine Small Intestine Submucosa Biologic Material for Repair of Ventral Hernias in Contaminated Fields: Long-Term Outcomes

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Current guidelines recommend biologic prosthetic materials for the repair of abdominal wall defects in a contaminated field. However, long-term data are limited. Our objective was to determine the rate of recurrent hernia and other outcomes following the use of porcine small intestine submucosa (SIS) for ventral hernia repair in a contaminated field.

From 2004–2012, consecutive patients undergoing ventral hernia repair in a contaminated field with SIS mesh were identified from a prospectively entered operating room database. Patients with open abdomen were excluded. Paper and electronic charts were reviewed and patients were stratified according to wound classification and compared in terms of demographics, hernia recurrence (based on physical examination and radiological follow-up), surgical site infections (according to CDC criteria), < 30 day re-operation rate, and post-operative bowel obstruction, fistula and dehiscence. Data are expressed as N(%) and median (interquartile range). Mann-Whitney-U and Fishers exact test determined significance ($p < 0.05$*). Institutional ethics approval was obtained.

Fifty-five patients (age: 59 [49–69], male:59%, ASA classification: 2 [2–3]) were included and stratified: clean-contaminated (20 [36%]), contaminated (13 [24%]) and dirty (22 [40%]). The most common indications for ventral hernia repair using SIS were: removal of a prior infected mesh (22 [40%]), enterotomy during repair (20 [36%]) and perforated viscus (9(16%)). Median follow-up was 41 months (25–62 months). Post-operative complications included surgical site infection (31 [56%]), fistula (6 [11%], bowel obstruction (5 [9%]), and dehiscence (4 [7%]), with 15 (27%) requiring re-operation within 30 days, mostly due to a surgical site infection (11 [20%]). Of the 47 (85%) patients who had >12 months follow-up, hernia recurrence occurred in 26 (54%) with a median time to diagnosis of recurrence of 15 months (9–23 months). Patients with dirty wounds were more likely to experience surgical-site infections, and to require early re-operation compared to patients with clean-contaminated wounds,* but the recurrence rate was similar.(table) Recurrence rate was also greater when SIS was used to bridge fascia (16/23 [70%]) compared to reinforcing fascia (10/25 [40%]).*

Wound infections and hernia recurrences are high with the use of biologic SIS material in contaminated surgical fields. Careful consideration is warranted using this approach, especially when the wound is dirty and the fascia cannot be re-approximated.

Table: Outcomes of Patients Following SIS Mesh for Ventral Hernia Repair in Clean-Contaminated (CC), Contaminated (C) and Dirty (D) Fields (Data Rresented as N[%] * = $p < 0.05$)

	CC (N = 20)	C (N = 13)	D (N = 22)
Surgical site infection	7 (35%)	6 (46%)	18 (82%)*
Fistula	1 (5%)	2 (15%)	3 (14%)
<30-day re-operation	2 (10%)	5 (38%)*	8 (32%)*
Hernia recurrence	10 (50%)	7 (64%)	9 (53%)

Translational: Pancreas

Su2100

Increased Expression of the GLUT-1 Gene Is Associated with a Poorer Prognosis in Pancreatic Cancer

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[1]Morsani College of Medicine, USF Health, Tampa, FL; [2]Gastrointestinal Oncology, H Lee Moffitt Cancer Center and Research Institute, Tampa, FL; [3]Epidemiology, H Lee Moffitt Cancer Center and Research Institute, Tampa, FL; [4]Lacks Cancer Center, Grand Rapids, FL

BACKGROUND: Increased glucose metabolism is a hallmark of cancer. This phenomenon, known as the Warburg effect, is also reflected by the overexpression of genes associated with glucose transport. The glucose transporter protein type 1 (GLUT-1) is a glucose plasma cell transporter encoded by the SLCA2A1 gene and associated with glucose metabolism. In this study, we evaluated the expression of the GLUT-1 gene in pancreatic cancer and determined its effect in pancreatic cancer prognosis.

METHODS: 63 patients with early stage pancreatic cancer (I-II) were identified from a comprehensive pancreatic adenocarcinoma database for retrospective analysis of GLUT-1 gene expression and the association with prognosis of pancreatic cancer. The primary outcome was overall survival (OS). Multivariate analysis was also performed to compare the role of GLUT-1 gene expression to other prognostic factors. Cox proportional hazards model was used for survival analysis.

RESULTS: Patients with increased GLUT-1 gene expression were found to have a decreased OS. Univariate analysis identifies the GLUT-1 gene as a poor prognostic marker in pancreatic cancer (hazard ratio (HR) = 1.33 with $p = 0.008$). Multivariate analysis further shows that the GLUT-1 gene is an independent prognostic factor even after adjusted for gender, age at diagnosis, histology, and pathological stage (HR = 1.27 with $p = 0.03$).

CONCLUSION: Increased GLUT-1 gene expression is associated with a decreased overall survival in pancreatic cancer, thus supporting its role as a potential prognostic marker in pancreatic cancer.

Monday, May 5, 2014

Authors available at their posters to answer questions 12:00 PM – 2:00 PM; posters on display 8:00 AM – 5:00 PM.

12:00 PM – 2:00 PM
South Hall

POSTER SESSION II
(NON-CME)

Basic: Colon-Rectal

Mo1790

Establishment and Characterization of a Crohn's Related Colonic Carcinoma Cell Line and Matched Xenograft

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BACKGROUND AND AIMS: Colitis-associated colorectal cancer (CAC) seems to be a rather unique entity and differs in some of its genetic alterations, characteristics of tumor formation and clinical features from those of sporadic colorectal carcinoma (CRC). Most of the descriptions about tumor biology of colitis-associated carcinomas are referring to ulcerative colitis whereas data on Crohn's colitis–related carcinoma are scarce. Additionally, the majority of patients with Crohn's disease are under immunosuppressive treatment; thus generating a different environment for tumor growth and especially for tumor immune escape. Recently, a worse clinical outcome with a decreased 5-year survival rate for patients with Crohn's-related carcinoma compared to sporadic CRC was shown. Representative pre-clinical models of CAC are thus mandatory for identifying molecular characteristics and biomarkers and ultimately for development of novel drugs and therapy regimen.

METHODS: Here, we describe the clinical case of a very fast growing CAC in a long-term immunosuppressed patient with Crohn's disease and the successful establishment and characterization of a CAC cell line (HROC69) along with its corresponding xenograft.

RESULTS: Molecular characterization revealed that both tumor models (cell line and xenografts) were microsatellite-stable. However, a near diploid DNA-status was observed both by flow cytometry and SNP Array analysis. Mutation analysis revealed mutations in TP53, APC and PTEN (interestingly two mutations in Exons 1 and 5) whereas K-ras and B-raf hotspot mutations were not found. The HROC69 cells were confirmed to be (i) human (PCR), (ii) identical to the original tumor (STR-typing) and (iii) of epithelial origin (EpCAM+, FACS). The cells did not express MHC-class I and II molecules. Upon Interferon-γ stimulation, MHC-class II expression was induced, whereas MHC-class I was not. The cell line doubled in 2.46 to 2.83 days. The chemosensitivity profile of the cell line was analyzed in detail.

CONCLUSIONS: This newly established and well-characterized, low-passage cell line and its corresponding xenograft of Crohn's associated carcinoma provide a useful tool for future investigations on the biological characteristics of a rare and distinct tumor entity. Additionally, matched patient-derived immune cells allow for comparative genetic studies as well as detailed analysis of immune escape mechanisms.

Mo1791

Colonic Microbiota and Gene Methylation in Colonic Carcinogenesis

Marco Scarpa[1], Melania Scarpa[1], Luisa Barzon[2], Giulia Costanzi[2], Enrico Lavezzo[2], Francesca Finotello[2], Francesca Erroi[2], Lucia Dallagnese[2], Silvia Basato[2], Paola Brun[2], Stefano Toppo[2], Barbara Di Camillo[2], Carlo Castoro[1], Ignazio Castagliuolo[2]
[1]Oncological Surgery Unit, Veneto Institute of Oncology (IOV-IRCCS), Padova, Italy; [2]University of Padova, Padova, Italy

BACKGROUND: Changes in gut microbiota have been associated to colonic carcinogenesis, although the underlying mechanisms are not clear. DNA methylation of gene promoters may inhibit gene expression and modulate oncosuppressor activity playing a role in colorectal carcinogenesis. The aim of this study was to analyze the interplay between colonic microbiota and gene methylation in colonic carcinogenesis.

MATERIALS AND METHODS: In this prospective study three groups of 8 patients, affected by either hyperplasic polyps, dysplastic adenoma or colonic adenocarcinoma, and 8 healthy subjects were enrolled. Colonic biopsies of healthy and affected (hyperplasic polyps or dysplastic adenoma or colonic adenocarcinoma) mucosa were obtained. The methylation status of MLH1, MGMT1, CDH13, APC and RUNX1 gene promoters was assessed by methylation specific PCR and a methylation score was created based on the number of methylated genes. The composition of microbiota adherent to the colonic mucosa was analysed by 454 pyrosequencing of bacterial 16S rRNA gene. Non parametric statistics and correction for multiple testing was used.

RESULTS: The analysis of the methylation status of the promoter region of APC, CDH13, MGMT, MLH1 and RUNX3 showed that along the colorectal carcinogenesis the promoter region of APC, CDH13, MGMT1 and RUNX3 were more frequently methylated at the invasive cancer step. Therefore, the methylation score resulted significantly higher in patients with cancer ($p < 0.05$). The presence of the genus Flavonifractor resulted inversely correlated with the number of methylated genes ($r = –0.49$, $p = 0.022$). On the contrary, Peptostreptococcus and Schwartzia genuses resulted directly correlated with the number of methylated genes ($r = 0.45$, $p = 0.047$ and $r = 0.44$, $p = 0.047$, respectively).

CONCLUSIONS: In our series, Flavonifractor genus resulted inversely correlated to methylation of genes occurring at the first steps of the colorectal carcinogeneisis. On the contrary, Peptostreptococcus and Schwartzia genuses directly correlated with colorectal carcinogenesis-related gene methylation. In vitro test to verify if these association are causal are warranted.

Mo1792

Overexpression of Stem Cell Markers Including Prominin 1/CD133 in Cardiac Mucosa and Barretts Intestinal Metaplasia

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INTRODUCTION: It has been hypothesized that intestinal or other stem cells play an important role in the etiology of Barretts esophagus, and may influence endotherapy and other treatment outcomes. The aim of this preliminary study was to identify potential stem cell markers in the origin of this disease, focussing on cardiac mucosa and Barretts intestinal metaplasia (IM).

MATERIAL AND METHODS: Fresh frozen endoscopic biopsies from 30 patients were investigated. The mRNA relative expression levels of the putative stem cell markers PROM1/CD133, ABCG2, MSI1, ATXN1, MYC, KLF4, LGR5 and DCLK1 were measured using standard qRT-PCR methods in normal squamous (n = 10), cardiac mucosa (n = 10), and Barretts IM (n = 10) tissues. The protein expression of Prominin-1/CD133 was measured by immunohistochemistry.

RESULTS: Significant mRNA upregulation at the IM stage was found for ABCG2 and KLF4. An on/off pattern with highest expression in cardiac mucosa was seen for MSI1, ATXN1, LGR5, and DCLK1. PROM1/CD133 was not expressed in normal squamous epithelia but was progressively and highly overexpressed in cardiac mucosa and IM. Intense PROM1/CD133 protein expression was present in all goblet cells in IM.

CONCLUSIONS: This study identifies novel putative stem cell markers for this disease and provides some support for a role for non-intestinalised cardiac mucosa in the etiology of Barretts esophagus. PROMININ1/CD133 immunohistochemisty selectively stains goblet cells in IM, which may be valuable for the pathological interpretation of esophageal tissues.

Mo1793

Analysis of the Cyclooxygenase-2 (COX-2) and Methylenetetrahydrofolate Reductase (MTHFR) Gene Polymorphisms in Esophageal Cancer

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BACKGROUND: Cyclooxygenase-2 (COX-2) is induced in response to growth factors and cytokines, expressed in inflammatory diseases, premalignant and esophageal tumors. The product of folate metabolism by the enzyme methylenetetrahydrofolate reductase (MTHFR) acts in DNA synthesis, alteration or inhibition of this enzyme increases the susceptibility to mutations, damage and altered DNA methylation, gene expression of transforming the tumor suppressor and proto- ontogenesis, potential risk factors for esophageal cancer. Cox-2 and MTHFR polymorphisms might modify the levels of protein expression and may have a considerable influence on disease phenotype, which may have important clinical/genomic implications. Aims: To evaluate single nucleotide polymorphisms (SNPs) in the Cox-2 and MTHFR genes and their prognostic values for patients operated on for esophageal cancer; and to investigate possible interactions between these genetic variations and clinicopathologic characteristics in esophageal cancer.

METHODS: Cox-2 and MTHFR SNPs were analyzed in 114 prospective patients who underwent surgical resection, and had a minimum of 5 years follow-up. DNA was isolated from leukocyte using extraction and purification kit, followed by amplification by polymerase chain reaction (PCR). Real-time analysis was used for genotyping Cox-2 and MTHFR SNPs through the TaqMan® SNP Genotyping Assay.

RESULTS: We determined frequencies of three COX-2 polymorphisms (1195A > G/ –1329A > G, 8437T > C, 1759G > A), with nine haplotypes; and two MTHFR biallelic polymorphisms (1298 A > C, 677 C > T), with six haplotypes. A high frequency of the wild genotype Cox-2-1195GG was detected in adenocarcinoma tumors. Homozygous Cox-2-8437CC was associated to Caucasians and younger patients at diagnosis. Polymorphic wild genotype MTHFR-1298AA was increased in squamous cell carcinoma, and younger patients. Wild homozigous MTHFR-677CC was associated to improved survivalship, and to heavy active tobacco smoking patients. Wild homozygous genotype of Cox-2 and MTFHR were significantly correlated to a worst progression-free survival and overall survival when compared to the combined heterozygous or recessive genotypes in a multivariate analysis.

CONCLUSIONS: 1) Wild homozygous Cox-2 and MTHFR SNPs were associated to disease progression and survival in patients with advanced esophageal cancer; 2) Cox-2 and MTFHR SNPs may be useful markers of aggressiveness in these patients, and may orientate the appropriate target therapy in novel clinical trials.

Basic: Hepatic

Mo1794

Heparin Fragments Effects in Liver Injury Secondary to Liver Ischemia/Reperfusion (I/R)

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BACKGROUND: Ischemia and reperfusion (I/R) is an essential phenomena in tissue damage in pathological conditions such as acute myocardial infarction, liver surgery and organ transplantation. Intracellular calcium concentrations are determining factors in cell death induced by I/R. It is estimated that 60% of the calcium entering into the cell is regulated by the sodium calcium exchanger (Na-Ca exg). In calcium overload situations the exchanger can operates extrusion of intracellular calcium excess. Therefore, if the intracellular calcium homeostasis is related to cell death in the presence of calcium overload, drugs acting on the Na-Ca exg could be a strategy to minimize hepatocellular injury. Some heparin fragments such as Trissulfated Disaccharide (TD) act on the Na-Ca exg inhibiting the exchange inhibitory peptide (XIP), which inhibits the cytoplasmic calcium extrusion, and consequently decreases the intracellular calcium overload. XIP inhibition is applicable as a possible new strategy to minimize hepatotoxicity secondary to the ischemia/reperfusion injury due to calcium overload.

OBJECTIVE: To evaluate the effects of TD administration in liver injury secondary to the ischemia/reperfusion in rats.

METHODS: Wistar male rats, kept under mechanical ventilation, underwent partial liver ischemia induced by 60 min. pedicle clamping of medium and left anterior lateral segments. Animals were divided into 2 groups: Control Group (n = 12): rats receiving saline solution 10 minutes before reperfusion, TD Group (n = 12): rats receiving TD in a dosage of 0.2 mg/kg IV, 10 minutes before reperfusion The volume administered of each drug was 0.4 ml. Four hours after reperfusion, blood was collected for determinations of AST and ALT. Liver tissue samples were assembled for mitochondrial oxidation and phosphorylation and malondialdehyde (MDA) content. Pulmonary vascular permeability was also determined.

RESULTS: Four hours after liver reperfusion AST and ALT serum level increases in TD Group animals were significantly lower than in Control Group ($p < 0.05$).

Significant reductions of liver MDA content and ofmitochondrial dysfunction were observed in TD Group when compared to Control Group ($p < 0.05$). No differences in pulmonary vascular permeability were observed between the two groups.

CONCLUSION: TD maintains liver mitochondrial function and increases liver tolerance to I/R injury. These effects require further evaluation before the introduction of this drug in the clinical setting.

Basic: Pancreas

Mo1795

PTK6 Increases Apoptosis with Gemcitabine Treatment in Pancreatic Cancer Cells by Enhancing DNA Damage

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BACKGROUND: Protein Tyrosine Kinase 6 (PTK6) is a non-receptor type tyrosine kinase known to be aberrantly expressed in various cancers including pancreatic cancer. The role of PTK6 in cancer chemo-resistance remains unknown. We tested our hypothesis that PTK6 regulates gemcitabine (GEM) resistance in pancreatic cancer, and explored its mechanism.

METHODS: We studied 2 human pancreatic cancer cell lines, Panc1 and MIAPaCa2. For some studies, GEM resistant clones of Panc1 and MIAPaCa2 were isolated by culture with GEM for 2 months. Cell survival was measured by WST-8 assay. GEM-induced apoptosis and DNA damage were evaluated by Western blotting. The effect of PTK6 overexpression on the efficacy of GEM therapy for pancreatic cancer in vivo was assayed using a xenograft mouse model.

RESULTS: Endogenous PTK6 expression was increased at 24–48 hours with GEM treatment in Panc1 and MIAPaCa2 cell lines. PTK6 gene-silencing increased cell survival after GEM treatment and decreased cleaved Caspase3 and PARP, indicating decreased apoptosis, while PTK6 overexpression decreased cell survival and increased apoptosis. Basal PTK6 expression was significantly reduced in the GEM resistant clones compared with the parental lines (0.29 fold decrease in MIAPaCa2 and 0.60 fold decrease in Panc1, respectively, $p < 0.05$). Restoration of PTK6 expression using an over-expression vector made the resistant MIAPaCa2 clone cells sensitive to GEM (0.77 fold decreased survival compared to the resistant clone, $p < 0.05$). To explore the mechanism in which PTK6 regulates the cytotoxic effect of GEM on pancreatic cancers, we tested the effect of altered PTK6 expression on DNA damage induced by GEM. GEM-induced H2AX phosphorylation (γ-H2AX), which is a specific marker for DNA double-strand breaks, was significantly reduced by PTK6 gene-silencing, while GEM-induced γ-H2AX was increased by PTK6 overexpression. Furthermore, PTK6 gene silencing also inhibited the GEM-induced activation of ataxia-telangiectasia mutated (ATM) protein kinase, a central initiator of key signal responses to DNA damages in both cell lines. Conversely, ATM kinase activation was enhanced by PTK6 overexpression (Figure). In the mouse xenograft model, subcutaneous tumors with PTK6-overexpressing MIAPaCa2 showed significant growth reduction compared with tumors with control MIAPaCa2 after 5 weeks treatment with GEM (150 mg/kg IP, twice a week) (606 mm^3 vs. 252 mm^3 in size, 609 mg vs. 128 mg in weight, $p < 0.01$, respectively).

CONCLUSION: PTK6 is endogenously activated by GEM treatment in pancreatic cancers, and forced-overexpression of PTK6 increases the efficacy of GEM on pancreatic cancer with enhancing DNA damage. Further study to elucidate the mechanism by which PTK6 regulates GEM-induced DNA damage may identify therapeutic targets to improve the outcomes of patients with pancreatic cancer.

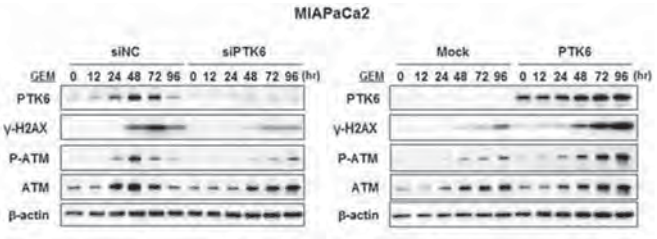

Figure: The effects of PTK6 alteration on DNA–damage-related molecules, γ-H2AX and activated ATM after GEM treatment for MIAPaCa2 cells: left panel, PTK6 was gene-silenced with siRNA and cells were treated with 50 nM of GEM, right panel, PTK6 was over-expressed and cells were treated with 10 nM of GEM.

Basic: Small Bowel

Mo1796

IGF-2 Is Necessary for Retinoblastoma-Mediated Enhanced Adaptation After Small Bowel Resection

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BACKGROUND: Previously, we have demonstrated that genetically disrupting retinoblastoma protein (Rb) expression in enterocytes results in taller villi and increased rates of enterocyte proliferation, which mimic resection-induced adaption responses. Disruption of Rb also results in elevated IGF-2 expression in villus enterocytes. IGF-2 is an intestinotrophic growth factor and is required for Rb-mediated growth as double knockouts of IGF-2 and Rb do not demonstrate hyperplastic intestinal mucosa at baseline. We have also found that an inducible deletion of Rb in adult mice after small bowel resection results in a magnified adaptation response. We propose that IGF-2 is the driving force behind this Rb-mediated enhanced adaptation.

METHODS: A tamoxifen (TAM)-inducible villin (vil) promoter driving Cre recombinase in adult Rb floxed mice was employed to induce Rb deficiency specifically in enterocytes. Seven- to 9-week old vil-cre-ER(-)/Rb(f/f) (wild-type -WT) and vil-Cre-ER(+)/Rb(f/f) (induced Rb-null – iRbIKO) mice underwent a 50% proximal SBR. On postoperative days (POD) 4–6, TAM was injected intraperitoneally, and the small intestine was harvested on POD 28. Vil-Cre-ER/Rb(f/f) mice were crossbred with IGF-2 null mice to generate a double knockout of both IGF-2 and Rb (IGF-2KO/vil-Cre-ER(+)/Rb(f/f); IGF-2 null/iRbIKO) as well as a WT control (IGF-2KO/vil-Cre-ER(-)/Rb(f/f); IGF-2 null/WT). These mice also underwent a 50% SBR, were given TAM on POD 4–6, and harvested on POD 28. Absent Rb expression was determined by Western blot while absent IGF-2 mRNA expression was confirmed by RT-PCR.

RESULTS: As expected, iRbIKO mice demonstrated enhanced resection-induced adaptive villus growth compared to their WT littermates at the time of harvest (Figure 1). Additionally, these iRbIKO mice had greater than a 2-fold increase in IGF-2 mRNA expression in ileal villus enterocytes compared to WT mice (p = 0.049). We found a significant positive linear relationship between IGF-2 mRNA expression and villus growth (Figure 2). When we examined the effect of SBR on double knockouts, we found that IGF-2 null/iRbIKO mice did not have any additional villus growth beyond what was expected of normal adaptation and were no different than IGF-2 null/WT mice (Figure 1).

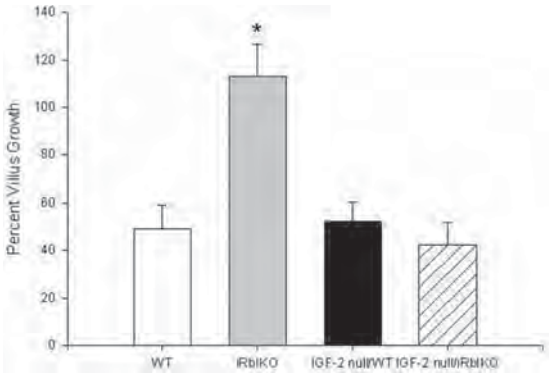

Figure 1: Percent villus growth, * p < 0.05.

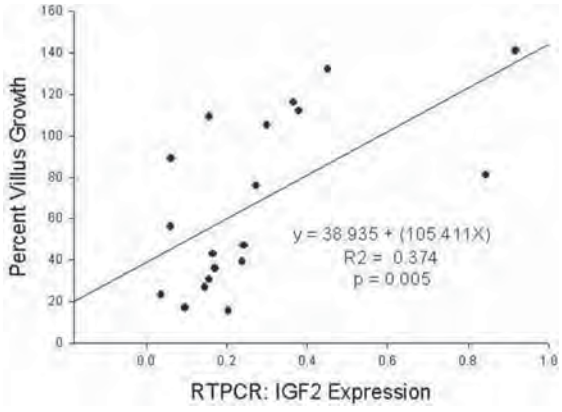

Figure 2: Linear regression of percent villus growth and IGF-2 mRNA expression.

CONCLUSIONS: Adult mice in which Rb is inducibly deleted from the intestinal epithelium following SBR have augmented adaptive growth as well as increased IGF-2 mRNA in villus enterocytes. Mice that have both IGF-2 and Rb deficiencies do not demonstrate further enhanced adaptive growth as seen in single Rb knockouts. Thus, IGF-2 is a critical component of enhanced adaptation associated to Rb deficiency in enterocytes.

Clinical: Biliary

Mo1574

Prognostic Impact of Human Equilibrative Nucleoside Transporter 1 and Ribonucleotid Reductase Submit 1 Expression in Cholangiocarcinoma Patients Treated with Adjuvant Gemcitabine-Based Chemotherapy

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BACKGROUND: The efficacy of AGC varies among individuals and the resulting survival rates are still unsatisfactory. Objective: The aim of this study was to investigate predictive value of intratumoral human equilibrative nucleoside transporter 1 (hENT1) and ribonucleotid reductase submit 1 (RRM1) expression for advanced cholangiocarcinoma patients treated with adjuvant gemcitabine-based chemotherapy (AGC) after surgical resection.

METHODS: Intratumoral hENT1 and RRM1 expression was investigated immunohistochemically in 127 patients with advanced cholangiocarcinoma who underwent surgical resection (including 68 with AGC, and 59 without AGC). Impact of hENT1 and RRM1 expression on disease-free survival (DFS) and overall survival (OS) were evaluated by univariate and multivariate analyses.

RESULTS: High intratumoral hENT1 and RRM1 expression was observed in 86 (68%) and 67 (53%) patients, respectively. Univariate analysis of data from 68 patients with AGC revealed that high hENT1 and low RRM1 expression were significantly associated with longer DFS (hENT1, P = 0.005; RRM1, P = 0.015) and longer OS (hENT1, P = 0.036; RRM1, P = 0.035). In multivariate analysis, moderately or poorly differentiation, (P = 0.007), low hENT1expression (P = 0.044) and high RRM1 expression (P = 0.009) were identified as independent risk factors for poor DFS, and moderately or poorly differentiation, (P = 0.045), lymph node metastasis, (P = 0.011) and high RRM1 expression (P = 0.009) were identified as independent risk factors for poor OS. In contrast, hENT1 and RRM1 expression did not correlate with DFS and OS in 58 patients without AGC.

CONCLUSIONS: Intratumoral hENT1 and RRM1 expression predicts survival of advanced cholangiocarcinoma patients treated with AGC.

Mo1575

Cost-Effectiveness of Elective Cholecystectomy Versus Observation in Older Patients Presenting with Mild Biliary Disease

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INTRODUCTION: Cholecystectomy is the standard of care for younger patients with symptomatic cholelithiasis. However, older patients with mild biliary disease may have multiple competing risks and the optimal treatment strategy for these patients is not known. For these patients, cholecystectomy should ideally be performed in the subset of patients most likely to benefit. Our objective was to determine the threshold for probability of recurrent symptoms at which elective cholecystectomy is the more effective and cost-effective option.

METHODS: We built a decision model to evaluate the cost-effectiveness of elective cholecystectomy vs. observation in patients >65 presenting with initial episodes of symptomatic cholelithiasis and not requiring initial hospitalization or cholecystectomy. Probabilities for subsequent hospitalization, emergency cholecystectomy, and perioperative complications in these patients were determined from observed frequencies in a 5% national sample of Medicare patients. Costs were estimated from Medicare reimbursements and from the Healthcare Cost and Utilization Project. Quality-adjusted life years (QALYs) for various health states were obtained from established literature estimates and the Tufts Cost-Effectiveness Analysis Registry. Threshold analyses was used to determine the probabilities of symptoms at which cholecystectomy became the more effective and cost-effective decision. Sensitivity analyses were also performed to account for variability in parameter estimates.

RESULTS: Compared to observation in all patients, elective cholecystectomy for this high-risk population was associated with slightly lower effectiveness (–0.09 QALYs) and had an increased cost of $3,320.44 per patient at two years follow-up. In the threshold analysis, elective cholecystectomy became the more effective option when the likelihood for continued symptoms exceeded 42.7%, with an additional cost of $2,236.99 per patient. Elective cholecystectomy was the both more effective and less costly when the probability for continued symptoms exceeded 80.8%. Our model was insensitive to wide variations in QALY measurements and costs.

CONCLUSION: These data can be used to guide shared decision-making in older patients presenting with symptomatic cholelithiasis. The development of models that accurately predict recurrent symptoms or complications from gallstones would allow practitioners to educate patients of the individual risks and benefits of observation versus elective cholecystectomy. This data driven, shared decision making approach has the potential to improve outcomes by increasing early elective cholecystectomy rates in patients at high risk for recurrent symptoms and minimizing unnecessary cholecystectomy for patients unlikely to benefit.

Mo1576

Development of a New Preoperative Staging System for Prediction of Resectability in Hilar Cholangiocarcinoma

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BACKGROUND: Radical surgical resection offers the best long-term survival in hilar cholangiocarcinoma (HCCA). We aimed to assess the value of a staging system based on previously described prognostic factors available from preoperative imaging to predict the chance of obtaining a radical (R0) resection.

METHODS: A total of 180 patients underwent explorative laparotomy for HCCA at a single, tertiary care center. If no distant metastases were found and the tumor appeared to be locally resectable, resection with curative intent was performed using extrahepatic bile duct resection with partial liver resection. The cohort was divided in a training set (n = 116) treated between 2003–2009 and a validation set (n = 64) treated between 2010–2013. A staging system to predict R0 resection based on preoperative imaging parameters (bilateral second order biliary involvement, vascular or lymph node involvement) was derived from previously described prognostic factors in the training set. The area under the receiver operating characteristic curve (AUC) was used to assess the discrimination achieved by the staging system.

RESULTS: Of 180 patients, a resection was performed in 104 patients (58%), which was a R0 resection in 88 patients (49%). Patients were stratified according to the proposed preoperative staging system (Figure). R0 resection rate was 72% in preoperative HCCA Stage 1 (33 of 46 patients), 44% in preoperative HCCA Stage 2 (27 of 61 patients), and 38% in preoperative HCCA stage 3 (28 of 73 patients). The AUC of the proposed staging system was 0.63 in the training set (SE 0.05) and 0.62 (SE 0.07) in the validation set, which indicated low discriminative power.

DISCUSSION: Although bilateral second order biliary involvement, and vascular or lymph node involvement on preoperative imaging have predictive power for resectability of HCCA, they have inadequate discriminative power to form a staging system. No patients should be withheld from exploration based on these criteria.

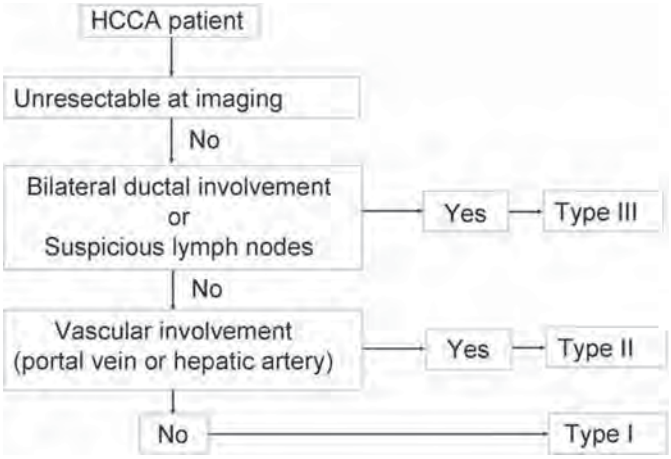

Figure: Proposed preoperative staging system to predict the chance of a R0 resection in HCCA.

Mo1577

Timing of Cholecystectomy in Children with Biliary Pancreatitis, Early Versus Delayed Surgery: A Single Pediatric Center Review

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OBJECTIVE: Biliary pancreatitis (BP) is a common cause of acute pancreatitis (AP) in adults and children. Current standard of care is to perform a cholecystectomy (CCE) to decrease the recurrence risk of AP. Controversy exists as to the timing of CCE, early (during index admission) versus delayed surgical intervention. Adult literature suggests a greater benefit of early CCE. However, there is limited literature as to the optimal timing of CCE in children. We sought to identify at our institution the frequency of adverse events in children with BP undergoing early versus delayed CCE.

METHODS: We conducted a retrospective chart review of all children admitted with AP from January 1, 2010 to July 24, 2013. We then queried for all patients who had also undergone a CCE as documented in the individual charts. Patients who underwent a CCE for reasons other than BP were excluded from this review. Patient demographic information, BMI, the date of presentation with BP, CCE operative date, and complications or adverse events occurring from CCE were recorded. Early CCE was defined as undergoing a CCE during the index admission; late CCE was defined as a CCE performed during a subsequent admission.

RESULTS: A total of 285 cases with AP were identified, of which 31 patients were found to have undergone a CCE. Twelve patients were excluded because the CCE was performed for an indication other than BP. The study group of 19 patients (17 female, 2 male) had a mean age of 15 years (range: 8–20 years). Two patients were found to be overweight (BMI 85th to 95th percentile) and 7 patients were characterized as obese (BMI ≥ 95th percentile). CCE was performed early in 9 patients with no pre- or post-surgical adverse events, and mean length of stay following CCE was 1.1 days. In the ten patients who had a delayed CCE, AP recurred in 1 and abdominal pain without AP consistent with biliary colic occurred in 3. The duration between the initial presentations with BP to the time of delayed CCE ranged from 8 to 90 days (mean 34 days, median 27 days). CCE was delayed 90 days in one patient with recurrent AP because of multiple co-morbid conditions. AP was considered to be severe in only 1 patient with a complication of pancreatic necrosis. In this patient, CCE was performed 81 days after initial presentation without the occurrence of any interval adverse events.

CONCLUSION: Gallstone related events including biliary colic and recurrent pancreatitis can occur at a high rate in children with BP who undergo a delayed CCE. Adverse events and surgical complications from early CCE are uncommon in children with non-severe BP. Early CCE during the index admission should be considered as the preferred timing for surgical intervention.

Clinical: Colon-Rectal

Mo1578

Do Preoperative Oral Antibiotics Decrease the Incidence of Surgical Site Infection After Segmental Colectomy Without a Mechanical Bowel Prep?

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PURPOSE: Preoperative oral antibiotics (Neomycin and Flagyl) have been shown to decrease the incidence of surgical site infection in colectomy patients who completed a preoperative mechanical bowel prep. Mechanical bowel prep has now been shown to be unnecessary, and potentially harmful for patients having a segmental colectomy. Our hypothesis is that preoperative oral antibiotics do not decrease the incidence of postoperative surgical site infection (SSI) in patients who did not receive a mechanical bowel prep prior to segmental colectomy.

METHODS: We performed a retrospective review of 185 patients who underwent a segmental colectomy without mechanical bowel prep by a group of 4 colorectal surgeons at a single academic medical center from July 2011–July 2013. A total of 66 patients received preoperative Neomycin and Flagyl in addition to perioperative IV antibiotics, while 119 received perioperative IV antibiotics alone. Oral antibiotics were given at the discretion of the attending surgeon. The primary outcome was postoperative surgical site infection. Multivariate logistic regression was performed to control for patient and surgical factors associated with surgical site infection.

RESULTS: A total of 66 patients received preoperative Neomycin and Flagyl, while 119 patients did not. The two groups were equally matched, with two exceptions. There was a higher proportion of cases performed laparoscopically in the group that did not receive oral antibiotics (75.7% versus 49.6%, p = 0.001), and the diagnosis of diabetes was more prevalent in the group that did not receive oral antibiotics (21.2% versus 10.1%, p = 0.0031). Postoperative surgical site infection occurred in 10.9% of patients who received Neomycin and Flagyl and 10.6% percent of those who did not (p = 0.95). Multivariate analysis of surgical and patient factors indicated that estimated blood loss (OR = 3.76 95% CI = 1.24–11.36), and perioperative steroid use (OR = 7.7 95% CI = 1.34–44.8) were associated with postoperative SSI. When controlling for patient and surgical factors, preoperative Neomycin and Flagyl did not decrease the incidence of SSI (OR = 0.75, 95% CI = 0.026–2.19).

CONCLUSION: In the absence of mechanical bowel prep, preoperative oral antibiotics do not reduce the incidence of surgical site infection following segmental colectomy.

Mo1579

Is Early Discharge Following Elective Surgery for Colon Cancer Safe? An Analysis of Short-Term Outcomes

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INTRODUCTION: In the era of enhanced recovery programs, a better understanding of the safety and feasibility of early discharge following colon resection is needed. The objective of this study is to determine if "early discharge" (i.e., on postoperative day 1 or 2) following oncologic colon resections is comparable to "standard discharge" (i.e., on postoperative day 3 or 4) with respect to 30-day patient outcomes.

METHODS AND PROCEDURES: Data was obtained from the American College of Surgeons' National Surgery Quality Improvement Program participant use file to perform a retrospective cohort analysis. The study population consisted of patients discharged on postoperative day (POD) 1, 2, 3 or 4 that received an elective colon resection for a malignant neoplasm during 2011 and 2012. Patients were excluded if they had evidence of metastatic disease, a concurrent procedure or any recorded complication/death during their principal admission. The primary outcome was the proportion of 30-day adverse events, which was a composite endpoint of serious complications, mortality or reoperations. The secondary outcome was the proportion of 30-day readmissions. A multiple logistic regression analysis was performed to evaluate the primary and secondary outcomes based on the discharge category.

RESULTS: The subselected population consisted of 305 and 2277 patients in the early and standard discharge groups, respectively. Although an open approach was performed more often in the standard group (p = < 0.001), there were no other major clinical differences between the two groups. The early group had 6 (1.97%) 30-day adverse events and the standard group had 59 (2.59%). There were 16 (5.56%) readmissions in the early group and 135 (6.24%) in the standard group. Using a multiple logistic regression analysis, an odds ratio (OR) estimate was adjusted for potential patient and operative confounders. No statistical difference was found between early and standard discharge with respect to the proportion of 30-day adverse events (OR 0.93, p = 0.87, 95% CI [0.41–2.12]) and 30-day readmissions (OR 1.03, p = 0.90, 95% CI [0.61–1.76]). Male sex and open operations were significant predictors for adverse events, while longer operating time and open operations were significant predictors for readmissions.

CONCLUSION: Using this large national surgical database, patients discharged on POD 1 or 2 after receiving elective oncologic colon resections did not have a significantly higher proportion of adverse events or readmissions compared to patients discharged on POD 3 or 4. Open surgery is a common predictor of adverse events and readmissions following colon resections with early discharge.

Mo1581

Should We Still Be Performing Open Appendectomies? A Comparison of Outcomes for Laparoscopic Versus Open Appendectomy with Data from the Canadian Institute for Health Information (CIHI)

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BACKGROUND: Appendicitis is one of the most common surgical conditions in North America. Since the initial description of open appendectomy in 1894, little changed in surgical technique until 1983 with the development of the laparoscopic approach. Thirty years later, debate still exists as to the ideal technique for this disease. The objective of this study was to compare laparoscopic appendectomy (LA) to open appendectomy (OA) for the treatment of appendicitis in Canada.

METHODS: Data was obtained from the Discharge Abstract Database within the Canadian Institute for Health Information (CIHI). All individuals admitted to a hospital across Canada for appendicitis (excluding Quebéc) between 2004 and 2008 were included. Patient demographics, morbidity and mortality were compared between patients who underwent laparoscopic and open appendectomies.

RESULTS: From 2004 to 2008, 105,882 patients underwent appendectomy for appendicitis. Overall, 48.32% of appendectomies were laparoscopic. The odds of females undergoing LA were 1.26 times higher than males. The odds of a patient with a Charlson Comorbidity Index (CCI) of 0 undergoing LA were 1.35 times higher than patients with a CCI of 1 or higher. For patients with non-perforated appendicitis, the odds of undergoing LA were 1.38 times higher than patients with perforated appendicitis. The length of stay was significantly shorter for LA (2.37 days [SD 2.31]) compared to OA (3.44 [SD 3.48]) ($p < .0001$). The post-operative complication rate (overall and intra-abdominal abscess, small bowel obstruction, paralytic ileus) was also significantly lower for LA compared to OA (3.16% vs. 5.33%, $p < .0001$), as was the mortality rate (0.03% vs. 0.10%, $p = .0002$). A statistically significant association was identified between the year of study and proportion of appendectomies performed laparoscopically ($p < .0001$), with a trend towards increasing rates of LA (35.6% in 2004 vs. 59% in 2008). Rates of LA also varied significantly across Canada ($p < .0001$), with higher rates in Pacific and Central Canada compared to Atlantic Canada.

DISCUSSION: This study demonstrates an increasing trend towards LA for the treatment of acute appendicitis in Canada. While certain patient characteristics may influence the decision to choose LA or OA (patient age, sex, perforation), this data clearly supports the safety profile of LA. Overall, LA is associated with decreased morbidity, mortality and overall length of stay. This has significant economic implications.

Mo1582

Appendicitis in the Modern Era: Universal Problem and Variable Treatment

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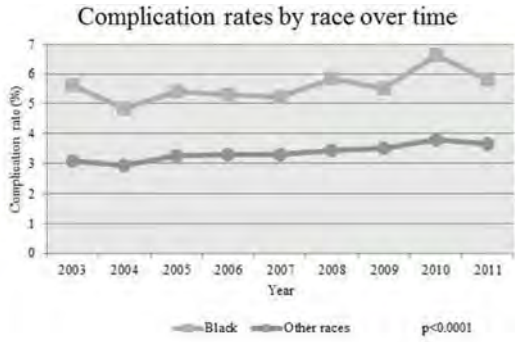
BACKGROUND: Acute appendicitis is the second most common gastrointestinal diagnosis mandating urgent operation in the U.S. The current state of adult appendectomy, including patient and hospital characteristics, complications, and costs are unknown.

METHODS: Retrospective review of U.S. Nationwide Inpatient Sample 2003–2011 for appendectomy in ≥18 year olds. Key patient demographics and hospital characteristics, including teaching status and hospital surgical volume, were identified. The use of laparoscopy was quantified. Outcome measures included postoperative complications (primary outcome), length of stay, and patient mortality. Categorical variables were analyzed by $\chi 2$, trend analyses by Cochran-Armitage. Multivariable logistic regression was performed for adjusted predictors of developing complications.

RESULTS: 1,663,238 weighted appendectomy discharges occurred during 2003–2011. Mean age was 40.9 (range: 18–106), median Elixhauser comorbidity score was 0 (IQR: 0–1), 45.3% were female, 54.6% were white. Over the period of the study, overall mortality decreased from 0.14% to 0.09% ($p < 0.0001$), complications increased, 3.2% to 3.8% ($p < 0.0001$), mean LOS decreased, 3.1 to 2.6 days ($p < 0.0001$), and proportion of laparoscopic appendectomy increased, 40.9% to 75.4% ($p < 0.0001$). In addition, patients were increasingly older (≥65 years, 9.4% to 11.6% [$p < 0.0001$]), obese (3.8%–8.9% [$p < 0.0001$]), and with more comorbidities (Elixhauser score ≥3, 4.7% to 9.8% ($p < 0.0001$) over time. After adjustment, independent predictors for postoperative complications included male sex (OR 1.6; 95% CI 1.5–1.6), black race (vs. white: OR 1.5; 95% CI 1.4–1.6), perforated appendix (OR 2.8; 95% CI 2.7–3.0), open appendectomy (OR 1.4; 95% CI 1.4–1.5), greater comorbidity (Elixhauser ≥3 vs. 0, OR 11.3, 95% CI 10.5–12.1), non-private insurance status (vs. private: Medicaid OR 1.3, 95% CI 1.2–1.4; Medicare OR 1.7, 95% CI 1.6–1.8), increasing age (>52 years vs. ≤27: OR 1.3; 95% CI 1.2–1.4) and hospital volume (vs. high: low OR 1.2; 95% CI 1.1–1.3).



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CONCLUSIONS: In the present era, appendicitis remains a major source of health care utilization. Black patients and patients with public insurance have inferior outcomes to their white, privately insured peers. Laparoscopic appendectomy is increasing with decreasing mortality and length of stay, but not decreasing complications. Laparoscopy is unevenly deployed across patient groups. In the era of health care reform, careful attention to maximizing outcomes for common problems will be critical.

Mo1583

Laparoscopic Surgery for Sigmoid Diverticulitis Complicated by Vesical/Vaginal Fistulas

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BACKGROUND: There are hardly any data on laparoscopic surgery for sigmoid diverticulitis complicated by entero-vesical and -vaginal fistulas. The aim of our study was to evaluate feasibility and outcomes of such patients.

PATIENTS AND METHODS: Data of patients undergoing laparoscopic surgery for diverticular disease with fistulas between 2004 and 2013 were obtained from our prospective IRB approved database. Short-term outcomes were evaluated.

RESULTS: 43 patients (60% male) were recruited; diagnosis was colovesical fistula in 35 patients and colovaginal fistula in 8 patients, the median age was 60 (28–84) years, mean body mass index was 28.2 ± 5.5; 51% of patients were ASA grade II. Diverticular colovesical fistulas were managed by sigmoid resection alone (n = 21) or in combination with suture repair of the bladder (n = 5), partial cystectomy (n = 1), omental pedicle graft (n = 4), as Hartmann's procedure (n = 1), left colectomy (n = 1) or with low anterior resection (n = 2).

The colovaginal fistulas were managed by sigmoid resection (n = 6), eventually with omentoplasty (n = 1), one patient required additional suture repair of fistula.

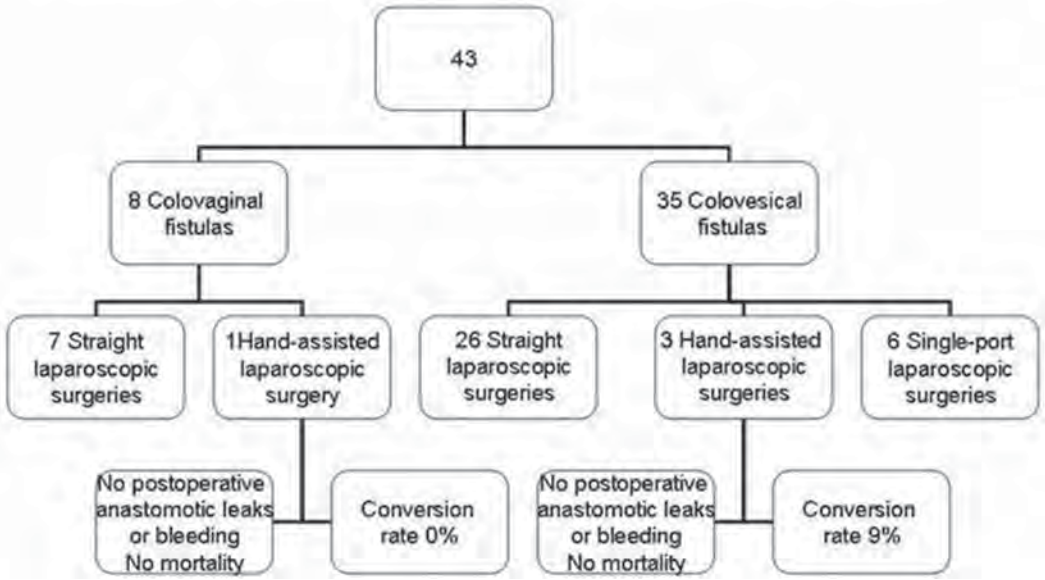
The median operative time was 180 (34–319) min; the median estimated blood loss was 100 (25–600) ml. The median hospital stay was 5 (1–22) days (5 [1–22] days in non-converted vs. 7 [4–8] days in converted cases). 3 (7%) patients required conversion; the reasons were dense adhesions (n = 1), difficult mobilization of the rectum in the low pelvis (n = 1) and associated hiatal hernia with transverse colon being prolapsed (n = 1). In 5 patients, a mini laparotomy was needed for fistula management: one patient tolerated the pneumoperitoneum poorly, in 3 patients the fistula was difficult to dissect laparoscopically and in one patient a large phlegmon was present.

The conversion rate was 9% (3/35) for the bladder fistulas and 0% for the vaginal fistulas, there were no major intraoperative complication, no postoperative anastomotic leaks or bleeding and no mortality.

There were 9 minor complications (21%), including postoperative ileus (n = 4), wound infection (n = 1), urinary tract infection (n = 3) and deep venous thrombosis (n = 1).

CONCLUSION: Laparoscopic surgery of sigmoid diverticulitis complicated by entero-vesical and -vaginal fistula is feasible and safe; this approach offers short hospitalization like in uncomplicated cases and favorable short term outcome.

Figure 1: Outcome of sigmoid diverticulitis complicated by vesical/vaginal fistulas treated with laparoscopic surgery



Mo1584

Why Is Your Patient with Crohn's Disease Still Smoking? Impact of Smoking on Surgical Outcomes

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INTRODUCTION: The influence of smoking on the course of Crohn's disease (CD) has been the subject of recent controversy, with several studies suggesting no negative impact from tobacco use. The aim of this study is to assess the effects of smoking on the length of small bowel (SB) resected, postoperative complications, reoperation rate, and disease phenotype in CD patients.

PATIENTS AND METHODS: A retrospective review of 130 consecutive CD patients who underwent ileocolic resection between 2008–2013 was performed. Patients were classified according to their smoking status at surgery into smokers and non-smokers. Demographics, disease characteristics, preoperative medical treatment, complications and pathology reports were reviewed. Univariable and multivariable analyses were used to compare the two groups.

RESULTS: 23 (18%) smokers and 107 (82%) non-smokers were similar in terms of age, gender, comorbidities, CD behavior and indications for surgery (see Table). Although the two groups had similar disease duration (12 vs. 11.9 years, p = 0.97), smokers were more likely to undergo a reoperation because of symptomatic recurrence (48% vs. 26%, p = 0.04). Smokers had similar rates of exposure to steroids (64% vs. 55%, p = 0.44) and anti-TNFs (35% vs. 39%, p = 0.69). However, 13% of smokers and 3% of non-smokers were on rescue therapy with Methotrexate (p = 0.07).

Ultimately, both groups had similar surgical outcomes but smokers required additional surgical procedures more frequently, including strictureplasties and secondary colonic resections (65% vs. 42% p = 0.04).

On final pathologic assessment, both groups had similar rates of active (83% vs. 83%, p = 0.96) and chronic inflammation (78% vs. 90%, p = 0.13), stricturing disease (39% vs 48%, p = 0.46) and fistulization (13% vs. 30%, p = 0.12). However, inflammation was present at the resection margin in 9 (75%) smokers vs. 29 (39%) non-smokers (p = 0.03). The mean length of resected SB was 21.4 ± 2.3 cm in smokers vs. 21.8 ± 1.8 cm in non-smokers (p = 0.89). On multivariable analysis aimed at determining predictors of length of SB resection, reoperation increased the length of SB resected (17.6 ± 3.5 cm vs. 24.7 ± 3.1 cm, p = 0.04) and this variable appeared to be collinear with smoking.

Table: Characteristics of Smoking vs. Non-Smoking CD Patients Treated with Ileocolic Resection

Variable	Smokers (N = 23)	Non-Smokers (N = 107)	p-Value
Age (years)	42 ± 3.3	38.8 ± 1.5	0.36
Duration of disease (years)	12 ± 2.6	11.9 ± 1.2	0.97
Males (%)	52.2	47.7	0.69
Comorbidities (%)	34.8	21	0.16
CD Behavior (%)			
Non-stricturing, non-penetrating	4.35	6.54	0.69
Stricturing	82.6	76.6	0.53
Penetrating	39.1	42.1	0.80
Perianal disease modifier	13	17.8	0.58
Preoperative Medications (%)			
Steroids	63.6	54.7	0.44
5-ASA	21.7	29.3	0.47
Anti-TNF	34.8	39.3	0.69
6MP	4.4	12.3	0.46
Azathioprine	17.4	19.8	0.79
Methotrexate	13	2.83	0.07
Cyclosporine	0	0.94	1.00
Antibiotics	39.1	34.3	0.64
Indications for Surgery (%)			
Small Bowel Obstruction	73.9	68.2	0.59
Perforation	8.7	9.35	0.92
Abscess	26.1	18.7	0.40
Fistula	21.7	25.2	0.72
Cancer	8.7	3.74	0.29
Refractory Symptoms	43.5	43	0.97
Bleed	8.7	8.41	0.96
Other	0	5.6	0.59

CONCLUSIONS: Eighteen percent of CD patients who underwent surgery continued to smoke at the time of the intervention. Smoking may accelerate disease activity, potentiate disease severity, and increase surgical recurrence, as manifested by the more frequent use of rescue therapy and the higher reoperation rate in this group despite similar disease duration. Preoperative smoking cessation should be encouraged and aggressive postoperative smoking cessation should be pursued in all CD patients to minimize lifetime SB loss to disease and at surgery.

Mo1585

Predictors of Surgical Site Infection After Ostomy Reversal: Lessons from ACS-NSQIP

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PURPOSE: The use of proximal fecal diversion may minimize the impact of anastomotic leak after primary anastomosis. However, subsequent closure of a diverting stoma is associated with its own morbidity such as surgical site infection (SSI). In order to quantify this morbidity, we aimed to identify predictors of SSI after ostomy reversal surgery from the largest dataset of ostomy reversal procedures reported to date.

METHODS: The ACS-NSQIP database from 2005–2011 was used to identify all patients who underwent ostomy reversal procedures with- and without-bowel resection and anastomosis (CPT codes 44625 or 44620, respectively). Exclusion criteria included inpatients, patients not admitted from home, emergencies, patients with any concurrent procedure, and patients with any other major synchronous procedure (e.g., other solid or hollow organ operation, hernia repair). Demographics, comorbidities, operative outcomes and complications were collected. Patients were grouped into those with colorectal cancer (CA), chronic ulcerative colitis (CUC), diverticular disease (DD), and Crohn disease (CD). Univariate and multivariate analysis was used to assess the rate of SSI in each of the 4 diagnostic groups, as well as predictors of SSI.

RESULTS: A total of 10,950 patients were included: 5078 (46.4%) without bowel resection, 5872 (53.6%) with bowel resection. The mean patient age was 53 (±16) years, 45% were women, and the mean BMI was 26 kg/m2. Demographic features and rate of SSI in the four groups are presented in Table 1. Overall 987 (9%) patients suffered SSI. Age, BMI, diabetes, smoking status, COPD, hypertension requiring medication, weight loss, steroid use, recent chemotherapy or radiation therapy, ASA classification, wound classification, and operative time were associated with a higher risk of SSI on univariate analysis. A saturated multivariate analysis limited to the 1479 patients with a known diagnosis of CA, CUC, DD, or CD identified only steroids (p = 0.002), anti-hypertensive medication use (p = 0.01), and the diagnosis of Crohn disease (p = 0.01) as independent predictors of any SSI. The risk of SSI if 0, 1, 2, or all 3 risk factors were presents was 5.9%, 8.9%, 31.6%, and 66.7%, respectively (p < 0.0001).

Table 1: Rate of SSI by diagnosis among patients undergoing ostomy reversal surgery[1].

Characteristic	CA N = 576	CUC N = 457	DD N = 328	CD N = 118	p-value
Any SSI[3]	28 (4.9)	36 (7.9)	34 (10.4)	18 (15.3)	<0.001
Superficial SSI	23 (4.0)	17 (3.7)	23 (7.0)	10 (8.5)	0.03
Deep incisional SSI	1 (0.2)	3 (0.7)	6 (1.8)	6 (5.1)	<0.001
Organ/space SSI	4 (0.7)	16 (3.5)	5 (1.5)	2 (1.7)	0.01
Wound disruption	4 (0.7	2 (0.4)	4 (1.2)	0 (0)	0.45

1. Data Source: American College of Surgery National Surgical Quality Improvement Program from 2005 to 2011.
2. Numbers represent frequency (proportion); p-values represent contingency table analysis.
3. Any SSI = includes superficial, deep, organ space SSI, or wound disruption.

CONCLUSIONS: Surgical site infections occur in approximately 10% of ostomy reversal procedures, but if multiple risk factors are present may be anticipated to occur in the majority of cases. Knowledge of these factors may help surgeons develop strategies to reduce SSI in those at highest risk.

Mo1586

Enhanced Recovery After Colorectal Surgery: Does Restrictive Fluid Management Result in Increased Acute Kidney Injury?

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PURPOSE: Enhanced recovery after surgery (ERAS) lowers complications and shortens lengths of stay (LOS) compared with standard recovery. A key management strategy of ERAS protocols, especially if goal-directed fluid management is not available, is restrictive fluid management. However, it is unknown whether this is a safe strategy. Thus we aimed to evaluate whether restrictive fluid management was associated with increased acute kidney injury.

METHODS: We performed a retrospective review of consecutive patients undergoing abdominal surgery by a single ERAS-trained colorectal surgeon at an academic medical center from 1/11/2012–8/15/2013. Demographics, operative data, and short-term (30-day) outcomes are presented. Univariate analysis assessed between group differences to test the hypothesis that ERAS patients managed with restrictive fluids did not have an increased rate of post-operative acute kidney injury. Results are reported as median (interquartile range) or frequency (proportion).

RESULTS: One hundred twenty-eight patients were included: 82 (64%) ERAS and 46 (36%) STD recovery. Patient in the two groups were of similar age (52.4 vs. 54.8 years old, p = 0.74), and BMI (26.8 vs. 27.4 kg/m^2, p = 0.98). Similar proportions underwent protectomy (22% vs. 28%, p = 0.52), but more ERAS patients underwent minimally invasive surgery (61% vs. 41%, p = 0.04), primary anastomosis (61% vs. 43%, p = 0.04), and fewer had an ostomy (40% vs. 63%, p = 0.02). Perioperative fluids (in cc/kg/hour) and creatinine levels are shown in Table 1. There was a trend towards ERAS patients receiving significantly less intra-operative fluids (p = 0.07), and ERAS patients made significantly less urine intra-operatively (p = 0.04). Post-operatively ERAS patients received significantly less IV fluids on POD#1 and POD#2 (p < 0.0001), but had similar urine output on POD#1 and a trend toward reduced UOP on POD#2 (p = 0.06). A total of 11 patients (8.6%) had a peak post-op creatinine ≥1.5; of these 8 (73%) recovered to <1.5 except three patients (2 ERAS- 1 malignant ureteral obstruction, 1 chronic renal insufficiency; 1 STD—contrast induced nephropathy). No patients in the series required dialysis. ERAS patients, compared with STD patients, had earlier bowel function (POD 1.7 vs. 2.3, p = 0.02), and shorter LOS 4 (3–6) vs. 6 (4–7) days, p = 0.0002, and a similar readmission rate (8.5% vs. 10.9%, p = 0.75), and need for return to the operating room (9.8% vs. 6.5%, p = 0.75)

CONCLUSIONS: Restrictive perioperative management after colorectal surgery is safe and does not result in a clinically or statistically increased rate of post-operative acute kidney injury.

Mo1587

Pre-Operative Radiographic Findings Predictive of Laparoscopic Conversion to Open Procedures in Crohn's Disease

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Laparoscopy is accepted as a standard surgical approach for Crohn's disease. However, the rate of conversion is high, ranging from 15–70% depending on the population. There are also concerns that conversion results in worsened outcomes versus an initial open procedure. This study evaluated pre-operative radiographic findings to determine who is at increased risk of conversion and may therefore benefit from an initial open approach.

A case-matched study included patients from 2004–2013 with pre-operative CTE/MRE who underwent laparoscopic surgery converted to an open approach, and compared them to laparoscopically completed controls with similar age, same surgeon, and number of previous abdominal operations. Studies were reviewed by two blinded radiologists. Variables included abdominal AP diameter, amount of subcutaneous fat, peritoneal vs. pelvic location of disease (true or false hemipelvis or abdomen), intestinal location of disease (colon, TI, ileum, jejunum), and presence, length, and location of strictures, simple or complex fistula, phlegmon, or abscess. Pearson's Chi-square or Fisher's exact tests assessed associations between conversion and categorical measures. Two-sample T-test evaluated relationships for continuous measures.

Twenty-seven patients meeting study criteria were compared with 81 controls. A negative association between conversion and disease in the left true pelvis was found ($p = .019$) and neared significance for left abdomen ($p = .08$). Positive correlations were found with pelvic fistulas ($p = .003$), complex fistulas ($p = .017$), and pelvic abscesses ($p = .009$), and neared significance for Baker classification ($p = .058$).

Preoperative imaging may help avoid unnecessary conversions and the risks associated with them. Patients with complex fistulas and pelvic disease may benefit from an open procedure.

Mo1589

The Impact of Long Term Diuretic Therapy on Post-Operative Physiology After Major GI Resection

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INTRODUCTION: Diuretic use is now common in the population. Preoperative diuretic use is associated with increased rates of adverse events and renal dysfunction after cardiac surgery though is very limited information on the effect on the post-operative response following major gastrointestinal surgery.

AIM: the aim of the study was to examine the physiological effect of diuretic therapy on patients who undergo major GI surgery.

METHOD: Patients enrolled into a large randomised trial of restricted versus liberal intravenous fluid therapy were divided into those taking pre-operative diuretics and those not on diuretics. Changes in the post-operative electrolytes, weight and complications were compared according to randomised group.

RESULTS: A total of 240 patients were enrolled into the study of whom 39 patients were identified as taking a pre-operative diuretic (16.25%). Diuretic use was associated with significantly lower serum sodium ($p = 0.047$) and lower serum osmolality in the post-operative period. The mortality rate in patients on diuretics was 7.7% compared to 1.5% in those not on a diuretic ($\chi 2 = 5.15$, $p = 0.023$). There was no difference in other post-operative complications.

CONCLUSION: Diuretic use may be associated with a higher mortality rate in patients undergoing major GI resectional surgery. The effect of withholding diuretics in the pre-operative period needs further research.

Mo1590

Does Gender Affect Short-Term Outcomes After Laparoscopic Total Proctocolectomy with IPAA for Ulcerative Colitis?

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INTRODUCTION: Total proctocolectomy (TPC) with ileal pouch anal anastomosis (IPAA) is the surgical procedure of choice for the treatment of mucosal ulcerative colitis. Whether the gender of the patient influences short-term outcomes after laparoscopic TPC with IPAA has not been assessed. Anatomic and physiologic differences between genders affect both the operation and possibly postoperative outcomes. In this study, we aim to determine the impact of gender on short-term outcomes after laparoscopic TPC with IPAA from a nationwide database.

METHODS: All patients who underwent laparoscopic TPC with IPAA for ulcerative colitis between 2005 and 2010 were identified from the ACS-NSQIP database based on their CPT and ICD-9 codes. Patients younger than 18 and older than 80 years old were excluded. Thirty day outcomes were evaluated and a stepwise logistic regression analysis was performed, in order to determine risk factors for each gender.

Table: Summary of Patient Demographics and Outcomes

	Female n = 253 (45.7%)	Male n = 301 (54.3%)	P-Value
Age, (year)	38.8 ± 13	40.2 ± 13.9	0.23
Body mass index (BMI), (kg/m^2)	24.7 ± 5.5	25.9 ± 5.1	<0.001
Obesity (BMI > 30 kg/m^2)	16%	17.9%	0.55
Steroid use*	51.8%	52.5%	0.87
ASA class			>0.99
I	4.3%	4.3%	
II	79.1%	79.1%	
III	16.6%	16.6%	
Emergency surgery	0	1%	0.25
Superficial SSI**	4.7%	5%	0.9
Deep SSI	1.6%	0.3%	0.18
Organ space SSI	7.5%	10.3%	0.26
Pneumonia	0.8%	1.7%	0.46
Sepsis	7.5%	7%	0.81
Septic shock	1.2%	1.3%	>0.99
Mortality	0	1.3%	0.13

*Regular administration of oral or parenteral corticosteroid medications in the 30 days prior to the surgery
**Surgical site infection

RESULTS: In total, 253 female and 301 male patients were included in the study. While mean BMI was higher for male patients, the number of obese patients and mean age was comparable between the groups (Table). Male gender was associated with a significantly longer operative time (303.2 ± 93.9 vs. 318.7 ± 103.7, p = 0.04). Urinary infection rate was higher for female patients (9.5% vs. 0.7%, p = 0.001). Superficial, deep, and organ space surgical site infections (SSI), pneumonia, sepsis, septic shock and mortality rates were similar for both genders.

CONCLUSION: Laparoscopic total proctocolectomy with ileal pouch anal anastomosis for ulcerative colitis has comparable short-term outcomes in both genders. Despite deep and narrow male pelvis, achieving similar short term outcomes with the exception of prolonged operating time may be due to superior visualization with laparoscopy.

Mo1591

Intraoperative Portable Gammacamera for Sentinel Node Mapping in Colon Cancer

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BACKGROUND: Sentinel lymph node (SLN) biopsy has been proposed for ultrastaging in patients with stage II colon cancer. However the optimal technique for SNL detection in the colon has not been established. The purpose of this study was to evaluate the safety and feasibility of in vivo SLN mapping in colon cancer patients using an intraoperative portable gammacamera, and to determine if upstaging occurrs.

PATIENTS AND METHODS: Between Feb 2007 and Oct 2012, consecutive patients who underwent elective curative surgery for histologically confirmed non-disseminated colon cancer were included this study. Those patients with metastatic disease and/or with tumors invading adjacent organs were excluded. Intraoperatively, 0.5 mCi of 99Tc - radiocolloid was subserosally injected in the four cardinal points around the tumor. In vivo lymphatic navigation was accomplished with dynamic intraoperative lymphoscintigraphy using a portable gammacamera (Sentinella, Onco-Vision, Spain) and assisted by a gamma probe. SLN was defined as the first identified node with the highest gamma emission. The ex vivo technique was used in those cases in which no in vivo migration occurred. All lymph nodes were analysed by conventional haematoxylin-eosin (HE)

staining, and negative SLNs underwent in depth analysis using immunohistochemical (IHC) staining. Patients with positive lymph nodes were offered adjuvant chemotherapy, and all of them were routinely monitored at 1, 6, and 12 month-intervals.

RESULTS: A total of 55 patients were included in the study, 31 were men and 24 women. The average age was 73.6 years (range: 38.6–89.9). The success rate of SLN identification was 74.5% (41/55), with 20% of them with more than one SNL. Histological analysis identified 20% of positive SLNs (11/41). SLN identification rate decreased with increasing T ($p = 0.010$), as well as positive SLNs with increasing N ($p < 0.001$). False negative rate was 26.6%. (8/30). The average follow-up time was 17.5 months (IQR: 3.47–35.16), with 16,4% (9/55) of recurrence. Overall disease-free-survival at 48 months was 67.7%, 47.6% in patients with positive SLNs, and 83.5% in patients with negative SLNs.

CONCLUSIONS: SLN detection using a portable gamma-camera intraoperatively is a feasible procedure for colorectal cancer. Tumor size directly correlates with SLN identification failure and higher false negative rates. This might be explained by direct tumoral invasion of lymphatic vessels.

Mo1592

Flaps for Large Radiated Perineal Wounds After Proctectomy

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BACKGROUND: The increased use of preoperative radiation therapy for low rectal and anal cancers presents the surgeon with large perineal defects that are known to result in poor wound healing. We present 37 cases of flap closure of the radiated perineum following proctectomy for malignancy.

METHODS: Thirty-three bilateral (BIGAP) or unilateral (IGAP) fasciocutaneous flaps based on the inferior gluteal perforator artery and four vertical rectus abdominis myocutaneous (VRAM) flaps are included in this study along with associated major and minor complications involving the perineal flaps. VRAM flaps were utilized for relatively large defects or those extensively involving the posterior vaginal wall; otherwise BIGAP flaps were used.

The BIGAP flap technique uses bilateral equilateral triangular incisions of gluteal skin, subcutaneous fat, and gluteal fascia. The dissection of the flaps does not include the muscle, allowing the flaps to slide medially. Damage to the vessels of the pedicle is avoided because the dissection is not carried into the gluteal muscle. The medial side of each triangle is created by the lateral edge of the proctectomy perineal defect and is parallel to the midline of the body. The pelvic defect is filled in by excising a 2 cm vertical strip of skin from the medial side of each triangle. The lateral defect in the gluteal skin is closed in a horizontal V-Y fashion. The center of each equilateral triangle is located above the inferior gluteal artery location.

RESULTS: Defects closed in the BIGAP group ranged from 60 cm^3 to 3,375 cm^3 with a mean of 617 cm^3, whereas defects in the VRAM group ranged from 250 cm^3 to 5,040 cm^3 with a mean of 1,676 cm^3. Average tumor size was 7.1 cm for both groups. There were no mortalities and no flaps were lost. All perineal wounds healed primarily. Major complications involving the perineum occurred in 21% and 75% of patients receiving BIGAP and VRAM closures, respectively. Minor perineal complications occurred in 61% and 25%, respectively.

CONCLUSION: When local tumor invasion requires the creation of a large defect to remove the tumor in an irradiated field, the use of vascularized flaps reduce the risk of failed wound healing often associated with primary closure.

Mo1593

Treatment of Colorectal Cancer in the Rural Community Hospital Setting: Compatibility to Standard Care, Risk Factors to Deviate from Standard

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BACKGROUND: Following the current treatment guidelines for primary colorectal cancer (CRC) is critical to improve the outcomes of the patients with CRC and the deviation from the standard is associated with the poor prognosis. We conducted this study to assess the quality of treatment of CRC in a rural community hospital setting, and to find risk factors for deviation of standard care.

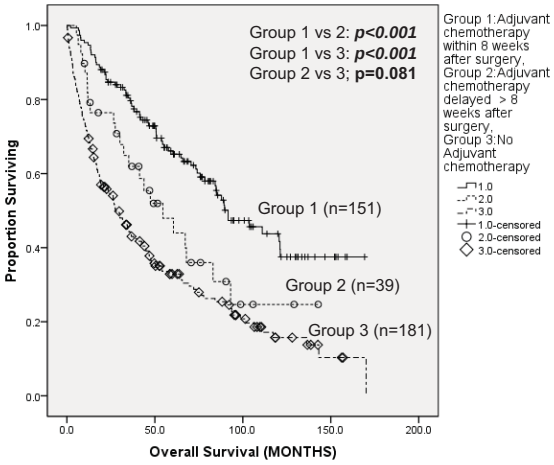
METHODS: The medical records of patients who underwent surgical resection for primary CRC at two regional community hospitals were reviewed. The demographics of patients, type of therapies received including surgery and adjuvant therapy, and long-term outcomes were analyzed. For the patients with stage III cancer, the time from the operation to the initiation of adjuvant therapy were also evaluated.

RESULTS: From 1999 through 2012, 1293 patients with CRC were identified and included in the study. There were 621 males (48.0%) and the median age was 71 years (range: 23–100). The median follow-up period for the entire cohort was 46.1 months (range: 0.1–170.1). The distribution of patients over stages and their long-term outcomes were as shown in the Table. Among 371 patients with stage III CRC, only 190 patients (51.2%) received adjuvant chemotherapy. The initiation of adjuvant chemotherapy was delayed greater than 8 weeks after their operation in 39 patients (20.5%) and their long-term outcomes were significantly worse compared to those who started adjuvant chemotherapy within 8 weeks post-operatively (median survival; 55 months vs 96 months, 5-year survival rate; 44% vs 65%, $p < 0.0001$, respectively [Figure]). Marital status (widowed) (23.1% vs 7.3%, $p = 0.004$) and renal failure (2.5% vs 0%, $p = 0.049$) were identified as risk factors for delayed adjuvant therapy.

CONCLUSIONS: In our community hospital setting, for patients with stage III CRC, underutilization of chemotherapy and failure to initiate it at the timely fashion are common and they compromises long-term outcomes. Enlightment of the community to use adjuvant chemotherapy in adequate timing for stage III patients is necessary to improve the outcomes.

Table: Long-Term Outcomes of Patients with CRC by Stage

Stage	N	Median Survival (Months)	5-Year Survival Rate (%)
0	68 (5%)	122	80
I	372 (29%)	125	74
II	329 (25%)	80	58
III	371 (29%)	54	48
IV	153 (12%)	17	9



Mo1594

Predictors of Post Operative Venous Thromboembolism in Colon and Rectal Surgery

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BACKGROUND: Venous thromboembolism (VTE) is a significant source of morbidity and mortality during the post operative period for general surgery patients. Pulmonary embolus, a life-threatening, sequela of VTE is associated with 0.8 to 2% of all deaths in general surgery patients. Abdominal and pelvic surgery carry a high rate of post operative VTE and this risk is increased in patients undergoing surgery for malignancy. We examined a nationwide database to highlight the prevalence and risk factors for developing VTE after colon and rectal surgery.

METHODS: The Nationwide Inpatient Data Sample (NIS) was queried for the years 2005 to 2010 for elective open and laparoscopic colo-rectal resections for inflammatory bowel disease, diverticular disease and malignancy. Cases of pre-existing VTE were excluded. The remaining patients were examined for age and comorbid conditions. We evaluated for length of stay and overall morbidity and mortality. The incidence of post operative VTE was evaluated. Univariate and multivariate logistic regression analyses were then performed to identify factors predicting post-operative VTE.

RESULTS: A total of 812,639 patients met the selection criteria. Open surgery was performed on 649,353 (79.9%) patients. Laparoscopic surgery was performed on 163,286 (20.1%) patients. In both open and laparoscopic groups cancer was the most common diagnosis at 57.1 and 38.8 percent, respectively. In the open group 3,624 (0.6%) patients suffered a post operative VTE and 530 (0.3%) in the laparoscopic group. ($p < 0.001$) In both groups the highest incidence was found in patients undergoing left colectomy, 0.77 and 0.5 percent respectively. Independent predictors of post operative VTE are CKD (OR 1.2), CHF (OR 1.7), severe liver disease (OR 2.7), IBD (OR 1.6) and malignancy

(OR 1.6). The odds ratio of post operative VTE in open surgery is 1.7 and in laparoscopy is 0.6 ($p < 0.001$).

CONCLUSION: Laparoscopy was found to be protective against post operative VTE after colon and rectal surgery. CHF, CKD, severe liver disease, IBD and malignancy were found to be independent predictors of VTE in the post operative period. This information can help surgeons stratify risk in their patient population. Moreover the results can aid in re-evaluating the VTE prophylaxis strategy in this group of patients. Consideration for pre operative prophylaxis may be given in these high risk populations.

Clinical: Esophageal

Mo1595

The Post-Esophagectomy Complications Influence the Overall Survival But Not Disease Free Survival in Patients with Esophageal Cancer

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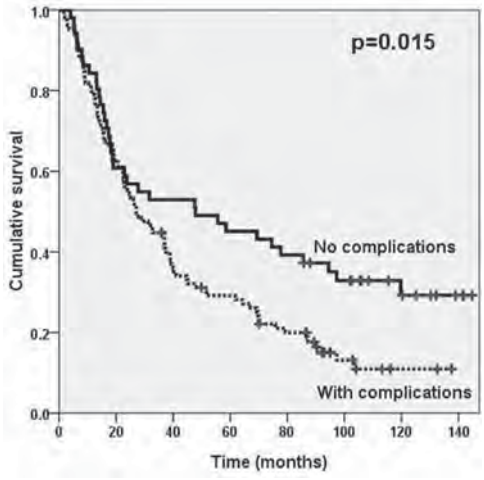
BACKGROUNDS: Esophageal cancer is an aggressive malignant disease and surgical resection is still the main treatment. Due to the extensive and complex operation, the complication rate is high. However, it is still conflicting issue that post-operative complications affect the oncologic outcome and overall survival. The aim of this study is to investigate the relationship between the presence of complication and survival.

PATIENTS AND METHODS: Between 2001 and 2006, 161 patients who received esophagectomy for esophageal cancer with curative intent were included. The medical records of these patients were systematically reviewed and the complications were recorded. Tumor staging was classified according to the 7th edition of AJCC cancer staging system. The Kaplan-Meier method and the log rank test were used to calculate and compare the overall survival. The Cox proportional hazards were employed to identify independent prognostic factors.

RESULTS: There were 147 males and 14 females with a mean age of 60.9 years (range: 36–88 years). Most patients (125/161, 77.6%) received transthoracic esophagectomy with gastric tubes reconstruction via retrosternal route. Complete resection was achieved in 145 (90.1%) patients, and the average resected lymph nodes were 23.6. Post-operative complications were noted in 110 patients (68.3%) including 5 surgical mortalities. The median follow-up time was 27.7 months (IQR: 13.3–78.5 months). There were 85 patients with tumor recurrence or metastasis, most of recurrence or metastasis developed within 2 years (63/85, 74.1%). The 3-year and 5-year disease-free survival (DFS) rate were 50% and 44.5%, respectively. Univariate analysis showed that gender, pathological T, N status and stage were the prognostic factors for DFS. There was no survival difference in patients with or without complications ($p = 0.337$). Multivariate analysis showed that pathological N status ($p < 0.001$, 95% CI, 1.333–2.238) and gender ($p = 0.023$, 95% CI, 0.083–0.831) were the independent prognostic factors for DFS. However, the 3-year and 5-year overall survival rate were 47.4% and 34.4%, respectively. In univariate analysis showed that gender, pathological T, N status, stage and presence of complication ($p = 0.015$, Figure 1) were prognostic factors for overall survival. Multivariate analysis showed that gender, age, pathological T, N status and presence of complication were independent factors for overall survival (Table).

Table: Multivariate Analysis of Prognostic Factors Influencing Overall Survival After Esophagectomy

Variable		Relative Risk (95% CI)	p-Value
Age		1.018 (1.002–1.033)	0.026
Gender	Male	1	0.046
	Female	0.431 (0.189–0.986)	
T status	T1	1	
	T2	1.245 (0.699–2.219)	0.457
	T3	1.532 (0.917–2.559)	0.103
	T4	3.932 (1.543–10.021)	0.004
N status	N0	1	
	N1	1.401 (0.912–2.150)	0.123
	N2	2.950 (1.671–5.206)	<0.001
	N3	4.608 (1.962–10.822)	<0.001
Complications	No	1	0.025
	Yes	1.597 (1.060–2.407)	



CONCLUSIONS: In this study, we demonstrated that the post-operative complications did not affect the disease-free survival, but the presence of complications may damage other organs then influence overall survival. On the other hand, if minimal invasive approach could decrease some kinds of complications, it may improve the overall survival rate in patients received esophagectomy.

Mo1596

High Resolution Manometric Predictors of Post-Fundoplication Dysphagia

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INTRODUCTION: Post-fundoplication dysphagia is a well-described side effect of antireflux surgery. Esophageal manometry is a standard part of the preoperative evaluation prior to antireflux surgery. However, controversy exists regarding the value of traditional manometry to predict post-operative dysphagia after fundoplication. Today, high-resolution manometry (HRM) has replaced traditional water perfused systems for the analysis of esophageal physiology. The aim of this study was to evaluate the utility of HRM in predicting post-operative dysphagia in patients with an otherwise functioning Nissen fundoplication.

METHODS: Patients who underwent a laparoscopic Nissen fundoplication at a single institution were identified through a prospectively collected database. Patients were asked to undergo routine post-operative testing 6–12 months after surgery. Patients who had normal post-operative 24-hour pH test scores were eligible for the study. Of these patients, those without available raw data from preoperative HRM were excluded. Traditional ineffective motility (IEM) was defined as mean distal esophageal contraction amplitude of <30 mmHg or 30% or less peristaltic waves. Post-operative dysphagia was graded using a standard scoring system (0 = never, 1 = 1–2 times a month, 2 = 1–2 times per week, 3 = daily). A symptom score of 2–3 was used to define post-operative dysphagia. Regression and association analysis of pre-operative manometric risk-factors were performed to determine predictors of post-operative dysphagia. P-values < 0.05 were considered significant.

Table: Pre-Operative Factors as Predictors of Post-Fundoplication Dysphagia

Value	P-Value
Peristalsis < 70%	0.626
DECA < 30 mmHg	<0.001
DCI < 450 mmHg-s-cm	0.202
CFV > 9 cm/s	0.156
DL < 4.5 s	0.642
IRP > 15 mmHg	<0.001
IBP > 30 mmHg	0.743
Pre-operative dysphagia > 2	0.942
Pre-operative dysphagia > 3	0.447

Abbreviations: DECA: Distal esophageal contraction amplitude; DCI: Distal contraction amplitude; CFV: Contractile front velocity; DL: Distal latency; IRP: Integrated relaxation pressure; IBP: intrabolus pressure.

RESULTS: 95 patients (41 male; 54 female) were included in the analysis. Mean post-operative length of follow-up was 14.9 months (range: 2–73). 70.2% patients had normal scores on all HRM parameters. Any dysphagia was reported by 50% of patients (17% grade-1, 23.4% grade-2, and 9.5% grade-3) Nineteen patients had traditional IEM. Of those with dysphagia, one also had traditional IEM. On univariate analysis only distal latency (DL) was found to be a significant predictor ($p < 0.001$) of grade-3 but not grade-2 dysphagia. On multivariate analysis, no preoperative factors were found to be significant predictors of grade-3 dysphagia, but contraction front velocity predicted grade-2 dysphagia.

CONCLUSION: Persistent daily dysphagia occurs in ~10% of patients following an otherwise successful Nissen fundoplication. Advancements in manometric technology provide additional data points in the preoperative analysis of these patients. This analysis reveals that elevated integrated relaxation pressure (IRP) is a useful new metric to predict post-operative dysphagia in addition to traditional identification of weak distal esophageal contraction amplitudes.

Mo1597

Impedance Planimetry As a Diagnostic Tool to Evaluate the Degree of Clinical Lower Esophageal Sphincter Dysfunction

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PURPOSE: Currently we rely on manometry among other diagnostic tools to evaluate patients with lower esophageal sphincter (LES) dysfunction. With the development of new technologies, there may be additional tools to correlate symptoms with physical findings. Functional Lumen Imaging Probe (FLIP) is a novel technology that allows us to measure the distensibility and diameter of the gastroesophageal junction (GEJ) using impedance planimetry. We hypothesize that the GEJ diameter measured by FILP will correlate with the severity of symptoms in patients with LES dysfunction.

METHODS: From 2011 to 2013, all patients that presented to our institution for surgical treatment of achalasia were evaluated preoperatively and postoperatively with reflux severity index and GERD questionnaires along with Eckardt scores as part of an IRB approved prospective database. All patients underwent work up with manometry, pH monitoring and EGD. In 2013, patients were additionally evaluated pre-myotomy and post-myotomy with the FLIP device.

RESULTS: A total of 24 FLIP diameter measurements were performed with corresponding Eckardt Scores. FLIP diameter ranged from 4.8 to 12.6mm and Eckardt scores from 0 to 10, resulting in a significant inverse correlation between FLIP diameter and Eckardt score with a Pearson's correlation of 0.635 (two-tailed, $p = 0.00086$). Compared to preoperative manometry, a total of 46 patients with LES relaxation pressure that ranged from 0 to 50 mmHg and corresponding Eckardt scores from 2 to 12 poorly correlated, with a Pearson's coefficient of 0.00835 (two-tailed, $p = 0.956$). Additionally reflux severity index and GERD scores did not significantly correlate with FLIP diameter or LES relaxation pressure in this population.

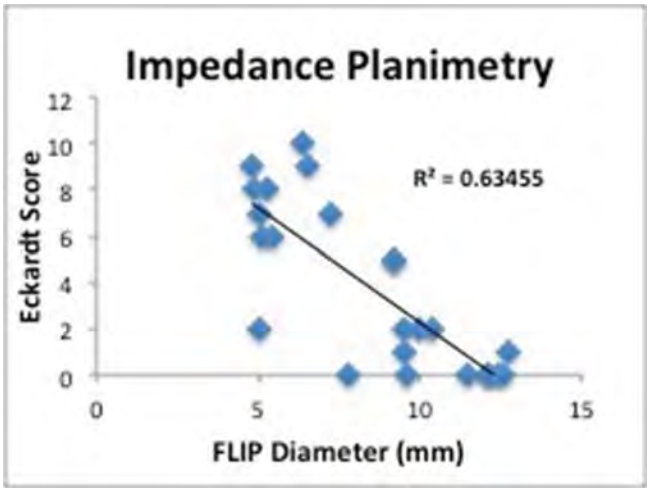

Figure 1: Eckardt score as a function of Functional Lumen Imaging Probe (FLIP) diameter measurement at the gastro-esophageal junction. Pearson's correlation of 0.635 (p = 0.00086).

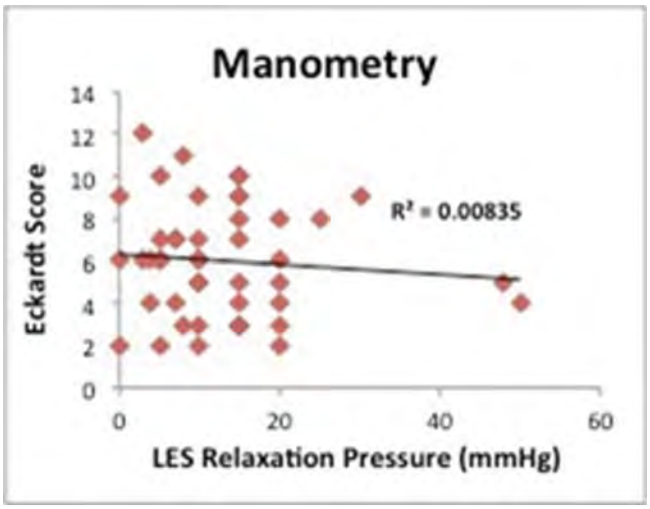

Figure 2: Eckardt score as a function of lower esophageal sphincter relaxation pressure. Pearson's correlation of 0.00835 (p = 0.956).

CONCLUSIONS: There is a significant correlation between the measured FLIP diameter at the GEJ and degree of clinical symptoms as described by Eckardt scores, unlike LES relaxation pressure on manometry. We thus postulate that the FLIP technology may be a better physical measure of the degree of achalasia than other current technologies.

Mo1598

Do Outcomes of Surgical Treatment for Achalasia Depend on the Manometric Subtype?

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BACKGROUND: High-Resolution Manometry (HRM) yields better understanding of esophageal motility than does conventional manometry, and a new classification system which describes three distinct HRM subtypes of achalasia based on esophageal body contraction patterns appears to be a promising tool in predicting results of treatment with standard Heller Myotomy. The aim of this study is to analyze the outcomes of surgical treatment with extended Heller myotomy) for each subtype and to identify additional parameters that may predict success of therapy.

METHODS: From 2008 to 2013 at a single institution 72 patients underwent laparoscopic extended Heller myotomy for first time. In addition to manometric parameters, clinical records were reviewed for symptom duration, patient age at the time of referral, and preoperative esophageal dilation (stage I–III) as assessed by radiography. We defined treatment failure as no improvement in symptoms and/or need for a second therapy within one year after the operation. Long-term follow-up data (15 to 46 months) was available for a subset of 25 patients in the form of a survey evaluating overall satisfaction with the operation.

RESULTS: The 72 myotomy patients included 11 with type I (no contractions), 56 with type II (pan-esophageal pressurizations), and 5 with type III (high-amplitude distal spasm). Failure was found in 1 patient with manometric type I and radiologic stage III esophageal dilation, 1 patient with manometric type II and radiologic stage II esophageal dilation, and none with manometric type III. All of the type I patients had at least some degree of esophageal dilation on radiography, whereas no dilation was found in the type III group. Treatment failure was not observed in any of the patients under 50 years old (n = 35) nor in any patients with stage I esophageal dilation. Only one of the 25 patients with long-term follow-up reported dissatisfaction with the treatment result; this patient had type II achalasia on HRM and esophageal dilation was stage I.

CONCLUSIONS: Overall, laparoscopic extended Heller myotomy is a highly successful treatment for patients with achalasia, and outcomes do not appear to vary significantly according to HRM subtypes. Stage I esophageal dilation and age below 50 may be better indicators of consistent symptom relief after surgical therapy for this disease.

Mo1599

Anti-Reflux Surgery Before Lung Transplantation Is Associated with Decreased Early Rejection Compared to Surgery After Transplantation

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BACKGROUND: Anti-reflux surgery (ARS) has been associated with improved long term outcomes following lung transplantation. Pre-transplant ARS has been shown in small studies to improve pulmonary function among transplant candidates with evidence of reflux. The optimal timing of ARS in transplant recipients, whether before or after transplantation, has not been assessed previously.

AIM: To evaluate the time to early acute rejection between lung transplantation patients undergoing ARS before versus after transplantation.

METHODS: This was a retrospective cohort study of lung transplant recipients undergoing ARS before or after transplantation at a tertiary care center since 2007, with follow-up time of at least one year. Early acute rejection was defined clinically and histologically as allograft rejection occurring within the first year after transplantation. Both cumulative incidence and time-to-event analysis using the Cox proportional hazards model were applied to assess the relationship between timing of surgery and rejection. Subjects not meeting this outcome were censored at one year in the time-to-event analysis. Fisher's exact test for binary variables and student's t-test for continuous variables were performed to assess for differences between surgical timing groups.

RESULTS: 40 subjects (62% men, mean age: 54, average follow-up: 3.1 years) met inclusion criteria for the study. Patient demographics, pre-transplant cardiopulmonary function, BMI, CMV status, and PPI exposure were similar between pre- and post- transplant ARS groups. Pre-transplant ARS was associated with a significantly lower rate of early acute rejection within the first year post-transplant compared to post-transplant ARS (0% versus 39%, p = 0.03). Time-to-event analysis showed similar decrease in risk of acute rejection by pre-transplant ARS compared to post-transplant ARS (log-rank p = 0.04). ARS was overall tolerated well in both groups, with no complications noted in the pre-transplant group. One subject in the post-transplant group died two weeks post-ARS from aspiration pneumonia. A second required surgical conversion after one month due to regurgitation symptoms.

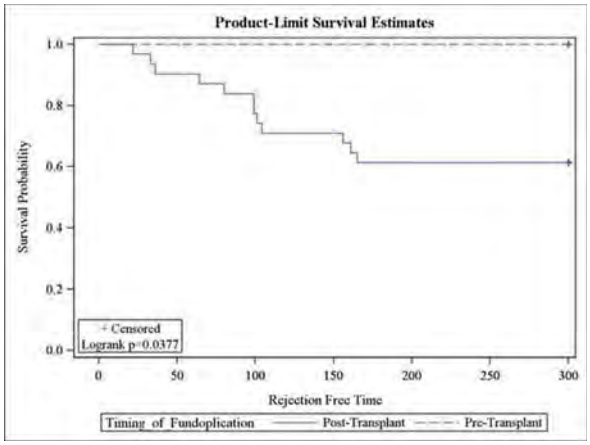

Figure: Kaplan-Meier analysis of time to early rejection by timing of fundoplication. Post-transplant surgical fundoplication was associated with early rejection.

CONCLUSION: Pre-lung transplant ARS decreased the risk of early acute rejection following lung transplantation compared to post-transplant ARS. Exposure to reflux, even in the early post-transplant period, may have significant impact on allograft injury, inflammation, and survival. ARS was overall safe among our cohort of lung transplant patients. Additional prospective studies should be performed to further identify the optimal candidates and timing for ARS in the lung transplant population. Pre-lung transplant ARS may be considered in suitable lung transplant candidates with objective signs of reflux on pre-transplant assessment.

Mo1600

Mesh Cruroplasty in Laparoscopic Repair of Paraesophageal Hernias Is Not Associated with Better Long-Term Outcomes Compared to Primary Repair

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BACKGROUND: Due to high rates of radiographic recurrence, mesh cruroplasty has been advocated as a necessary component of the laparoscopic repair of large paraesophageal hernias(PEH). Recently, however, ~50% recurrence rates were reported for both groups in long-term follow-up from a randomized trial and the question of whether radiographic recurrence is clinically important was posed. In our

center, mesh is used selectively when a tension-free primary closure cannot be achieved. We aimed to determine whether selective use of mesh cruroplasty is associated with differences in recurrence and quality of life outcomes.

METHODS: We performed nonemergent PEH repair with fundoplication in 795 patients (n = 106 with mesh). Multivariable logistic regression identified factors associated with mesh cruroplasty. Radiographic follow-up at least 3 months postoperatively (n = 556) and symptom outcomes (n = 688) were compared between mesh and no mesh groups as were radiographic recurrence (n = 101; defined as at least 10%[or 2 cm] of proximal stomach above the hiatus), and reoperation rates (n = 30). Impact of recurrence on quality of life was evaluated.

RESULTS: A completely intrathoracic stomach, male sex, age 75 or greater and a history of connective tissue disorder were independently associated with mesh cruroplasty. Radiographic recurrence was identified in 22% of mesh patients (n = 15) and 17% of non-mesh patients (n = 86;p = 0.32) at a median 27 months (IQR 14 to 53 mo). Time to radiographic assessment for recurrence (p = 0.40) and symptoms (median 25 months [IQR 12 to 49 mo]; p = 0.92) was similar between groups. Reoperation rates were higher in the mesh cohort (9% vs 3%; p = 0.01). Good to excellent quality of life was reported by 88% in both groups (p = 0.98). Comparing pre- and post-operative symptoms, the proportion with heartburn, regurgitation, epigastric pain, and PPI use decreased significantly in both groups while postoperative dysphagia in the mesh group (p = 0.14) and bloating in the non-mesh group (p = 0.32), were unchanged. Patients with radiographic recurrence were more likely to be dissatisfied with surgical outcome compared to those without recurrence (13% vs 4%; p = 0.007) despite similar scores in the physical (p = 0.51) and mental components (p = 0.29) of the SF-36 and GERD-HRQoL (p = 0.20).

CONCLUSIONS: Our data support selective use of mesh for laparoscopic repair of large PEH based on similar radiographic recurrence rates and symptom outcomes between groups. Reflecting the greater complexity of patients in whom we find mesh is needed, reoperations were more common in the mesh cohort. Quality of life was good-to-excellent in both groups, with symptom resolution in the majority of patients. Radiographic recurrence was associated with dissatisfaction with surgical outcomes, emphasizing the need to continue efforts to optimize the laparoscopic approach to large PEH repair.

Mo1601

Long-Term Symptomatic Outcomes After Laparoscopic Heller Myotomy for Achalasia

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INTRODUCTION: Despite the proven short-term effectiveness of laparoscopic Heller myotomy (LHM) for the treatment of achalasia, over time a significant portion of patients develop recurrent symptoms and/or iatrogenic gastroesophageal reflux (GER). In this study we examined symptomatic outcomes from a LHM series and sought to determine preoperative patient characteristics and perioperative events that were predictive of poor long-term results.

METHODS: Patients undergoing LHM for treatment of achalasia were enrolled in a prospective outcomes database beginning in 2004. Diagnosis was confirmed with high-resolution manometry (HRM). Preoperative patient characteristics and perioperative outcomes were recorded prospectively. To determine current symptoms, we attempted to contact all patients via telephone. The Eckardt symptom score and GerdQ surveys were then administered to assess for recurrent achalasia symptoms and iatrogenic GER respectively. Associations between pre and perioperative variables and current symptom scores were tested using a bivariate Pearson's correlation.

RESULTS: From April, 2004 to August, 2012, 117 patients underwent LHM and were enrolled in the database. Of these patients, 67 (57%) were successfully contacted to obtain current symptom scores and were included in the subsequent analysis. At the time of LHM, patients had a mean age of 55 ± 16, symptom duration of 4 ± 5 years, and 43% had prior endoscopic treatment for achalasia. Operative time was 123 ± 21 min and EBL was 90 ± 55 ml. Length of stay 1.1 ± 0.4 days. No mortalities or major complications occurred and 10% of patients had a minor (Grade I) complication. The follow-up interval from LHM to current symptom surveys was 4.2 ± 2.1 years. Current Eckardt scores were decreased from preoperatively (pre 7.6 ± 2.6 vs. current 1.9 ± 1.8, scale 0–12, $p < .001$) and 85% of patients had treatment successes (i.e., Eckardt <4). Currently, 27% of patients had symptoms of GER (i.e., GerdQ score >7) and 45% were taking daily anti-reflux medications. Patients with chest pain preoperatively had higher current Eckardt scores (ie. worse outcomes) ($r = .41$, $p < .001$). Operative EBL and periop complications were also positively associated with current Eckardt score ($r = .29$ and .27, both $p < .05$). Patients with higher current Eckardt scores were more likely to have symptomatic GER ($r = .33$, $p = .01$), an association that remained significant when the chest pain component of the Eckardt score was subtracted from the total.

CONCLUSIONS: In this series, LHM was performed safely with an average hospital stay of one day. At a mean of four years after surgery, 85% of patients had relief of achalasia symptoms, but 27% had symptoms of iatrogenic GER. Higher operative blood loss was associated with worse long-term outcomes. Interestingly, patients with more severe achalasia symptoms, were also more likely to have symptomatic GER.

Mo1602

Locally Advanced Esophageal Carcinoma Without Neoadjuvant Therapy: Is It Still Worth to Operate? A Single Institutional Experience

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OBJECTIVE: To evaluate the impact of upfront surgery without neoadjuvant pre-treatment on survival in patients with clinically staged locally advanced esophageal canrcinoma. There is still controversy about whether neoadjuvant chemo or radio-chemotherapy should be the standard management in patients with locally advanced esophageal carcinoma. Furthermore, many gastroenterologists and oncologists believe that surgery should be avoided in locally advanced esophageal cancer due to high mortality and morbidity rates related to the procedure and the particularly low benefit for the patient.

MATERIAL AND METHODS: A retrospective analysis of prospectively collected data of patients with clinically advanced esophageal cancer (cT3) and without neo-adjuvant treatment who underwent thoraco-abdominal esophagectomy in curative intent. Locally advanced esophageal cancer was defined based on pre-surgical computertomography, endoscopy and endosonography findings as a tumor infiltrating the paraesophageal tissue or the adjacent structures, with or without lymph node affection.

RESULTS: Histological subtypes included 131 squamous-cell carcinomas (SCC) and 81 adenocarcinomas (AC). Complete resection (R0) was achieved in 84.0% of all 212 patients. Thirty-day mortality rate was 7.1%. Final pathology revealed 50 patients (23.5%) with pT1 or pT2 carcinomas which were preoperatively overstaged. Median overall survival following TAE for SCC was 13.7 months (95% CI; 10.1–17.2 months) and 24.8 months (95% CI; 14.5–35.1 months) for AC, respectively (p = 0.007). The 5-year survival rates were 14% for SCC and 26% for AC, respectively. In median, 27 lymph nodes were resected. On multivariate analyses, histological type, tumor localization, a lymph node yield higher than 18 resected nodes, tumor grading and resection status remained independent factors influencing overall survival.

CONCLUSION: Our results in the treatment of patients with locally advanced esophageal carcinoma undergoing primary TAE are comparable to the results reported for patients undergoing neoadjuvant chemo-radio-therapy followed by surgery (median 10 to 14 months; 5-YOS of 19–23%). Histological subtypes show different survival rates and should therefore be separately examined in future trials.

Mo1603

The Effect of Oral Sucralfate on the Postprandial Proximal Gastric Acid Pocket

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BACKGROUND: An unbuffered layer of acidity that escapes neutralization by food has been demonstrated in volunteers and gastroesophageal reflux disease patients, corresponding to the postprandial proximal gastric acid pocket (PPGAP). It is elusive if this layer of acidity is best conceptualized as a "film" or as a "pocket." Previous studies showed that an alginate-antacid formulation, that forms a raft above the gastric contents, eliminates or displaces the PPGAP. However, there are no studies on the effect of mucosal coating drugs. This study aims to analyze the effect of oral sucralfate on PPGAP in GERD patients.

METHODS: Preliminary results in 10 patients (age 45 [43.5–60], 7 females) were studied. All patients underwent upper endoscopy to analyze the presence of hiatal hernia, esophagitis or Barrett's esophagus. Patients underwent a high-resolution manometry for localization of the lower border of the lower esophageal sphincter (LBLES). A station pull-through pH monitoring was performed from 5 cm below the LBLES to the LBLES in increments of 1 cm in a fasting state and 10 min after a standardized fatty meal and also 10 min after oral administration of 2 g sucralfate. Postprandial proximal gastric acid pocket was defined by the presence of acid reading (pH < 4) in a segment of the proximal stomach between non-acid segments distally (food) and proximally (LBLES). The PPGAP extent and position were compared before and after sucralfate. Standard 24h pH monitoring was performed for objective characterization of GERD. The protocol was approved by local ethics committee.

RESULTS: After sucralfate, PPGAP disappeared in 1 (12%) patient. PPGAP extent increased in 5 (62%) and diminished in 2 (25%) patients. Two patients (25%) had intraesphincteric PPGAP before sucralfate: in 1 of them (12%) the PPGAP moved down LBLES and in the other it disappeared. In 6 (75%) individuals PPGAG remained below the LBLES in both measurements. After meal, PPGAP was not found in two patients and these were excluded from the analysis.

CONCLUSIONS: Our results showed that: (1) sucralfate did not show a neutralization effect on the PPGAP, supporting the theory of acid pocket, not acid film, and (2) sucralfate is not an adequate treatment for the PPGAP.

Mo1604

Modified Nissen Fundoplication: Operative Technique and Its Impact on Immediate Postoperative Complications

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OBJECTIVE: The pathophysiology and treatment of gastroesophageal reflux disease has undergone significant changes over the last decade. The aim of this study was to describe a modified Nissen fundoplication technique and review the outcomes of a large single-surgeon experience.

METHODS: Retrospective review of patients who underwent modified Nissen fundoplication from 2008 to 2013 by a single surgeon, and comparison of immediate postoperative results (up to 3 months) with those obtained from a comprehensive review of the literature. Patients were evaluated at 1 week, 1 month, and 3 months postoperative.

RESULTS: 568 patients (300 men; mean age of 45 [range: 13–76] years) underwent modified Nissen fundoplication (Figure). The median operative time including intraoperative endoscopy was 75 (range: 45–130) minutes. Median length of hospital stay was 2 (range: 2–4) days. No intraoperative complications occurred. Compared to the results obtained from a comprehensive literature review, patients who underwent modified Nissen fundoplication had significantly less bloating (P < 0.001), persistent postoperative reflux (P = 0.01), heartburn (P = 0.005), dysphagia (P < 0.001), and wrap migration (P < 0.001) (Table). No significant differences were seen in wrap rotation (P = 0.55) or short-term redo fundoplications. Patients who underwent fundoplication with a 60 Fr Savary-Gilliard dilator had significantly less dysphagia compared to patients in whom a 58 Fr dilator was used (4.7% vs. 1%, P = 0.018).

Essential Operative Steps
1. Full dissection of the phrenoesophageal membrane.
2. Obtain a minimum of 4-5cm of intra-abdominal esophagus.
3. Full transection of the short gastric vessels.
4. Crural closure and fundoplication over a 60Fr boogie.
5. Intraoperative endoscopy to assess the configuration of the new fundoplication.
6. Bilateral fixation of the fundoplication to the crura to prevent migration, rotation, and herniation.

	Current Study (n = 568)	Literature Review (n = 562)	P-Value
Bloating (%)	1.2	9.1	<0.001
Persistent Reflux (%)	0.5	2.3	0.01
Heartburn (%)	1.4	0	0.005
Dysphagia (%)	1.6	16.9	<0.001
Wrap migration (%)	0.2	3.6	<0.001
Wrap rotation (%)	0.2	0.4	0.55
Redo Fundoplication (%)	0.7	0	NS

NS: non-significant.

CONCLUSION: Modified laparoscopic Nissen fundoplication with intraoperative endoscopy is associated with very low morbidity, and compared to results obtained from a current literature review, it results in significantly less immediate postoperative complications.

Mo1605

Racial Disparities in the Characteristics of Surgically Treated Achalasia Patients

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INTRODUCTION: Achalasia is one the most common esophageal motility disorders and Heller myotomy is the gold standard of surgical treatment. To date, there has been no description of racial disparities in the presentation, treatment, and outcomes of patients with achalasia undergoing surgical treatment.

METHODS: Patients undergoing a laparoscopic Heller myotomy with or without Dor fundoplication at a single center between the years of 2002–2013 were identified using CPT codes. All surgeries were performed by the same surgeon. A retrospective chart review to abstract data from the electronic medical record was performed. Achalasia classification was based on barium swallow radiographic findings. The independent variable of interest was race categorized as African-American versus Caucasian/others. Univarate and bivariate frequencies were used to examine differences by race along with Chi-square tests for categorical variables and Wilcoxon rank sums for continuous variables. All analyses were performed using SAS version 9.4.

RESULTS: The patient population consisted of 287 patients undergoing laparoscopic Heller myotomy for achalasia with African-Americans composing 28% (n = 82) of the population. Race was classified as "other" in the medical record of 7.6% (n = 22) of the patients and these were included with the Caucasian population in the analysis phase. The African-American patients were more likely to be female (63.4% vs 44.9% P = 0.01), younger (median age 41 vs 50 years, P = < 0.001) and report regurgitation as a preoperative symptom (80.5% vs 60.3% P = < 0.001) when compared to Caucasian/Others. African-Americans were more likely to be classified as having Type 1 achalasia (81.4% versus 65.5% P = 0.03) and to have undergone a previous Heller myotomy (15.9% vs 7.8% P = 0.04) at the time of presentation. No significant difference was observed when comparing a history of previous esophageal dilatations, overall achalasia recurrence rates, or median time to recurrence between races (see Table).

CONCLUSIONS: In this single center study, racial disparities exist among achalasia patients with African-Americans being predominantly classified as having Type 1 disease and more likely to present with failure after Heller myotomy despite presenting at a younger age. However, rates of achalasia recurrence were not significantly different between the two races. Long-term follow-up is needed to assess if racial differences in treatment outcomes are present and independent of other known predictors of failure.

	Overall		African-American		Caucasian/others		P-Value
	N	%	N	%	N	%	
	287	100%	82	28.6%	205	71.4%	
Gender							
Male	143	49.8%	30	36.6%	113	55.1%	0.01
Female	144	50.2%	52	63.4%	92	44.9%	
Median Age (years)	48	IQR (37–65)	41	IQR (34–53)	50	IQR (38–66)	0.001
Preoperative characteristics							
Dysphagia	246	86%	59	72%	187	91.7%	< 0.001
Regurgitation	189	66.1%	66	80.5%	123	60.3%	0.001
Weight loss	158	55.2%	47	57.3%	111	54.4%	0.66
Achalasia classification							
Type 1	173	70%	57	81.4%	116	65.5%	0.03
Type 2	60	24.3%	12	17.1%	48	27.1%	
Type 3	14	5.7%	1	1.4%	13	7.3%	
Previous Heller myotomy	29	10.1%	13	15.9%	16	7.8%	0.04
Previous esophageal dilatation	97	33.9%	26	31.7%	71	34.8%	0.62
Postoperative outcomes							
Achalasia recurrence	37	13.9%	13	16.9%	24	12.7%	0.37
Median time to recurrence (months)	6	IQR (2.5–11.0)	6	IQR (2.3–6.8)	7.4	IQR (3.3–28.0)	0.22

Mo1606

How We Learned Peroral Endoscopic Myotomy (POEM): The Observe-Train-Perform-Strategy

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BACKGROUND: Peroral endoscopic myotomy (POEM) is a promising new technique for treatment of achalasia through the endoscopic route. Previous publications from different centers reported excellent short-term results (control of dysphagia, low reflux rates, control of chest pain). However, POEM is a rather complex procedure, with several technically demanding steps. Therefore a certain strategy seems necessary, prior to establishing the procedure in clinical practice. We herein evaluate our observe-train-perform-(OTG)-strategy which lead to successful implementation of POEM at our center.

PATIENTS AND METHODS: The OTG-strategy encompassed: 1) Observing live POEM procedures (n = 18) at the pioneer center (Showa University/ Yokohama/ Japan) and watching video presentations about complications and pitfalls; 2) Training POEM in the live porcine model (n = 11); 3) Performing POEM in human achalasia patients, with (n = 5) and without (n = 12) expert assistance. The experiences from the animal training were analysed based on objective criteria (procedure time, number of clips used, complications, completeness of myotomy etc.) and subjective judgement on learn progress, using a specially designed scoring system. After sacrificing the animals, the esophagogastric specimens were dissected and checked for completeness of the myotomy. The results obtained in humans were analysed with differential assessment of outcome in procedures with and without expert guidance.

RESULTS: Altogether 18 POEM procedures with different degrees of difficulty (n = 16 non-sigmoid, n = 2 sigmoid) were observed. Due to rarity of complications in the observed expert series, complication management could only be learned "in theory" and from watching sample videos. The 11 procedures performed in the live porcine model were found well-suited to train all steps of the POEM technique. The mean operating time was 107 (78–140) min, length of the submucosal tunnel median 15 (12–17) cm, length of the myotomy 13 (10–15) cm. Results of the subjective as well as the objective evaluation depicted a step-wise improvement of technical skills and an efficient pass through of the learning curve. Judgment on completeness of myotomy (not achieved in three animals) was improved with increasing experience. There was no difference with respect of weight of the animals (90 kg vs. 50 kg) with smaller animals being equally suited. The influence of expert guidance was depicted by a shorter OR time (p = 0.033), a trend to a lower number of clips used for mucosal closure (p = 0.45) and a lower rate of minor complications (p = 0.98).

CONCLUSIONS: The OTG strategy was useful for implementation in clinical practice, with good results in the initial series of patients. Training POEM in the porcine model seems to be the best currently available method for training, prior to establishing the procedure in human achalasia patients.

Mo1607

Transhiatal Versus Three-Hole Esophagectomy: Does Technique Change Survival?

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BACKGROUND: Surgical treatment for esophageal cancer remains one of the fundamental treatments. Multiple surgical approaches have been described for esophagectomy and can be grouped under two categories: either transhiatal or transthoracic. Controversy exists whether more extensive resection provides better surgical outcomes. This study aims to describe the experience at a non-university tertiary care center (NUTCC) and to evaluate outcomes comparing Transhiatal vs. Three-Hole esophagectomy (Modified McKeown).

METHODS: A retrospective chart analysis of 123 patients from 2006 to 2012 comparing Transhiatal vs. Three-Hole esophagectomy (open and minimally invasive surgery) was performed. Operative time, estimated blood loss (EBL), lymph node (LN) harvest, margin status, ICU stay, respiratory failure, anastomotic leak, and survival analysis were compared. Statistical analysis was performed using 2 sample t test, Wilcoxon-Mann-Whitney test, and Fisher exact test.

RESULTS: Analysis for both Laparoscopic and Open approaches for Three-Hole vs. Transhiatal esophagectomies. (See Table)

Table: Analysis for Both Laparoscopic and Open Approaches for Three-Hole vs. Transhiatal Esophagectomies

	Transhiatal N = 73	3-Hole N = 50	P-Value
Operative time (hrs)	2.83	4.35	<0.0001
EBL (mls)	300 (75–3000)	300 (100–700)	0.63
LN Harvest	12 (0–34)	8 (1–26)	0.0004
LN positive	0	0	0.1688
Margin status positive	15 (20.5%)	7 (14%)	0.33
ICU stay (days)	3 (1-33)	3 (1–49)	0.46
Anastomotic leak	3 (4.1%)	0	0.27
Respiratory failure	11 (15.07%)	4 (8%)	0.24

Log-rank test comparing the two groups showed a significant difference in increased survival for the Transhiatal group (p = 0.04).

CONCLUSION: This analysis of comparing Transhiatal with Three- Hole esophagectomy demonstrated a significant difference in operative time and LN harvest. Moreover, there was a significant increase in survival in the Transhiatal group favoring outcomes based on surgical approach. The question remains does increased nodal harvest translate to increased survival in the Transhiatal group.

Mo1608

Minimmaly Invasive Esophagectomy — Lymph Nodes Removal and Complications — A Retrospective Study

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BACKGROUND: Esophageal cancer (EC) has one of the highest malignant potentials of any type of tumor. Recent studies have shown that Minimally Invasive Esophagectomy (MIE) reduces blood loss, respiratory complications, the total morbidity rate and hospitalization duration. Current recommendations suggest that at least 15 lymph nodes should be examined after esophagectomy. The number of lymph nodes examined during surgical resection therefore considerably affects staging accuracy. Because of that, staging is clearly an important prognostic factor for patients.

Despite aggressive treatment, locoregional recurrence figures are around 25–30%.

Although data suggest that operative mortality is not significantly different between open and MIE, from our knowledge, patient survival has not been studied.

The aim of this study is to evaluate the total number of resected lymph nodes after MIE and classic approach, as well as their complications.

METHOD: From 2004 to 2012, 40 patients went through Ivor Lewis esophagectomy, including 7 of whom under went thoracoscopic and laparoscopic approach, 12 patients under went thoracotomy and laparoscopic approach, and 21 patients under went thoracotomy and laparotomy approach. In any case, laparoscopic and open approach, abdominal lymphadenectomy used was D2 dissection. Whereas in the thorax, conventional two-field dissection was performed.

RESULTS: There were no differences between the TNM between different groups.

When we compare the number of lymph nodes removed at the abdomen by laparoscopy (mean: 16.95 Metastatic Lymph Node Ratio [MLNR]: 0.16) compared to laparotomy (mean: 17.4 MLNR: 0.30) no statistically significant differences were observed (p = 0.87).

When analyzing the thoracic lymph nodes removed by thoracoscopy (mean: 10.29 MLNR: 0,05) versus thoracotomy (mean: 15.36 MLNR: 0.31) less dissection of metastasic lymph nodes and total lymph nodes were observed, although this differences were not statistically significant (p = 0.754).

Table 1: Resected Abdominal Lymph Node Depending on Their Location and Technique

Laparoscopy	Laparoscopy	N	Mean	Standard Deviation	Standard Error	p
Right Paracardial	YES	19	2.47	2.568	0.589	0.270
Right Paracardial	NO	21	2.29	3.690	0.805	
Left Paracardial	YES	19	2.47	2.756	0.632	0.027
Left Paracardial	NO	21	1.24	2.827	0.617	
Lesser Curvature	YES	19	5.68	7.227	1.658	0.652
Lesser Curvature	NO	21	3.95	3.775	0.824	
Left Gastric Artery	YES	19	1.95	1.840	0.422	0.751
Left Gastric Artery	NO	21	3.52	3.572	0.780	
Celiac Trunk	YES	19	1.95	1.840	0.422	0.751
Celiac Trunk	NO	21	2.43	2.580	0.563	
Hepatic artery	YES	19	2.28	2.081	0.490	0.885
Hepatic artery	NO	21	2.29	2.283	0.498	
Greater Curvature	YES	19	0.26	0.806	0.185	0.534
Greater Curvature	NO	21	0.19	0.873	0.190	
Retroportal vein	YES	19	0.0	0,0	0,0	0.048
Retroportal vein	NO	21	0.33	0.796	0.174	

Table 2: Resected Thoracic Lymph Node Depending on Their Location and Technique

Thoracoscopy	Thoracoscopy	N	Mean	Standard Deviation	Standard Error	p
Recurrent chain	YES	7	0.43	1.134	0.429	0.651
Recurrent chain	NO	33	0.91	2.156	0.375	
Paratracheal	YES	7	0.57	1.134	0.429	0.463
Paratracheal	NO	33	1.27	2.125	0.37	
Subcarinal	YES	7	5.29	4.499	1.700	0.463
Subcarinal	NO	33	2.36	2.356	0.410	
Para Aortic	YES	7	0	0	0	0.553
Para Aortic	NO	33	0.45	1.543	0.269	
Paraesophageal	YES	7	3.86	3.716	1.405	0.095
Paraesophageal	NO	33	10.15	17.532	3.052	
Diaphragm	YES	7	0.14	0.378	0.143	0.972
Diaphragm	NO	33	0.18	0.528	0.092	

Based on Clavien scale, decrease in complications type III and IV were seen when minimally invasive approach was accomplished. However, these differences were not statistically significant ($p > 0.05$).

The reported hospital stay average were reduced when both, laparoscopic and thoracoscopic approach was the elected procedure, but this reduction was not seen when only one of the endoscopic procedure was elected. ($p > 0.05$).

DISCUSSION: The MIE has shown a decrease in postoperative complications, as has been shown in the literature. Since a decrease in the number of lymph nodes removed by MIE has not been demonstrated, minimally invasive surgery may be approach of choice. However, more studies comparing long-term survival in these patients are needed.

Mo1609

Treatment and Survival Disparities of Locoregional Gastroesophageal Cancer in Whites, Blacks and Asian Americans: A SEER-Database Analysis

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BACKGROUND: Cancers that arise from the lower esophagus, esophagogastric junction and gastric cardia, so-called gastroesophageal cancers (GEC), predominantly adenocarcinomas, have trended up rapidly in incidence since the mid-1970s. Despite advances in multimodal therapies for GEC, the overall survival remains poor. African Americans have known worse outcome of GEC, however the reasons are still elusive. Studies on the outcome of GEC in the Asian Americans are sparse.

METHODS: In this study, we examined the racial differences in receipt of surgery and survival of locoregional GEC among whites, blacks and Asian-Americans, using the latest Surveillance Epidemiology and End Results database. Subjects diagnosed with a primary GEC between 1998 and 2010 were extracted along with their demographics, tumor- and therapy-related variables. Multivariate logistic regression, Kaplan-Meier and Cox proportional hazards regression analyses were performed to identify the factors influencing the receipt of surgery and cancer-specific survival using STATA.

RESULTS: 12,543 patients, diagnosed with primary GEC, consisting of 11,043 whites, 830 blacks and 526 Asian Americans were included. The Asian-Americans had a similar surgical rate as the whites, while the black patients had lower surgical rate than whites (59% vs. 80%; OR = 0.53; $p < 0.001$), after controlling for all potential covariates. Specifically, blacks had 39% lower rate of local tumor excision, 32% less partial esophagectomy or gastrectomy, and 62% less total esophagectomy/gastrectomy compared to whites ($p < 0.05$). Additionally, blacks were 2-fold more likely to refuse recommended surgery, and to have unknown or undocumented reasons for not receiving recommended surgery than whites ($p < 0.001$). The median survivals were 19, 33 and 35 months for blacks, whites and Asian-Americans, respectively. Being black was associated with a HR of 1.41 for cancer-specific mortality of GEC compared to white ($p < 0.001$). After controlling for patient and tumor characteristics, the HR for black versus white was 1.20 ($p < 0.001$); further adjustment for surgery reduced the difference in hazards to a statistically insignificant value (HR = 1.11, $p = 0.06$). Surgery reduced HR of cancers at the midesophagus and lower more pronouncedly than at the cardia for blacks versus whites. In contrast, there was no difference in the survival of GEC between Asian-Americans and whites.

CONCLUSIONS: Blacks had markedly lower rate of surgical intervention and worse survival of locoregional GEC than whites and Asian-Americans. The black-white survival differences were more profound for cancers of the mid- or lower -esophagus than that of the cardia. Surgery diminished the survival disadvantages in blacks. More efforts are needed to promote patient education, surgeon-patient communication and close follow-up for black patients to improve their survival of GEC.

Clinical: Hepatic

Mo1610

Defining Perioperative Risk After Hepatectomy Based on Diagnosis and Resection Extent

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INTRODUCTION: Hepatectomy outcomes are incompletely and inaccurately represented in the current literature, which have not compared outcomes stratified by both extent of resection and diagnosis. We hypothesized that operative risk can be better assessed by stratifying diagnoses into low and high risk categories and extent of resection into major and minor resection categories for more accurate identification of patient outcomes following hepatectomy.

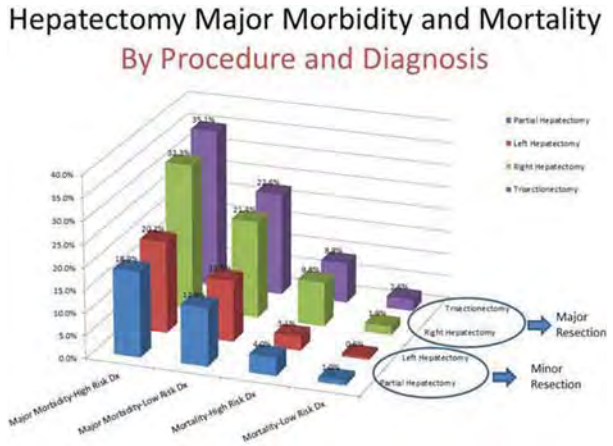
METHODS: ACS-NSQIP was reviewed for thirty-day operative mortality and major morbidity after Partial Hepatectomy (PH), Left Hepatectomy (LH), Right Hepatectomy (RH), and Trisectionectomy (TS). Mortality was reviewed per diagnosis and "High Risk" was defined as the diagnoses associated with the greatest mortality. Univariate analysis of operative outcomes by resection extent was performed to define "Major" and "Minor" resections. Chi-square, t-tests and multivariable logistic regression were utilized to compare outcomes across groups.

RESULTS: Within 7,895 patients the highest mortality was observed in Hepatocellular carcinoma (5.2%) and cholangiocarcinoma (8.4%), either intra- or extrahepatic, which were classified as "High Risk." Metastatic disease, benign neoplasms, and gallbladder cancer, experienced mortality of 1.4%, 0.5%, and 1.2%, respectively, and were classified as "Low Risk."

PH and LH were statistically similar with respect to operative mortality and major morbidity within respective diagnosis risk groups (Low Risk: PH vs. LH and High Risk: PH vs. LL; all $p > 0.31$) and were defined as "Minor Resections". Similarly RH and TS had similar rates of operative mortality and major morbidity within respective diagnosis risk groups (Low Risk: RH vs. TS and High Risk: RH vs. TS; all $p > 0.43$) and were defined as "Major Resections."

Risks of major morbidity and mortality increased across all diagnosis and the extent of resection groups. Of Minor Resections, High Risk diagnoses had 5 times the mortality and 1.6 times the major morbidity as Low Risk diagnoses. Of Major Resections, High Risk diagnoses had 4 times the mortality and 1.6 times the major morbidity as Low Risk diagnoses. Of Low Risk diagnoses, Major Resections had 2.9 times the mortality and 1.7 times the major morbidity as Minor Resections. Of High Risk diagnoses, Major Resections had 2.3 times the mortality and 1.7 times the major morbidity as Minor Resections. (All $p < 0.01$).

Within both Major and Minor Resections, High Risk diagnosis was an independent risk factor for Mortality (ORs = 3.1–3.2) and Major Morbidity (ORs = 1.4–1.5).



Outcome	Procedure	Diagnosis	
		Low Risk (Mets, Benign, GB Ca)	High Risk (HCC, ICC)
Mortality	Minor (PH, LH)	0.8%	4.0%
	Major (RH, TS)	7.3%	9.1%
Major Morbidity	Minor (PH, LH)	11.9%	19.2%
	Major (RH, TS)	20.2%	32.7%

Figure: Major Morbidityand Mortality Stratified by Diagnosis Risk Group and by Major and Minor Hepatectomy.

CONCLUSION: Risk of hepatectomy can be better assessed when stratified by both risk of diagnosis and extent of resection, allowing for a more accurate assessment of patient outcomes. These results have significant implications for pre-operative planning, informed consent, resource utilization, and comparisons between centers.

Mo1611

Hepatectomy for Non-Colorectal or Non-Neuroendocrine Liver Metastases

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BACKGROUND: Although surgical treatment for liver metastases from colorectal and neuroendocrine has been well established, the role of hepatectomy for liver metastases from other primary tumors, so-called non-colorectal or non-endocrine liver metastases (NCNELM) has not been well evaluated.

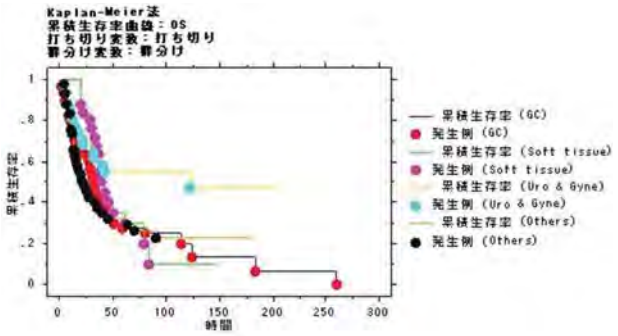
OBJECTIVE: To examine postoperative outcome and prognostic factors in patients undergoing hepatectomy with NCNELM and establish appropriate patients selection.

METHODS: One hundred and sixty one patients who underwent liver resection for NCNELM between January 1990 and December 2009 at a single institution were reviewed retrospectively. Patient demographics, primary disease, tumor characteristics, treatment, and postoperative course were analyzed.

RESULTS: Patient age ranged from 17–81 years, with a median age of 58. There were 64 women (40%) and 97 men (60%). Liver metastases were synchronous in 43 of 161 (27%).

Hepatectomy was performed for liver metastases from gastric carcinoma (n = 59; 36.6%), genitourinary tumors (n = 32; 19.9%), and soft tissue primary tumors (n = 28; 17.4%). There are four patients from breast cancer and two patients from melanoma.

Overall 5-year and 10-year survival rates were 36% and 27%, respectively. The average follow-up period was 47.4 months (2–260 months). Five-year survival in patients with liver metastases from gastric carcinoma, genitourinary tumors, soft tissue tumors, and others were 25%, 55%, 30%, and 29%, respectively. Genitourinary tumors had a best survival with a significant difference. (p = 0.05) Five-year survival for synchronous and metachronous liver metastases was 36% and 34%, respectively. There was no significant difference between both of them. There were 19 patients who underwent repeat hepatectomies in this study. Most of the patient (n = 8) were liver metastases from soft tissue tumors of gastrointestinal tract. There is a patient who underwent 4 times hepatectomies for liver metastasis from gastro-intestinal stromal tumor of stomach (alive at 118 months from the primary tumor surgery).



CONCLUSIONS: NCNELM could be resected safely and with accepted survival outcomes in the selected patients. Hepatectomy for genitourinary tumors metastases might be beneficial among the patients with NCNELM. It is important to consider biological behavior of the primary disease and to confirm neither rapid tumor growth nor increase in tumor numbers within a short time interval in appropriate patient selection.

Mo1612

Morbidity and Mortality of Hepatectomy for Benign Liver Tumors

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OBJECTIVES: Liver resection remains the primary treatment for patients with hepatic metastases. Some patients with benign liver tumors undergo hepatectomy, due to tumor related subjective symptoms or concern for malignant transformation. Recent studies continue to emphasize the risk of hepatectomy even with modern operative techniques. This analysis aims to compare the morbidity and mortality of hepatic resection between patients with benign liver tumors and those with metastatic disease.

STUDY DESIGN: All patients who underwent partial or anatomic hepatectomy for benign liver tumors and hepatic metastases reported to the National Surgical Quality Improvement Program (NSQIP) between 2005 and 2011 were included in this retrospective cohort study. Pre-operative patient characteristics, intra-operative morbidity, and postoperative morbidity and mortality were compared between the two groups.

RESULTS: A total of 5,542 patients underwent hepatectomy during the study period: 1,164 (21%) for benign and 4,378 (79%) for metastatic disease. Patients with benign liver tumors were younger and predominantly female ($p < 0.001$). In addition, patients with benign liver tumors had lower ASA class and were less likely to have pre-operative comorbidities such as smoking, diabetes, cardiovascular, pulmonary, and hematologic diseases (all $p < 0.037$). 3,420 (62%) patients underwent partial hepatectomy, while 1,657 (30%) and 465 (8%) required anatomic lobectomy or trisectionectomy, respectively. Intra- and post-operative complications, including transfusion requirement, pneumonia, myocardial infarction, deep venous thrombosis, and sepsis were more common in patients with hepatic metastases (all $p < 0.049$). However, rates of other major complications including surgical site infections, pulmonary embolism, renal failure, stroke, coma, cardiac arrest, return to operating room, and ventilator dependence did not differ between the two groups (all $p \geq 0.05$). 30-day mortality was 1% among patients with benign liver tumors and 3.2% among patients with hepatic metastases ($p = 0.128$).

CONCLUSIONS: Peri-operative mortality for patients with benign liver tumors is 1%. Despite patients with benign disease being younger and healthier, the risk of many major complications is similar between patients undergoing hepatectomy for benign and malignant disease. These findings reinforce avoiding hepatectomy in patients with benign disease in the absence of a clear indication for resection. A careful and balanced risk and benefit discussion should precede hepatic resection in these patients.

Mo1614

Pylephlebitis: Single Institutional Retrospective Review Identifies Gaps in Traditional Approach to Diagnosis and Treatment

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INTRODUCTION: Pylephlebitis, a suppurative infection of the portovenous system, has traditionally been thought to be a rare (largest case series reported has fewer than 40 patients), but highly mortal (20% or greater in most studies). The diagnosis is non-specific but inferred from the combination of acute portovenous thrombosis and an inflammatory abdominal process. Literature review identified diverticulitis as the most typical inciting event and Bacteroides sp. being the most prevalent organism. We aimed to identify the characteristics of patients with symptoms consistent with the diagnosis of pylephlebitis in our institution.

METHODS: Review of patients at our institution who developed portovenous thrombosis within 30 days of an associated intra-abdominal inflammatory process from 2002 to 2012. Patients were excluded if they were less than 18 years old, or had a histories of primary/secondary hepatobiliary malignancies, splenectomy, transjugular intrahepatic portosystemic shunt (TIPS), hepatic transplant, and chronic portovenous thrombosis. Data is presented as percentages or means ± standard deviation, as appropriate.

RESULTS: There were 93 patients identified (60% men) with a mean age of 57 ± 16 years. The most common associated inflammatory processes were pancreatitis (32%), diverticulitis (18%) and peritonitis (14%). 28 patients underwent recent abdominal exploration (30%) a mean of 29 ± 38 days prior to diagnosis. The most commonly involved structures included the right (30%), and main portal veins (30%). Blood cultures were done for 74 patients (80%) and were positive in 33 (45%); the most common cultured organism was *E. coli* (26%) followed by *Strep Viridans* (24%). 83 patients received antibiotics (89%), 74 received anticoagulant treatment (80%), and 67 received both (72%). Thrombectomy via surgical or endovascular methods was not performed in any patient. 38 patients (41%) developed complications including; chronic thrombosis (36%) bowel ischemia (4%) and hepatic abscess (2%). The mortality rate was 9%; most (50%) died of multiple organ failure. The following table shows the differences between our results and the literature review over the past 4 decades.

Table: Differences Between Our Results and the Literature

Criteria	Our Study	Literature
Number of cases	93	100
Time frame	2002–2012	1971–2009
Age range/mean	24 y–88 y/ 57y	20 d–77 y/ 42y
Most common causes	Pancreatitis (32%) Diverticulitis (18%)	Diverticulitis (30%) Appendicitis (19%)
Most common microorganism	*E. coli* (26%)	*Bacteroides sp.* (27%)
Antibiotic use	89%	100%
Anticoagulant use	80%	35%
Combined antibiotic and anticoagulant	72%	35%
Bowel ischemia	4%	10%
Mortality	9%	19%

CONCLUSION: Pylephlebitis is an underdiagnosed complication of intra- abdominal inflammatory conditions with seemingly improving mortality over time. Our findings do not corroborate the reported literature; rather, a new patient population has been recognized. Additionally, by identifying *E. coli* as the most common organism, antibiotics should be tailored towards the hospital's antibiogram for this organism. Further study with therapy directed practice guideline should be studied prospectively.

Clinical: Pancreas

Mo1616

Quantifying the Burden of Perioperative Complications Following Total Pancreatectomy Using the Postoperative Morbidity Index: A Multi-Institutional Perspective

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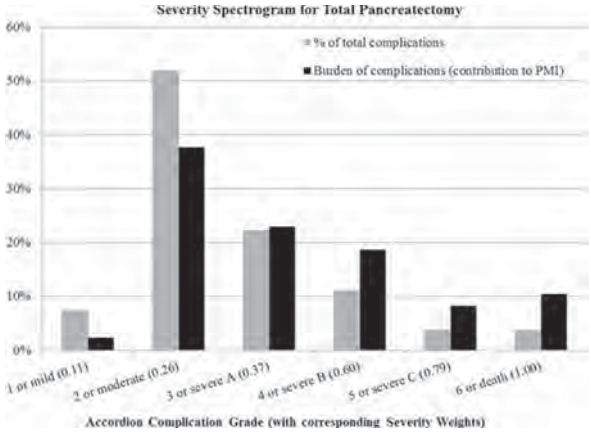
BACKGROUND: Historically, total pancreatectomy (TP) has been regarded as particularly morbid. While contemporary studies indicate decreasing complication rates following TP, none have quantitatively evaluated the impact of its complications. The Postoperative Morbidity Index (PMI)—a validated measure of complication burden—combines data accrued using ACS-NSQIP criteria with severity weighting derived from the Modified Accordion Grading System. We aimed to establish the perioperative morbidity burden for TP using PMI in a multi-institutional cohort.

METHODS: Nine institutions contributed data for 64 TPs from 2005–2011. Each NSQIP complication was assigned an Accordion grade with an associated severity weight ranging from 0.110 (grade 1/mild) to 1.00 (grade 6/death). PMI equals the sum of severity weights for all highest-grade complications (Total Burden) divided by total number of patients. It can range along the utility scale from 0 (no complication in any patient) to 1.00 (all patients died of complications). Prior work has established the PMIs of proximal and distal pancreatectomy as 0.115 and 0.087. A severity profile spectrogram was generated to depict the relationship between frequency and burden of complications at each severity grade. Correlates to PMI were determined by regression analysis.

RESULTS: Median age was 65 yrs (range: 23–85); the most common indication was pancreatic adenocarcinoma (37.5%). Overall, 29 patients (45.3%) suffered a total of 55 NSQIP complications; 15 (23.4%) had >1 complication. Median length of stay was 10 days. Thirteen patients (20.3%) were readmitted and one death (1.6%) occurred within 30 days. Non-risk adjusted PMI for TP was 0.151, while average burden for the 29 complication-bearing cases rose to 0.333. The most common highest-grade complications were bleeding/transfusion (17.2%) and sepsis (12.5%). Accordion grade 2 complications predominated in frequency (51.9%). Severity spectrogram analysis illustrated discordance between frequency and burden of complications (Figure). Notably, grades 4–6 comprised only 18.5% of complications but contributed 37.1% to the series' Total Burden. Of the 22 standardized NSQIP complications, Organ Space SSI provided a quarter of the Total Burden. On univariate analysis, advanced age ($p = 0.002$), low preoperative sodium level ($p = 0.03$), postoperative bile leak ($p = 0.04$), and length of stay ($p < 0.001$) correlated with PMI.



CONCLUSION: This first multi-institutional series on TP for all indications quantifies the complication burden following TP using the rigor of ACS-NSQIP. A PMI of 0.151 indicates that, collectively, patients undergoing TP have an average burden of complications in the mild severity range (= 0.110), underscoring a steadily improving morbidity profile following TP. However, those patients who do develop complications have a substantial reduction in health utility.

Mo1617

Population-Based Trends of Pancreatico-duodenectomy: Temporal and Age-Related Outcomes

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INTRODUCTION: Pancreaticoduodenectomy (PD) remains a technically challenging procedure with significant morbidity and mortality. Medical and technological advancements have lead to an ageing patient-population and advanced disease associated with increasing technical challenges and taxing postoperative management. We report outcomes of PD across three major states over a 6-year period.

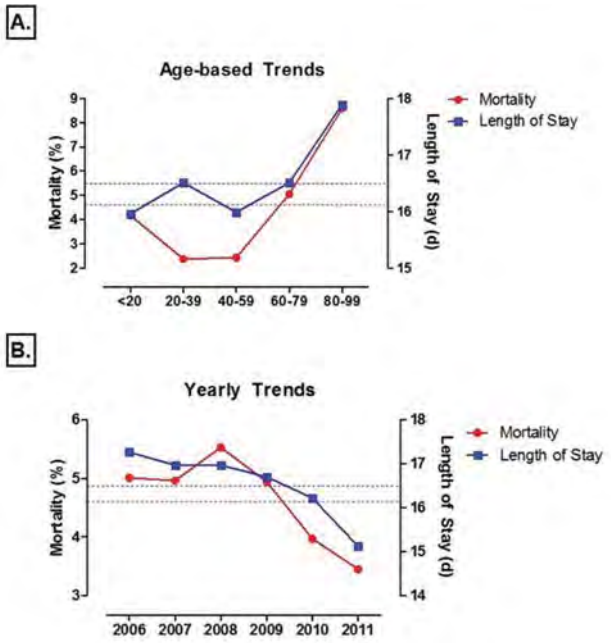
METHODS: Using the State Inpatient Databases (SID), Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, we retrospectively reviewed the outcomes of all PDs performed from 2006 to 2011 in the states of California, Florida, and New York. Patient variables of interest included gender, age distribution, admission and disposition stratification, and payer distribution. Primary end-points included mortality and length of stay (LOS).

RESULTS: A total of 12,270 PDs were performed in this time period; approximate percent of PDs performed by year were 15% in 2006, 15% in 2007, 16% in 2008, 17% in 2009, 18% in 2010, and 19% in 2011. The majority of patients were male (51.5%), between the ages of 60 and 79 (59.01%), admitted from home (59.97%), received Medicare (49.49%) and discharged home (47.98%) postoperatively (Table 1). The most common indication for PD was a malignant neoplasm of the head of pancreas (46.76%) followed by malignant neoplasm of the Ampulla of Vater (10.54%). Approximately 31.37% of patients required transfusion of packed red blood cells and 16.14% of patients required parenteral nutrition perioperatively. The frequency of percutaneous drainage of an abdominal collection was 7.82%. Approximately 4.82% of patients required continuous invasive mechanical ventilation for ≥96 hours. The proportion of gastroparesis and glucose dysregulation were 2.49% and 1.87%, respectively. Mortality rates and LOS increased with increasing age (Figure 1A). Patients aged 40–59 years had a mortality rate and LOS of 2.44% and 15.99 days, respectively, compared to patients aged ≥80 years who had rates of 8.58% and 17.89 days, respectively. Mortality peaked in 2008 to 5.53%; however, have subsequently decreased over the last three years (3.45% in 2011; Figure 1B). LOS has steadily decreased over the last 5 years, with the lowest LOS in 2011 at 15.12 days (Figure 1B).

CONCLUSION: Mortality rates and LOS continue to improve following pancreaticoduodenectomy despite an increasingly ageing patient population. Mortality rates and LOS remain lowest for younger patients. The SID has important limitations; therefore, further analyses are necessary to identify the full impact of these findings.

Table 1: Population-based Statistics

	Pancreaticoduodenectomy N=12,155
Gender Distribution:	
Male	51.52%
Female	48.48%
Age distribution:	
<20	0.58%
20-39	3.08%
40-59	27.44%
60-79	59.01%
≥80	9.88%
Payer distribution:	
Medicare	49.49%
Medicaid	6.36%
Private	37.82%
Self-pay	2.04%
Other	1.87%
Income distribution:	
Q1	20.14%
Q2	22.68%
Q3	26.21%
Q4	30.97%
Postoperative disposition:	
Home	47.98%
Skilled nursing facility	12.71%
Home with services	34.14%
Other	0.50%
Died (Mortality)	4.60%
Length of Stay (mean), d	
Overall	16.49
Age <20	15.96
Age 20-39	16.51
Age 40-59	15.99
Age 60-79	16.51
Age 80-99	17.89
Mortality	
Overall	4.60%
Age <20	4.17%
Age 20-39	2.38%
Age 40-59	2.44%
Age 60-79	5.05%
Age 80-99	8.58%



The left y-axis represents the mortality rates, the right y-axis represents the mean length of stay, and the x-axis corresponds to the year or age. The dashed lines represent the overall means.

Mo1618

High Performing Whipple Patients: Factors Associated with Short Length of Stay After Open Pancreaticoduodenectomy

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INTRODUCTION: In this cost-conscious era of health care reform, much attention has been focused on minimizing length of hospital stay (LOS) and readmission rates after surgical procedures. Despite the decreasing morbidity and mortality of pancreaticoduodenectomy (PD), it continues to be associated with prolonged LOS. As preliminary data of minimally invasive PD emerges, we sought to determine the average LOS after open PD at a high-volume tertiary care hospital in an attempt to set a standard to which minimally invasive PD can be compared. We also determined the factors that could predict "high performance" after PD.

METHODS: The demographic, perioperative, and readmission data of 634 consecutive patients who underwent open PD between January 2007 and December 2012 at a single institution were reviewed. "High performers" were defined as patients with a LOS ≤5 days.

RESULTS: The median LOS was 7 days (interquartile range 6–10 days). A total of 61 patients (9.6%) had a LOS ≤5 days and were deemed "high performing". Postoperative delayed gastric emptying, ICU admission, and discharge to a rehabilitation facility each perfectly predicted LOS >5 days. In multivariate logistic regression analysis, neoadjuvant therapy (26.2 vs. 15.9%, OR 3.31, p = 0.003), epidural success (92.9 vs. 85.1%, OR 3.73, p = 0.030), epidural duration ≤3 days (40.4 vs. 19.5%, OR 2.90, p = 0.002), surgery on Thursday or Friday (59.3 vs. 46.1%, OR 3.10, p = 0.001), and discharge on Monday through Wednesday (80.3 vs. 50.7%, OR 6.54, p < 0.001) were independently associated with LOS ≤5 days. Age ≤70 years, male gender, Charlson comorbidity index < 5, and high surgeon volume were predictive of "high performance" on univariate analysis, but were not significant in the multivariate model. When comparing "high performing" patients to those with LOS >5 days, readmission rate (16.4% vs. 22.2%, p = 0.298) and time to readmission (5.5 vs. 12 days, p = 0.661) were not different. Body mass index, diabetes, prior abdominal surgery, prior ERCP, vessel resection, and tumor pathology also did not correlate with LOS.

CONCLUSION: In our contemporary experience of patients undergoing pancreaticoduodenectomy, median LOS after open PD was 7 days, with a 9.6% rate of "high performers". LOS ≤5 days was associated with neoadjuvant therapy, epidural success, and undergoing surgery at the end of the week. "High performing" patients experienced no difference in readmission rates as a result of their early discharges. Minimally invasive PD should be compared to this high standard for LOS, among other quality metrics, to justify its increased cost and operative duration.

Mo1619

A 30-Years Celebration of First Description of Central Pancreatectomy (The Dagradi-Serio-Iacono Operation): Historical Outline and Surgical Outcome

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BACKGROUND AND AIMS: Central Pancreatectomy (CP) is a parenchyma-sparing surgical procedure. The aims of this report are to celebrate a 30-year of CP, clarify the history and the development of CP and to evaluate the short- and long-term surgical results of CP from all published studies.

METHODS: A worldwide historical research was performed. Furthermore, all studies published between 1988 and 2010 were systematically reviewed. Comparisons between CP and DP were pooled and analysed by standard meta-analytical techniques using the random or fixed effects model as appropriate.

RESULTS: Since 1907, several surgeons applied in the evolution of this technique, the pioneers in the demolitive part (Ehrhardt, Finney, Honjyo) and in the 50s in the reconstructive part (Guillemin and Bessott and Letton and Wilson), only Dagradi and Serio in 1984 published the complete surgical intervention including the resective and reconstructive aspects. Subsequently, Iacono has validated it with functional endocrine and exocrine tests and popularised it worldwide. In 2003, Baca and Bokan performed laparoscopic CP and, in 2004, Giulianotti et al. performed a robotic assisted CP.

Ninety-four studies, which involved 963 cases of CP, were identified. The postoperative morbidity rate was 45.3%; pancreatic fistula (PF) occurred in 40.9% of cases. Endocrine and exocrine pancreatic insufficiency were reported in 5.0% and 9.8% of patients, respectively. The overall mortality rate was 0.8%. Compared with DP, CP had a higher postoperative morbidity and a higher incidence of PF. The relative risk (RR) of postoperative endocrine insufficiency was 0.22 (95% confidence interval 0.14–0.35), which revealed a statistically significant benefit of CP ($P < 0.001$). The RR of exocrine failure was 0.59 (0.32–1.07). However, this result was not significant ($P = 0.082$) because of the large degree of heterogeneity among studies.

CONCLUSIONS: 30 years after the first description, CP is performed worldwide either by open surgery or by using minimally invasive or robotic approaches. CP seems to be a safe surgical procedure with good long-term functional reserve, although CP is associated with a slightly higher risk of PF than DP. The CP should be considered, with specific indications, not as an alternative to DP, but rather as a standard surgical procedure.

Mo1620

Acute Necrotizing Pancreatitis: What Happens After the Thunderstorm?

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INTRODUCTION: Several researches have studied the long-term outcomes after recovery from acute pancreatitis, assessing whether there is damage in pancreatic function and morphology, associated with impairment in patients' quality of life (QoL). But yet the results are contradictory, with prevalences varying from 10 to 80% in literature. Moreover, there are few studies evaluating exclusively necrotizing pancreatitis cases. Objectives: The aims of this study are to evaluate exocrine and endocrine pancreatic function, pancreatic morphology and patients' QoL after a single episode of acute necrotizing pancreatitis.

METHODS: Fourty-nine consecutive patients with acute necrotizing pancreatitis were identified, attended in our hospital from 2003 to 2012. Survivors (thirty-eight) were contacted to participate the study; thus, sixteen patients were included in the research. Pancreatic exocrine function was studied by qualitative fecal fat excretion. Endocrine function was evaluated by oral glucose tolerance test, C-Peptide and mathematical index HOMA-beta (Homeostasis Model Assessment-beta). Pancreatic morphology was examined by contrast-enhanced abdominal computed tomography. QoL was measured by 36-item Short-Form Health Survey questionnaire (SF-36). Tests were performed at least twelve months after the acute injury (average interval from diagnosis and the study was 2.9 years).

RESULTS: The prevalence of pancreatic exocrine insufficiency was low (6.2%). Endocrine dysfunction was observed in half the cases, and no association with extension of necrosis was found ($p > 0.999$). Morphological changes were common (62.5%) and more prevalent in those who experienced extensive necrosis, considered greater than 30% ($p = 0.011$). Computed tomography findings were: glandular atrophy, dilatation of Wirsung's duct, pancreatic calcifications, pseudocysts and peripancreatic fat densification. Compared to general Brazilian population, QoL was considered good (preserved in seven of the eight domains assessed), whereas its impairment was found exclusively in mental health domain, particularly in patients who had alcoholic acute pancreatitis ($p = 0.028$). There was no correlation between QoL and prognostic indicators, such as APACHE II, C - reactive protein and extension of necrosis.

CONCLUSIONS: All possible therapeutic measures for the treatment of acute necrotizing pancreatitis are justified, despite high costs and prolonged hospital stay, since patients exhibit good pancreatic exocrine function and QoL in long-term outcomes. Medical follow-up of these patients should be stimulated, given that late endocrine dysfunction and morphological abnormalities are frequent and may require specific therapy.

Mo1621

Socioeconomic Status and Surgical Outcomes After Regional Pancreatectomy

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BACKGROUND: The comparison of socioeconomic status (SES) and surgical outcomes has not received adequate attention in the peer-review literature. Patients with lower SES are presumed to suffer from higher rates of postoperative morbidity. The aim of this study was to determine whether or not the SES of a patient, established by their Median Household Income (MHI) at the time of surgery, correlates with increased morbidity following regional pancreatectomy.

METHODS: A restrospective review of 1212 cases of pancreaticoduodenectomy and distal pancreatectomy was conducted at a single, high-volume institution between 2007 and 2013. Annual MHI was derived from patient ZIP codes as determined by U.S. Census data; patient groups were divided into higher and lower SES by their location above and below the median MHI of the entire sample ($46,934). All cases were monitored with complete 30-day outcomes through the American College of Surgeons-National Surgical Quality Improvement Program (NSQIP). Two-way statistical analyses were performed between the patient categories, and SES was separately analyzed by surgery type.

RESULTS: The higher SES group (n = 607) as compared to the lower SES group (n = 605) had a significantly higher MHI. The lower SES group had significantly greater length of stay (LOS) as well as higher rates of Body Mass Index (BMI), current smoker status, and chronic obstructive pulmonary disease. There were no significant differences noted in intraoperative variables, 30-day morbidity or mortality.

CONCLUSION: Lower SES does not appear to impart a greater risk of 30-day morbidity or mortality to patients undergoing regional pancreatectomy. This may suggest that lower SES is not a reliable criterion when assessing surgical risk for this patient population. Further study of this topic is warranted with prospective collection of household income and insurance coverage.

Patient Category	n	Age (yrs)	LOS	Mean MHI ($/Year)	30-Day Mortality	30-Day Morbidity	30-Day Total Complication Rate	30-Day Readmit
High SES (≥$46934)	607	60	10	59,305*	2.14%	21%	34%	9%
Low SES (<$46934)	605	61	11+	39182	3.64%	21%	35%	8%

*p < 0.001 ^p < 0.01 +p < 0.05

Mo1623

Oxygen Saturation Predicts Pancreatic Leak Following Pancreatectomy: A Feasibility Study on Direct Data Transfer from the Electronic Health Record for Clinical Outcomes Research

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BACKGROUND: As medical centers have adopted the electronic health record (EHR), automated data collection is possible and may offer the ability to analyze clinical data that has not been previously practical. A database was created via direct data transfer (DDT) from the EHR to examine the ability of perioperative vital signs, laboratory values and operative details to predict pancreatic leak following pancreatectomy.

METHODS: Patients undergoing pancreatic resection from April 2008–June 2010 were identified by CPT code in a single center's EHR. Demographics, vital signs, laboratory values and operative details were collected in automated fashion via DDT. The primary endpoint, pancreatic leak, was defined as drain amylase greater than three times the upper limit of normal serum amylase. The mean of vital signs taken during the first 24 hours following surgery was calculated for analysis. Independent risk factors influencing pancreatic leak were determined by multivariable logistic regression analysis.

RESULTS: 140 patients were identified who underwent distal pancreatectomy (31%) or pancreaticoduodenectomy (69%). The majority were for cancer (84%). The overall pancreatic leak rate was 25%. After controlling for age, mean perioperative blood pressure, blood loss, operative time, pre-operative albumin and malignancy, only oxygen saturation was found to be a significant risk factor for pancreatic leak with an odds ratio of 1.53 (CI: 1.08–2.21) for every percentage point decrease in oxygen saturation (p = 0.02).

CONCLUSIONS: Automated data collection directly from the EHR is feasible and provides an opportunity to assess clinical data in ways not previously practical. Perioperative mean oxygen saturation is predictive of pancreatic leak following pancreatic resection.

Mo1624

Robotic Pancreaticoduodenectomy: Comparison of Complications and Cost to the Open Approach

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INTRODUCTION: Robotic pancreaticoduodenectomy (RP) has shown some advantages over open pancreaticoduodenectomy (OP) but no data has been published providing a cost comparison. We hypothesized that RP would initially be more expensive but patients would have decreased complications and follow-up costs.

METHODS: This is a retrospective cohort study of all pancreaticoduodenectomies performed at a single quaternary cancer referral center from August 2012 to July 2013. Patient demographics, comorbidities, operative characteristics, complications, and charge data were recorded for OP and RP, and then compared using standard statistical methods. All conversions from RP to OP were analyzed with intention to treat. Statistical significance was set to $p \leq 0.05$.

RESULTS: There were 64 pancreaticoduodenectomies: 15 RP and 49 OP. There were two conversions in the RP group due to vein resection or repair. Patients undergoing OP were similar to RP: age (62.1 ± 12.9 vs. 64.4 ± 10.3), male (44.9% vs. 66.7%), BMI (26.7 ± 5.5 vs. 25.7 ± 4.1 kg/m^2), Charlson Comorbidity Index (2.9 ± 1.7 vs. 2.2 ± 1.4), ASA score III (65.3 vs. 60.0%) malignant etiology(81.6%vs80.0%), neoadjuvant chemotherapy (12.8% vs. 15.4%); all non-significant. Operative characteristics, patient outcomes, and charges are recorded in Table 1. OP and RP had similar rates of R0 resection, length of stay (LOS), readmission, total charges, and mortality, but OP had significantly more complications and ICU LOS ($p < 0.05$).

CONCLUSION: Patients undergoing RP have equivalent rates of R0 resection as OP, and benefit from decreased number of complications, surgical site infections, and LOS in the ICU. As expected, operative time and cost are significantly increased in RP. However, once cost of complications and follow-up are incorporated, total charge to the patient is not statistically significantly different.

Table 1. Pancreaticoduodenectomy Operative Characteristics, Outcomes, and Charges

	Open n =49 (%)	Robotic n = 15 (%)
Operative		
+Margin	36.8	25.0
Blood Loss (mL)	866.8±931.5	673.3±635.5
Time (minutes)*	**391.1±141.8**	**462.45.5±45.5**
Transfusion (units pRBC)	1.5±2.7	1.3±2.3
Outcomes		
Complications 30-days	67.4	46.7
Number of Complications*	**1.9**	**0.7**
Urinary Track Infection	12.2	13.3
Delayed Gastric Emptying	30.6	13.3
Surgical Site Infection*	**26.5**	**0**
Pancreatic Fistula	12.2	6.7
Bile Leak	4.1	0
Sepsis	14.3	6.7
Radiologic Guided Drain	18.4	6.7
Endoscopy	6.1	6.7
Re-operation	12.2	6.7
Clavien Classification	1.9±1.9	1.0±1.6
ICU Length of Stay*	**2.9±3.2**	**1.7±1.3**
Hospital Length of Stay	11.5±7.1	10.7±6.0
Readmission 30-days	29.8	20.0
Number follow-ups	4.1±3.3	3.5±2.2
Death 90-days	2 (4.1)	0
Charges		
Operative*	**$35,665.34** ±12,906.49	**$50,679.03** ±5,780.33
Hospital*	$164,120.22 ± 96,205.69	$172,619.60 ±40,828.79
Follow-up	$18,861.12 ±37,901.36	24,904.60 ±44,741.78
Total	**$182,552.68** ±100,770.67	**$197,524.20** ±69,017.90

*statistically significant p<0.05; pPRBC =packed red blood cells

Monday Poster Abstracts

Mo1625

Is Antacid Therapy After Pancreatoduodenectomy Necessary? Contemporary Global Practice of Pancreatic Surgeons

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BACKGROUND: Marginal ulcer is a well-described and morbid complication of pancreatoduodenectomy (PD). As increasing numbers of PD are performed for non-oncologic indications, this often-delayed complication may be more prevalent. Effective acid suppressing medication may mediate the risk of marginal ulceration after PD. However, few data exist regarding the true incidence of marginal ulcer after PD, and ulcer prophylaxis is not standardized. The aim of this study was to document the current practice of gastric antisecretory medication prescription after PD among experienced pancreatic surgeons.

METHODS: A four-question survey was distributed electronically to established pancreatic surgeons across the world. The questions asked: 1) How many years have you practiced pancreatic surgery; how many PD have you performed? 2) Do you currently prescribe antacid medication for post-op PD patients and if so for what duration? 3) Has your practice of post-PD antacid prescription changed over your career, if so why? 4) Have you ever treated a patient with a marginal ulcer after PD?

RESULTS: 145 of 200 (73%) surveys were returned, representing 11 countries and a collective experience of over 55,000 PD. Among respondents, the average number of years practicing pancreatic surgery was 15 (range: 2–40) and the average number of PD preformed was 425 (range: 23–2,000). Most pancreatic surgeons (86%) prescribe antacid medication after resection. The duration of antacid treatment was variable: 16% limited treatment to the immediate postoperative period (approximately 7 days), 38% prescribed antacids for 1–12 months, and 46% routinely prescribed antacids for life. The vast majority of pancreatic surgeons—119 (89%)—have encountered marginal ulcer after PD.

CONCLUSIONS: Prescribing antacid therapy after PD represents common practice among pancreatic surgeons worldwide. The duration of antacid treatment is variable; however, nearly half of surveyed pancreatic surgeons continued antacid treatment lifelong. The overwhelming majority of pancreatic surgeons have encountered marginal ulcer after PD.

Mo1627

A Service Based Mid Level Provider Utilizing Peri-Operative Pathways Can Reduce Length of Stay and Hospital Costs Related to Pancreaticoduodenectomy Patients

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INTRODUCTION: Healthcare costs are growing at an unsustainable rate making it imperative that physicians become leaders in cost reduction and quality improvement programs. After partnering with administration to hire a mid-level NP for our service, we implemented a comprehensive peri-operative pathway for patients undergoing pancreaticoduodenectomy (PD) with the goal of standardizing care to improve quality and reduce costs. Significant NP coding education was also provided to ensure accurate DRG assessment.

METHODS: After a service-specific nurse practitioner (NP) was hired, a standardized peri-operative program, including an evidence-based post-op critical pathway, was created and implemented. Data was collected for all PD patients from January 2011 through Q1 2013, including length of stay (LOS), morbidity and mortality, hospital costs, revenue, comorbidity capture and readmissions.

RESULTS: Initial formal NP education included pathway/post-op care familiarity, coding, and home health/discharge coordination for PD patients. 151 patients were identified from Q1 2010 through Q1 2013. Implementing the comprehensive program lead to a reduction in LOS from 15.29 to 8.91 days (mean, $p = 0.013$). There was a trend toward reduced average direct costs from $27,878 (2010) to $22,715 (2013) per case ($p = 0.271$). Coding improved from a no comorbidity/complication rate of 23% in 2010 to 0% in 2013. Unfortunately, this did not improve contribution (2010: $24,262/case; 2013: $14,896/case) due to changes in payer mix and reduced reimbursement. Quality was maintained throughout this period with a complication index less than one for each year. 30 day readmissions were reduced from over 30% in 2010 to 16.7% in 2013, likely related to implementation of a formal discharge instruction set and 48 hour post-discharge phone call.

CONCLUSION: A service-specific NP can foster a peri-operative critical pathway, reduce LOS and readmissions, improve hospital coding, and reduce direct hospital costs for PD patients. The addition of a mid level provider to an upper GI/HPB surgical oncology service is cost effective.

Mo1629

Does Length of Preoperative Admission Impact In-Hospital Morbidity and Mortality After Pancreatectomy? A Population-Based Study

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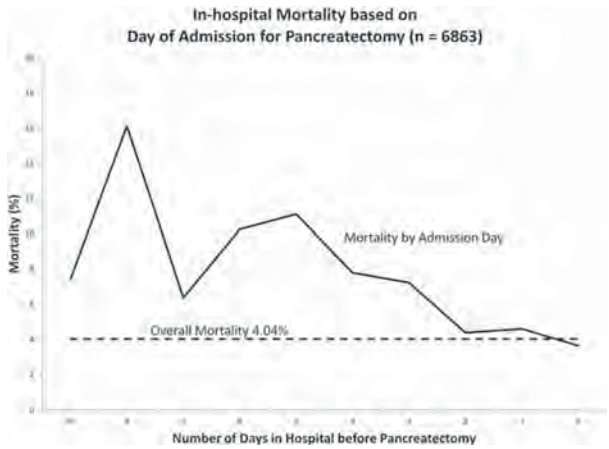
INTRODUCTION: Many patients with newly diagnosed pancreatic adenocarcinoma present with poor performance status. It is unclear if preoperative admission to improve performance status is truly beneficial. The aim of the current study is to determine if preoperative admission increases the in-hospital morbidity and mortality of pancreatectomy.

METHODS: This is a retrospective cohort study using the Nationwide Inpatient Sample from 1998–2010. We identified patients with a discharge diagnosis of pancreatic malignancy who underwent pancreatectomy. Patients with a secondary diagnosis of neuroendocrine tumor of the pancreas and acute or chronic pancreatitis were excluded. In-hospital morbidity and mortality were compared between patients admitted on the day of surgery with patients admitted before the day of surgery.

RESULTS: 6863 patients (median age 67, male 50.1%) were identified during the study period. 22.4% (n = 1537) of patients had three or more comorbidities. The majority of the procedures were performed in urban (96.4%), academic centers (80.7%). Median length of stay was 10 days (IQR 8–15). 16.4% (n = 1126) of patients were admitted prior to the day of surgery. Overall morbidity and mortality were 56.1% (n = 3851) and 4.0% (n = 277), respectively. Patients admitted on the day of surgery had lower morbidity than patients admitted prior to the day of surgery, 55.1% vs. 61.5%, respectively ($p < 0.001$). After adjusting for age and comorbidities, admission before the day of surgery was independently associated with significantly higher morbidity (OR 1.2; 95% CI 1.1–1.4). Similarly, patients admitted on the day of surgery had lower mortality than patients admitted prior to the day of surgery, 3.6% vs. 5.9%, respectively ($p < 0.001$). After adjusting for age and comorbidities, admission before day of surgery was independently associated with significantly higher mortality (OR 1.5; 95% CI 1.1–2.0). In addition, mortality increased with each additional preoperative day in the hospital (OR 1.1; 95% CI 1.1–1.2) (see Figure).



CONCLUSIONS: Preoperative admission significantly increases the morbidity and mortality associated with pancreatectomy in patients with pancreatic malignancy.

Mo1630

Institutional Influence on the Surgical Management of Peri-Ampullary Adenocarcinoma

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OBJECTIVES: To evaluate the institutional effect on the outcomes following pancreaticoduodenectomy (PD) for periampullary adenocarcinoma (PACa) performed by the same group of hepatobiliary/pancreatic surgeons in an academic county versus academic private setting.

DESIGN: Retrospective review.

SETTING: Academic county hospital (CH) versus academic private hospital (PH).

PATIENTS: All patients undergoing PD from 1/1/2010 to 4/30/2012 for periampullary adenocarcinoma.

MAIN OUTCOME MEASURES: Time to intervention, disease stage, completeness of resection, post-operative length of stay, complication rates, and overall survival.

RESULTS: Ninety-one patients underwent PD for PACa during the study period: 30 patients at the CH and 59 patients at the PH. No CH patients had private health insurance while only 5% of PH patients had state insurance. CH patients were significantly younger (57.3 versus 67.4 years old, $p < 0.01$) and more frequently Hispanic (66.7% versus 21.3%, $p < 0.01$) compared to PH patients. The mean time from surgical consultation to PD was longer for CH patients than for PH patients but did not achieve significance (35.5 days versus 22.6 days, $p = 0.09$). PH patients had more advanced disease, defined as AJCC Stage IIb, III, or IV, compared to CH patients (73.8% versus 50.0%, $p = 0.02$). Portal venous resection was performed in 26.2% of PH patients while no CH patients underwent portal venous or arterial resection/reconstruction. Though not achieving statistical significance, and R1 or M1 resection was more frequently performed at the PH compared to the CH (23% versus 6.7%, $p = 0.06$). The mean tumor diameter, number of lymph nodes obtained, number of positive lymph nodes, and incidence of perineural or perivascular invasion did not differ between the two groups. No post-operative mortality was observed within 30 days of surgery. Independent predictors of mortality included presence of positive lymph nodes (adjusted OR 1.22 (1.02, 1.46), $p = 0.034$) and increasing tumor size (adjusted OR 1.57 (1.07, 2.46), $p = 0.049$). Interestingly, after adjusting for differences between the groups, the odds of dying for patients admitted to County Hospital were 4.21 times higher, and trended towards significance (adjusted OR 4.21 (1.00, 17.79), $p = 0.051$).

CONCLUSIONS: The type of institution influences practice patterns in the management of peri-ampullary cancers. Private hospital patients have more advanced disease and undergo significantly more complicated resections with a higher incidence of residual disease compared to county hospital patients. Factors leading to differences in surgical practice pattern must be better understood to ensure optimal treatment for both well insured and poorly insured patient populations.

Clinical: Small Bowel

Mo1632

Laparoscopic-Assisted Resection of Metastatic Cutaneous Melanoma to the Small Intestine Is Safe and Effective

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INTRODUCTION: Melanoma metastasizes to the gastrointestinal (GI) tract in only 2–4% of patients, but about 50% of people who die of Stage IV melanoma have GI involvement. The median overall survival of patients with nonpulmonary visceral metastases is only 5–11 months. Multiple randomized prospective trials have shown laparoscopic resection for colon cancer is not inferior to open surgery in either survival or recurrence rates. We undertook a review of our experience with laparoscopic small bowel melanoma metastasectomy, with special attention to morbidity and oncologic outcomes.

METHODS: Patients who underwent laparoscopic-assisted resection of small bowel melanoma metastases at our institution from January 1, 2006 to September 30, 2013 were retrospectively reviewed. Collected data included patient and primary tumor characteristics, symptoms, hospital length of stay, post-operative morbidity, progression-free survival (PFS), and overall survival.

RESULTS: Twenty-five patients underwent laparoscopic-assisted resection of small bowel melanoma metastases. The median age was 52 years, median Breslow depth of primary melanomas was 2.38 mm, and 7 patients (28%) had regional nodal metastases at the time of diagnosis. The median time from diagnosis to development of small bowel metastasis was 48.4 months. Thirteen patients (52%) had one or more preoperative symptoms, the most common being GI bleeding (9 patients), abdominal pain (5 patients), and obstruction (3 patients). Most were diagnosed with small bowel metastases by PET scan (72%). Of the 25 patients, 6 (24%) underwent curative resection of all metastatic sites, while 19 (76%) underwent resection for palliation. Median overall survival in the curative group vs. the palliative group approached significance, and PFS was significantly longer in the curative group (median not yet reached, HR 3.786, $p = 0.026$). There was one mortality on day 18 after surgery in a patient with small bowel and brain metastases who underwent urgent surgery due to obstruction, developed Acinetobacter pneumonia, sepsis and a cerebellar infarct. One patient developed a wound infection, and one on warfarin had a GI bleed 2 weeks post-operatively, leading to resection of the 2 prior anastomoses. Median post-operative hospital stay was 5 days. Over a median follow-up of 14.9 months, no patient developed a trocar site melanoma recurrence. Of those who underwent resection with curative intent, 2 (33%) developed a small bowel recurrence, both also had additional sites of disease.

CONCLUSIONS: This series of laparoscopic-assisted small bowel resections for metastatic melanoma shows it to be safe, with minimal mortality and morbidity and short post-operative lengths of stay. Oncologic outcomes are acceptable, and curative surgery was associated with durable disease-free intervals, as seen in prior large series.

Mo1633

Endoscopy in the Immediate Postoperative Setting After Primary Gastrointestinal Anastomosis

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INTRODUCTION: Gastrointestinal anastomoses in the early postoperative period may require evaluation and treatment via flexible endoscopic techniques when complications arise. There is reticence, however, to perform endoscopy given the mechanical forces from torque and air insufflation. We aimed to identify the incidence of gastrointestinal anastomotic perforation resulting from endoscopy performed ≤6 weeks of anastomoses.

METHODS: Review of patients from 2002 to 2013 who underwent flexible endoscopy within six weeks of a gastrointestinal anastomosis. Exclusion criteria included intraoperative endoscopy, anastomotic perforation prior to endoscopy, and endoscopy remote from the anastomotic site. Data are presented as median (interquartile range; IQR) or percentages as appropriate.

RESULTS: There were 11,578 patients with gastrointestinal anastomoses performed during the study period of whom 24 (0.2%) underwent endoscopy in the postoperative period (age 69 years [IQR: 54–77], 54% men]). Of these patients, there were 33 anastomoses performed (12 small intestine, 8 colocolic, 5 ileocolic, 1 jejunocolic, 3 esophagogastric, 2 gastrojejunal, 1 gastrocolic, 1 bilioduodenal). Indications for the index operation included cancer treatment, small bowel obstruction, inflammatory bowel disease, mesenteric ischemia and bowel perforation. Median endoscopy was performed on postoperative day 19 (IQR: 8–34) with 15 patients (63%) undergoing colonoscopy and 9 (37%) upper endoscopy, (71%) of the endoscopies traversed the anastomosis site. Indications for endoscopy included bleeding (67%), obstruction (13%), pain (8%), cancer surveillance (4%), and concern for ischemia (4%). Four patients underwent therapeutic endoscopic procedures including coagulation (8%), balloon dilation (8%), and stent placement (4%). Mortality was 13%, none of whom were due to endoscopy. There were no anastomotic perforations as a result of endoscopy.

Figure: EGD post Ivor-Lewis.

CONCLUSION: Postoperative flexible endoscopy for management of anastomotic complications is performed infrequently. Despite the theoretical risk of adverse events of endoscopy, no endoscopic perforations occurred in recently created surgical anastomoses, which denotes the safety of the procedure.

Mo1634

Single-Port Laparoscopic Surgery for Inflammatory Bowel Disease: A Single Center Experience

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BACKGROUND: Single-incision laparoscopy (SIL) for colorectal surgery was first described in 2008. Since then, SIL has been reported for a variety of colorectal procedures, even though its role in inflammatory bowel disease (IBD) has not yet been determined. Aim of this study is to prospectively assess its safety and feasibility in a consecutive IBD series.

METHODS: All patients presenting for IBD surgery from November 2012 until November 2013 in elective or urgent setting, were considered for a SIL approach. Data were prospectively collected. SIL was performed using a single port placed either transumbilically or at the site marked for stoma formation. Standard, straight laparoscopic instruments were used. Surgery was performed by the same team experienced in both laparoscopy and IBD surgery.

RESULTS: Out of 110 consecutive IBD patients referred for surgery over a 12 months period, 32 (18 f) underwent SIL. 29 patients were affected by Crohn's disease (CD) (recurrent in 5 cases) and 3 by Ulcerative Colitis (UC). In 28/32 (87.5%) SIL was performed using the "glove-port" (surgical glove mounted on a plastic ring retractor) while in 4/32 (12.5%) a dedicated port device was adopted. 10 patients were submitted to primary ileocecal resection, 4 to total colectomy (1 with ileo-rectal anastomosis for CD; 3 "scarless" with end-ileostomy, entirely performed through the ileostomy site, for UC); 3 patients underwent conservative surgery (9 strictureplasties) for isolated small bowel disease; 15 patients underwent SIL for complicated resections, defined as resections for recurrent CD after previous open surgery, SIL after open surgery for other indication and SIL for multifocal disease. During the same operation, in 12/32 cases mutiple procedures were performed, including jejunal (3) and sigmoid (3) resections, strictureplasties (12), perianal sepsis drainage (3). Mean operative time was 170 minutes (73–282). No patient suffered intraoperative complication. Six patients were converted to open surgery (18.7%) due to large inflammatory masses (5) or massive adesions (1). Mean postoperative stay was 6 days (range: 4–21). After 7 months mean follow-up, three Class II and two Class III complications, according to Clavien-Dindo Classification were reported.

CONCLUSIONS: SIL is safe and feasible in IBD patients and can be adopted even in selected multifocal or recurrent CD patients. The use of the glove port and of standard surgical laparoscopic instrumentation does not increase costs and may facilitate the spread of this technique. Prospective comparative trials and longer follow-up are needed to prove advantages over traditional multiport laparoscopic surgery.

Mo1635

CT Scan Is Helpful for Internal Hernia Detection Following Weight Loss Surgery

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INTRODUCTION: Radiographic imaging with CT scan in patients presenting with acute abdominal pain following Roux-en-Y gastric bypass (RYGB) or biliopancreatic diversion with duodenal switch (BPD/DS) is becoming commonplace. While surgical exploration remains the gold standard for diagnosing internal hernia, decisions for operative intervention are often based on CT findings. The accuracy of CT scan to reliably identify internal hernia in this subset of patients remains unknown. The purpose of this study is to evaluate the reliability of CT scan as a diagnostic tool to identify internal hernia (IH) in bariatric patients with acute abdominal pain.

METHODS: Following institutional review board approval, a retrospective chart review of all patients presenting with symptoms concerning for obstruction following Roux-en-Y gastric bypass or BPD/DS switch was performed. Patients without CT scans were excluded. Fifty-two patients who underwent an operation for a suspected internal hernia from 2008–2013 were identified from surgeons' records at 2 institutions. CT and intraoperative findings were compared via univariate statistical analysis. Patients with incidental finding of a hernia defect were excluded.

Table 1: Patient Demographics, Type of Procedure, and Operative Findings

Patient Demographic	CT Scan		P-Value
	Positive (n=31)	Negative (n=21)	
Age (in years)	44.82	41.4	
Gender	17	30	
Female			
Male	0	5	0.1012
Time to operation (in years)	4.53	5.2	
B Type of Procedure			
PD-DS	2	0	
Roux-en-Y Bypass	15	35	0.1026
Operative Findings			
IH/SBO	21	6	
Adhesions/intussusception	10	15	0.0102

RESULTS: Of the 52 patients, 50 had previous RYGB and 2 BPD/DS. There was a higher number of female patients in this population (Table 1). Mean time to presentation was 5 years following initial bariatric procedure (5 months to 14 years). Of the 52 patients, 27 had IH at operation. Thirty one (60%) patients had CT scans read as positive for IH and/or obstruction. Of these 31, 21(68%) were found to have IH at operation and 10 (32%) underwent negative diagnostic laparoscopy. Of the 21 patients with negative CT scans, 6 (29%) had IH at operation versus 15 (71%) who were negative. The sensitivity of CT scan to identify IH and/or obstruction is 78% with 95% CI (57% to 91%), specificity is 60% with 95% CI (39%–78%), positive predictive value is 68% with 95% CI (49%–83%), and negative predictive value is 71% with 95% CI (48%–88%). Kappa statistics comparing the agreement between CT findings and operative findings was 0.380 with 95 CI 0.131–0.629, which was consistent with fair agreement.

CONCLUSIONS: This study examined the utilization of CT scans in detection of internal hernias. Positive CT scan is highly predictive of IH, but not specific. As CT scan will not detect IH in 1:4 patients, despite negative findings surgical exploration should remain the gold standard for patients with acute abdominal pain following RYGB or BPD when IH cannot be ruled out.

Mo1636

Outcomes of Patients with Biopsy-Proven Sclerosing Mesenteritis

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BACKGROUND: Sclerosing mesenteritis (SM) is a rare, non-specific condition characterized by a variable amount of chronic mesenteric fibrosis, usually but not always involving the root of the mesentery. It has a variable presentation, from incidental finding to acute abdomen. Its rarity has limited the ability to investigate demographic and clinical features of the disease. Thus, treatment decisions are largely guided by anecdotal experience and small case studies. Treatment options include surgical removal and/or medical therapy including corticosteroids, immunosuppressive agents, colchicine, tamoxigen, progesterone, and thalidomide. Each of these treatments has been used with varying success. This study attempts to characterize the demographics and treatment algorithms of patients diagnosed with SM at our institution, and describe the long term outcomes of these patients.

METHODS: 20 patients with biopsy-proven SM at a single institution were identified. Demographic and clinical characteristics were collected by review of the electronic medical record. Long-term follow-up was also characterized. Continuous variables were summarized using means and standard deviations, or median and interquartile ranges. Categorical variables were summarized using counts and percentages. Comparisons of ordinal variables between two groups were done using Wilcoxon's rank-sum test. All analyses were done using R software (Version 3.0.2, Vienna, Austria). A 5% level of significance was used for all testing.

RESULTS: 20 patients with biopsy-proven sclerosing mesenteritis from the single institution were identified and followed for a median of 16 months. The mean age at diagnosis was 60.2 years. Demographic information is summarized in Table 1. 14 patients underwent medical therapy and 6 underwent surgical therapy. One patient received both surgical and medical therapy. There was no difference in outcome when comparing patients who did and did not receive medical therapy (Table 2). However, 10 of 13 patients who received medical therapy had improvement or total cure. Similar results were observed for patients who did or did not receive surgical therapy (Table 3). Interestingly, five of six patients who had therapeutic surgery had a small bowel resection for obstructive symptoms. All patients who had surgical therapy had improvement in their symptoms or total cure (Table 3).

Factor	Total	N	Statistics
Diagnosis Age [a]	20	20	60.2 ± 15.16
Gender [b]	20		
Female	9	9	45
Male	11	11	55
Diagnosis Surgery [b]	20		
No	6	6	30
Yes	14	14	70
Diagnostic Surgery Type [b]	14		
Laparoscopy	5	5	35.71
Laparotomy	9	9	64.29
Medical Therapy [b]	19		
No	5	5	26.32
Yes	14	14	73.68
Surgical Therapy [b]	19		
No	13	13	68.42
Yes	6	6	31.58
Follow-up period [c]	19	19	16 [10, 78.5]
Result [b]	18		
Worse	2	2	11.11
Unchanged	2	2	11.11
Better	8	8	44.44
Cured	6	6	33.33

[a] Mean ± SD; [b] Percentage; [c] Median [P25, P75]

Table 2: Result by medical therapy

		No		Yes			
Factor	Total	N	Statistics	N	Statistics	Test Statistic	p-value
Result [a]	18					41.5	0.37[W]
Worse	2	1	20	1	7.6		
Unchanged	2	0	0	2	15.4		
Better	8	1	20	7	53.9		
Cured	6	3	60	3	23.1		

[a] Percentage
[W] Wilcoxon's rank-sum test with continuity correction

Table 3: Result by surgical therapy

		No		Yes			
Factor	Total	N	Statistics	N	Statistics	Test Statistic	p-value
Result [a]	18					21	0.15[W]
Worse	2	2	16.67	0	0		
Unchanged	2	2	16.67	0	0		
Better	8	5	41.67	3	50		
Cured	6	3	25	3	50		

[a] Percentage
[W] Wilcoxon's rank-sum test with continuity correction

CONCLUSION: Though limited by power, this study revealed a trend that medical therapy is effective treatment for biopsy-proven sclerosing mesenteritis. However, when clinical findings indicate therapeutic surgery in patients with sclerosing mesenteritis, results are overwhelmingly positive with 100 percent of patients achieving symptomatic improvement or total cure.

Clinical: Stomach

Mo1797

Laparoscopic Versus Open Surgical Management of Perforated Peptic Ulcer: A Comparison of Outcomes

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BACKGROUND: Laparoscopic management of perforated peptic ulcer (PPU) is a rapidly developing tool in the armamentarium of the acute care surgeon. As experience with laparoscopy in the emergency treatment of PPU grows, it is critical that outcomes are tracked and analyzed to aid surgeons in making evidence-based decisions with regards to management of their patients. The objective of this study was to investigate the outcomes of patients with perforated peptic ulcer treated laparoscopically as compared to those treated by open surgery.

METHODS: We performed a retrospective review of all patients managed surgically for perforated peptic ulcer at our institution between January 2005 and October 2012. Data abstracted included patient demographics, comorbidities, and operative details. Outcomes collected included short-term postoperative morbidity and mortality, reoperation, and length of stay (LOS). Patients admitted to the intensive care unit with a primary or secondary diagnosis of PPU were excluded from the analysis. The laparoscopic group included patients with conversion to open. Continuous variables were compared using the student t-test and categorical variables with the Chi-square test. Univariate analysis and multivariate logistic regression provided a comparison of the rates of complications between both groups.

Table 1: Complications in Laparoscopic vs. Open Surgery for PPU: Univariate Analysis

Complication	Open, n (%)	Laparoscopic, n (%)	P-Value
SSI	10 (14.4)	1 (2.7)	0.063
UTI	2 (2.9)	1 (2.7	0.972
Acute renal failure	3 (4.3)	0 (0)	0.204
Leak	8 (11.5)	4 (11.1)	0.941
Septic shock	15 (21.7)	6 (16.6)	0.537
Pneumonia	9 (13.0)	1 (2.7)	0.089
Reintubation	4 (5.8)	4 (11.1)	0.330
MI	5 (7.2)	1 (2.7)	0.349
PE	1 (1.4)	1 (2.7)	0.636
Early reoperation	5 (7.2)	4 (11.1)	0.502
Death	10 (14.4)	2 (5.5)	0.172
Overal complication	41 (59.4)	11 (30.5)	0.005

PPU, Perforated Peptic Ulcer; SSI, Surgical Site Infection; UTI, Urinary Tract Infection; MI, Myocardial Infartion; PE, Pulmonary Embolism *Number of patients with one or more of anastomotic leak, pneumonia, acute renal failure, myocardial infarction, thromboembolic event, septic shock, ileus, failure to wean >48 h, unplanned intubation, early reoperation, cardiac arrest and death.

Table 2: Predictors of Adverse Outcome: Multivariable Logistic Regression Analysis

Variable	Odds Ratio	95% CI	P-Value
Laparoscopic vs. open approach	0.27	0.08–0.93	0.037
Age	1.07	1.02–1.11	0.001
ASA 3*	1.21	0.10–14.6	0.881
ASA 4–5*	4.61	0.41–50.8	0.212
Boey score > 0	4.9	1.54–15.5	0.007

CI, Confidence Interval; ASA, American Society of Anesthiologists *Compared to ASA 1 and 2.

RESULTS: A total of 105 patients managed surgically for perforated peptic ulcer were included in our study. 36 patients (34.2%) were treated with initial laparoscopy, while 69 had conventional open surgery. While the laparoscopic group tended to be younger (mean age 54.2 vs. 61.8, p = 0.036), there were no significant differences with respect to gender (72.2% vs. 63.8% males, p = 0.383) or the presence of important comorbidities, history of previous operation, and use of steroids (p > 0.05). Of the 36 patients initiated laparoscopically, 7 (19.4%) were converted to the open approach. The overall complication rate was significantly lower in those treated with laparoscopic surgery (59.4% vs. 30.5%, p = 0.005), while our multivariable logistical regression, adjusting for important patient characteristics, confirms a significant reduction in the odds of adverse outcome (OR 0.27, 95% CI 0.08–0.93, p = 0.037). Median length of stay was shorter in those treated with laparoscopy (median of 5 vs. 9 days, p = 0.009).

CONCLUSIONS: Treatment of patients with perforated peptic ulcer by an initial laparoscopic approach appears to be safe, and was associated with a reduction in adverse outcomes as compared to conventional open management. In addition, it appears to result in a reduction in length stay. The laparoscopic approach may be considered a therapeutic tool in cases of suspected perforated ulcer. Further research is needed to understand predictors of successful laparoscopic completion.

Mo1798

Daikenchuto (DKT) Helps Improve Postoperative Functional Gastrointestinal Disorder After Total Gastrectomy in Patients with Gastric Cancer: A Multicenter, Randomized, Double-Blind, Placebo-Controlled Trial (JFMC42-1002)

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BACKGROUND AND AIM: Prolonged postoperative paralytic ileus and/or adhesive intestinal obstruction remain serious and inevitable consequences in certain number of cases after abdominal surgery. Intestinal ileus results in not only protracted hospital stay, but also deteriorates quality of life of the patients. Daikenchuto (DKT), a traditional herbal medicine (Kampo), has widely been used to improve abdominal symptoms by accelerating bowel motility. In this study, we examined the efficacy and safety of DKT for prevention of ileus and associated gastrointestinal symptoms after total gastrectomy by a double-blind placebo-controlled randomized phase II clinical trial.

METHODS: Two hundred forty-five gastric cancer patients who underwent total gastrectomy at 40 Japanese institutions from January 2011 to December 2012 were enrolled. Patients received either DKT (15.0 g/day) or matching placebo from postoperative day (POD) 1 to POD12. Primary endpoints were time to first passage of flatus, time to first bowel movement (BM), and frequency of BM. Secondary endpoints included quality of life, C reactive protein level, symptoms of severe gastrointestinal problems (i.e., abdominal pain, bloating, nausea and vomiting), and the incidence of postoperative ileus. Quality of life was evaluated at baseline, POD3 and POD12. Symptoms of gastrointestinal dysfunction and C reactive protein level were also assessed at baseline, POD1, POD5, and POD12.

RESULTS: One hundred ninety-five patients (DKT, n = 96; placebo, n = 99) were included in per protocol set analysis. Significant differences were not found between the groups in terms of patient background characteristics (age, sex, body mass index, operation time, intraoperative bleeding, and tumor stage). The median time to first BM was shorter in the DKT group than in the placebo group (97.4 h [95% CI, 90.0–114.1] vs. 113.9 h [95% CI, 96.5–119.1]; p = 0.051, Wilcoxon test). In patients with high medication adherence, the median time to first BM was also shorter in the DKT group than in the placebo group [93.8 h (95% CI, 87.9–105.3) vs. 115.1 h (95% CI, 95.2–123.8); p = 0.014, generalized Wilcoxon test]. Significantly fewer patients in the DKT group had two or more symptoms of gastrointestinal dysfunction than those in the placebo group on POD12 (p = 0.026, Fisher's exact test). Other outcome measures such as time to first flatus, frequency of BM, quality of life, C reactive protein level, and the incidence of postoperative ileus did not show significant differences between the groups. None of the patients developed serious adverse drug reactions during the study.

CONCLUSION: DKT administration during the immediate postoperative period appears to promote and improves early recovery of postoperative bowel function and is presumed to prevent postoperative ileus after total gastrectomy for patients with gastric cancer.

Mo1799

Limitations of EUS and CT for Preoperative Staging of Gastric Cancer

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BACKGROUND: Neoadjuvant therapy has been recommended for locally advanced gastric cancer patients (stage IB–IIIC, AJCC 7th edition). Accurate preoperative staging is critical for the implementation of this recommendation. This study was to determine the accuracy of endoscopic ultrasound (EUS) and CT imaging in evaluating depth of tumor invasion (T stage) and lymph node status (N stage) for gastric cancer patients.

METHODS: Between 2000 and 2013, 49 gastric adenocarcinoma patients who underwent preoperative staging by EUS followed by a radical gastrectomy with curative intent were included. CT scans of adequate quality available in 25 patients were reviewed by a radiologist blinded to the EUS and pathology results. The results of preoperative EUS/CT staging were compared with surgical pathologic staging to determine the accuracy of the imaging results.

RESULTS: The accuracy of EUS in identifying each individual T and N stage was 41.0% and 42.9% respectively. The accuracy in differentiating locally advanced from early (stage 0–IA) disease was 77.6%. For each individual T and N stage, the accuracy of CT imaging was 4.0% and 56% respectively. CT scan had low accuracy in differentiating locally advanced from early disease (44.0%). When combining EUS and CT staging, the accuracy of identifying early vs. locally advanced disease increased to 76%.

Table: Accuracy of Preoperative EUS (38/49 = 77.6%) and CT Imaging (15/25 = 44.0%) in Predicting Early (0–IA0) and Locally Advanced (IB–IIIC) Disease

	Pathologic Staging				Pathologic Staging		
EUS Stage	0–IA	IB–IIIC	Total	CT Stage	0–IA	IB–IIIC	Total
0–IA	9	9	18		4	7	11
IB–IIIC	2	29	31		3	11	14
Total	11	38	49		7	18	25

CONCLUSION: EUS and CT imaging have suboptimal performance to identify each individual T and N stage although EUS had moderate accuracy in identifying patients with locally advanced diseases. CT does not improve the staging accuracy when combined with EUS. Efforts are needed to improve the performance of both preoperative staging modalities.

Mo1800

Gastrointestinal Stromal Tumors Outcomes in Afro-Caribbean Immigrants Are Impacted by Social and Economic Status

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INTRODUCTION: Previous studies have reported that outcomes of patients with Gastrointestinal Stromal Tumors (GIST) are not impacted by racial disparities. In this study, we characterized the clinical features and outcomes of GIST tumors in a homogeneous immigrant Afro-Caribbean population with indices of low socio-economic status. Subsequently, we compared our results with SEER data and with a large homogeneous European population.

METHODS: We reviewed our Afro-Caribbean patients with GIST treated from 01/2002 to 07/2013. Low socio-economic status was assigned for uninsured and Medicaid patients. Measured outcomes were risk class according to Fletcher-NIH consensus criteria, rate of metastasis, resectability, and disease-free survival. Comparisons were made using Fisher's Exact Test and Columns Proportions Tests. Statistical significance was accepted at $p < 0.05$.

RESULTS: We identified 52 patients with GIST, of which 37 were Afro-Caribbean. 84% had Medicaid (51%) or were uninsured (33%). Mean age was 65 years (39–86), stomach was the primary site in 76%. Bleeding was present in 86% and pain in 65% of patients. Metastases were found in 36% of patients at presentation, compared to 24% in the SEER ($p = 0.3$), 11% in the Swedish ($p = 0.001$) studies. Resection was undertaken in 78% compared to 81% in SEER data and 86% Swedish studies (p = NS). Three year disease-free survival was 56% compared to 79% in the SEER data ($p < .05$).

CONCLUSIONS: Our Afro-Caribbean patients presented with more advanced disease, and despite aggressive treatment, they experienced worse outcomes compared to other ethnicities. Racial diversities and socio-economic status are important determinant of outcomes in patients with GIST.

Mo1801

Primary Sleeve Gastrectomy Compared to Sleeve Gastrectomy As Revisional Surgery

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INTRODUCTION: The laparoscopic adjustable gastric band (LAGB) can be revised to laparoscopic sleeve gastrectomy (LSG) due to insufficient weight loss, patient intolerance, or complications. Little is known about the weight-loss outcomes in this population when directly compared to patients undergoing primary sleeve gastrectomy.

OBJECTIVE: To compare weight loss between patients undergoing primary LSG compared to those undergoing single-stage revision from LAGB to LSG, and to assess for complications.

METHODS: Retrospective analysis was performed on patients who underwent single-stage revision from LAGB to LSG between 2009 and 2013 (revision group). A cohort of matched patients who underwent primary LSG was used for comparison (control group). All patients underwent surgery at the same academic medical center by the same surgeons. Patients were followed for six months postoperatively and evaluated for weight loss and complications.

RESULTS: The revision group included 24 patients, with a matched cohort of 48 patients in the control group. There was no difference between the groups with respect to age and the presence of comorbidities. Preoperative BMI was 41.8 in the revision group and 42.6 in the control group ($p = 0.55$). Average OR time was 154 minutes for the revision group and 114 minutes for the control group ($p = 0.002$). Intraoperative blood loss was equivalent. Length of stay was 3.2 days in the revision group and 2.5 days in the control group ($p = 0.005$). There were no reoperations or emergency visits within 30 days of surgery in either group. At three months, BMI was 35.15 in the revision group and 35.03 in the control group ($p = 0.90$) with percent excess weight loss (%EWL) of 32.64 and 35.64 respectively ($p = 0.21$). At six months postoperatively, BMI was 33.61 for the revision group and 32.87 for the control group ($p = 0.57$), with %EWL of 40.94 and 48.68 respectively ($p = 0.03$). Average change in BMI was 7.90 in the revision group and 9.69 in the control group ($p = 0.06$).

CONCLUSION: Single-stage revision from LAGB to LSG can be performed safely and with only a minor increase in length of stay compared to primary LSG. At six months postoperatively, there is a trend toward improved weight loss following primary LSG compared to revision from LAGB to LSG.

Mo1802

Single Stage Conversion from Gastric Banding to a Stapled Bariatric Procedure: An Analysis of Complications

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INTRODUCTION: Single stage conversion from gastric banded procedures to other bariatric surgery approaches has been associated with increased rates of strictures and other complications, likely due to scarring and reaction to the foreign body. The objective of this study was to review the experience with this group of patients at our hospital, a Center of Excellence in the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP).

METHODS: Our prospective database was queried for the 6-year period ending 10/31/2013. Only patients who had a single stage conversion from Adjustable Gastric Banding (AGB) to Roux-En-Y Gastric Bypass (RNY) or Laparoscopic Sleeve Gastrectomy (LSG), performed at our hospital, were included. Outcomes including rates of organ failure, venous thromboembolism (VTE), wound infection, persistent nausea and vomiting (N/V), strictures, staple line leaks and mortality were assessed.

RESULTS: Of 1,840 patients having bariatric surgery in the time period, 81 underwent conversion from a banding procedure. We excluded 30 patients: 13 who had been converted from Vertical Banded Gastroplasty (VBG) and 17 because of multi-staged procedures after AGB, primarily due to emergency exploration for band slippage or erosion. Fifty-one patients (50 female) were identified. Their median follow-up period was 1.65 years. Mean age, weight and BMI of RNY patients were 49.5 years, 120 Kg and 46.2 Kg/m^2 respectively and were not significantly different from LSG patients. Thirty-one patients underwent conversion to RNY and 20 to LSG. There were no strictures, organ failures, VTEs, wound infections, or deaths in either group. Persistent N/V was no different between the two groups. There were 2 leaks (6.4%) after conversion to RNY vs. 0 after LSG and 0.28% in the remaining bariatric population, ($p < .0058$, Fisher's exact test).

CONCLUSION: Single stage conversion from AGB to RNY and LSG does not appear to carry an increased risk of stricture, wound infection, VTE, organ failure or death. However, the risk of staple line leak appears to be higher with conversion to RNY vs. LSG. This finding may be of value in selecting a revision procedure in the high risk patient. Further studies and comparison to an elective population of patients with a 2-stage procedure are warranted.

Mo1803

Blood Transfusion Among Patients Undergoing Elective Bariatric Surgery for Weight Reduction: A Nationwide Perspective

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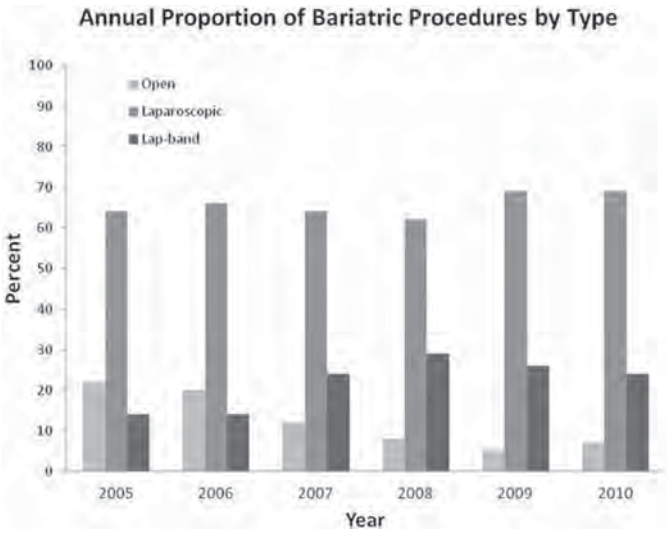
BACKGROUND: Significant perioperative blood loss and transfusion are thought to occur infrequently among patients undergoing bariatric surgery. Little has been reported regarding bariatric procedure types and blood product utilization. We compared non-autologous transfusion across procedure type among patients undergoing open and laparoscopic Roux-en-Y procedures and laparoscopic gastric banding (lap-band).

METHODS: Data from the HCUP Nationwide Inpatient Sample from 2005 through 2010 were examined and all electively admitted patients with a diagnosis of morbid obesity who underwent open (ICD-9-CM 44.31 & 44.39), or laparoscopic (ICD-9-CM 44.38) Roux-en-Y bypass or lap-band (ICD-9-CM 44.95) were identified. After excluding patients with abdominal cancer (ICD-9-CM 150.0–159.9, 230.1–230.9), proportional non-autologous blood-product transfusion (ICD-9-CM 99.03, 99.04) was compared across procedure types using Chi-square tests and multivariable logistic regression controlling for patient age, gender, and year of procedure.

RESULTS: From 2005–2010, approximately 569,754 patients (79.8% female; mean age 44.2 [SD 11.5] years) underwent open (12.1%) or laparoscopic (65.3%) Roux-en-Y bypass, or laparoscopic band (22.6%). Lap-band patients were slightly older (mean age 45.8 years vs. 43.7 for open and 43.7 for laparoscopic patients respectively [$p < 0.001$]) and less likely to be female (77.8% vs. 79.5% open and 80.5% laparoscopic respectively [$p < 0.001$]). The proportion of patients undergoing open procedures dropped from 21.9% in 2005 to 6.9% in 2010 (see Figure). Overall, a total of 1.7% received non-autologous blood products (3.0% open vs. 1.9% laparoscopic vs. 0.3% lap-band respectively [$p < 0.001$]). Compared with patients undergoing laparoscopic procedures, those treated with open procedures demonstrated greater odds of transfusion (OR 1.56; 95% CI 1.39–1.75) while those undergoing lap-band procedures had substantially reduced odds of transfusion (OR 0.13; 95% CI 0.10–0.16). There was no change in the proportion of open-procedure patients undergoing transfusion across the study period (range: 2.64%–4.02%, $p = 1.71$). However, overall, blood transfusion decreased, in parallel with the declining number of open procedures, from a high of 1.89% in 2005 to a nadir of 1.36% in 2008 ($p < 0.001$).



CONCULSION: Among bariatric surgery patients, non-autologous transfusion was relatively uncommon; however, compared with patients treated laparoscopically, patients undergoing open procedures were 56% more likely to undergo transfusion, while those undergoing lap-band procedures 87% less likely to undergo transfusion. Continuing the trend away from open Roux-en-Y bypass may further reduce the potential need for perioperative blood products in bariatric surgery patients.

Mo1804

Short-Term Outcomes in Robotic Gastric Bypass Patients

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PURPOSE: This study was designed to evaluate the short-term outcomes of patients undergoing robotic roux y gastric bypass (RRYGB).

METHODS: Prospectively collected data on consecutive obese patients undergoing RGBRY were reviewed. RRYGB was performed by two surgeons in a single institution utilizing sequential standardized technical steps. Data collected included demographics, American Society of Anesthesiology (ASA) Score, perioperative outcomes and 30-day follow-up. Reoperation was defined as any endoscopic and/or surgical intervention after the initial procedure. Anastomotic leak was defined as presence of intestinal contents or contrast medium in the abdomen on upper GI series, with intra-abdominal abscess detected by CT scan. Values are medians (ranges).

RESULTS: From November 2009 to September 2013, 196 (136 women, 60 males) obese patients aged 45 (17–73) years with a BMI of 46.6 (36–72.2), and ASA score of 3 (2–4) underwent RRYGB. 45% of patients had previous abdominal surgery. Adverse event rate was 3.0%. These included pneumonias (2), surgical site infection (1), deep venous thrombosis (1) and anastomotic ulcers (2). Thirteen patients required reoperation (3 anastomotic leaks, 4 gastrojejunal anastomotic revisions, 5 upper endoscopies for stricture and one exploratory laparotomy for strangulated hernia). Two patients required conversion to laparoscopic RYGB. There were no mortalities. Length of stay was 3 (2–7) days. The readmission rate was 4.0%.

CONCLUSIONS: Robotic gastric bypass roux y resulted in a safe procedure with acceptable short-term perioperative outcomes.

Translational: Esophageal

Mo2048

Cathepsin E Is a Novel Highly Overexpressed Biomarker in Barrett's Esophagus & Esophageal Adenocarcinoma

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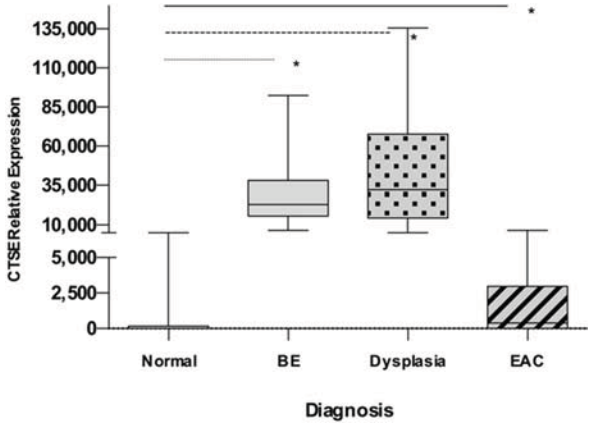
BACKGROUND: The identification of clinically relevant biomarkers for the progression of Barrett's esophagus (BE) to esophageal adenocarcinoma (EAC), or of prognosis for patients with EAC, remains an unsolved problem. Cathepsin E (CTSE) is an aspartic proteinase and possible oncofetal antigen that is differentially expressed in the metaplasia-dysplasia-neoplasia sequence of gastric and colon cancer, and is overexpressed in almost all pancreatic ductal adenocarcinomas. Increased CTSE levels are linked to improved survival in lung, bladder and breast cancer. We evaluated CTSE as a biomarker in Barrett's disease including EAC.

METHODS: 232 pre-treatment tissues from 166 patients were analyzed (22 normal squamous esophagus (NE) from non-GERD patients, 21 BE IM, 22 BE with dysplasia, 101 EAC). CTSE relative mRNA expression was measured by multiplex tandem RT-PCR, and protein expression by immunohistochemistry.

RESULTS: CTSE mRNA expression levels were more than 1,000-fold higher in BE IM and BE dysplasia tissues compared to NE ($p < 0.001$; Figure 1). CTSE levels dropped significantly in EAC tissues but remained significantly higher than NE levels (875 vs. 18.4; $p = 0.0048$; Figure 1). A similar expression pattern was present in IHC, with intense staining in IM and dysplasia and less intense EAC staining. In uni- and multivariable analysis CTSE expression was not significantly associated with survival (HR 0.907; 95% CI 0.744–1.105, $p = 0.33$), but CTSE expression above the 25th percentile resulted in a 42% relative risk reduction for death (HR 0.58, 95% CI 0.27–1.21, $p = 0.15$).

Figure 1



CONCLUSIONS: Cathepsin E mRNA expression is upregulated more than any known gene in Barrett's IM and dysplasia compared to normal squamous esophagus tissues. Protein expression is similarly highly intense in these tissues whereas mRNA and protein expression levels are reduced in EAC tissues relative to Barrett's precancer tissues. Cathepsin E overexpression may influence survival in some EAC patients. Further studies investigating the biomarker potential and functional role of cathepsin E are warranted.

Translational: Other

Mo2049

Amelioration of the Effects of Obesity on the Short-Term Postoperative Complication Rate of Laparoscopic Compared to Open Ventral Hernia Repair

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BACKGROUND: Recent studies indicate that laparoscopic ventral hernia repair has a lower incidence of postoperative surgical site infections (SSI) and length of stay (LOS). There is limited literature evaluating postoperative SSI, (LOS), blood loss and operation time (OT) in obese patients. The objective of this study was to compare postoperative SSI, LOS, Blood loss and OT in obese patients undergoing laparoscopic and open ventral hernia repair.

MATERIAL AND METHODS: The American College of Surgeons National Surgery Quality Improvement Program (ACS-NSQIP) The ACS-NSQIP is a large database collecting prospective clinical data on patients undergoing surgical procedures in hospitals across North America. The file from 2011 was used to identify patients with open and laparoscopic ventral hernia repair. Postoperative SSI, OT, LOS, and Blood loss was analyzed and compared in the different patient groups using univariate and multivariate analyses.

RESULTS: A total of 12,004 patients underwent ventral hernia repair. 6,537 patients (54.5%) had reducible open incisional hernia repair; 2749 patients (22.9%) had an incarcerated open ventral hernia repair; 1,767 patients (14.7%) had laparoscopic incisional hernia repair; 763 patients (6.4%) had incarcerated laparoscopic hernia repair; 188 patients (6.4%) had open hernia repair with mesh implant. 113 (3.4%) of the patients with BMI >30 kg/m^2 were identified with superficial SSI's in open incisional hernia repair versus 7 (0.72%) of the patients with BMI >30 in laparoscopic incisional hernia repair ($p < 0.01$). The mean total operation time in incisional ventral hernia repair versus laparoscopic ventral hernia repair for BMI <5 kg/m^2 was 77.9 minutes versus 87.9 minutes. In the highest BMI class >40 kg/m^2 operation time was not significant ($p = 0.6$) longer in laparoscopic ventral hernia repair, laparoscopic versus open, 108.8 minutes versus 105.9 minutes. The mean length of stay increase in open ventral hernia repair, from 2.4 days in BMI < 5 kg/m^2 to a mean of 3.7 days in patients with BMI >40 kg/m^2. In laparoscopic ventral hernia repair the length of stay was decreasing from a mean of 3.2 days in patients with BMI <25 kg/m^2 to a mean of 1.9 days in patients with BMI >40 kg/m^2.

CONCLUSION: Laparoscopic ventral hernia repair is related to a decreased risk for superficial SSI's and length of stay in obese patients, without extending operation time.

Mo2050

Analysis of Morbidity and Mortality of Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy in Patients Age ≥ 65 Years

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BACKGROUND: Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy (CS & HIPEC) is a complex surgical procedure that is utilized for treatment of patients with peritoneal carcinomatosis of various tumor histologies. Because of increasing life expectancy, the number of elderly patients referred for this procedure continues to rise. Given the potential for major morbidity and mortality rates, there is controversy regarding the suitability of elderly patients for CS & HIPEC.

OBJECTIVE: To evaluate the morbidity and mortality of CS & HIPEC in patients ≥65 years of age.

METHODS: Retrospective analysis of a prospectively maintained database between December 1, 2004 and March 1, 2013 revealed 321 patients who underwent CS & HIPEC at a single institution. 44 of these patients were ≥65 years of age and constituted the study group. Maximal tumor debulking was achieved through a combination of partial or total organ resection, peritonectomy, and thermal ablation of metastases. HIPEC was performed using a closed technique with Mitomycin C for 60–90 minutes at temp range of 40–42 Celsius. Information on patient and tumor characteristics, operative data, and postoperative morbidity and mortality was collected. Patient complications were graded from 1 to 5 according to the National Cancer Institute Common Terminology Criteria for Adverse Events, version 4.0.

RESULTS: The median age was 67.5 (range: 65–86). Patients with ECOG status of 0, 1 and 2 constituted 66, 29.5 and 4.5% respectively. Surgeries were extensive with a median PCI of 20 (range: 0–35). The median duration of surgery was 420 minutes (range: 229–720) with a median estimated blood loss of 400 milliliters. The most common organs resected were the colon and spleen in 20 patients. The majority of patients had a complete (57%) or near complete (36%) cytoreduction. The median duration of initial hospitalization was 9 days (range: 5–136 days). Thirty day mortality was 4.5% as there were 2 mortalities at days 5 and 29. Complications occurred in 19 patients (45%) with grade 3 or 4 complications occurring in 10 patients (22.7%). The most common complication was pulmonary in 8 patients (19%). Re-operation was required in 5 patients (11.4%). Of the 42 discharged patients, 10 were sent to rehab (23.8%) with overall readmission rate of 14% (6 patients).

CONCLUSION: In the present study, the major morbidity and overall mortality of CS and HIPEC were 22.7% and 4.5%, respectively. This is similar to what has been previously reported in major gastrointestinal surgery. CS & HIPEC is a complex surgical procedure which can be performed safely in elderly patients with proper patient selection.

Mo2051

Medicare Diagnosis Related Group Analysis for Laparoscopic Cholecystectomy: Gaps and Opportunities

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BACKGROUND: To increase procedural efficiency and development of new technologies and processes, Centers for Medicare and Medicaid Services (CMS) makes available Diagnosis Related Group (DRG) data. Laparoscopic Cholecystectomy without Common Duct Exploration with complications or comorbidities and without complications or comorbidities are represented by DRG 418 and 419 respectively. Both of these are among the top 100 DRGs and therefore significant contribution to total Medicare expense. The purpose of this study was to analyze trends and national variations in procedure volume, submitted charges and payments for benchmarking.

METHODS: We studied the Inpatient Diagnosis Related Groups in the MEDPAR Inpatient Hospital National Data for year 2008 to 2011. We also analyzed hospital and state level submitted charge and payment data. Analysis was conducted separately for DRG 418 and 419 as they represent different level in severity of care. Descriptive statistics were used to analyze the data.

RESULTS: To understand geographical variation, by combining the DRGs, we found that South Dakota, Kentucky and New Jersey had the highest number of discharges per 100,000 Medicare beneficiaries. Lowest rates were in Rhode Island, New Hampshire, and Oregon.

For both DRGs Florida and Texas had the highest number of discharges in the year. This can be explained by the large Medicare population in these states.

The total covered charges for DRG 418 significantly increased from $1,119,019,702 in 2008 to $1,652,601,684 in 2011 and total payments increased from $243,066,667 to $279,124,072. Total number of discharges increased from 29,589 to 35,958 and average days decreased from 5.3 to 5.1 in this period.

The total covered charges for DRG 419 increased from $971,790,006 to $1,152,948,923 from 2008 to 2011 but the total reimbursement decreased from $206,013,678 to $169,594,412. Total discharges increased from 36,544 to 35,509 and average total days remained unchanged at 3.

For DRG 419, the highest Medicare payments on average went to Vermont and Maryland while the lowest went to Kansas and Alabama.

For DRG 418, the highest average reimbursement went to Alaska and DC while Alabama and West Virginia had the lowest.

It is also evident that many counties did not have any hospital with more than 10 discharges over the year. County level variation is depicted in the following Figures.

CONCLUSION: It is evident that hospital charges have increased on an average in the four year period. Also some states have significantly higher discharges per capita Medicare population. Research is required in translational technologies and efficiencies to standardize the procedures and improve national access.

Translational: Pancreas

Mo2052

Strong Membranous Expression of Plectin Is an Independent Predictor of Improved Survival After Resection of Pancreatic Head Ductal Adenocarcinoma

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INTRODUCTION: Plectin has been proposed as a novel marker of pancreatic ductal adenocarcinoma (PDAC). Cell surface as well as cytosolic localization has been found and suggested to contribute to distinct biological functions. The aim of our study was to evaluate the prognostic value of plectin expression pattern in PDAC.

METHODS: A retrospective study was performed on the basis of a prospectively maintained database. Tissue slides from formalin-fixed paraffin embedded tissue were immunostained for plectin and expression was graded with respect to staining intensity, subcellular location and percentage of tumor positive cells. IBM SPSS Version 21 was used for all calculations with the significance level set to $p = 0.05$.

RESULTS: N = 103 patients with pancreatic head PDAC resected by pancreatoduodenectomy were included. Median percentage of plectin expressing tumor cells was 90%, with strong intensity in 52% of cases, predominantly membranous expression in 21% versus cytosolic or mixed expression in 79%. Strong membranous plectin expression was associated with improved survival compared to strong cytosolic or mixed expression (37 versus 17 months, $p < 0.05$). In a multivariate Cox proportional hazards model, strong membranous plectin expression and lymph node ratio were the only independent predictors of survival.

CONCLUSION: Plectin expression was found in all pancreatic head PDAC, with variations in percentage of positive tumor cells, intensity and subcellular location. Strong and predominantly membranous expression of plectin was independently associated with improved survival.

Translational: Small Bowel

Mo2053

Small Bowel Length Correlates with Height in Adults: Implications for General Surgery and Gastroenterology

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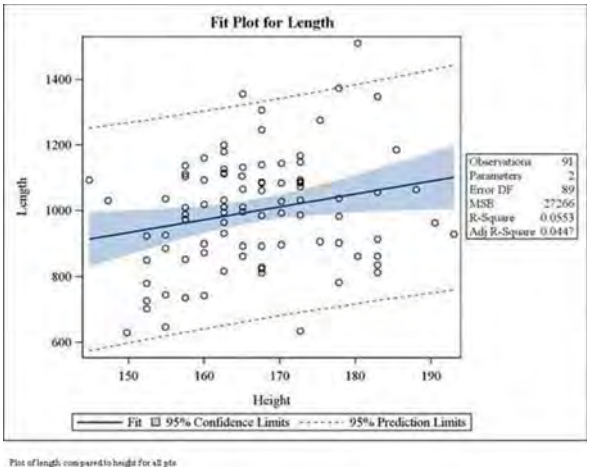
INTRODUCTION: Look in any anatomy textbook and the length of the small bowel (SB) is reported to be roughly 7 m. This information is based on data from the 19th century where measurements were done on cadavers, and in those studies the SB length for females was found to be longer than in males. The small bowel length is integral in helping to avoid short gut syndrome during bowel resection and dumping syndrome after gastric bypass. Gastroenterologists are interested in the small bowel length as they attempt "total" enteroscopy. However, there is only a paucity of in vivo SB measurements. We set out to measure the small bowel length of patients undergoing laparotomy to see if variations in length would correlate to height, weight, or sex.

METHODS: Measurement of SB length was performed by a single surgeon on 91 patients undergoing laparotomy. The bowel was measured using a sterile 10 cm ruler on the anti-mesenteric side with minimal stretch from the ileocecal valve to the ligament of Treitz. Patients with adhesions, previous GI surgery, peritonitis, or laparoscopic procedures were excluded. Demographic data was recorded including height, weight, gender, ethnicity, and reason for laparotomy. Historical data was collected based on all available publications.

RESULTS: In our group there was a wide variation of length (630–1,510 cm), with the average being 998 cm. Linear regression analysis showed a statistically significant relationship between bowel length and patient height. ($p = .025$) Males had a longer intestinal length than females, ($p = 0.007$).

Data from 12 previous studies, conducted from 1885–2008, were compiled for comparison. A total of 1,730 patients, ranging in age from neonates to 91 years old were measured using multiple techniques. 565 patients were measured in vivo with 200 of those using radiologic techniques. Seven studies found a correlation between length and patient height, while 6 did not. Seven studies found differences between males and females with 6 finding the length longer in males.



Plot of length compared to height for all pts

CONCLUSIONS: Our study is the largest in vivo study done in the US. We have shown a wide variation in the length of the SB and an average length of 998 cm. Our data also shows a linear correlation between length and patient height, which corroborates previous studies. We have also been able to show differences in length based on gender. We have not been able to differentiate if the differences in SB length are solely due to height or gender. We have also found that the length measurements are very dependent on technique.

We believe that the wide variation of length makes it impossible to predict location or proximity when total enteroscopy is performed. Finally, we recommend that small bowel length be assessed prior to surgical resection or Roux-en-Y reconstructions to reduce the risk of dumping syndrome or short gut.

Translational: Stomach

Mo2054

Preclinical Trial of Gastric Injection of Botulinum Toxin Type A As Weight-Loss-Surgery

Helene Johannessen[1], Magnus K. Olsen[1], Nikki Cassie[2], Perry Barrett[2], Jens F. Rehfeld[3], Jens J. Holst[4], Baard Kulseng[5,1], Chun-Mei Zhao[1], Duan Chen[1,5]

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BACKGROUND/AIM: Recently, a clinical trial enrolling 60 obese patients failed to show that gastric injection of botulinum neurotoxin type -A (Botox) promotes body weight (BW) loss. The aim of this study was to verify the effectiveness and the underlying mechanism of gastric injection of Botox as weight-loss-surgery (WLS).

METHODS: 102 male rats (42 normal rats at 500 g BW and 60 high-fat-diet-induced obese rats at 700-800 g BW) were subjected to Botox injection, vehicle injection, or sleeve gastrectomy (SG) followed by Botox injection. Rats on high-fat-diet were continuously fed the high-fat-diet after Botox injection or surgery. Botox was injected at a dose of 20 U/rat into the subserosa layer of pyloric antrum or the remaining antrum post SG, and Botox injection was repeated when rats regained BW. Measurements included BW development, food intake, eating behavior and metabolic parameters (monitored by Comprehensive Laboratory Animal Monitoring System, CLAMS), fasting blood glucose levels, gastric emptying rate (acetaminophen absorption test), gut hormones (RIA), and expression of genes encoding orexigenic and anorexigenic neuropeptides in the hypothalamus (in situ hybridization).

RESULTS: There were no mortality, adverse effects and pathological changes in rats subjected to Botox injection. Botox injection reduced BW by 14% in normal rats and 25% in obese rats compared to values before Botox injection ($p < 0.001$). Rats started to regain BW after 3 and 4 weeks in normal and obese rats, respectively. The 2nd Botox injection caused a total BW loss of 18% in normal rats and 32% in obese rats ($p < 0.001$). SG reduced BW by 10% ($p > 0.05$). Additional Botox injection led to BW loss of 22% ($p < 0.01$). Botox injection increased satiety ratio (min/g), leading to reduced food intake (g/day), and increased energy expenditure (kcal/h/100 g BW). Botox injection reduced fasting blood glucose levels, while gastric emptying rate was unchanged (measured at 3 days, 1, 2, or 3 weeks after Botox injection) in either normal or obese rats. Gene expression in hypothalamus and plasma levels of gut hormones were unchanged at 48 hours after Botox injection. However, 8 weeks after Botox injection, the gene expression for neuropeptide Y and agouti-related peptide was increased, while pro-opiomelanocortin was decreased in arcuate nucleus in hypothalamus, and plasma levels of cholecystokinin, gastrin, and peptide YY, but not glucagon, glucagon-like peptide-1, were reduced, suggesting compensatory changes in the gut hormones-hypothalamus pathway.

CONCLUSIONS: This preclinical trial demonstrates the safety and efficacy of gastric injection of Botox as WLS when it is performed alone or in combination with SG. Botox reduced food intake and increased energy expenditure, independently of the gastric emptying rate and of the hypothalamus-gut hormone pathway.

Tuesday, May 6, 2014

Authors available at their posters to answer questions 12:00 PM – 2:00 PM; posters on display 8:00 AM – 5:00 PM.

12:00 PM – 2:00 PM
South Hall

POSTER SESSION III
(NON-CME)

Basic: Small Bowel

Tu1820

High Protein Diet (HPD) Improves Post-Operative Weight Gain After Massive Small Bowel Resection

Raphael C. Sun, Pamela M. Choi, Jose Diaz-Miron, Josh Sommovilla, Jun Guo, Christopher R. Erwin, Brad Warner
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BACKGROUND: Short bowel syndrome (SBS) is a morbid clinical condition that results from massive small bowel resection. Many SBS patients require long term parenteral nutrition (PN) which carries a high complication rate. After small bowel resection (SBR), there is a dramatic weight loss in the acute post-operative period. Simultaneously, structural adaptation occurs to compensate for the loss of function and absorption of nutrients. Although we have previously found that a high fat diet enhances intestinal villus growth and weight gain after SBR, the effects of augmented protein diet on resection-associated metabolic responses is presently unknown. The purpose of this study is to determine weight gain and body composition changes after SBR using a high protein diet.

METHODS: C57BL/6 mice underwent 50% proximal SBR. Post-operatively, mice were randomly selected to receive standard rodent liquid diet (LD) (n = 6) or an isocaloric high protein diet (HPD) (n = 9) for 28 days. LD consisted of 17% protein versus HPD consisted of 45% protein while the percentage of fat content remained the same in both diets. Both diets were based on the Lieber-Decarli formula to produce an isocaloric proportion of 1 kcal per gram. Mice weights were recorded daily. Food intake and fecal output were compared between the two groups. Body composition percentages were obtained at POD 0, 7, 14, 21, and 28 days. Structural intestinal adaptation between mice receiving LD versus HPD was also measured. Student t-test was used for statistical comparisons between groups with $p < 0.05$ defined as significant.

RESULTS: Mice that were fed HPD after small bowel resection returned to baseline weight (measured after resection) on an average of post-operative day (POD) 8 versus mice that were fed LD returned to baseline weight on average of POD 22. (Figure 1) There was no statistical difference in daily food intake (p-value = 0.99) and fecal output (p-value = 0.33) between the LD and HPD groups. Total fat mass and lean mass were significantly different by POD 14 between mice in the LD versus HPD group. However, the percentages of fat mass and lean mass increased at a similar rate within each group throughout the post-operative period in both groups of mice. (Figure 2) Despite the difference in weight gain between LD and HPD, the post-operative histology of the small intestine showed no differences in the degree of adaptation for both crypt depth (p-value = 0.19) and villus height (p-value = 0.68).

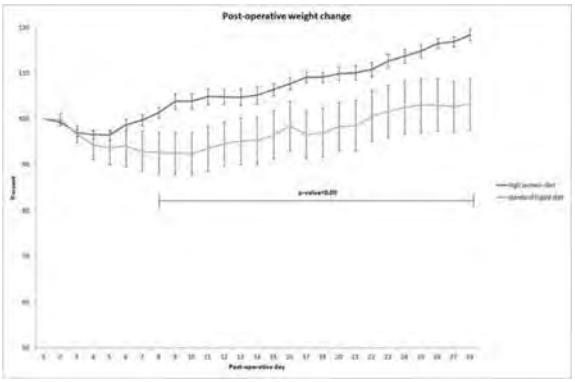

Figure 1: Post-operative weight gain after proximal small bowel resection between mice fed standard liquid diet versus high protein diet.

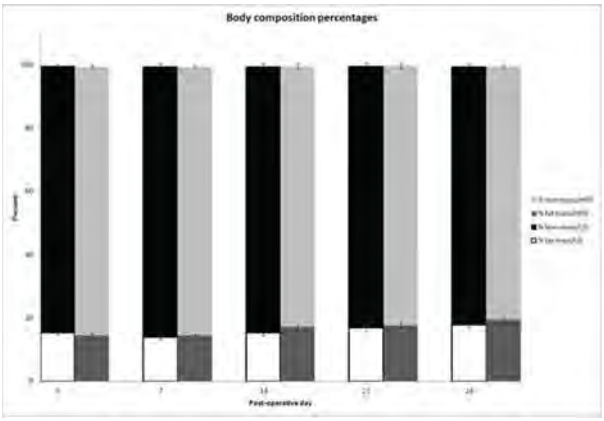

Figure 2: Post-operative body composition after small bowel resection between mice fed standard liquid diet versus high protein diet.

CONCLUSION: HPD results in greater weight gain in mice after SBR. This finding may be clinically important for patients with SBS since better weight gain may reduce the time needed for PN.

Clinical: Biliary

Tu1568

Predictors of Surgical Complexity in the Treatment of Choledocholithiasis: Number of ERCP Attempts and CBD Diameter Matter

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CONTEXT: Endoscopic retrograde cholangiopancreatography (ERCP) is frequently used to clear the common bile duct (CBD) in patients with choledocholithiasis. While a single ERCP is usually effective, many patients undergo multiple ERCP attempts before cholecystectomy.

OBJECTIVE: To identify pre-operative factors predictive of surgical complexity beyond routine laparoscopic cholecystectomy (LC) after ERCP.

DESIGN/SETTING: Data was prospectively collected for all ERCPs between 4/2010 and 2/2012 at a public academic medical center including: demographics, indication, stone presence, CBD diameter, sphincterotomy, stent placement, and ERCP number.

PATIENTS: 73 patients meeting inclusion criteria underwent ERCP for choledocholithiasis followed by cholecystectomy.

MAIN OUTCOME MEASURES: Need for surgical intervention beyond LC including open cholecystectomy, CBD exploration or hepaticojejunostomy.

RESULTS: 124 ERCPs were attempted in 73 patients, 10% of whom presented with cholangitis. 56% of patients underwent 1 ERCP, while 16% required ≥3. LC was performed in 58 (79%) patients while 15 (21%) patients required more complex operations including 5 open common bile duct explorations and 1 hepaticojejunostomy. The likelihood of requiring more complex surgery correlated with increased number of ERCPs with an OR (95% CI) of 4.302 (2.036–9.09), p = < 0.001 for more than one ERCP. Increased CBD diameter also correlated with complex surgery with OR (95% CI) 1.315 (1.04–1.662), p = 0.022.

CONCLUSIONS: The number of pre-operative ERCPs and CBD diameter in choledocholithiasis patients are strong predictors for necessity of more complex surgical treatment and referral to a hepatobiliary surgeon should be considered.

Tu1569

Hepato-Pancreato-Biliary Surgery in Canada: Workforce and Wait Times

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BACKGROUND: The demographics and practice characteristics of physicians performing hepato-pancreato-biliary (HPB) surgery across Canada are poorly characterized.

METHODS: A questionnaire addressing these issues (developed using a modified Delphi process) was administered to all actively practicing Canadian HPB surgeons who were members of the Americas or Canadian HPB Associations (n= 52).

RESULTS: Forty-one surgeons completed the survey (79% response rate). Their mean age was 50.0 (SD 10.5) years; 19% were older than 60 years. The average planned age of retirement was 65.0 (SD 6.4) years. Thirty-nine respondents (95%) were male. Only one respondent (3%) did not have fellowship training. Most (78%) had either an HPB or HPB/transplant fellowship and (68%) held an advanced degree (Masters or Ph.D.). All had a medical school affiliation, with 96% practicing in university teaching hospitals and 95% conducting research. Ninety percent reported that non-HPB surgeons did not perform HPB cases in their institution. Only 17% of respondents worked fewer than 60 hours per week, and 21% worked more than 80 hours per week. Surgeons had a median 1.5 (SD 1.3) days of surgery per week with an average of 10% (SD 17.5) of HPB cases performed laparoscopically (excluding cholecystectomy). More than 69% of respondents reported being satisfied with their career. Nearly half (49%) felt that too many HPB surgeons are being trained and 30% advised trainees not to pursue HPB surgery due to perceived lack of jobs.

CONCLUSION: This survey characterizes Canadian HPB surgery workforce by providing demographic, job satisfaction and scope of practice information.

Tu1570

Predictors of Malignancy in Patients with Suspicious Gallbladder Lesions: Retrospective Analysis of 103 Patients Who Underwent Cholecystectomy at a Tertiary Hospital in South India

Dhiraj J. Sonbare[1], Ravish S. Raju[1], Frederick Vyas[1], Philip Joseph[1], Betty Mani[2], Anu Eapen[2], Mahasampath Gowri[3], Venkatramani Sitaram[1]

[1]Department of HPB Surgery, Christian Medical College, Vellore, India; [2]Department of Radiology, Christian Medical College, Vellore, India; [3]Department of Biostatistics, Christian Medical College, Vellore, India

BACKGROUND: Gallbladder cancer is common in India. While early lesions present with thickening of the gallbladder wall, locally advanced disease can present as a gallbladder mass. There is scarcity of data on the predictors of malignancy in patients with suspicious gallbladder lesions.

AIM: To analyze the pre-operative and intra-operative factors which predict malignancy in patients with suspicious gallbladder lesions.

METHODOLOGY: This is a retrospective analysis of patients who underwent cholecystectomy for suspicious gallbladder lesions in a single institution. There were 103 patients from January 2004 to May 2011. The gallbladder specimen was not available for analysis in 13 patients who underwent only biopsy or palliative procedure.

RESULTS: There were 43 male and 60 females. The mean age was 51.23 years. The final histopathology was benign in 40 patients and malignant in 63 patients.

All patients were evaluated by pre-operative cross sectional imaging; pre-operative image guided FNAC was done in some patients. Patients were divided into following categories:

1) Histological surprise in our hospital and pre-operative CT scan available: 2

2) Extended cholecystectomy after pre-operative image guided FNAC/B or intra-operative frozen section reported as malignant: 34

3) Extensive disease intra-operatively, only cholecystectomy, biopsy or palliative procedure performed: 25

4) Clinical picture and imaging suspicious of malignancy but frozen section benign: 38

5) Clinical picture and imaging suspicious of malignancy but frozen section incorrect (benign on frozen section and malignant on paraffin section, and vice versa): 4

The following pre-operative and intra-operative parameters were analysed in all patients: age, sex, symptoms, physical findings, blood investigations and findings on cross sectional imaging. The gallbladder morphology was classified as “thick walled only without mass” or “thick walled with presence of mass.” The tumor location was either “tumor location at a single site” or “tumor at more than one site.” The presence of enhancement pattern on contrast-enhanced CT scan and involvement of cystic duct (CD) and common bile duct (CBD) was noted. The nodal involvement was classified as absent if node was absent or less than 1 cm (maximum dimension), and present if node was more than 1 cm. Infiltration into the liver parenchyma, adjacent vessels, and adjacent organ(s) was noted.

On multivariate analysis, the presence of polyp or tumor on intra-operative examination was the only factor which was statistically significant (p less than 0.001).

Table 1: Predictors of Malignancy in Patients with Suspicious Gallbladder Lesions: Univariate Analysis

	Benign Mean (SD)	Malignant Mean (SD)	Univariate Analysis
Age			
≤40	6	10	0.90
>40	34	53	
Sex			
Male	21	22	0.08
Female	19	41	
Clinical symptom			
Abdominal pain	35	53	0.64
Jaundice	4	22	0.01
Weight loss	6	17	0.16
Vomiting	9	16	0.74
Symptom duration (mon.)	10.88 (16.76)	10.6 (20.58)	0.89
Clinical examination			
No mass	30	27	0.001
GB/ liver mass	10	36	
Blood investigations			
Haemoglobin	11.71 (1.79)	11.59 (1.05)	0.66
Total Bilirubin	1.08 (2.57)	5.96 (8.88)	0.026
Direct Bilirubin	0.64 (2.27)	4.03 (6.52)	0.016
Indirect Bilirubin	0.44 (0.34)	1.92 (3.65)	0.027
Total Protein	7.85 (0.72)	7.79 (0.69)	0.71
Albumin	4.16 (0.06)	3.94 (0.57)	0.13
Globulin	3.62 (0.65)	3.8 (0.62)	0.16
SGOT	37 (22.26)	57.87 (41.43)	0.033
SGPT	47.73 (49.5)	48.14 (42.2)	0.58
Alkaline phosphatase	149.55 (151.6)	188.83 (143.38)	0.060
Radiology			
GB Morpho.	21	17	0.009
Thick wall only	17	42	0.042
GB mass present	12	31	0.26
Tumour location			
Single location	26	28	0.37
More than one region	33	56	0.01
Enhancement pattern			
CD involvement	12	24	0.13
CBD involvement	1	14	0.92
Nodal involvement	8	21	0.07
Liver involvement	10	25	0.72
Vascular involvement	3	13	
Adjacent organ involvement	6	11	
Intra-operative findings			
Wall thickness 5 mm cut off	24	30	0.68
Polyp/tumour	10	46	0.001
Stone	28	25	0.03

Table 2: Multivariate Analysis

	Significance	Exposure	Lower Limit of 95% CI	Upper Limit of 95% CI
Age	0.465	1.982	0.316	12.438
Sex	0.904	0.918	0.227	3.706
Serum direct bilirubin	0.133	1.194	0.984	1.505
Presence of mass	0.153	2.711	0.690	10.647
single location on imaging	0.794	1.2	0.304	4.739
gall bladder mass on imaging	0.150	2.741	0.694	10.82
CBD involvement	0.626	0.493	0.029	8.498
Presence of stone	0.434	0.589	0.156	2.22
Presence of tumour or polyp	0.000	18.585	3.926	88.078

CONCLUSION: In an area endemic for gallbladder cancer, the presence of tumor or a polyp in a cut section of the gallbladder is highly suggestive of malignancy.

Tu1572

Gallbladder Volvulus: A Single Institution's Experience over Two Years

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INTRODUCTION: Gallbladder volvulus is a rare and acute surgical disorder with roughly five hundred cases reported. Pre-operative workup can be misleading and may be suggestive of cholecystitis. Objective: To characterize patients with gallbladder volvulus and compare to those in prior reports to determine unique pre-operative findings to aid in diagnosis.

METHODS: A retrospective review of all cases of gallbladder volvulus from 2011–2013.

FINDINGS: Five patients were identified. All were slender, elderly, had a medical history significant for coronary disease, complained of nausea, denied fevers and chills, and had variable characterization of their pain. One patient had a Murphy's sign. All patients had markedly distended gallbladders, often outside the gallbladder fossa. Two patients had a whirl sign on CT, suggesting the diagnosis of volvulus. Gallbladder sizes were similar amongst imaged and pathologic measurements and 2 had stones. Those with longer time to presentation had higher leukocyte counts and gallbladder necrosis. Only one patient had an elevation in liver function laboratory values. All patients were treated via urgent laparoscopic cholecystectomy and had unremarkable postoperative courses.

Figure: Axial CT slice demonstrating "whirl" sign suggesting volvulus.

CONCLUSION: Gallbladder volvulus remains an uncommon urgent surgical condition. Typical features to the current and prior reports include old age, thin habitus, and varied clinical examinations. Additionally, radiographic findings are consistent: marked gallbladder enlargement and wall thickening with torsion present on higher-fidelity imaging. This is the largest single-center analysis in the United States and offers findings suggestive of gallbladder volvulus as a pre-operative diagnosis. Volvulus may be suggested by the lack of fever, Murphy's sign, and leukocytosis in the setting of epigastric pain. Radiographically, a markedly distended, thick-walled gallbladder on imaging may support the diagnosis but additional findings of a very large gallbladder out of its fossa and/or a whirl sign are more specific. Stones remain an inconsistent finding with volvulus. Given an aging population, a paucity of consistent history and exam findings and potentially confusing ultrasound findings, misdiagnoses are possible, thus imaging with CT may be of benefit. Urgent laparoscopic cholecystectomy continues as the mainstay of therapy.

Table: Patient and Radiographic Characteristics

Age	Fever	Nausea/Emesis	Murphy's	WBC	Elev LFTs	Imaged Size (mm)	Wall Thickness (mm)	Whirl	Stones
86	N	N/N	N	9.7	N	9.7	18	N	N
95	N	Y/Y	Y	11.8	N	7.6	6	N	N
67	N	Y/N	N	19.7	N	8.1	5	N	N
88	N	Y/N	N	7.4	N	8.7	6	Y	Y
92	N	Y/Y	N	9.4	Y	13.6	7	Y	Y

Clinical: Colon-Rectal

Tu1573

Variation in Outcomes Between Elective and Non-Elective Colorectal Surgery: A Population-Based Cohort Study

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[1]Centre for Patient Safety and Service Quality, Imperial College London, London, United Kingdom; [2]Department of Surgery and Cancer, Imperial College London, London, United Kingdom; [3]Surgical Epidemiology, Trials and Outcome Centre, St. Mark's Hospital, Harrow, United Kingdom

BACKGROUND: Elective and non-elective colorectal surgical outcomes are often studied together. Differences are examined to aid outcome selection for reporting and direct quality improvement.

METHODS: Adults undergoing major colorectal resections during 2001–2007 in English National Health Service (NHS) Trusts were included. Patient and procedure characteristics, and 90-day mortality were examined. Outliers for adjusted institutional mortality were identified on funnel plots for elective and non-elective cohorts. Observed-to-expected mortality ratios were correlated.

RESULTS: 171,330 patients treated in 151 NHS Trusts were included. 90-day mortality was 6% (6,336 of 112,222 patients) and 22% (13,111 of 59,108 patients) after elective and non-elective surgery, respectively. Cohorts were significantly different for all characteristics. No unit with high outlying mortality for elective surgery was a high outlier for non-elective mortality, and vice-versa. Observed-to-expected mortality correlated moderately ($\rho = 0.501$, $p < 0.001$).

CONCLUSIONS: Patient characteristics for elective and non-elective surgery were different. High unit-level mortality was not consistent across cohorts. Both cohorts` outcomes should be reported publicly. High absolute non-elective mortality highlights its importance for further study and quality improvement.

Tu1574

Preoperative Anemia and Outcomes in Elective Colorectal Surgery

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INTRODUCTION: Preoperative anemia is common in patients with inflammatory bowel disease (IBD) and diverticulosis. The aim of this study was to evaluate the association between preoperative anemia and postoperative morbidity and mortality in this subset of patients undergoing elective colon or rectal surgery.

METHODS: We used data from the National Surgical Quality Improvement Project (NSQIP) from 2005–2011 to identify 30,982 elective colorectal resections in patients with a preoperative diagnosis of IBD or diverticulosis/diverticulitis. Joint point analysis was performed to determine the hematocrit level at which the rate of complications began increasing. Based on the identified inflection point, anemia was defined as a hematocrit less than or equal to 38%. Morbidity and mortality rates were calculated for patients with and without anemia. Morbidity was defined as the presence of any infectious, cardiovascular, pulmonary, renal, thromboembolic, and bleeding event within 30 days of surgery. Multivariable logistic regression models were used to evaluate the association between every 5% decrease in hematocrit and complications in patients with anemia (hematocrit > 38%) and without anemia (hematocrit ≤ 38%).

RESULTS: Preoperative anemia was identified in 37.4% of the cohort. The overall morbidity and 30-day operative mortality rates were 20.9% and 0.4%, respectively. Postoperative complications (24.3% vs. 18.9%, $p < 0.0001$) and postoperative mortality (0.8% vs. 0.2%, $p < 0.0001$) were more common in patients with anemia compared to patients without anemia. In the adjusted models, hematocrit was not significantly associated with complications for patients with a preoperative hematocrit >38%. However, in patients with hematocrit ≤38%, every 5% decrease in hematocrit was associated with a 14% increase in the odds of developing complications (OR 1.14; 95% CI 1.08–1.20 [table]). This association was independent of receipt of transfusion, which was a significant predictor of complications in both groups.

Table: Multivariable Logistic Regression Models-Factors Associated with Postoperative Complications

Factors (REF)	Patients with Hematocrit >38% OR (95% CI) N = 19,406	Patients with Hematocrit ≤38% OR (95% CI) N = 11,576
Preoperative hematocrit	0.95 (0.93–1.06)	1.14 (1.07–1.20)
Transfusion (No)	3.66 (2.80–4.78)	2.11 (1.79–2.50)

Models controlled for the following patient factors: age, sex, BMI, diabetes, tobacco use, COPD, ascites, CHF, HTN, dialysis, wound infection, chronic steroid use, >10% weight loss, bleeding disorder, and functional status prior to surgery. Transfusion defined as any transfusion of packed red blood cells or whole blood given from the time the patient leaves the operating room up to and including 72 hrs postoperatively.

CONCLUSIONS: Below a hematocrit of 38%, the risk of complications increases progressively as hematocrit decreases. Our data support delaying elective colorectal resection until measures are taken to correct preoperative anemia.

Tu1575

Conservative Treatment and Interval Appendectomy for Acute Appendicitis

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BACKGROUND: Conservative treatment for acute appendicitis (AA) is gradually being adopted as valuable therapeutic choice. Interval appendectomy (IA) after conservative treatment is controversial.

OBJECTIVE: To clarify the success and recurrence rate of conservative treatment for acute appendicitis, and necessity of IA.

PATIENTS AND METHODS: We reviewed 503 patients with AA between 2006 and 2013.

RESULTS: In 503 patients, of which 122 patient undergone emergency appendectomy within 3 days after admission, remaining 381 patients underwent conservative treatment. In 381 patients taken conservative treatment, the success rate of conservative treatment was 98%. Nine patients (2%) were required appendectomy because of progressive disease despite of conservative treatment. After conservative treatment 95 patients (27%) were diagnosed as a recurrent AA at median follow-up 18 months. The predictor for recurrence after conservative treatment was the only following multiple episodes of AA (p = 0.002, HR 2.1, 95% CI [1.56–41.1]). The abscess formation and appendicolith did not predict the disease recurrence. At the recurrent AA, 37 of 95 (39%) patients underwent appendectomy including IA. The morbidity of appendectomy for recurrent disease was 5%. Especially the morbidity of IA for recurrent disease was 0%.

CONCLUSIONS: The success rate of conservative treatment was very high and the risk of recurrence after conservative treatment was 27%. The morbidity of appendectomy for recurrent disease was low (5%). The conservative treatment may be an effective alternative to emergency appendectomy. The routine IA is probably not warranted following successful management of AA, but IA should be required to patients with multiple episodes of AA.

Table: Morbidity Rate of Appendectomy by Timing of Operation

Timing of Appendectomy	Within 3 Days at First Attack (No Conservative Treatment)	After 4 Days at First Attack (Progressive Disease Despite of Conservative Treatment)	Appendectomy for Recurrent Acute Appendicitis (Recurrence After Conservative Treatment)	Interval Appendectomy (After Conservative Treatment)
N	122	9	37	45
Mobidity rate	22 (17%)	5 (55%)	4 (5%)	0
Wound infection	8 (6%)	1 (11%)	0	0
Peritoneal abscess	6 (4%)	2 (22%)	0	0
Pseudomembranous enterocolitis	3 (2%)	0	1 (2%)	0
Ileus	3 (2%)	1 (11%)	1 (2%)	0
Pneumonia	1 (1%)	0	0	0
Pleural effusion	0	1 (11%)	0	0

Tu1577

The Use of Radiology in Bowel Screening Wales: 3 Years Data

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INTRODUCTION: Colonoscopy is the gold standard diagnostic screening test used by Bowel Screening Wales (BSW). However, when a patient returning a positive faecal occult blood (FOB) test is deemed to be too high risk for colonoscopy, radiological imaging at the screening colonoscopist's discretion is offered as an alternative.

AIM: Assessment of the use of substitutive radiological imaging by BSW.

METHODS: Data was collected retrospectively from the BSW database in one Health Board between 2009 and 2012. All patients who were referred directly for CT colonogram (CTC) or CT abdomen & pelvis (CTAP) following initial assessment and those subsequently referred following a failed or incomplete colonoscopy were identified. Factors assessed included demographics, co-morbidity and reasons for radiological imaging over colonoscopy, colonic findings and estimated sensitivity of CTC.

RESULTS: 93.6% (n = 1687) patients underwent colonoscopy. 6.4% (n = 108, 63 Male, 53 Female) of all patients returning positive FOB were referred for substitutive radiological imaging. 94% underwent CTC and 6% CTAP (median age 66 and 70 years, respectively). 82% of patients were referred directly following initial assessment with the remaining 18% following incomplete endoscopy. Median time from referral to study report was 5 weeks. Frequently stated reasons for imaging were history of significant cardiovascular disease, history of failed endoscopy, warfarin therapy and poor mobility. 39% of scan reports documented potentially significant pathology, 74% (n = 30) of which were colonic polyps (28% > 10 mm), 10% (n = 4) tumours and 13% (n = 5) bowel wall thickening or stricture. Subsequent referral for endoscopic investigation revealed an estimated sensitivity of CTC for identification of potential colonic neoplasm in the region of 80%.

CONCLUSION: CTC is a rational alternative imaging modality for further investigation of positive FOB in those patients deemed unfit for colonoscopy. A surprisingly high number (6.4%) of screening patients undergo radiological imaging; this has obvious resource implications for Radiology Departments.

Tu1578

Laparoscopic Versus Open Appendectomy: A Tri-State, 6-Year Analysis of Trends & Outcomes

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INTRODUCTION: Multiple single-institutional trials comparing laparoscopic appendectomy (LA) to open appendectomy (OA) have been reported over a single year, including several national reports; however, the results have been conflicting. We report outcomes comparing LA to OA from a state-wide level over a 6-year period.

METHODS: Using the State Inpatient Databases (SID), Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, we retrospectively reviewed outcomes of all LA and OA performed from 2006 to 2011 in California, Florida, and New York. Preoperative variables, including gender, age distribution, insurance data, and diagnoses were compared. Outcomes specifically focused on length of stay (LOS), complications as graded by the Clavien-Dindo classification system, complication-related procedures, and mortality (stratified by year).

RESULTS: A total of 363,737 appendectomies were performed with a total of 252,603 LAs and 117,836 OAs performed over the study period. Comparing OA to LA, a higher proportion of OA patients were male ($P < 0.0001$), older ($P < 0.0001$), and insured by Medicare or Medicaid ($P < 0.0001$, Table 1). Moreover, a higher proportion of the OA group had co-morbidities, including diabetes mellitus type II, hypertension, and atrial fibrillation ($P < 0.0001$). Patients with peritonitis or peritoneal abscesses were more likely to undergo OA ($P < 0.0001$). The LOS was significantly longer in the OA over every time period measured ($P < 0.0001$). The conversion rate from LA to OA was 12.84%. Discharges in the OA group had a higher proportion of the complications in each of the categories listed in Table 2. Furthermore, when patients in the OA developed a complication, they were more likely to need an additional intervention or procedure (Clavien-Dindo Grade > II). Overall in-hospital mortality was significantly higher in the OA compared to LA (0.48% vs. 0.06%, respectively; $P < 0.0001$).

CONCLUSION: LA had significantly less morbidity, mortality, and shorter hospitalizations compared to OA. However, patients may be preselected to undergo OA given age, co-morbidities and preoperative diagnosis, which may also predispose towards more morbidity and mortality. The SID has important limitations; therefore, further analyses are necessary to identify the full impact of these findings.

Table 1: Patient Demographics and Hospitalization Information

	LA N=252603 N (%)	OA N=117836 N (%)	P-value
Preoperative Variables			
Gender			<0.0001
Male	120029 (49.9)	57168 (50.7)	
Female	120696 (50.1)	55701 (49.4)	
Age Distribution:			<0.0001
18-39	135177 (53.5)	52663 (44.7)	
40-59	82112 (32.5)	39954 (33.9)	
60-79	30526 (12.1)	20842 (17.7)	
80-99	4788 (1.9)	4377 (3.7)	
Insurance:			<0.0001
Medicare	25448 (10.1)	18985 (16.1)	
Medicaid	35749 (14.2)	20139 (17.1)	
Private	144785 (57.3)	55639 (47.2)	
Self-pay	29728 (11.8)	14768 (12.5)	
No charge	3409 (1.4)	1298 (1.1)	
Other	13456 (5.3)	6994 (5.9)	
Co-morbidities			
Diabetes type II	15141 (6.0)	10236 (8.7)	<0.0001
Atrial fibrillation	3720 1.5)	3353 (2.9)	<0.0001
Hypertension	41623 (16.5)	24500 (20.8)	<0.0001
Previous MI	2505 (1.0)	1567 (1.3)	<0.0001
COPD	3240 (1.3)	3063 (2.6)	<0.0001
Long-term anticoagulant use	1712 (0.7)	1192 (1.0)	<0.0001
Diagnosis			<0.0001
Acute appendicitis w/peritonitis	31374 (12.4)	21322 (18.1)	
Acute appendicitis w/peritoneal abscess	15939 (6.3)	16244 (13.8)	
Acute appendicitis w/o peritonitis	188853 (74.8)	61636 (52.3)	
Other	16437 (6.5)	18634 (15.8)	
Mean Length of Stay by year, days (95% CI)			
2006	2.4 (2.4,2.5)	4.5 (4.4,4.6)	<0.0001
2007	2.4 (2.4,2.4)	4.7 (4.6,4.8)	<0.0001
2008	2.4 (2.3,2.4)	4.9 (4.8,4.9)	<0.0001
2009	2.3 (2.3,2.3)	4.9 (4.8,5.0)	<0.0001
2010	2.3 (2.3,2.3)	5.1 (5.0,5.2)	<0.0001
2011	2.3 (2.3,2.4)	5.3 (5.2,5.5)	<0.0001

Table 2: Postoperative Data

	LA N=252603 [N (%)]	OA N=117836 [N (%)]	P-value
Complications Data			
Gastrointestinal	**12258 (4.9)**	**13060 (11.1)**	**<0.0001**
-Diarrhea	1294 (0.5)	1001 (0.9)	
-Other	5376 (2.1)	6529 (4.8)	
-Ileus	10786 (4.3)	11738 (10.0)	
-SBO	164 (0.1)	204 (0.2)	
Cardiovascular	**1610 (0.6)**	**2083 (1.8)**	**<0.0001**
-CHF	321 (0.1)	502 (0.4)	
-Paroxysmal VT	135 (0.1)	228 (0.2)	
-Other dysrhythmia	678 (0.3)	782 (0.7)	
-Subendocardial infarction	165 (0.1)	202 (0.2)	
-Other cardiac complications	680 (0.3)	833 (0.7)	
Respiratory	**3819 (1.5)**	**5609 (4.8)**	**<0.0001**
-Pulmonary collapse	2155 (0.9)	2646 (2.3)	
-Pulmonary insufficiency	961 (0.4)	1728 (1.5)	
-Pleural effusion	535 (0.2)	957 (0.8)	
-Other pulm complications	652 (0.3)	600 (0.5)	
-Acute resp failure	475 (0.2)	1118 (1.0)	
Hematologic	**3688 (1.5)**	**4337 (3.7)**	**<0.0001**
-Anemia	1599 (0.6)	1916 (1.6)	
-Acute posthemorrhagic anemia	1240 (0.5)	1697 (1.4)	
-Hypotension	477 (0.2)	430 (0.4)	
-Other hypotension	571 (0.2)	532 (0.5)	
Genitourinary/Electrolyte	**4207 (1.7)**	**5384 (4.6)**	**<0.0001**
-Acidosis	232 (0.1)	578 (0.5)	
-Hyperosmolality/hypernatremia	114 (0.1)	310 (0.3)	
-Hypoosmolality/hyponatremia	680 (0.3)	942 (0.8)	
-Hypokalemia	2778 (1.1)	3177 (2.7)	
-Acute renal failure	755 (0.3)	1135 (1.0)	
Infectious	**2789 (1.1)**	**4722 (4.0)**	**<0.0001**
-Septic shock	181 (0.1)	523 (0.4)	
-Cellulitis	325 (0.1)	628 (0.5)	
-Peritoneal abscess	250 (0.1)	276 (0.2)	
-Pneumonia	865 (0.3)	1234 (1.1)	
-UTI	471 (0.2)	884 (0.8)	
-Sepsis	492 (0.2)	725 (0.6)	
-Other	979 (0.4)	1965 (1.7)	
Complication-related procedures			
Re-intubation	962 (0.4)	2101 (1.8)	<0.0001
Mechanical ventilation<96h	919 (0.4)	1845 (1.6)	<0.0001
Mechanical ventilation>96h	322 (0.1)	1270 (1.1)	<0.0001
Transfusion of pRBC	2581 (1.0)	5931 (5.0)	<0.0001
Transfusion of platelets	392 (0.2)	428 (0.4)	<0.0001
Percutaneous abdominal drainage	2251 (0.9)	2060 (1.8)	<0.0001
Hemodialysis	545 (0.2)	781 (0.7)	<0.0001

Tu1579

Repeat Endoscopy and Angiography for Persistent Lower Gastrointestinal Bleeding: Is There an Upper Limit?

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INTRODUCTION: Patients presenting with lower gastrointestinal bleeding may undergo multiple endoscopic and angiographic procedures. Identification of the source of bleeding may be elusive, and the end result may be a total colectomy. For those patients who have many nonoperative interventional procedures, we sought to investigate any differences that might exist with regards to overall mortality, the rate of operative intervention, and the type of operative procedure.

METHODS: All patients were identified nationwide who were admitted to the hospital between 2006 and 2010 with lower gastrointestinal bleeding using the Nationwide Inpatient Sample (NIS) database. Patients not requiring blood transfusions were excluded. Patients were grouped according to the number of colonoscopies, flexible sigmoidoscopies, and angiographies that were performed. We then compared the rate of bowel resection, the type of procedure, and the overall mortality for patients who underwent more than 2 nonoperative interventional procedures with those patients who had 2 or fewer procedures.

RESULTS: From 2006 through 2010, 289,501 patients were admitted with a diagnosis of lower gastrointestinal bleeding requiring blood transfusion. Of these patients, 0.33% (n = 954) underwent more than 2 nonoperative interventional procedures. The rate of large bowel resection was significantly higher for this group of patients (15.0% vs. 3.5%, $p < 0.0005$). There was no difference in mortality (1.7% vs. 1.7%, $p = 0.962$). For those patients who underwent large bowel resection, patients who had undergoing more than 2 nonoperative interventional procedures were significantly more likely to undergo total colectomy (20.3% vs. 8.0%, $p < 0.0005$).

CONCLUSIONS: Patient who undergo more than 2 nonoperative interventional procedures are more likely to require a bowel resection and more likely to undergo a total colectomy. Overall mortality for this group, however, is not higher. These patients may have persistent bleeding that cannot be localized, yet a stable enough clinical picture to permit repeating endoscopy or angiography and delaying resection. There is no evidence from our study to suggest that such patients should undergo resection sooner, nor is there evidence that multiple endoscopies and angiographies adversely affect survival.

Tu1580

Determinants of Folate Metabolism in Colorectal Cancer Patients and Healthy Individuals

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Folate metabolism, a complex pathway required for either the synthesis of DNA precursors or for DNA methylation reactions, has been frequently suggested to play a key role in colorectal cancer (CRC) pathogenesis. In the present study we collected 96 CRC individuals (55 males/41 females, mean age 71.04 years) and 96 healthy matched controls (53 males/43 females, mean age 70.86 years) to further investigate the determinants of folate metabolism in both CRC patients and healthy matched controls. All the individuals have been genotyped for nine biallelic polymorphism of genes involved in folate metabolism (MTHFR 677C > T, MTHFR 1298A > C, MTR 2756A > G, MTRR 66A > G, SLC19A1 80G > A, TYMS 28bp 2R/3R, TYMS 1494 6bp ins/del, DNMT3B –579G > T, DNMT3B –149C > T). In addition, we also measured plasma homocysteine (hcy), serum folate, and serum vitamin B12 levels in those subjects that were not taking drugs or supplements known to interfere with those parameters.

Multifactorial analysis of variance revealed significantly decreased serum folate (P = 0.04) and plasma hcy (P = 0.02) levels in CRC patients with respect to healthy matched controls. In addition, vitamin B12 levels had a significant effect on serum folate concentrations (P = 0.04), whilst a significant contributor of plasma hcy levels was age at sampling (P = 0.0001). Concerning the polymorphisms of metabolic genes, none of them showed significant different distributions between CRC patients and healthy controls. However, the MTRR 66A > G polymorphism was associated with serum folate levels in both CRC and healthy individuals (AA vs. GG, P < 0.05), the SLC19A1 80G > A polymorphism showed a significant correlation with hcy levels in our population (GG vs. AA, P < 0.05), and the DNMT3B -579G > T polymorphism resulted associated with serum vitamin B12 levels (GG vs. GT, P < 0.05).

Present results suggest that complex interactions among folate, hcy, vitamin B12, and polymorphisms of metabolic genes, superimposed on age related declines, might be responsible of the impairments of folate metabolism in CRC patients.

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Tu1581

Surgical Prognosis Factors for Recurrence After Resection of Ileocecal Crohn's Disease

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BACKGROUND: Recurrence of Crohn's disease (CD) after ileocolic resection is a major challenge for gastroenterologists and surgeons. It would be important to have good markers of the postoperative course to tailor medical and surgical management. The aim of this retrospective study was to identify surgical risk factors for postoperative recurrence after primary ileocolic resection, and to evaluate possible prognostic factors that could help to optimize postoperative management.

PATIENTS AND METHODS: The medical records of patients who consecutively underwent ileocolic resection for CD between 1966 and 2011 and had been followed at our institution, were retrospectively reviewed. The diagnosis of CD was based on clinical, radiological and histological criteria. Recurrence was defined as the presence of symptoms attributable to CD and the presence of compatible lesions adjacent to the anastomosis in the resected bowel. The following variables related to surgical treatment were evaluated: age at time of surgery, surgical approach, indication for surgery, surgical technique, anastomotic configuration and postoperative complications. Univariate analysis was used to determine those factors related to recurrence and a multivariate logistic regression analysis was performed to identify independent prognosis factors for postoperative recurrence. Statistical significance was defined as $p < 0.05$.

RESULTS: A total of 214 patients were included in the study, 111were men and 103 women. The median age at the time of surgery was 34.1 years (IQR: 27.1–47.0). After a mean follow-up of 2.99 years (IQR: 0.9–6.8), the overalll cumulative recurrence rate was 76.8%. Overall, the disease-free rate at 12 and 24 months was 82.9% y 71.7% respectively. Patients who recurred were younger at time of resection (p50: 32.5 years; IQR: 26.9–46.0, p50: 39.0; IQR: 29.9–53.7, respectively; p = 0.027). Multivariate logistic regression analysis showed that anastomotic configuration (end-to-end or side-to-end) was a significant risk factor for recurrence (OR = 2.56, 95% IC = 0.93–7.03; p = 0.067). Regarding the disease-free interval after surgery, the laparoscopic approach was associated with longer time to recurrence (p = 0.020) in the univariate analysis, while the multivariate analysis showed that anastomotic configuration was a significant prognosis factor (HR = 2.11, 95% IC = 1.01–4.41; p = 0.047).

CONCLUSIONS: Surgical factors, such as the approach or the anastomotic configuration, are associated with an increased risk of recurrence, while others (indication for surgery and surgical technique) do not seem to have any relevance. These findings should be considered when an elective ilecolic resection for Crohn's disease is planned.

Tu1582

The Effect of Surgical Approach on the Use of Adjuvant Chemotherapy Following Low Anterior Resection for Rectal Cancer

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BACKGROUND: Adjuvant chemotherapy (AC) following proctectomy for locally advanced rectal cancer is recommended by current treatment guidelines. While laparoscopic low anterior resection (LAR) reduces peri-operative complications, no study has examined the effect of surgical approach on the potential to receive AC. This study aims to determine if a laparoscopic, compared to open, approach for LAR leads to increased use of AC.

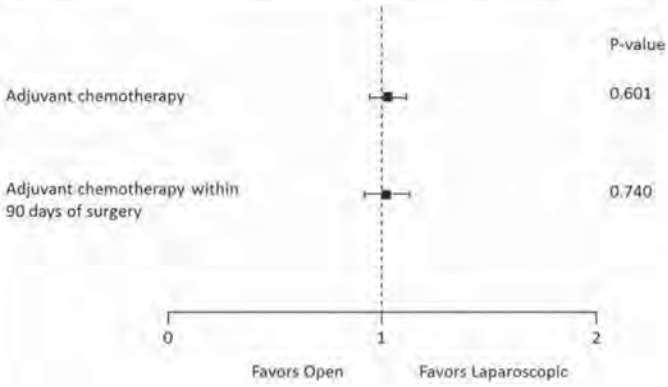
METHODS: Using the National Cancer Data Base, which documents patient demographics, tumor characteristics and survival outcomes for >70% of United States cancer cases, all patients with locally advanced rectal cancer (node positive or T3) from 2010–2011 were identified. Patients were stratified based on surgical approach, laparoscopic or open, and the primary outcomes of interest were receiving AC at anytime and within 90 days. The Chi-square test or Student's t-test were used for comparisons between the groups for categorical and continuous variables respectively. To adjust for non-random treatment choices a propensity analysis with inverse probability weighting (IPW) was conducted. Following adjustment, a weighted logistic regression analysis was done to examine the independent effect of surgical approach on likelihood to receive AC.

RESULTS: N = 10,572 patients with locally advanced rectal cancer were identified with 66.3% receiving an open LAR (n = 7,011) and 33.7% (n = 3,561) having a laparoscopic LAR. Unadjusted analysis revealed that a laparoscopic approach was more common in patients who were younger, of white race, who had private insurance, who had smaller tumors, clinical stage T1, T2, or N0, or who had not received neoadjuvant chemo or radiation therapy, however IPW adjustment eliminated these differences (see Table). Prior to adjustment, patients with a laparoscopic LAR were more likely to receive AC (45.3% vs. 41.5% in open patients; $p < 0.01$) and to have AC earlier following surgery (52.7 days v. 56.2 days for open patients; $p < 0.01$). While no significant difference was observed in rates of AC following IPW adjustment (43.1% v. 42.6% for laparoscopic compared to open; $p = 0.60$), the time to AC remained shorter for laparoscopic LAR patients (52.6 days vs. 55.8 days for open approach; $p = 0.01$) (Table). Weighted logistic regression analysis confirmed that surgical approach was not independently associated with receiving AC at anytime (Odds ratio [OR] = 1.02; $p = 0.60$) or within 90 days (OR = 1.02; $p = 0.74$) (see Figure).

Table: Unadjusted and IPW-Adjusted Patient and Operative Characteristics and Short-Term Outcomes

	Unadjusted			After IPW Adjustment		
Variable	**Open (n = 7,011)**	**Laparoscopic (n = 3,561)**	**P-value**	**Open (n = 7,011)**	**Laparoscopic (n = 3,561)**	**P-Value**
Age, years ± SD	62.2 ± 13.3	61.3 ± 13.2	0.002	61.9 ± 13.3	61.9 ± 13.2	0.909
Female Sex	41.9%	40.6%	0.195	41.4%	41.4%	0.945
White Race	85.6%	87.2%	0.008	86.1%	86.2%	0.994
Charlson co-morbidity score			0.226			0.976
0–1	94.3%	95.1%		94.5%	94.5%	
2+	5.7%	4.9%		5.5%	5.5%	
Treatment facility			<0.001			0.948
Comprehensive community cancer program	56.4%	60.5%		57.9%	58.2%	
Academic/research program	31.8%	32.5%		32.0%	31.8%	
Insurance			<0.001			1
Private	46.3%	53.7%		48.8%	48.7%	
Medicare	40.7%	36.9%		39.4%	39.4%	
Other	13.0%	9.4%		11.8%	11.9%	
Tumor Size ≥ 5.0 cm	39.2%	34.6%	<0.001	37.7%	37.9%	0.997
Clinical T Stage			<0.001			0.996
1–2	17.6%	23.4%		19.4%	19.2%	
3–4	82.4%	76.6%		80.6%	80.8%	
Clinical N Stage			0.028			0.953
0	62.1%	64.3%		62.8%	62.5%	
1	31.4%	30.3%		31.1%	31.2%	
2	6.5%	5.4%		6.1%	6.3%	
Neoadjuvant radiation therapy	49.7%	43.1%	<0.001	47.6%	47.9%	0.789
Neoadjuvant chemotherapy	49.9%	42.5%	<0.001	47.5%	47.7%	0.845
Outcomes						
Adjuvant chemotherapy	41.5%	45.3%	<0.001	42.6%	43.1%	0.601
Days from surgery to adjuvant chemotherapy (±SD)	56.2 ± 36.4	52.7 ± 30.7	0.008	55.8 ± 35.7	52.6 ± 30.9	0.014

Figure. Odds ratio of adjuvant chemotherapy with open vs. laparoscopic surgical approach



CONCLUSIONS: Use of AC following LAR for locally advanced rectal cancer confers a survival advantage and is recommended by current guidelines. While surgical approach was not associated with receiving AC, patients who had a laparoscopic LAR received AC earlier than those undergoing open LAR. Additional analysis of the effect of surgical approach for LAR on long-term survival and disease free interval is necessary.

Tu1584

Case-Matched Comparison of Laparoscopic Versus Open Ileal Pouch-Anal Anastomosis Assessing Small Bowel Obstruction and Incisional Hernia Rates

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BACKGROUND: There is scant data on the presumed long-term advantages of laparoscopic ileal pouch-anal anastomosis (IPAA) in reducing rates of small bowel obstruction (SBO) and incisional hernia (IH). This study investigated IH and SBO in contemporary patients treated with laparoscopic vs. open IPAA.

METHODS: Patients undergoing laparoscopic IPAA between 2008–2011, queried from a prospectively collected database were case-matched to open IPAA based on age (±5 years), extent of resection (completion proctectomy vs. proctocolectomy), gender and body mass index (±5 kg/m^2). Study endpoints including IH clinically detected by a physician, admissions to hospital and surgery for SBO, pouch excision and pouchitis were retrospectively obtained from a prospective database and patient charts as necessary. Laparoscopic abdominal colectomy followed by rectal dissection under direct vision (using lower midline or Pfannenstiel incision) and converted cases were analyzed within the laparoscopic group.

RESULTS: Out of 480 patients treated during the study period, 98 patients with laparoscopic IPAA were matched 1:2 with 196 patients having open IPAA. Mean follow-up (2.8 years vs. 2.6 years, respectively, p = 0.27) and anti-adhesion barrier use were similar between the groups. The incidences of IH, SBO requiring hospital admission and surgery, pouch excision and pouchitis were also comparable (Table). A subgroup analysis within the laparoscopic group comparing 28 patients with rectal dissection under direct vision vs. 70 patients with laparoscopic rectal dissection showed statistically similar incidence of IH (7.1% vs. 2.9%, respectively, p = 0.35), hospital admission and surgery for SBO (14.3% vs. 10%, p = 0.55 and 7.1% vs. 2.9%, p = 0.35, respectively).

Table: Comparison of Demographics and Long-Term Results Between Laparoscopic and Open IPAA

	Laparoscopic (N = 98)	Open (N = 196)	P-Value
Age	38.2 (13.5)	38.1 (13.2)	0.91
Female, gender	38 (38.8%)	76 (38.8%)	>0.99
Extent of resection			>0.99
Completion proctectomy	63 (64.3%)	126 (64.3%)	
Proctocolectomy	35 (35.7%)	70 (35.7%)	
Conversion	7 (7.1%)	N/A	
BMI, kg/m^2	25.6 (5.8)	25.6 (4.6)	0.62
Anti-adhesion barrier use	21 (21.4%)	32 (16.3%)	0.28
Follow-up, years	2.8 (1.5)	2.6 (1.5)	0.27
Incisional hernia	4 (4.1%)	20 (10.2%)	0.08
Midline	1	9	
Ileostomy site	2	11	
Umbilical port site	1	0	
Pfannenstiel extraction site	0	N/A	
Hospital admission for SBO	11 (11.2%)	22 (11.2%)	>0.99
Surgery for SBO	4 (4.1%)	13 (6.6%)	0.38
Pouch excision	5 (5.1%)	3 (1.5%)	0.12
Pouchitis	26 (26.5%)	40 (20.4%)	0.24

Values are reported as mean (SD) or absolute values (%).

CONCLUSION: Laparoscopic IPAA was not associated with a reduction in the incidence or surgery for SBO and offered only a marginal reduction in the IH rate when compared to open IPAA. The lack of these specific putative advantages of the laparoscopic approach should be discussed with patients when offering laparoscopic IPAA.

Tu1585

Influence of Body Mass Index (BMI) on Outcomes After Colorectal Surgery: Underweight More a Problem Than Obesity?

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BACKGROUND: While obesity is recognized as a risk factor for adverse outcomes, the impact of a low BMI has not been well characterized. In fact, patients who are underweight are often excluded from studies evaluating the influence of weight on outcomes.

METHODS: The National Surgical Quality Improvement Program (NSQIP) database was queried for colorectal operations from 2006–2011. Patients were divided into 4 groups: obese (OB; BMI > 30), overweight (OW; BMI = 25–29.9), normal weight (NW; BMI = 18.5–24.9) and underweight (UW; BMI < 18.5). Complications and 30-day mortality were compared between the 4 groups.

RESULTS: Of 27,616 patients, the mean age was 61.8 years, 13,542 (49%) were male, and the mean albumin for each group was >3.9 g/dl. OB patients had higher rates of acute renal failure (0.9%, p = 0.001), overall wound infection (17.1%, p < 0.001), and wound dehiscence (2.4%, p < 0.001) than the other groups (table). UW patients (when compared to NW, OW, and OB) were more likely to have pneumonia (p = 0.002), failure to wean from the ventilator (p < 0.001), prolonged length of stay (p < 0.001), and increased 30-day mortality (3.1%; p < 0.001). Reintubation and cardiac arrest were particularly high in the UW group (p < 0.02). Overall wound infection rates were generally lower in UW patients (9.1%) than the other groups (p < 0.001). Organ space infections were similar among the 4 groups (p = 0.579). Myocardial infarction (MI), cerebrovascular accident (CVA), and postoperative bleeding rates were also similar (p = 0.091, 0.833, and 0.976, respectively).

CONCLUSION: Although UW patients have a lower risk for SSI than patients who have normal weight, are overweight, or obese, they are surprisingly at significantly greater risk for several major general complications and mortality. These findings suggest the need for a focus on preoperative optimization and counseling for underweight patients that are at least on par with current practice for the overweight and obese.

Table: Demographics and Outcomes

Characteristic	BMI < 18.5 Underweight N = 767 (2.8%)	BMI = 18.5–24.9 Normal Weight N = 8333 (30.2%)	BMI = 25–29.9 Overweight N = 9535 (34.6%)	BMI ≥ 30 Obese N = 8949 (32.4%)	p-Value
Age (mean ± SD)	59.4 ± 19.6	61.2 ± 16.7	62.1 ± 14.2	59.8 ± 13.2	<0.001
Gender (female)	525 (68.4%)	4793 (57.5%)	4152 (43.5%)	4590 (51.3%)	<0.001
ASA3-5	408 (53.2%)	3481 (41.8%)	4000 (42.0%)	4693 (52.4%)	<0.001
Emergency operation	136 (17.7%)	954 (11.4%)	988 (10.4%)	892 (10.0%)	<0.001
Operative time (mean±SD)	150.4±90.6	159.3±87.8	170.2±88.1	181.3±93.9	<0.001
		Medical complications			
Pneumonia	36 (4.7%)	215 (2.6%)	251 (2.6%)	215 (2.4%)	0.002
Reintubation	27 (3.5%)	155 (1.9%)	203 (2.1%)	207 (2.3%)	0.01
Failure to wean	39 (5.1%)	211 (2.5%)	250 (2.6%)	306 (3.4%)	<0.001
Pulmonary embolism	4 (0.5%)	40 (0.5%)	64 (0.7%)	70 (0.8%)	0.09
Renal failure	4 (0.5%)	42 (0.5%)	51 (0.5%)	84 (0.9%)	0.001
Urinary tract infection	36 (4.7%)	281 (3.4%)	294 (3.1%)	336 (3.8%)	0.018
Myocardial infarction	1 (0.1%)	47 (0.6%)	46 (0.5%)	31 (0.4%)	0.09
Cerebrovascular accident	1 (0.1%)	23 (0.3%)	29 (0.3%)	24 (0.3%)	0.83
		Surgical complications			
Dehiscence	12 (1.6%)	87 (1.0%)	131 (1.4%)	210 (2.3%)	<0.001
Superficial SSI	40 (5.2%)	532 (6.4%)	771 (8.1%)	1027 (11.5%)	<0.001
Deep SSI	8 (1.0%)	105 (1.3%)	137 (1.4%)	188 (2.1%)	<0.001
Organ space SSI	30 (3.9%)	344 (4.1%)	370 (3.9%)	383 (4.3%)	0.58
Overall SSI	71 (9.3%)	930 (11.2%)	1216 (12.8%)	1526 (17.1%)	<0.001
Postop bleeding	5 (0.7%)	44 (0.5%)	52 (0.6%)	49 (0.6%)	0.98
Return to OR	57 (7.4%)	484 (5.8%)	581 (6.1%)	601 (6.7%)	0.04
Length of stay (mean ± SD)	9.3 ± 9.0	7.7 ± 7.5	7.63 ± 7.2	7.9 ± 7.9	<0.001
30-day mortality	24 (3.1%)	151 (1.8%)	120 (1.3%)	99 (1.1%)	<0.001

OR = operating room; SSI = surgical site infection

Tu1586

Impact of Colorectal and General Surgery Resident Participation on the Rate of Cecal Intubation in Colonoscopy

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PURPOSE: The U.S. Multi-Society Task Force on Colorectal Cancer states that a target for cecal intubation, as a measure of colonoscopy quality, should be at least 90% in all colonoscopies and at least 95% in screening colonoscopies. We examined colonoscopies performed by 5 board-certified colorectal surgeons in a fellowship program to identify the rate of incomplete colonoscopies and associated factors. All procedures were conducted in an ambulatory center. The mentorship colonoscopy training model was adapted, where colorectal and general surgery residents were paired up with a surgeon for all endoscopy procedures.

METHODS: A retrospective chart review from July 1, 2011, to August 31, 2013, was done. We identified all colonoscopies, and categorized them as complete only if an endoscopy report stated that the cecum had been intubated. We used the Chi-square, ANOVA, and t-tests to evaluate the association between a surgeon, trainee participation, gender, previous abdominal surgeries, point of termination, time to termination, and incomplete colonoscopies.

RESULTS: A total of 3,548 colonoscopies were conducted, of which 588 were screening. Incomplete colonoscopies constituted 65 (1.8%) of all colonoscopies, and included 12 (2%) of screening colonoscopies. Of 65 patients, 20 (31%) were men ($p < 0.01$). Residents and fellows participated in 41 (63%) of incomplete colonoscopies, the remaining 24 colonoscopies were conducted by surgeons alone (p 0.04). There was no significant difference in the gender distribution between the groups with and without trainees. The overall incomplete colonoscopy rates varied from 0.4% to 3.8% among the surgeons. Colorectal or general surgery resident participation didn't result in a statistically significant difference of an individual surgeon's incompletion rate (p 0.76). Time to termination was 18.8 minutes with a trainee involvement and 14.7 minutes when surgeons were doing endoscopy alone (p 0.089). Colonoscopy was most frequently terminated in sigmoid colon (57.8%), followed by the splenic flexure (15.6%) and hepatic flexure (7.8%) in both groups (p 0.01). There were no perforations. Propofol was administered to all patients by a CRNA. Of 45 female patients, 11 women (24%) had hysterectomies, and 11 additional patients had other previous abdominal operations. As a follow-up, 40 patients had normal barium enemas, 13 patients had surgery, and 6 patients had complete repeat colonoscopy.

CONCLUSIONS: In a colorectal fellowship program, the rate of incomplete colonoscopies was lower than set by the U.S. Multi-Society Task Force on Colorectal Cancer. The mentorship colonoscopy training model adapted by the program appears to be very safe and effective. It doesn't result in increased incompletion rates or complications.

Tu1587

Defunctioning Ileostomy Does Not Prevent Anastomotic Leaks After Restorative Proctocolectomy with Ileal Pouch-Anal Anastomosis in Patients Treated with Anti-TNF and Steroids

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INTRODUCTION: Anastomotic leakage (AL) is a serious complication after restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) that may lead to pelvic sepsis, poor pouch function and ultimately to pouch failure. Previous studies have shown significantly decreased leak rates in diverted patients with less severe clinical consequences. The last decade, a trend has been seen towards more extensive medical treatment in IBD patients, leaving refractory patients in a worse condition when it comes to surgery. Therefore, the aim of this study is to analyse whether a defunctioning ileostomy should be considered as standard care in patients undergoing IPAA.

METHODS: In a retrospective study, 621 patients undergoing IPAA for ulcerative colitis, indeterminate colitis or Crohn, were identified from prospectively maintained databases of three large IBD centers. The creation of an ileostomy was left at the discretion of the surgeon. AL was defined as any leak confirmed by either contrast extravasation on imaging or by re-laparotomy (grade A; antibiotics, B; drainage, and C; re-laparotomy).

RESULTS: In 305 patients (49.1%), an ileostomy was created during IPAA. A comparable overall leak rate was found in the stoma group when compared to non-diverted patients (16.7% vs. 17.1%, $p = 0.92$). As expected, a significantly higher number of patients required re-laparotomy in the non-diverted group (10.4% vs. 4.3%, $p = 0.003$), but there was no difference in both groups when combining the clinically relevant leaks (grade B and C; 15.2 vs. 13.8, $p = 0.65$). This unexpected finding of high leak rates despite stoma formation could probably be explained by the increased use of anti-TNF during the last three months (12.6% versus 4.6%, $p < 0.001$), increased steroid use (33.0% vs. 12.1%, $p < 0.001$), and weight loss (>5% of total bodyweight) (14.6% vs. 8.5%, $p = 0.02$) when compared to non-diverted patients. Multivariate analysis confirmed preoperative anti-TNF and steroid use as independent factors associated with the creation of an ileostomy. Despite having a protective stoma, a high leak rate (40.0% vs. 15.1%, $p = 0.02$) was found in patients treated with a combination of anti-TNF and steroids. The importance of these predictive variables was emphasized by the fact that patients undergoing subtotal colectomy and completion proctectomy with IPAA at a later stage (weaned of medication, increased weight) had a significantly decreased leak rate when compared to patients undergoing primary IPAA formation (11.6% vs. 20.7%, $p = 0.003$).

CONCLUSIONS: These results imply that in daily practice surgeons perform loop ileostomy in more fragile and disease affected patients. This strategy seems ineffective in the prevention of AL in these series implicating that a staged procedure, that is subtotal colectomy followed by completion proctectomy and IPAA after weaning of the medication, is more appropriate.

Tu1588

The Relationship Between a New Framework for Cancer Cachexia Based on the Glasgow Prognostic Score (GPS) and CT Body Composition Analysis in Patients with Colorectal Cancer

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BACKGROUND: Progressive involuntary weight loss in cancer (cancer cachexia) is increasingly recognised as part of syndrome associated with chronic activation of the systemic inflammatory response. Recently it has been proposed that inflammation based prognostic scores (GPS) could form the basis of a clinically useful definition of cancer cachexia (1). The aim of the present study was to examine the relationship between the GPS and CT body composition analysis in patients with primary operable colorectal cancer (CRC).

PATIENTS AND METHODS: 303 patients with primary operable CRC underwent image analysis of CT scans and total fat index (cm^2/m^2), subcutaneous fat index (cm^2/m^2), visceral fat index (cm^2/m^2) and skeletal muscle index (cm^2/m^2) were measured. These measurements were related to the GPS groupings of No Cachexia (CRP < 10 mg/l and albumin > 35 g/l), Malnourished (CRP < 10 mg/l and albumin < 35 g/l), Pre-Cachexia (CRP > 10 mg/l and albumin > 35 g/l) and Refractory Cachexia (CRP > 10 mg/l and albumin < 35g/l).

RESULTS: In contrast to the similar clinicopathological characteristics, compared with female patients (n = 136), male patients (n = 167) had an increased visceral fat index ($p < 0.001$) and skeletal muscle index ($p < 0.001$). Whereas, compared with male patients, female patients had an elevated subcutaneous ($p < 0.001$) and total fat index ($p = 0.001$). In both female and male patients with increasing cachexia, according to the above cachexia groupings, there was a progressive reduction in the skeletal muscle index ($p < 0.001$) but not in total fat index, subcutaneous fat index or visceral fat index.

CONCLUSIONS: The results of the present study, using CT body composition measurements, appear to confirm the clinical utility of a framework for cancer cachexia based on the GPS.

1. Douglas, E., McMillan, D.C., Towards a simple objective framework for the investigation and treatment of cancer cachexia: The Glasgow Prognostic Score. Cancer Treatment Reviews (2013), doi: http://dx.doi.org/10.1016/j.ctrv.2013.11.007

Tu1589

Early Versus Delayed Surgery in Patients with Medically Refractory Ulcerative Colitis Superimposed by Clostridium Difficile Infection

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BACKGROUND: Medically refractory ulcerative colitis (UC) superimposed by Clostridium difficile infection (CDI) is recently more frequently observed and can cause an increase in length of stay, hospital costs, morbidity and mortality. Limited data exist regarding the optimal timing of surgery in this group of patients. In this study we aimed to investigate the safety and outcomes of early colectomy in patients with medically refractory UC superimposed by CDI. We also aimed to compare the outcomes of these patients to their counterparts where colectomy is delayed until the initial CDI treatment with antibiotics was complete.

METHODS: All patients who underwent total abdominal colectomy due to active, refractory UC between January 2003 and January 2013 were reviewed for coexisting CDI. Patients were enrolled into two groups: Group A (n = 13); who completed full 10 days course of antibiotic therapy for CDI followed by total abdominal colectomy and end ileostomy; Group B (n = 21); who underwent upfront surgery without any delay for antibiotics. Demographics, comorbidities, body mass index (BMI) and UC-related parameters were compared. Intraoperative complications, the need for intensive care unit stay (ICU), mortality, 30-day reoperation and readmission rates, surgical site infection rate (SSI), return to bowel function and were assessed. The impact of two different approaches on future restorative attempts was also evaluated.

RESULTS: Both groups were similar in terms of demographics, BMI, comorbidities, medical treatment of UC, operation time, estimated blood loss and ICU requirement. There was no statistically difference in terms of wound infection ([30.8% vs. 9.5%], $p = 0.11$), ileus ([30.8% vs. 14.3%], $p = 0.25$), return to bowel function (2.23 [±1.8] vs. 2.14 [±1.3] days; $p = 0.73$), reoperation (1 [7.7%] vs. 2 [9.5%], $p = 0.85$) and readmission rates (0 vs. 2 [9.5%], $p = 0.15$). Intraoperative splenic injury was observed in one (7.7%) patient in group A ($p = 0.16$). Restorative proctocolectomy was completed for 9 (69.2%) patients in group A and in 18 (85.7%) patients in group B within a follow-up time of 12 months ($p = 0.25$).

CONCLUSION: Early colectomy can safely be performed in patients with medically refractory ulcerative colitis superimposed by Clostridium difficile infection with no difference in postoperative complications. Further randomized studies may potentially reveal superiority of upfront surgery.

Table: Characteristics and Outcomes of Patients who Underwent Early or Delay Surgery

	Antibiotherapy (N = 13)	Surgery (N = 21)	P-Value
Age	44.3 (19.2)	43.5 (20.1)	0.9
Male gender	9 (69.2%)	12 (57.1%)	0.47
Previous CDI	2 (15.4%)	2 (9.5%)	0.61
BMI, kg/m^2	23.7 (3.0)	22.6 (3.8)	0.4
Operative time, min	137.8 (59.3)	105.3 (43.3)	0.12
Reoperation	1 (7.7%)	2 (9.5%)	0.85
Readmission	0 (0%)	2 (9.5%)	0.15
Wound infection	4 (30.8%)	2 (9.5%)	0.11
Ileus	4 (30.8%)	3 (14.3%)	0.25
Return to bowel function	2.23 (1.8)	2.14 (1.3)	0.73
Estimated blood loss	238 (227.9)	140.8 (116.4)	0.18
Intensive care unit	1 (7.7%)	4 (19%)	0.34

Values are reported as mean (SD) or absolute values (%).

Clinical: Esophageal

Tu1591

Learning Curve for Combined Thoracoscopic and Laparoscopic Robotic-Assisted Minimally Invasive Esophagectomy Using a Four-Arm Platform

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PURPOSE: Robotic-assisted minimally invasive esophagectomy (RAMIE) using a 4-arm platform is a complex operation requiring a combined laparoscopic and thoracoscopic approach. Our objective was to evaluate the learning curve for this procedure using a dedicated operative team and a two-surgeon approach.

METHODS: We conducted a prospective observational study of sequential patients undergoing RAMIE from 1/25/2011 to 10/22/2012. Demographics, operative times and peri-operative outcomes were recorded.

RESULTS: 45 patients underwent RAMIE during the study period. Overall and inter-tertile patient demographics and outcomes are summarized in the table that follows. Median estimated blood loss, median hospital length of stay (LOS), conversions rates, median operative times, and major complications (≥grade 2 as defined by the Common Terminology Criteria for Adverse Events v. 3.0) decreased during the study period. Running median operative time per five cases is shown in the figure that follows. There was one death (2.2%) within 90 days of surgery.

CONCLUSIONS: RAMIE is a complex procedure with short-term outcomes comparable to open and standard minimally invasive procedures. Using a dedicated operative team and a two surgeon approach, we estimate that a learning curve of 30–35 cases is required to achieve acceptable outcomes.

Table: Patient Overall and Inter-Tertile Demographics and Short-Term Outcomes

Demographic/Data Point	Overall	First One-Third	Second One-Third	Third One-Third
Patients, no.	45	15	15	15
Mean age, years	62 (37–83)	62	60	62
Male, %	75			
Adenocarcinoma, %	84			
Induction chemoradiation, %	73			
Ivor-Lewis, %	75			
Complete resection (R0), %	81			
Median estimated blood loss, cc	250 (50–700)	350	300	200
Median lymph nodes, no.	21 (10–56)	21	19	24
Conversion to open surgery, %	24	33	13	7
Last 5 cases	0			
Median operative time, min	468 (283–807)	603	452	373
Last 5 cases	297 (283–374)			
Median length of stay, days	10 (7–70)	10	10	9
Last 5 cases	9 (7–9)			
Complications (CTCAE v3.0)				
Grade II	12/45 (27%)	40%	20%	20%
Grade III–IV	8/45 (17%)	33%	27%	0%
Grade V (death)	1/45 (2.2%)	7%	0%	0%
Anastomotic leak ≥ grade II	4/45 (9%)	13%	0%	7%

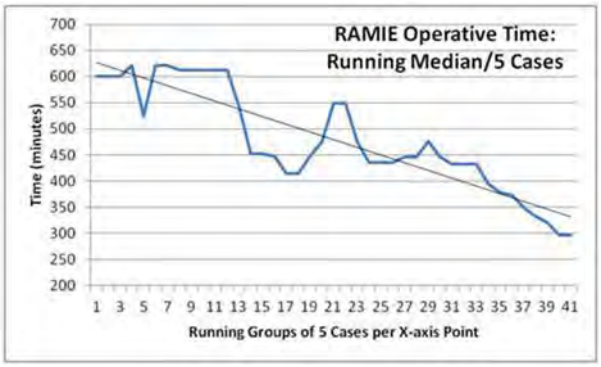

Figure: Running median operative time per five cases.

Tu1592

Is Resection of an Esophageal Epiphrenic Diverticulum Always Necessary in the Setting of Achalasia?

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BACKGROUND: Epiphrenic diverticulum (ED) of the esophagus is secondary to a primary esophageal motility disorder such as achalasia. While the recommended treatment includes esophageal myotomy and diverticulectomy, the outcome of patients in whom a myotomy without ED resection is performed is not known.

AIMS: The aim of this study was to compare the outcome of patients with ED who underwent ED resection and myotomy and those of ED patients who had a myotomy only.

METHODS: Retrospective review of a prospective database. Thirteen ED patients had symptoms evaluation, barium swallow, endoscopy and esophageal high resolution manometry. All patients underwent laparoscopic myotomy and Dor fundoplication. In 6 patients the diverticulum was resected (group A), while in 7 it was left in place (Group B; in 3 because it was small and in 4 for technical reasons).

RESULTS: Preoperatively all patients had dysphagia and 85% had regurgitation. The mean preoperative Eckardt score was 6.5 ± 2.1 in group A patients and 6.6 ± 3.3 in group B ($p = 0.9503$). Size of ED was 46.3 ± 5.5 mm in group A and 40.6 ± 22.5 mm in group B ($p = 0.5595$). High resolution manometry showed type II esophageal achalasia. One group A patient had a staple line leak. At a median follow-up of 2 years, the Eckardt score was 0 in group A and 0.1 ± 0.4 in group B ($p = 0.5553$).

CONCLUSIONS: The results of this study suggest that in selected patients with achalasia and ED: 1) a myotomy alone gives excellent results; and 2) the underlying motility disorder rather than the ED may be the cause of symptoms.

Tu1593

Time Trends and Relation of Stage and Tumor Size at Diagnosis in Gastrointestinal Cancer: A SEER Database Analysis with 496,051 Patients

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BACKGROUND: Widespread use of modern imaging techniques and screening programmes promise the detection of malignant disease at a smaller size and in an earlier, more curable stage but their effect in reducing the incidence of advanced disease is controversial. Our objective was to evaluate the time trends of tumor size at diagnosis in gastrointestinal (GI) cancer, assess the relationship of tumor size and stage and identify factors associated with an early diagnosis in a large population-based sample.

METHODS: Using the National Cancer Institute's Surveillance Epidemiology and End Results Database (1997–2010), a total of 496,051 patients with histologically proven GI malignancy (esophagus: 20,012; stomach: 37,958; colon: 285,859; rectum: 58,465; liver: 29233; pancreas: 60,016, gallbladder: 4,508) were identified. Tumor size at diagnosis and incidence of early stage and advanced disease for each cancer type were assessed and trended over the study period. Multivariate logistic regression was employed to identify factors predicting an early diagnosis, defined as tumor size <10 mm.

RESULTS: While median size of tumors at diagnosis decreased over the two decades of study in most types of GI cancer (esophagus: from 50 to 45 mm; stomach: 50–40 mm; colon: 43–42 mm; rectum: 40–35 mm; liver: 60–62 mm, gall bladder: 30–35 mm and pancreas: 40–36 mm), the incidence of advanced stage disease increased in all gastrointestinal malignancies (esophagus: from 6.4 to 12.5/100,000; stomach: 15.3–17.6/100,000; colon: 109.8–111.6/100,000; rectum: 16.1–23.2/100,000; liver: 4.4–12.7/100,000, gall bladder: 1.1–2.6/100,000 and pancreas: 18.6–53.9/100,000). Eighty-five percent of patiens diagnosed with a GI tumor smaller than 10 mm had early stage disease (esophagus: 73%; stomach: 84%; colon: 88%; rectum: 92%; liver: 76%, gall bladder: 78% and pancreas: 44%). Proportion of patients diagnosed with a tumor smaller than 10 mm remained <10% in all types of GI maligancy (except in patients with rectal cancer: 16%) even in 2010. Elderly white patients, those diagnosed earlier in the study period and living in areas with lower poverty rates were significantly less likely to be diagnosed with a tumor smaller than 1 cm (all $p < 0.01$).

CONCLUSIONS: Tumor size correllates with the distribution of stages in GI cancer: smaller lesions represent earlier stage disease. Despite considerable decreases in the median size of gastrointestinal tumors detected, this has not reduced the rate at which patients present with advanced disease. Further improvements are needed in early detection of GI malignancies.

Tu1594

Esophageal Adenocarcinoma Identified in Consecutive Patients Undergoing Laparoscopic Roux-en-Y Gastric Bypass

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More than one third of Americans are obese. Obesity is a risk factor for gastroesophageal reflux disease (GERD) and esophageal adenocarcinoma (EA). Obesity is one of the fastest growing diseases and the incidence of EA is increasing faster than any other malignancy in the US. The only durable treatment for obesity and its comorbid conditions is bariatric surgery. There is no consensus among bariatric surgeons regarding the role of screening endoscopy (EGD) in patients with GERD prior to bariatric surgery.

Two cases of incidental EA were identified by completion EGD following laparoscopic Roux-en-Y gastric bypass (LRYGB). EGD was done for anastomotic surveillance and provocative leak testing. Esophageal masses were identified and biopsies demonstrated adenocarcinoma.

The first patient is a 66-year-old man with a body mass index (BMI) of 48 and no history of GERD. He quit smoking 13 years prior to evaluation. He was found to have T1bN0M0 EA. Laparoscopic transhiatal esophagectomy (LTHE) was completed three months after LRYGB during which he lost 46 pounds. Final pathology revealed high-grade dysplasia arising in Barrett's esophagus. Length of stay was six days. His postoperative course was complicated by transient recurrent laryngeal nerve palsy and anastomotic stricture. Six months post resection his hoarseness and dysphagia had resolved and his BMI was 31.

The second patient is a 49-year-old man with a BMI of 45 and GERD. He used tobacco but quit two years prior to evaluation. He had T1bN1M0 EA and was treated with neoadjuvant carboplatin, paclitaxel and radiation. He lost 76 pounds in five months prior to LTHE. He had a complete pathologic response to neoadjuvant therapy. Length of stay was six days. He had an anastomotic leak which healed with stent placement. At follow-up two months post resection, his BMI was 30.

In both cases, LTHE was completed using the gastric remnant as conduit; the biliopancreatic limb was divided proximal to the jejunojejunostomy and anastomosed to the proximal roux limb to complete the reconstruction.

Obesity is a risk factor for GERD and EA. The role of EGD prior to bariatric surgery is unclear. Our group has performed over 4000 LRYGB with completion EGD prior to these two cases. Studies have demonstrated routine EGD prior to bariatric surgery may diagnose foregut pathology; however, few of the findings alter the planned treatment. The cost effectiveness of this strategy is questionable. There are reports of EA developing after bariatric surgery; however, we found no previous case reports of EA identified at LRYGB. LTHE is feasible after LRYGB. The conditioning of the gastric conduit and preoperative weight loss may be technically beneficial.

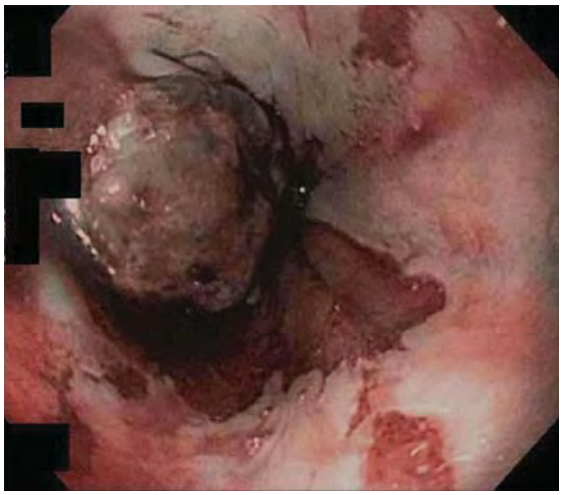

Figure 1: Patient One.

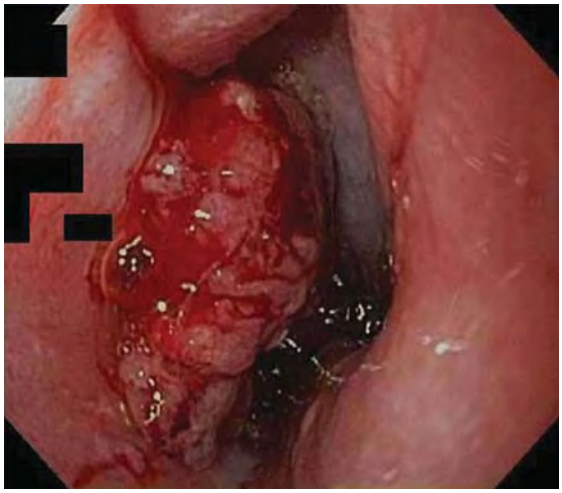

Figure 2: Patient Two.

Esophageal cancer in patients undergoing bariatric surgery is rare. It may be beneficial to define selection criteria for patients who may benefit from routine preoperative EGD.

Tu1595

Transoral Treatment of Achalasia: Combining Submucosal Myothomy with Transoral Funduplication

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Peroral endoscopic myotomy (POEM TM) is a novel approach to performing esophageal myotomy through a long submucosal tunnel and rapprents a feasible, safe, and effective treatment for achalasia. Recently, FDA approved a method for transoral stapled anterior funduplicatio (SRSTM). SRS TM Endoscopic Stapling System (Medigus, Tel Aviv, Israel) is an advanced endoscope procedure to create an effective reflux barrier, like a laparoscopic anterior funduplicatio, using two or three quintuplets of standard 4.8 mm titanium "B" shaped surgical staples.

OBJECTIVE: The aim of this study was to test the feasibility of combining the two procedures, thereby achieving a completely transoral myotomy with anterior fundoplication, functinally equivalent to the standard laparoscopic operation for achalasia.

DESIGN AND METHODS: The feasibility experiment was performed on a swine model at a laboratory certified according to the Israeli Animal Welfare Act. After induction of general anesthesia, a standard gastroscope was inserted into the stomach, and an overtube was slided into the mid-esophagus. A submucosal tunnel, starting about 5 cm above the GE junction and extending to 2 cm below it, was created, and the circular layer of esophageal muscle was incised using the POEM electrode. Following the myotomy, the SRS stapler was inserted through the overtube, and the fundus of the stomach was stapled over the myotomy, using three quintuplets of staples, in a semi-circle. At the end of the procedure, the animal was sacrificied, and the stomach with the distal esophagus were dissected out carefully, and examined macroscopically.

RESULTS: Macroscopically, the resulting fundoplication covered the distal half of the myotomized muscle, including the gastric part. No perforation was observed. The macroscopic apearance was similar to that of a standard anterior fundoplication.

CONCLUSIONS/EXPECTATIONS: It is feasible to combine the two procedures, at least in the swine model, and add a transoral reflux barrier to the submucosal myotomy. If the aganglionic segment is short (<3 cm) it is possible to cover all the myotomized esophagus with the fundus, which may reduce the risk of perforation. It is probably easier to to ensure that the myotomy is on the side of the esophagus covered by the fundic flap perform the stapling first, and start the myotomy between the two topmost quintuplets. Although further experiments are needed to optimize stapling location vis-a-vis the myotomy site, the combined procedure may enable the operator to achieve a result which is similar to the standard laparoscopic operation for achalasia, without violating the abodominal cavity, and without any incisions.

Tu1596

Increasing Tumor Length Is Associated with Increased Regional Lymph Node Metastases and Decreased Survival in Esophageal Cancer

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BACKGROUND: Depth of tumor invasion is a key factor in determining clinical and pathologic stage in esophageal cancer. The effect of increased tumor length on overall survival and staging has received less attention, but may be an equally important prognostic feature of a primary esophageal cancer.

METHODS: We reviewed final pathology reports of all patients in our esophageal cancer research database where tumor length was well documented. In order to eliminate treatment effect on tumor size only patients that did not receive neoadjuvant chemoradiation were included in the analysis. Association between tumor length and survival was assessed with a Cox proportional hazards model. Association with nodal involvement and resection used a linear regression model.

RESULTS: 86 patients undergoing esophagectomy from March 1995 to April 2013 were included in the analysis. 72 (85%) were men and the median age was 64. 74 (86%) of patients had adenocarcinoma (AC) and 12 (14%) had squamous cell carcinoma (SCC). Median tumor length was 2.8 cm, interquartile range (1.7, 5.0) and median number of nodes removed was 10 (5, 17). 16 (19%) patients received adjuvant chemotherapy or radiation, 63 (73%) did not, and the remaining 7 (8%) were unknown. For all patients a significant decrease in survival was seen with increasing tumor length (hazard ratio 1.18 for every 1 cm increase in tumor length, 95% CI 1.06–1.31, $p = 0.003$). On multivariate analysis, controlling for age, gender, number of positive lymph nodes, and adjuvant chemoradiation, there was decreased survival with increasing tumor length in all patients (HR 1.23, 95% CI 1.07–1.39, $p = 0.003$). A significant increase in positive lymph nodes was seen with increasing tumor length ($p < 0.001$) in all patients, while no difference was seen in total lymph nodes harvested.

CONCLUSION: The findings of this study suggest an important association between esophageal cancer tumor length and regional lymph node metastasis as well as overall survival. Future clinical staging of esophageal cancer may benefit from adding tumor length to current methods relying on depth of invasion (T status) and an estimation of positive lymph nodes from CT or EUS (N status).

Figure 1: Esophageal cancer overall survival by tumor length

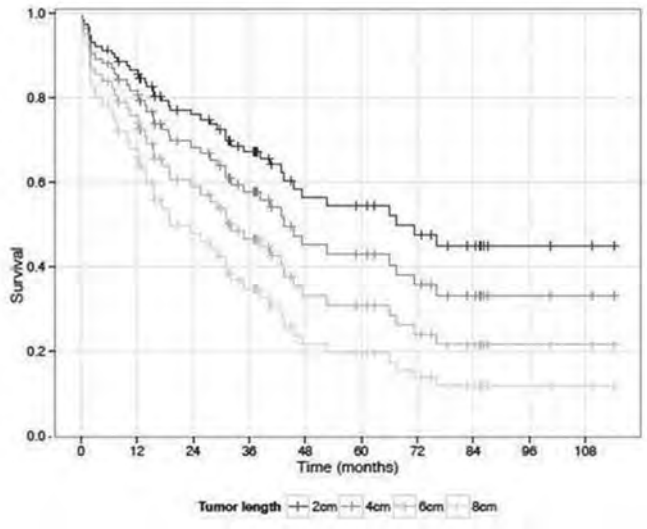
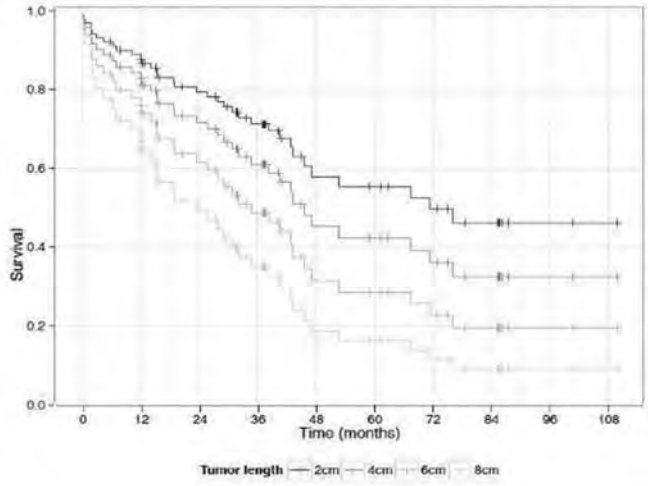


Figure 2: Adenocarcinoma overall survival by tumor length



Tu1597

Outcomes of Salvage Curative Intent Therapy for Recurrences of Esophago-Gastric Adenocarcinoma

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PURPOSE: Our objective was to characterize the isolated loco-regional and non-regional lymph node (LN) recurrences and outcomes after salvage therapy for esophageal and esophagogastric junction (EGJ) adenocarcinoma (ADC) patients treated with neoadjuvant docetaxel, cisplatin and 5FU (DCF) chemotherapy, curative intent en bloc resection, and extended lymphadenectomy (D2 or D3).

METHODS: A prospectively entered database of all esophageal and EGJ ADC patients resected at a high volume referral center was reviewed for cases treated with curative intent DCF and en bloc resection between 9/07–09/13. Follow-up included physical exam Q3m × 2 yrs then Q6m, and endoscopy and CT chest/abdo/pelvis performed Q6m. Loco-regional (biopsy on endoscopy/regional LNs) and non-regional LNs (mediastinal/retroperitoneal/supraclavicular LNs) recurrences were identified and salvage therapy outcomes were analyzed. Standard statistical techniques were used with data presented as median (interquartile range).

RESULTS: Of 365 patients in the database, 86 (85% Male, 63 yrs [IQR: 56–70]) patients with locally advanced ADC (cT3 93%; cN+ 69%) met inclusion criteria with a median follow-up of 40 mo (IQR: 20–53). Locoregional failures occurred in 2 patients (2%), 33 (38%) had solid organ and multiple metastasis, and isolated non-regional LN metastasis in 10 (12%) patients as mediastinal (1), supraclavicular (3), mesenteric (1) and retroperitoneal (5) recurrences. One third of these recurrences occurred within the first post-operative year of histologic diagnosis, and the majority (11/12) within the first 2 years with a median time to recurrence of 14 mo. Salvage chemoradiation was completed for 8 (67%) patients, chemotherapy for 3 (25%) and surgery in 2 (16%). Of 12 patients, 10 (83%) are still alive. The median follow-up post-recurrence was 33 mo (range: 5–54 mo) excluding patients diagnosed within the last calendar year.

One patient (1/12, 8%) has survived more than 4 years after salvage and is in complete remission; four patients (4/12, 33%) survived more than 2 years after salvage of which 3 patients are in complete remission and alive. Three patients (3/12, 25%) incurred disease progression despite salvage with one death. Four patients (4/12, 33%) have recent or ongoing salvage maneuvers (are within 8 mo of recurrence) with satisfactory response at the time of analysis.

CONCLUSION: We have demonstrated that in the absence of neoadjuvant chemoradiation, low rates of loco-regional recurrence can be achieved with en bloc resection and extended lymphadenectomy after neoadjuvant DCF. Furthermore, in a highly selected population, curative intent salvage maneuvers for loco-regional and non-regional LNs can successfully prolong survival and be potentially curative, highlighting the importance of surveillance especially in the first 2 years after diagnosis.

Tu1598

Esophageal Ulcers at an Urban Emergency Hospital: A Twenty Year Experience

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OBJECTIVE: This study assessed the incidence, etiologies, endoscopic and pathologic findings, and clinical outcomes of patients with esophageal ulcers seen in an urban acute care hospital over twenty years.

METHODS: This is a retrospective chart review of all upper endoscopies (EGD) performed by a single surgical endoscopist from January 1991 to December 2010. For all patients diagnosed with esophageal ulcer, a thorough review of the paper and electronic medical records was performed.

RESULTS: Out of 13,891 EGDs performed during the study period, there were 262 patients (pts) with esophageal ulcers for an incidence of 1.88%. The most common etiologies were gastroesophageal reflux disease (GERD; 59%), and drug induced (19.7%). Other causes included herpes simplex virus (7 pts), ingestion of a caustic substance (6 pts), Candida (5 pts), foreign body (5 pts), AIDS-related (3 pts), post-gastrectomy (2 pts), and esophageal diverticulosis (1 pt). The most common presenting complaints were nausea and vomiting, epigastric pain, and hematemesis (48, 45, and 35%, respectively). There were 12 deaths; most (11 pts) were due to comorbid diseases, whereas one death was a direct result of esophageal perforation.

CONCLUSIONS: Esophageal ulcer is a rare cause of upper gastrointestinal problems. Most are caused by GERD or drugs; the most common drugs are aspirin and ibuprofen. Mortality (4.6%) is due to comorbid disease, whereas perforation led to one death (0.4%).

Tu1599

Surgery for Early Esophageal Cancer: Operative Outcome and Long-Term Survival

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BACKGROUND: Early esophageal cancer is a curable disease with a favorable five-year survival. Surgery alone is considered to be the treatment of choice in such cases. Here we present our experience with early esophageal cancer.

PATIENTS AND METHODS: All patients with a diagnosis early esophageal cancer (T0-2N0) were operated with a curative intent between 2000 and 2012. A retrospective analysis of post operative outcomes as well as long term survival was performed.

RESULTS: There were 64 (46 males and 18 females, average age: 66) patients who were surgically treated for early esophageal cancer. There were 52 (81%) cases of adenocarcinoma and 12 cases of squamous carcinoma. High grade dysplasia (T0) was diagnosed in 8 (14.3% patients), T1 in 41 (65.1%) patients and T2 13(20.6%). There was no perioperative mortality. Overall morbidity rate was 33.9%. Crude 5-year survival rate was noted in 51 patients (79.6%). Of the 13 patients who died during the follow-up period, 4 died of recurrent or metastatic disease (24–47 months after surgery) and 9 died of other causes.

CONCLUSION: Surgical resection remains the treatment approach for early esophageal cancer. It can be safely performed with a relative low incidence of morbidity and mortality. It provides a 5-year median survival rate of 80%.

Tu1600

Adenosquamous Carcinoma of the Esophagus and Esophagogastric Junction: An Analysis of Clinical Manifestations and Surgical Outcomes

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BACKGROUND: Adenosquamous carcinoma (ASC) is a rare cell type of cancer, not only in the esophagus, but in the stomach. Its characteristics and surgical outcomes are still unclear. The aim of this study is to investigate the clinical presentation, the surgical outcome and the prognostic factors influencing survival.

PATIENTS AND METHODS: Between 1981 and 2011, 27 patients who were diagnosed with ASC of esophagus and esophagogastric junction and received operation with curative intent were retrospectively analyzed. The medical records of these patients were systematically reviewed. The clinicopathological parameters were evaluated including age, gender, main symptoms at presentation, tumor location, maximum size, pathological T&N status and survival. Tumor staging was classified according to the 7th edition of AJCC cancer staging system. The Kaplan-Meier method and the log rank test were used to calculate and compare the overall survival. The Cox proportional hazards were employed to identify independent prognostic factors.

RESULTS: There were 24 males and 3 females with a mean age of 66.1 years (range: 37–80 years). There were 13 smokers and 13 patients with alcohol habit. No one had betel nuts chewing history. The main symptoms were swallowing difficulty in 17 patients and body weight loss in 10 patients and the average symptoms duration was 3.4 months before admission for operation. Only one patient (1/27, 3.7%) could be diagnosed as ASC by preoperative endoscopic biopsy. Due to tumor location and preoperative biopsy result, 20 patients were considered as esophageal cancer that received esophagectomy with reconstruction, the other 7 patients were categorized as gastric cardia cancer that received total gastrectomy with Roux-en-Y esophagojejunostomy. There was one surgical mortality. The median follow-up period was 32 months (range: 0.5–12 months). The 3-year and 5-year overall survival rate were 50% and 33%, respectively. Univariate analysis showed that pathological T status, tumor maximum size and perineural invasion were prognostic factors for overall survival. Multivariate analysis showed that only tumor maximum size and perineural invasion were independent prognostic factors, shown in the following table.

Table: Multivariate Analysis of Prognostic Factors Influencing Overall Survival After Surgical Resection

Variable		Relative Risk (95% CI)	p-Value
Tumor maximum size		1.138–1.869	0.003
Perineural invasion	Absent	1	0.005
	Present	1.744–22.622	

CONCLUSIONS: ASC of esophagus and esophagogastric junction was rare cell type of cancer and difficult to categorize. It is difficult to diagnosis pre-operatively. Surgical resection is the primary treatment and the prognosis of ASC was better than that of squamous cell carcinoma of the esophagus. Tumor maximum size and perineural invasion were independent prognostic factors for overall survival in multivariate analysis.

Tu1601

Ten-Year Outcome of Treatment in Achalasia: Prospective Study of Surgical Myotomy and Pneumatic Dilatation, Single Institute in Thailand

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INTRODUCTION: Less was known regarding the effectiveness of surgical myotomy and pneumatic dilatation in the treatment of achalasia. This study aimed to compare the treatment outcome of surgical myotomy and pneumatic dilatation.

METHODS: Medical records of 85 patients diagnosed as achalasia (2002–2012) were reviewed. Only patients underwent surgical myotomy or pneumatic dilatation were included. Patients who lost to follow-up or had treatment other than surgical myotomy or pneumatic dilatation were excluded from the study. Standardized questionnaire of 4 symptoms were prospectively collected before and after treatment (August, 2013). These symptoms included dysphagia, regurgitation, chest pain and weight loss. Each symptom was scored range from 0 to 3 depending on symptom severity. Patients who had symptom score more than 2 or underwent second intervention were considered as unfavorable outcome.

RESULTS: There were 46 patients fit to the criteria. 23 patients underwent pneumatic dilatation and 23 patients had surgical myotomy. There was no treatment mortality. Ten-year favorable outcome was 80% for surgical myotomy and 43% for single pneumatic dilatation ($p = 0.001$). If repeated pneumatic dilatations were not considered as unfavorable outcome in pneumatic dilatation and symptom scores after last treatment were analysed, ten-year favorable outcome of pneumatic dilatation was comparable to that of surgical myotomy (75% vs. 80%, $p = 0.51$).

CONCLUSION: Surgical myotomy is more effective than single pneumatic dilatation in term of ten-year outcome for treatment of achalasia. However, if repeated pneumatic dilatation are included, ten-year outcome is comparable to that of surgical myotomy.

Tu1602

Esophageal Cancer Management: Preoperative CA19.9 and CEA Serum Levels May Identifiy Occult Advanced Cancer

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BACKGROUND: Esophagectomy is controindicated in case of advanced cancer (i.e., carcinomatosis, distant metastasis and invasion of other organs). In some cases, preoperative imaging may fail to identify advanced neoplasm and esophagectomy is inappropriatelly planned. Few data are available on preoperative biomarkers of occult advanced disease preventing radical esophagectomy. The aim of the study was to identify possible preoperative predictors of occult advanced disease that force surgeons to abort the planned esophagectomy.

METHODS: From 2008 to 2013, 192 consecutive patients were taken to the operative room (OR) to have esophagectomy for cancer in our department. All of them had blood test at admission and their preoperative biohumoral data were retrieved. Their medical history was collected and the intraoperative findings and outcome were recorded. Non parametric tests, multiple regression analysis and ROC curves analysis were performed.

RESULTS: In our study group, 10 (5.2%) patients, taken in the OR to have esophagectomy, were discovered to have occult advanced disease at laparotomy/laparoscopy or at thoracotomy. Four of them had peritoneal carcinomatosis, four had advanced tumour invading other organs, one had small liver metastasis and one pleural carcinomatosis. In all these cases, esophagectomy was aborted and a feeding jejunostomy was placed. In patients with occult advanced esophageal cancer CA19.9 and CEA serum levels were significantly higher than patients who could have esophagectomy ($p < 0.001$ and $p = 0.01$, respectively) while sodium and potassium levels were significantly lower. At multivariate analysis CA19.9 and CEA serum levels and neoadjuvant therapy resulted to be predictors of occult advanced disease preventing esophagectomy ($b = –0.34$, $p < 0.001$; $b = –0.28$, $p < 0.001$; $b = –0.15$, $p = 0.03$, respectively). CA19.9 and CEA resulted to be accurate biomarkers of occult advanced disease (AUC = 82%, $p < 0.001$ and AUC = 72%, $p = 0.01$, respectively).

CONCLUSIONS: Preoperative CEA and CA19.9 serum levels should be taken in consideration when evaluating patients candidate to esophagectomy for esophageal cancer to prevent inappropriate laparotomies or thoracotomies. If any doubt arise minimally invasive exploration is warranted.

Tu1603

Prophylactic Effect of Rikkunshito on Body Weight Loss and Malnutrition Accompanied with Anorexia in Esophageal Cancer Patients After Esophagectomy

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BACKGROUND: Esophageal cancer patients after esophagectomy will not only be in a malnutrition accompanied with anorexia, but also tend to cause dysfunction of digestion and absorption. Therefore, prophylaxes of body weight loss and malnutrition at an early stage after the operation lead to improvement of patient's quality of life (QoL). Rikkunshito, a traditional Japanese medicine, has been reported to attenuate dyspeptic symptoms and appetite loss after the gastrointestinal surgery, and its effect on ghrelin is attracting the most attention. The purpose of this study was to evaluate the prophylactic effect of rikkunshito on body weight loss and malnutrition accompanied with anorexia in esophageal cancer patients after esophagectomy.

METHODS: This study design was a prospective nonrandomized study. Forty patients with esophageal cancer who underwent esophagectomy from April 2011 to August 2012 at Wakayama Medical University Hospital in Japan were enrolled in this study. They were assigned to the following two groups; the control group (n = 20) and the rikkunshito group (n = 20). Patients in the rikkunshito group received 2.5 g of rikkunshito before every meal for 48 weeks after 4 weeks of the surgery. After the 48-week treatments of rikkunshito, we assessed body weight loss, the nutritional parameters (albumin, prealbumin, transferin, acylghrelin, desacylghrelin) and QoL (The Functional Assessment of Cancer Therapy-Esophageal (FACT-E) Scale). The primary endpoint was the rate of body weight loss in two groups after the 48-week treatments. The rate of body weight loss was calculated as follows: % = [(body weight before surgery)—(body weight 4, 13, 26 or 52 weeks after surgery)]/body weight before surgery × 100. The plasma ghrelin level was expressed as a percentage of the preoperative level.

RESULTS: There were no adverse effects on administration of rikkunshito. In the rikkunshito group, eighteen patients (90%) could take more than two-thirds of the amount of rikkunshito administration for 48 weeks. The rate of body weight loss after the 48-week treatments was significantly lower in the rikkunshito group than in the control group (the rikkunshito group; 11.8 ± 8.2%, the control group; 18.0 ± 6.9%, $p = 0.0161$). The acyl-ghrelin level after the 48-week treatments was significantly higher in the rikkunshito group than in the control group (the rikkunshito group; 131.7 ± 74.5%, the control group; 75.6 ± 47.5%, $p = 0.0391$). There was no significant difference in the other nutritional parameters and QoL scores between two groups.

CONCLUSION: Rikkunshito is useful to improve body weight loss and malnutrition in connection with increase of the plasma acyl-ghrelin level for esophageal cancer patients after esophagectomy.

Tu1604

Esophageal Shortening Ratio Provides a Simple Calculation to Predict Clinically Significant Esophageal Shortening in Patients with Giant Paraesophageal Hernias

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BACKGROUND: Clinically significant esophageal shortening (ES) in patients with giant paraesophageal hernias (PEH) can complicate the surgical repair. Accurate prediction of ES in patients with PEH would help guide operative planning. A validated pre-operative indicator of ES has yet to be described. The purpose of this study is to assess esophageal shortening ratio (ES ratio) utilizing esophageal length measured with high resolution manometry (HRM) as a predictor of ES in patients undergoing PEH repair.

METHODS: Between 1/2008 and 9/2013, 125 consecutive patients undergoing PEH repair at a single institution were entered in a prospectively maintained database. 102 patients with complete datasets were included. An ES group of 31 patients, defined by the surgeons intraoperative decision to perform a Hill repair with gastropexy or gastrostomy as a surrogate for ES, was compared to a non-ES group of 71 patients. Patient demographics, diagnostic results, intraoperative findings and outcomes were assessed. HRM was obtained pre-operatively in all patients and then retrospectively re-evaluated by a single gastroenterologist (C.M.) specialized in manometric interpretation. Manometric esophageal length was measured from the lower border of the upper esophageal sphincter and the upper border of the lower esophageal sphincter. ES ratio was calculated by dividing manometric esophageal length by body height.

RESULTS: Age, BMI, hernia type and manometric esophageal length were not statistically different between groups. ES patients were taller than non-ES patients (166 cm [160–178] vs. 160 cm [156–165], p = 0.002) and had a higher incidence of male sex (13 [42%] vs. 9 [13%], p = 0.001). However, when stratified by sex, there were no differences in height between ES and non-ES groups (males, p = 0.122; females, p = 0.464). Mean ES ratio was less in the ES group (9.3 ± 1.5% vs. 10.0 ± 1.3%, p = 0.01). In a multivariate logistic regression model, the odds of ES were 9.8-times greater in patients with an ES ratio less than 8.5%, and 3.4-times greater in patients with an ES ratio between 8.5% and 9.5%, when compared to those with an ES ratio of 9.5% or greater (95% CI 2.5–39.5, p = 0.001; 95% CI 1.2–10.0, p = 0.027). Additionally, the odds of ES was 6.1-times greater for males compared to females (95% CI 2.0–18.6, p = 0.001).

CONCLUSION: Patients with an ES ratio <8.5% have a greater chance of clinically significant ES, and thus may also require a more complex surgical repair. The ES ratio can be easily calculated with HRM, and may be an important measurement for operative planning.

Tu1605

Learning Curve for Minimally Invasive Trans-Thoracic Esophagectomy: A Single Center Experience

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BACKGROUND: Minimally invasive esophagectomy is rapidly gaining acceptance as the procedure of choice for esophageal resection. However, it requires advanced laparoscopic and thoracoscopic skills. A learning curve has not been defined for safety and oncological efficacy.

PURPOSE: Describe a learning curve for minimally invasive trans-thoracic esophagectomy (MIE) in terms of safety and oncological efficacy.

METHODS: After Institutional review board approval, a prospectively maintained database was queried to identify patients who underwent MIE for esophageal cancer between July 2003 and August 2013. Patients underwent either MIE or a hybrid procedure (either laparotomy or thoracotomy). Study patients were sequentially divided into 4 cohorts (24, 24, 24 and 23, respectively). Sigma plot® version 12.3 was used for statistical analysis.

RESULTS: Ninety-five patients (82 males) with a median age of 63 years (34–84) met inclusion criteria. There was no significant difference in terms of age, gender and diagnosis among the cohorts (refer to Table 1). Seventy nine patients (83%) had adenocarcinoma and 63 patients (66.3%) received neo-adjuvant therapy. There were 23 hybrids (12 planned and 11 conversions) and 72 totally MIE procedures with 53 intra-thoracic and 42 cervical anastomosis. Patients in the first cohort had more neck anastomosis than the following patients. There were no conversions in the most recent cohort (Table 1).

There was a significant decrease in mean operative time (429 ± 57 min to 340 ± 49 min, p < 0.001), decrease in median estimated blood loss (500 ml to 300 ml, p = 0.004), and increase in mean Lymph Node yield (18.5 ± 11.2 to 36 ± 26, p < 0.001) from the first to the last cohort. However, second cohort of patients experienced significantly higher intra-operative complications and severe post-operative complications (Clavien grade ≥ III). The second cohort of patients also experienced higher anastomotic leaks, chyle leaks, new onset atrial fibrillations and pulmonary complications (p = not significant) . Resection status was similar among the cohorts. Hospital stay ranged from 13 days (1st cohort) to 17 days (2nd cohort) (p = 0.06). There was an overall 5% in-hospital/30-day post-operative mortality (Table 2).

CONCLUSION: Progressive improvement in operative parameters along with improved lymphatic clearance was noted in our single center experience of Minimally Invasive Transthoracic Esophagectomies. Oncological efficacy was noticeable after the initial 24 patients, whereas more patient experience (up to 48) was needed to improve on intra-operative and post-operative complications.

Table 1

Variables	Cohort 1 (n = 24)	Cohort 2 (n = 24)	Cohort 3 (n = 24)	Cohort 4 (n = 23)	P-Value
Age (years)	60.9 ± 10	62.8 ± 10	66.6 ± 9.5	65.2 ± 10.8	0.23
Gender - Male	20 (83.3%)	19 (79%)	22 (91.6%)	21 (91.3%)	0.5
Neo-adjuvant treatment	17 (70.8%)	18 (75%)	18 (75%)	10 (43.5%)	0.06
Diagnosis (adenocarcinoma)	20 (83%)	19 (79%)	22 (91.6%)	18 (78%)	0.59
Neck anastomosis	24 (100%)	9 (37.5%)	5 (20.8%)	4 (17.4%)	<0.001
Conversion hybrids	1 (4%)	6 (25%)	4 (16.6%)	0%	.028

Table 2

Operative outcome	Cohort 1 (n = 24)	Cohort 2 (n = 24)	Cohort 3 (n = 24)	Cohort 4 (n = 23)	P-Value
Operative time (min)	429 ± 57	402 ± 48	373.5 ± 42	340 ± 49	<0.001
Blood Loss (ml)	500 (300–4500)	550 (225–1800)	400 (100–1450)	300 (75–1100)	0.004
Lymph node yield	18.5 ± 11.2	23 ± 16.5	22 ± 19.5	36 ± 26	<0.001
R0 resection	24 (100%)	21 (87.5%)	21 (87.5%)	20 (87%)	0.33
Intra-operative complication	4 (16.6%)	6 (25%)	9 (37.5%)	1 (4.3%)	0.04
Anastomotic leaks	2 (8.3%)	6 (25%)	6 (25%)	1 (4.3%)	0.09
Chyle leaks	3 (12.5%)	6 (25%)	5 (20.8%)	4 (17.3%)	0.7
New onset atrial fibrillation	7 (29%)	6 (25%)	7 (29%)	7 (30.4%)	0.9
Pulmonary complications	6 (25%)	7 (29%)	4 (16.6%)	5 (21.7%)	0.7
Severe post-operative complications (Clavien ≥ III)	5 (20.8%)	14 (58.3%)	8 (33.3%)	9 (39%)	0.05
Hospital stay (days)	13 (7–70)	17 (9–92)	15.5 (3–44)	15 (8–41)	0.06

Tu1606

Hypopharyngeal Multichannel Intraluminal Impedance Improves the Outcome of Antireflux Surgery on Patients with Laryngeal Symptoms

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INTRODUCTION: Patient selection is critical for the successful surgical treatment of gastroesophageal reflux disease (GERD). Previously, we established the normative data of laryngopharyngeal reflux (LPR) and high-esophageal reflux (HER: reflux up to 2 cm distal to upper esophageal sphincter) events for 24-hour hypopharyngeal multichannel intraluminal impedance (HMII). Based on the data, we have constructed the criteria to define "abnormal proximal exposure (APE)" as LPR ≥1/day and/or HER ≥5/day. Previous retrospective analyses have suggested that HMII may increase the sensitivity in selecting patients with LPR symptoms who likely respond antireflux surgery (ARS). The purpose of this study was to objectively evaluate the outcome of ARS on patients selected based on our criteria by using validated questionnaires.

METHODS: This is a retrospective review of prospectively collected data from patients who underwent HMII. Patients with APE as measured by HMII and subsequently underwent ARS, were identified. The outcome of surgery included improvement in clinical symptoms and quality of life, both of which were assessed based on the personal interview and the validated questionnaires such as GERD-HRQL, Respiratory Symptom Index (RSI) and SF-36 before and after ARS.

RESULTS: From September 2012 to October 2013, 171 patients underwent HMII. Of 118 patients with APE, 26 patients underwent ARS (7 men and 19 women; mean age 51.6). Twenty-one patients (81%) had LPR symptoms including cough (n = 20), throat burning (n = 3), cervical dysphagia (n = 3), throat tightness/pressure (n = 2), and hoarseness (n = 1). Of 21 with LPR symptoms, 11 (42%) had concomitant typical GERD symptom such as heartburn and regurgitation. The mean DeMeester score was 15.7 (range: 1–54.8) and 15 patients (58%) had negative DeMeester score. Clinical symptoms completely resolved in 20 patients (77%) and significantly improved in 5 patients (19%) at 6 weeks after the surgery. Anti-secretory medications were discontinued in 25 patients (96%) at a mean follow-up period of 2.1 months (0.36–5.3). Complete validated questionnaires before and after ARS were available for 11 patients. Of them, there was a significant improvement in GERD-HRQL (pre-op 20.7; post-op 6.9, p = 0.016) and RSI scores (pre-op 23.9; post-op 15, p = 0.001) post-operatively. However, there was no significant difference in SF-36 scores on either physical component scores (pre-op 33.6; post-op 32.8, p = 0.853) or mental component scores (pre-op 44.7; post-op 47.5, p = 0.49).

CONCLUSION: APE as measured by HMII, regardless of whether there is positive DeMeester score, may identify patients with laryngeal symptoms, who likely respond ARS, potentially improving the surgical outcome. Data set is currently being expanded and will be presented at the conference.

Tu1607

Impact of Venous Thromboembolism on Outcomes After Esophagectomy for Esophageal Cancer

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BACKGROUND: Esophagectomy for esophageal cancer is one of the more morbid surgical procedures in practice today. Emphasis has been placed on preventing venous thromboembolism (VTE) after surgery. However, limited reports exist on how VTE impacts outcomes and resource utilization after esophagectomy.

OBJECTIVE: Evaluate the impact of venous thromboembolism (VTE) on outcomes and resource utilization after esophagectomy for esophageal cancer.

METHODS: Retrospective review of the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) 2011–2012 database was performed to identify patients who underwent elective esophagectomy for esophageal cancer. Patient who developed deep venous thrombosis or pulmonary embolism within 30 days of surgery were categorized as having VTE.

RESULTS: One thousand one hundred and three patients satisfied study criteria. Fifty-four patients (4.9%) developed VTE. VTE patients were significantly older (mean: 66.6 years vs. 63.9 years, $p = 0.04$), more likely to have received neo adjuvant therapy (75% vs. 42%, $p = 0.02$), had a preoperative myocardial infarction (8.3% vs. 0.8%, $p = 0.009$) and have a higher American Society of Anesthesiologists' (ASA) class ($p < 0.001$), than patients without VTE. There was no significant difference between the groups in terms of gender, type of esophagectomy performed, history of pulmonary disease. Operative time in minutes was longer in patients with VTE (mean: 393.5 vs. 354.6, $p = 0.03$). Patients with VTE had a significantly higher incidence of postoperative pulmonary complications like pneumonia (25.9% vs. 13%, $p = 0.007$), had difficulty being weaned of the ventilator (31.5% vs. 10.3%, $p < 0.001$), and were more likely to be reintubated (25.9% vs. 10.5%, $p < 0.001$). VTE patients have a significantly longer hospital stay (mean: 20.4 days vs. 14 days, $p = 0.01$) and higher 30-day readmission rate (29.6% vs. 11.5%, $p < 0.001$). Thirty-day mortality was higher in patients with VTE (5.5% vs. 3.05%, $p = 0.24$). On multivariate regression analysis, ASA class was significantly ($p = 0.04$) associated with VTE.

CONCLUSIONS: Patients undergoing esophagectomy for esophageal cancer are at a high risk for VTE. VTE significantly adds to the morbidity associated with an esophagectomy resulting in increased resource utilization. Stringent peri-operative prophylaxis is needed to combat this dreaded complication.

Clinical: Hepatic

Tu1608

Risk Factors for 30-Day Readmissions After Hepatectomy: Analysis of 2,444 Patients from the ACS-NSQIP Database

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BACKGROUND: With optimization of surgical technique and perioperative care, the mortality rate from hepatectomy has declined substantially over the last two decades. Readmission rate has been proposed as a primary endpoint for quality assurance in addition to the traditional measures of morbidity and mortality. The aim of this study was to identify risk factors associated with unplanned readmissions following hepatectomy.

METHOD: Patients who underwent hepatectomies between January–December 2011 were identified using the ACS-NSQIP procedure-specific database. A multivariable logistic regression analysis was performed to determine predictors of unplanned readmissions related to the procedure (UPRR) within 30 days.

RESULT: Unplanned rehospitalization occurred in 10.5% of patients undergoing hepatectomy in this national cohort. On multivariate analysis, transfusion within 72 hrs (odds ratio [OR] 1.74, $p < 0.001$), complexity of procedure (extended, OR 1.84, $p = 0.004$; right hepatectomy, OR 1.66, $p = 0.003$), and longer operative time (> median 320 min, OR 2.43, $p < 0.001$) were independent perioperative predictors of UPRR. Independent preoperative risk factors included elevated alkaline phosphatase (OR 1.45, $p = 0.017$), hypoalbuminemia (OR 1.30, $p = 0.036$), and bleeding disorder (OR 1.72, $p = 0.051$).

CONCLUSION: Transfusion, complexity of procedure, and duration of operation were the strongest predictors of unplanned readmissions after hepatectomy. These risk factors help identify patients at greater risk of unplanned readmission in order to optimize preoperative screening strategies and preventive measures at time of discharge.

Tu1609

Sorafenib Use After Prior Surgical Resection or Transplant in Hepatocellular Carcinoma: US Regional Analysis of GIDEON

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BACKGROUND: Experience using sorafenib (SOR) after prior surgical resection (PSR) or transplant (OLT) for recurrent hepatocellular carcinoma (HCC) is limited. GIDEON is a global, prospective, non-interventional study to evaluate SOR safety under real-life conditions. We aimed to examine US patients (pts) who received SOR for recurrent HCC after PSR or OLT. The GIDEON registry contains one of the largest data series collected in US pts.

METHODS: Pts with unresectable HCC who were candidates for systemic therapy and for whom a decision was made to treat with SOR were eligible for inclusion; pts may have undergone PSR or OLT. Disease characteristics, safety, and treatment duration were evaluated. All results are descriptive.

RESULTS: In the US, 563 pts were evaluable for safety. 53 had PSR, 27 had OLT, and 6 had both. Median time in months from PSR to start of SOR was 9.3 (range: 0.7–61.3) and from OLT was 23.7 (range: 1.2–78.3; data were missing for 7 [26%] pts). Median SOR doses were similar among all groups (Table). Grade 3/4 serious adverse events (SAEs) were 32%/8% for pts with PSR and 31%/6% without PSR; 4%/4% for pts with OLT and 14%/5% without OLT. Grade 3/4 drug-related SAEs (DRSAEs) were 42%/6% for pts with PSR and 20%/2% without PSR; 11%/4% for pts with OLT and 4%/1% without OLT. Treatment-emergent deaths occurred in 26% of PSR pts, 33% of pts without PSR, 22% of OLT pts, and 33% of pts without OLT. No drug-related deaths occurred in PSR or OLT patients (<1% overall). Median overall survival [95% confidence interval] in the ITT population (n = 553) from start of SOR was 471 (284–689) days for PSR and 338 (234–910) days for OLT.

CONCLUSIONS: SOR after PSR or OLT was well tolerated in this real-life setting. PSR or OLT pts experienced a similar or reduced frequency of SAEs compared with those with no PSR or OLT. However, DRSAEs were more frequent. PSR and OLT pts had better preserved liver function and longer SOR treatment duration than those without. Safety profiles are consistent with SOR clinical trials with no new findings. Despite the small number of PSR and OLT pts, GIDEON represents the largest US experience currently available.

% (Unless Indicated Otherwise)	Recurrent HCC After Resection n = 53	No Prior Resection n = 510	Recurrent HCC After OLT n = 27	No Prior OLT n = 536
Etiology[1]: HBV/HCV/alcohol use	25/40/17	13/57/42	22/63/44	14/54/54
BCLC stage at SOR initiation: A/B/C/D/NE	8/15/42/4/32	10/12/36/13/29[2]	4/4/37/11/44	10/13/36/12/29[3]
Child-Pugh at SOR initiation: A/B/C/NE	53/23/2/23	32/32/8/28	63/0/0/37	33/32/8/27[4]
Max tumor size at SOR initiation: median (range)	3.2 (0–13)	5.2 (0–23)	2.7 (0–10)	5.0 (0–23)
Extrahepatic spread at study entry	40	29	70	28
AFP at SOR initiation: <400/≥400	60/19[5]	49/34[6]	59/11[7]	49/34[8]
Median average daily dose, mg (range)	488 (200–800)	546 (112–800)	557 (209–800)	526 (112–800)
Median (range) treatment duration, months	23 (1–110)	12 (1–131)	22 (1–112)	12 (<1–131)[9]

[1]May have more than 1; [2]Missing for 1 pt; [3]Missing for 1 pt; [4]Missing for 1 pt; [5]Unknown for 11 pts; [6]Unknown for 86 pts; [7]Unknown for 8 pts; [8]Unknown for 90 pts; [9]Missing for 12 pts. AFP, α-fetoprotein; BCLC, Barcelona Clinic Liver Cancer; HBV/HCV, hepatitis B/C virus; HCC, hepatocellular carcinoma; NE, not evaluable; OLT, orthotopic liver transplant; SOR, sorafenib

Tu1610

Laparoscopic Microwave Ablation (MWA) Is an Efficacious, Novel Modality in the Treatment of Hepatic Adenomas

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INTRODUCTION: Conventional treatment for symptomatic and large hepatic adenomas is resection. There is significant morbidity and mortality associated with major hepatic resections. We hypothesize that MWA is equally efficacious in treating hepatic adenomas, with a reduced risk profile.

METHODS: A single center retrospective analysis was performed from 2007–2013. A total of 134 patients were identified with benign hepatic lesions. 34 patients had hepatic adenomas of which 25 were symptomatic (pain/compression of surrounding structures/bleeding) and required surgical intervention. They were subdivided into 2 groups based on clinical presentation, either intact or ruptured. Size of lesion, operative time, intraoperative blood loss and length of stay were compared between groups using paired t-test. One-year follow-up CT or MRI was reviewed for patients who underwent MWA to assess for disease recurrence.

RESULTS: All patients were female, median age was 36.5 (20–49). 9 patients were treated with MWA and 17 had a resection. Length of stay (days), operative time (min), and blood loss (cc) were analyzed (see Table). Smaller lesions were favored for microwave ablation. There was no evidence of recurrence on 1-year follow-up imaging.

Table: Results

Hepatic Adenoma	MWA	Resection	p-Value (*<0.05)
Intact	8	12	
Ruptured	1	5	
Number of lesions	10	20	
Size of lesion (cm)	4.1	7.3	0.014*
Operative time (min)	98	145	0.064
Intraoperative blood loss (cc)	70.6	830	0.029*
Length of stay (days)	1.4	7.4	0.038*

CONCLUSION: Laparoscopic microwave ablation is an efficacious mode of treatment in select patients with hepatic adenomata (intact or ruptured), with a reduced risk profile and better resource utilization. Laparoscopic microwave ablation could be considered as an alternative to resection, when feasible.

Tu1613

The Validity of Nonalcoholic Fatty Liver Disease Diagnosis in Veterans Affairs Administrative Databases

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INTRODUCTION: Administrative data is often used to analyze clinical outcomes among large patient cohorts with common disorders. Yet few studies have defined the validity of the nonalcoholic fatty liver disease (NAFLD) diagnosis in administrative data despite the fact that NAFLD is the most common chronic liver disease in the United States. The aim of this study is to compare the accuracy of the NAFLD diagnosis without the presence of other chronic liver diseases using International Classification of Diseases-9 (ICD-9) codes in administrative data with that obtained from medical record review using Veterans Affairs (VA) sources.

METHODS: VA Patient Treatment File and Outpatient Care File databases from 2010–2011 were searched for patients assigned a discharge or encounter ICD-9 diagnosis code of 571.8 (other chronic nonalcoholic liver disease). Patients with ICD-9 diagnosis codes representing any other chronic liver diseases and/or alcohol abuse/dependence were excluded. Using the Compensation and Pension Records Interchange (CAPRI), each corresponding electronic medical record was reviewed for the actual presence of NAFLD (determined by radiologic imaging revealing hepatic steatosis), other chronic liver diseases, and a history of alcohol abuse/dependence.

RESULTS: Of the 17,731 veterans who had an ICD-9 discharge or encounter diagnosis of NAFLD and without ICD-9 codes representing other chronic liver diseases or alcohol abuse/dependence, medical records of a randomly chosen 5.0% (n = 888) were reviewed. On chart review, 757 (85.2%) of these veterans had computed tomography or ultrasound imaging describing hepatic steatosis and no history of other chronic liver diseases or alcohol abuse/dependence. 43 (5.7%) veterans with NAFLD and no history of other chronic liver diseases or alcohol abuse/dependence used medications known to cause hepatic steatosis. In contrast, 131 (14.8%) veterans without ICD-9 codes representing other chronic liver diseases or alcohol abuse/dependence had a history documented in the medical record of other etiologies of chronic liver disease; including autoimmune hepatitis (n = 1, 0.001%), hepatitis B viral infection (n = 1, 0.001%), hepatitis C viral infection (n = 1, 0.001%), and alcohol abuse/dependence (n = 128, 14.4%).

CONCLUSION: Use of ICD-9 diagnosis codes to determine the presence of NAFLD and the absence of other etiologies of chronic liver diseases in VA administrative data is predictive of the presence of NAFLD without other chronic liver diseases as documented in medical records. A history of alcohol abuse/dependence is the most common alternate etiology of chronic liver disease not captured by VA administrative data. ICD-9 diagnosis codes can be reliably used for clinical outcomes research in NAFLD.

Clinical: Pancreas

Tu1614

Braun Enteroenterostomy Affects Delayed Gastric Emptying After Pylorus-Preserving Pancreatoduodenectomy: A Retrospective Review

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BACKGROUND: Delayed gastric emptying (DGE) is one of the most common adverse events after pancreatoduodenectomy. DGE is not a life-threatening complication and can be treated conservatively; however, it results in a prolonged hospital stay, which increases costs and affects quality of life. Various surgical techniques to reduce the incidence of DGE have been reported, and several recent studies have suggested that enteroenterostomy between the afferent and efferent limbs distal to the gastroenterostomy site during conventional pancreatoduodenectomy might decrease DGE. This anastomosis is known as Braun enteroenterostomy (BEE). However, the advantages and disadvantages of performing BEE during pylorus-preserving pancreatoduodenectomy (PPPD) remain controversial. The aim of this study was to evaluate the effect of BEE during PPPD on the postoperative course.

METHODS: The medical records of consecutive 185 patients who underwent PPPD either with or without BEE between January 2008 and June 2013 were retrospectively reviewed. We have been routinely performing BEE during PPPD at our institution to date, while we did not perform BEE between May 2010 and February 2013 to evaluate the effect of BEE on the postoperative course. The postoperative clinical course including complications was compared between the two groups.

RESULTS: Ninety-eight patients underwent PPPD with BEE and 87 without BEE. Table 1 shows that there was no differences in the patients' background characteristics between the two groups. The operation time was significantly shorter in the group without BEE than that with BEE ($P < 0.01$). Table 2 shows comparison of the postoperative course, and DGE occurred more frequently in patients without BEE (21%) than those with BEE (4%) ($P < 0.01$). The addition of BEE did not affect postoperative complications other than DGE, and no complications directly attributed to BEE were observed. By univariate analysis to evaluate the predictive factors for DGE, the omission of BEE and shorter operative time were significant factors associated with DGE. By multivariate analysis, the omission of BEE was the only independent factor associated with DGE (odds ratio of 5.04, 95% confidence interval: 1.59–19.66; $P < 0.01$).

CONCLUSIONS: BEE during PPPD can lead to a significant reduction in the incidence of DGE, while is not associated with other adverse events. Therefore, BEE is recommended during PPPD.

Table 1: Comparison of the Patients' Background Characteristics and Operative Details Between the Two Groups with and without Braun Enteroenterostomy

	With Braun Enteroenterostomy (n = 98)		Without Braun Enteroenterostomy (n = 87)		P-Value
Background Characteristics	**Value**	**%**	**Value**	**%**	
Age, years	67 (22–85)		70 (27–91)		0.31
Gender					0.77
Male	57	58	47	54	
Female	41	42	40	46	
Body mass index, kg/m^2	21.3 (14.2–31.3)		22 (14.8–32.7)		0.18
Albumin, g/dL	4.0 (2.7–4.8)		3.9 (2.4–5.0)		0.12
Benign/Malignant tumors					1.00
Benign tumors	17	17	15	17	
Malignant tumors	81	83	72	83	
Pancreatic adenocarcinoma	37	38	29	33	0.54
IPMN†	21	21	16	18	0.71
Bile duct carcinoma	17	17	18	21	0.58
Ampullary adenocarcinoma	14	14	15	17	0.69
Neuroendocrine tumor	5	5	4	5	1.00
Liposarcoma	1	1	1	1	1.00
Other disease	3	3	4	5	0.71
Operative details					
Operation time, min	475 (255–914)		380 (228–662)		< 0.01
Intraoperative bleeding, mL	800 (191–3889)		710 (97–3202)		0.20
Intraoperative blood transfusion	20	20	13	15	0.34

The value is expressed as median (range), or the number of the patients. †IPMN, intraductal papillary mucinous neoplasm

Table 2: Comparison of the Postoperative Course Between the Two Groups with and without Braun Enteroenterostomy

	With Braun Enteroenterostomy (n = 98)		Without Braun Enteroenterostomy (n = 87)		P-Value
	Value	%	Value	%	
Delayed gastric emptying	4	4	18	21	<0.01
Pancreatic fistula	21	21	22	25	0.60
Intra-abdominal hemorrhage	2	2	0	0	0.50
Bile leakage	1	1	1	1	1.00
Intra-abdominal abscess	3	3	3	4	1.00
Bowel obstruction	1	1	2	2	0.60
Wound infection	9	9	10	12	0.64
Pulmonary complications	1	1	2	2	0.60
Cholangitis	6	6	5	6	1.00
Pancreatitis	2	2	1	1	1.00
Pseudomembranous enteritis	3	3	0	0	0.25
Sepsis	3	3	3	4	1.00
Anastomotic site ulceration	4	4	1	1	0.37
Overall intra-abdominal complications	31	32	30	35	0.75
Relaparotomy	0	0	2	2	0.22
Days until regular diet was tolerated orally	7 (2–37)		7 (3–36)		0.90
Reinsertion of nasogastric tube	2	2	6	7	0.15
Postoperative hospital stay, days	23 (12–151)		22 (10–111		0.29
Readmission	5	5	8	9	0.39

The value is expressed as median (range), or the number of the patients. Overall intra-abdominal complications include patients with pancreatic fistula, hemorrhage, bile leakage, intra-abdominal abscess, cholangitis, and pancreatitis. When two or more complications occurred in one patient, they were regarded as a single consequence.

Tu1615

Prognostic Value of Additional Pancreatic Resection for Cancer Positive Cut Margins During Pancreaticoduodenectomy for Pancreatic Head Cancer

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BACKGROUND: Invasive ductal carcinoma of the pancreas often shows microscopic infiltration in the peripheral pancreatic parenchyma. Because this infiltration is difficult to recognize on preoperative imaging, invasive cancer at the pancreatic cut margin may be observed during pancreatectomy. However, the prognostic significance of additional pancreatic resection to achieve a final negative margin has not been determined.

PATIENTS AND METHODS: We retrospectively reviewed the records of 308 consecutive patients who underwent pancreaticoduodenectomy (PD) for pancreatic cancer, excluding invasive intraductal papillary mucinous carcinoma, at our hospital from 2000 to 2012. All patients underwent intra-operative frozen section analysis (IOFSA) of the pancreatic stump, with the need for additional pancreatic resection determined by the operating surgeon. Patients who underwent R2 resection, were positive for lavage cytology or para-aortic lymph node metastasis, received preoperative chemotherapy, or died in-hospital were excluded. Based on the final pathologic diagnosis of pancreatic cut margins, patients were divided into three groups: initial margins negative for invasive cancer (Group A); initial margins positive for invasive cancer, but negative after additional pancreatic resection (Group B); and final margins positive for invasive cancer (Group C). Patients who required conversion to total pancreatectomy (TP) were included in Group B. The clinicopathological characteristics and prognoses of the three groups were compared.

RESULTS: IOFSA of the initial pancreatic stump showed that 71 patients harbored invasive cancer, 20 had PanIN3 and 25 had PanIN1 or 2. Additional pancreatic resection was performed in 99 patients, with 76 patients undergoing one, 14 undergoing two, four undergoing three, and five undergoing four or more resections. Eight patients required conversion to TP. IOFSA results were inconsistent with the final pathological diagnosis in 7 patients. Groups A, B and C consisted of 234, 63 and 11 patients, respectively, with median survival times of 31, 24, and 11 months, respectively, and 3-year survival rates of 44%, 40%, and 11%, respectively (A vs. B; P = 0.410, A vs. C; P = 0.001, B vs. C; P = 0.012, Figure 1). Patients who underwent TP had a median survival time of 24 months and a 3-year survival rate of 43%. Rates of lymph node metastasis, R1 resection, portal vein resection and severe perineural invasion were significantly higher in Groups B and C than in group A. Survival was similar among the 85 patients in Groups A, B and C who underwent R1 resection (Figure 2).

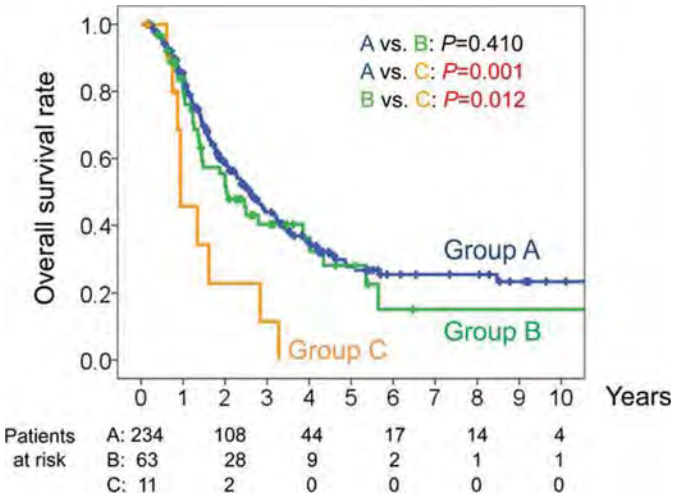

Figure 1

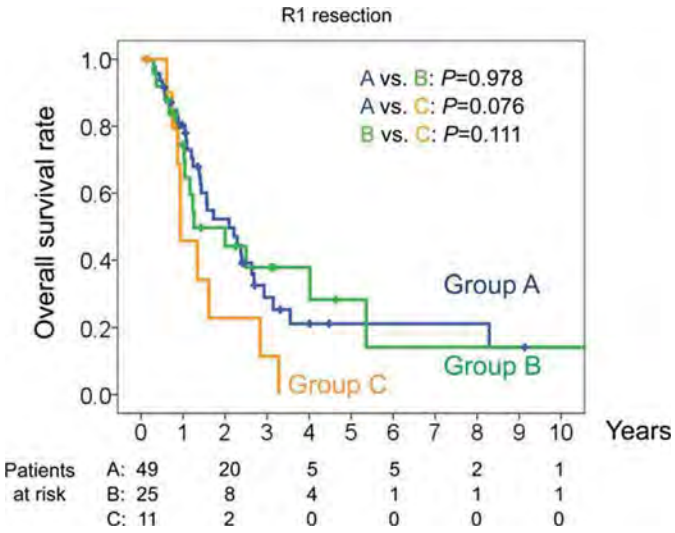

Figure 2

CONCLUSION: Pancreatic margin status during PD should be confirmed, even if a curative resection is macroscopically expected. Additional pancreatic resection to achieve negative cut margins may improve postoperative survival.

Tu1616

MRI Liver in Pancreatic Cancer: A Game Changer

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BACKGROUND: Pancreatic cancer is one of the leading causes of cancer mortality. Surgery is the only chance of cure, but is inappropriate for patients with metastasis.

AIM: To evaluate the frequency of liver metastasis on MRI in patients with resectable pancreatic cancer and normal liver on contrast enhanced MDCT.

METHODS: Between April 2012–13, all patients with resectable pancreatic cancer based on CT staging underwent MRI liver utilising hepatocyte-specific contrast agent and diffusion weight imaging.

RESULTS: Forty-five consecutive patients were examined. Thirty-two were male and 13 were female. Median age was 64 years (range: 31–76 years). MRI was performed at a median of 2 weeks from CT. Thirteen (29%) patients with normal liver on CT had findings consistent with liver metastases while 4 (9%) had indeterminate liver lesions on MRI. Three of the 4 patients with indeterminate liver lesions demonstrated progression on follow-up imaging consistent with metastases. One of the 28 patients with a normal MRI liver underwent palliative bypass on discovering a 5 mm subcapsular lesion at laparotomy. At a median follow-up of 12 months, 3 of the remaining 27 patients with normal MRI had evidence of liver metastasis (7, 10, and 13 months post MRI) while 4 had extrahepatic disease. Survival was significantly reduced in patients with liver metastasis on MRI (p = 0.01).

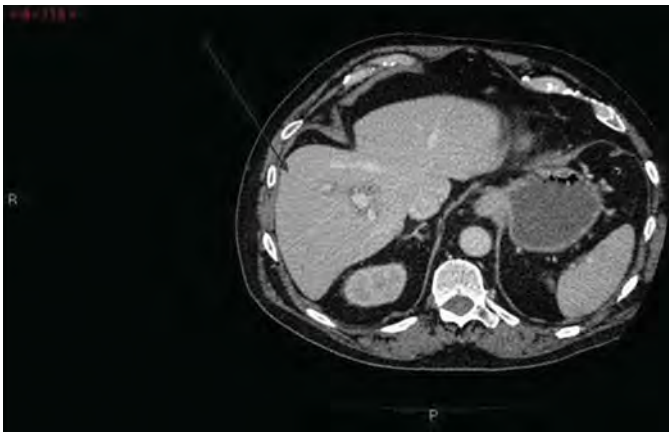

Figure 1: Normal liver staging CT.

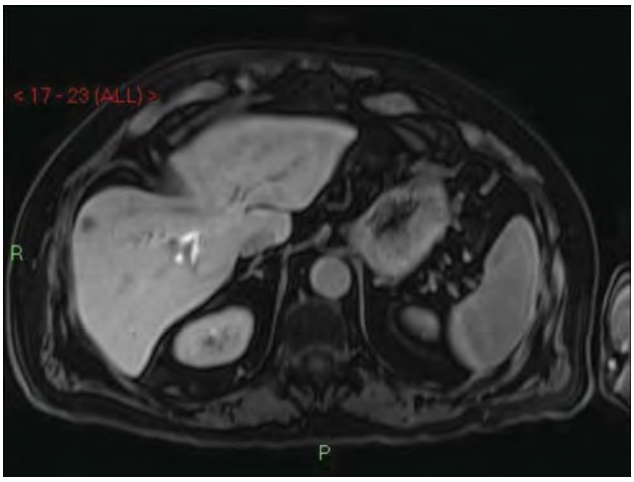

Figure 2: One of multiple lesions seen on MRI consistent with multiple liver metastases (subcapsular location, segment VIII). Follow-up CT 4 months later demonstrated increase in the number and size of liver metastases.

CONCLUSION: MRI identified liver metastases in 36% of patients with resectable pancreatic cancer on MDCT and should be included in the routine staging of these patients.

Tu1618

Roux-en-Y Drainage of the Pancreatic Stump by Nonstented Duct-to-Mucosa Anastomosis Reduced the Amylase Level in the Drainage Fluid After Distal Pancreatectomy with En-Bloc Celiac Axis Resection

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BACKGROUND: The pancreatic fistula is a fatal complication especially in distal pancreatectomy with en bloc celiac axis resection (DP-CAR). Among the literatures about the management of the pancreatic stump after distal pancreatectomy, the most attractive method with low incidence of pancreatic fistula was reported in pancreaticoenteric anastomosis.

METHODS: Twenty-six consecutive patients who underwent DP-CAR between April 2008 and August 2012 were reviewed retrospectively. The first 13 consecutive patients underwent DP-CAR with no anastomosis, and the subsequent 13 consecutive patients with Roux-en-Y pancreaticojejunostomy (PJ) by duct-to-mucosa fashion.

RESULTS: Median operation time for DP-CAR with PJ was 382 compared to 366 minutes for DP-CAR with no anastomosis ($p = 0.840$). Clinically significant pancreatic fistula (ISGPF [The International Study Group on Pancreatic Fistula] classification Grade B/C) occurred in 2 patients (15.4%) with PJ and 5 patients (38.5%) with no anastomosis ($p = 0.189$). The median amylase level in the drainage fluid were decreased in patients with PJ compared to those in patients with no anastomosis at all time points, 315/589 (IU/L) on postoperative day (POD) 1 ($p = 0.336$), 121/286 (IU/L) on POD 3 ($p = 0.050$), and 52/247 (IU/L) on POD4 ($p = 0.044$), respectively. There were no significant differences in regard to mortality and morbidity rates between the groups.

CONCLUSION: Roux-en-Y drainage of the pancreatic stump by nonstented duct-to-mucosa anastomosis reduced the amylase level in the drainage fluid after DP-CAR (Journal of Hepato-Biliary-Pancreatic Sciences In Press.). We are proceeding to examine the evidence of the present study in a multicenter, randomized controlled trial for distal pancreatectomy patients (ClinicalTrials.gov NCT01384617).

Tu1619

Socioeconomic Status and Access to Care: Do They Influence Outcomes in Pancreaticoduodenectomy?

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PURPOSE: For pancreatic surgery, high volume (HV) centers have demonstrated superior outcomes. However, the effects of socioeconomic status (SES) and access to care on outcomes in pancreaticoduodenectomy (PD) are unknown.

METHODS: The University Healthsystems Consortium (UHC) database was queried to identify 9,883 adult patients undergoing (PD) from 2009–2011. Patients were stratified into quintiles based on a validated SES score. Patient distance to center was calculated using Maptitude Geographic Information System. Logistic regression determined how patient characteristics, including distance to center, influenced center access.

RESULTS: Lower SES patients undergoing PD were more likely to be younger (64 years vs. 67 years, $p < 0.001$), black (20.9% vs. 3.4%, $p < 0.001$), and have a higher severity of illness index ($p < .001$). Lower SES patients also had longer hospital stays (10 d vs. 9 d, $p < 0.001$), increased hospital costs ($20,876 vs. $18,708, $p < 0.001$) and were less likely to receive care at a HV center (37.7% vs. 43.8%, $p < .001$). Compared to the lowest SES patients, the highest SES patients resided closer to HV centers (36.2 miles [IQR: 16.4–136.3] vs. 129.8 [IQR: 46.0–217.9], $p < 0.001$) and traveled less to undergo PD (18.7 miles [IQR: 9.2–35.5] vs. 54.8 miles [IQR: 13.6–109.1], $p < 0.001$). Patients in the lowest SES quintile undergoing care at a HV center traveled a median distance of 71.1 miles (IQR: 29.0–137.2), significantly further than the closest available center (43.0 [IQR: 9.9–78.4], $p < 0.001$) Lowest SES patients, when undergoing surgery at LV vs. HV centers, had longer hospital stays (12d vs. 9d, $p < .001$), increased hospital cost ($21,914 vs. $19,111, $p < .001$) and higher readmission rates (21.5% vs. 16.1%, $p = 0.01$).

CONCLUSIONS: Low SES patients are less likely to access high volume centers, travel significantly further to do so, and have worse outcomes with disproportionate utilization of care at low volume centers. These data suggest that increased access to HV centers could improve outcomes in low SES patients.

Tu1620

Total Pancreatectomy with Islet Autotransplantation for Chronic Pancreatitis: The Price Patients Pay for Improvements in Quality of Life

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BACKGROUND: For selected patients with debilitating pain from chronic pancreatitis total pancreatectomy with islet autotransplantation (TPIAT) has been undertaken with recently increased enthusiasm. Safety and efficacy, i.e., "patient-centered cost," of this radical procedure has not been well assessed previously.

METHODS: A retrospective review of a prospectively collected database of patients undergoing TPIAT was undertaken. Perioperative morbidity, quality of life (QOL, SF-12), and insulin use were assessed preoperatively and at 12 and 24 months postoperatively.

RESULTS: One hundred twenty patients (93 women, mean age 41, mean BMI 26.2) underwent TPIAT. Duration of pancreatitisprior to TPIAT averaged 7.6 years (0.5–40). Mean operative time was 237 minutes (75–395), EBL was 618 cc (50–7,800), and median islet equivalents transplanted were 256,470 (969–1,168,725), or 3640IEQ/kg (14–16,010). Average length of hospitalization was 12 days. Twelve patients required reoperation in the 30-day post-operative period (10%). Postoperative morbidity overall was 68% and 23% of patients had a complication requiring intervention (Clavien-DindoIIIa or greater). Perioperative mortality was 1.6%. Five patients (4%) died in the follow-up period. Eighty-five patients were available for at least 12 month follow-up. Physical QOL went from mean 27 preoperatively to 35 and 33 at 12 and 24 months ($p = 0.001$, 0.003) and mental health QOL went from 38 to 42 and 41 ($p = 0.02$, 0.2). Insulin independence was achieved in 26% and 29% at 12 and 24 months, respectively.

CONCLUSION: Quality of life is significantly improved in patients who undergo TPIAT for chronic pancreatitis, but with notable costsin postoperative morbidity and diabetes. Improvements in physical and mental QOL are sustained up to two years after surgery.

Tu1621

Prognostic Significance of ZEB1 Expression in Cancer Cells and Cancer Associated Fibroblasts in Pancreatic Head Cancer

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BACKGROUND: Pancreatic ductal adenocarcinoma (PDAC) is characterized by an aggressive biology and poor prognosis. Experimental evidence has suggested a role for the transcriptional repressor ZEB1 in epithelial-mesenchymal transition, invasion and metastasis in PDAC. ZEB1 expression has been observed in cancer cells as well as stromal fibroblasts. Our study aimed to evaluate the prognostic value of ZEB1 expression in PDAC tissue.

METHODS: Patient baseline and follow-up data was extracted from a prospectively maintained database. After clinicopathological re-review, serial sliced tissue slides were immunostained for ZEB1 and Pan-Cytokeratin. ZEB1 expression in cancer cells and adjacent stromal fibroblasts was graded separately and correlated to routine histopathological parameters and survival after resection.

RESULTS: N = 117 cases of PDAC were included in the study. High ZEB1 expression in cancer cells and in stromal cancer associated fibroblasts (CAF) was significantly associated with poor prognosis. There was also a trend for poor prognosis with a lymph node ratio of over 0.10. In multivariate analysis, stromal ZEB1 expression grade was the only independent factor of survival after resection.

CONCLUSIONS: Our data suggest that ZEB1 expression in cancer cells as well as in stromal fibroblasts are strong prognostic factors in PDAC. Stromal ZEB1 expression is identified for the first time as an independent predictor of survival after resection of PDAC. This observation suggests that therapies targeting ZEB1 and its downstream pathways could hit both cancer cells and supporting CAF.

Tu1622

Portal Venous Resection in Cancer of the Pancreatic Head: What Are the Relevant Predictors of Survival?

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INTRODUCTION: When tumors are found to be adherent to the superior mesenteric or portal vein during pancreatoduodenectomy, en bloc portal venous resection (PVR) is an option to achieve complete tumor resection. It has also been reported that PVR without confirmed histopathologic portal venous infiltration (PVI) is associated with significantly better survival. The aim of this study was to evaluate oncologic outcome and prognostic factors in patients receiving PVR for pancreatic cancer.

METHODS: A unicenter retrospective study was performed on the basis of a prospectively maintained database. IBM SPSS Version 21 was used for all calculations with the significance level set to $p = 0.05$.

RESULTS: From 2001 to 2013, 103 patients received pancreatoduodenectomy with PVR for pancreatic head cancer. Median survival in patients with PVR without PVI was 25 months, whereas confirmed PVI was associated with poor median survival of 14 months ($p < 0.05$). In patients with PVR, only PVI and lymph node ratio, but not margin status, T or N stage, grading, lymphatic, microvessel or perineural infiltration, age or gender were independent prognostic factors in a multivariate Cox proportional hazards model.

CONCLUSION: Portal venous resection for tumor adherence in pancreatic cancer is associated with equal median survival as in patients without PVR when there is no histopathologic infiltation of the large veins. Additional prognostic information is only provided by lymph node ratio, whereas margin status and other standard histopathologic parameters have no additional predictive value in this situation.

Tu1623

Impact of Pancreatic Fistula on Recurrence and Long-Term Prognosis of Periampullary Adenocarcinomas After Pancreaticoduodenectomy

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BACKGROUND: The impact of pancreatic fistulas (PF) on cancer-specific survival and recurrence patterns is not well understood. The objective of this study was to evaluate the impact of PF on disease-free-survival (DFS) and overall survival (OS) after pancreaticoduodenectomy in patients with periampullary adenocarcinomas, including pancreatic, distal bile duct, duodenal and ampullary adenocarcinoma,

METHODS: This is a retrospective cohort study of patients undergoing pancreaticoduodenectomy for periampullary adenocarcinomas from 2000–2012. Univariate and multivariate survival analyses were performed to determine the impact of PF on DFS and OS, while controlling for pathologic and clinical factors.

RESULTS: There were 634 PD (pancreas: 347; other periampullary: 287); median age: 65 (range: 24–84) years; 424/634, 68% had node positive disease; 61/634, 10% had positive margins and 98/634, 16% were poorly differentiated. There were 81/634, 13% patients with PF. Perioperative mortality rate was 1.7% (11/634), higher in patients with PF (10 vs. 0.5%, $P < 0.001$). In the multivariate analysis, PF significantly reduced DFS (Hazard ratio [HR]: 1.6, 95% confidence-interval [CI]: 1.1–2.6) in pancreatic but not in other periampullary cancer patients. Other factors associated with decreased DFS and OS were: node, margin-positive, and higher-grade cancers. Adjuvant therapy was associated with improved OS in pancreatic cancer patients (HR: 0.7, 95% CI = 0.5–0.9, $P = 0.02$). PF was not associated with decreased OS in pancreatic or other periampullary cancer patients.

CONCLUSION: PF increase the risk of pancreas cancer recurrence after pancreaticoduodenectomy. Low tumor grade, negative lymph nodes, and negative resection margin are associated with improved DFS and OS.

Tu1624

Postoperative Fat Absorptive Function and Glucose Metabolism: Does Age Affect Outcomes Following Pancreatoduodenectomy?

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BACKGROUND: Postoperative exocrine pancreatic insufficiency and resultant maldigestion is multifactorial in nature, mainly influenced by patient-specific features of the pancreas; however, the impact of advancing age is less well understood. The aim was to evaluate the effect of aging on postoperative digestive and fat absorptive disturbances following pylorus-preserving pancreatoduodenectomy (PPPD).

METHODS: A prospectively collected, IRB approved database at a single institution was reviewed. Patients with an aged greater than or equal to 75 (elderly group) were compared to those with an aged less than 75 prior to surgery (control group). An optimized 13C-mixed triglyceride breath test (13C-MTG-T) using a labeled long-chain triglyceride mixture was performed to assess postoperative fat absorptive function after PPPD. Pancreatic exocrine insufficiency was defined as cumulative 7-hour $13CO_2$ exhalation (% dose 13C cum 7 h) <5%. Pre and postoperative HbA1c levels were measured in blood samples to assess glucose metabolism function. Diabetic patients were identified as those treated with insulin, oral hypoglycemic medications, or having an HbA1c level ≥6.9% (NGSP). Data pertaining [13C-MTG-T], HbA1c levels, oral pancreatic enzyme requirements, and body mass index (BMI) were measured at 1 year following surgery. Post-operative fat absorptive function was compared with pre- and post-operative patient's characteristics and glucose metabolism.

RESULTS: Consecutive 51 patients were identified from April 2005 to 2009. The elderly group (≥75 years) included 18 patients, while the remaining 33 patients were assigned as the control group (<75 years). The % dose 13C cum 7 h was significantly higher in the elderly group (6.5 ± 5.1%) compared to the control group (3.3 ± 2.4%; $P < 0.05$). The number of patients requiring oral pancreatic enzyme was significantly higher in the elderly group (12 of 18; 83%) comparing to the control group (11 of 33; 33%; $P < 0.05$). The difference in either HbA1c or body mass index (BMI) between the two groups is not statistically significant.

CONCLUSION: Aging is not associated with impaired pancreatic exocrine function following PPPD compared to the younger patients, and that cumulative 7-hour $13CO_2$ exhalation of 13C-mixed triglyceride breath test is an important predictive marker of exocrine pancreatic insufficiency, even in a subclinical condition. These findings may have potential implications for the selection of therapeutic strategies in the clinical setting.

Tu1625

Increased Bacterial Translocation in Aging Animals Is Not Related to Decreased Intestinal Antimicrobial Peptide Expression in Acute Pancreatitis

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INTRODUCTION/BACKGROUND: Acute pancreatitis (AP) in elderly patients in spite of similar occurrence of local complications is followed by a substantial increase in organ failure and mortality rates. We have recently demonstrated that aging is related to increased bacterial translocation and distant organ damage in acute pancreatitis. Enteric antimicrobial peptides are key effectors of innate immunity and therefore could have reduced expression in aging animals with acute pancreatitis. The aim of the present study was to evaluate the effect of aging on intestinal expression of antimicrobial peptides in acute pancreatitis.

METHODS: AP was induced in male Wistar rats by an intraductal 2.5% taurocholate injection and divided in 2 experimental groups(20 rats each group) G-1 young 3 month old rats and older (18-month-old rats). Twelve hours after AP fragments of distal ileum were collected for evaluation of the gene expression of alfa defensins 5 and 7, Cramp, IL-1 beta, IL-10, and TNF -alpha.

RESULTS: A significant increase in the intestinal expression of alpha defensins 5 and 7 was observed in older group compared to the young animals with AP ($p < 0.05$).Cramp gene expression was similar in both groups .Also a significant increase in intestinal TNF-alpha expression was observed in older group compared to young rats ($P < 0.05$). The expression of IL-1 beta was similar in both groups of animals. Intestinal IL-10 gene expression was increased in young animals compared to the older group.

CONCLUSIONS: The increased bacterial translocation in aging animals is not related to a decreased production of antimicrobial peptides but could be related to imbalance between intestinal pro-inflammatory and anti-inflammatory cytokine production.

Tu1626

Minimally Invasive Surgical Cystgastrostomy and Necrosectomy for the Management of Walled Off Pancreatic Necrosis: Comparison with Endoscopic Approach at a High Volume Pancreatic Center

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INTRODUCTION: Walled off pancreatic necrosis (WOPN) is a potentially lethal complication of acute necrotic pancreatitis occurring in 5–10% of patients. We hypothesized that minimally invasive surgical cystgastrostomy and necrosectomy is a safe and feasible approach with comparable results to endoscopic management.

METHOD: A retrospective review of a prospectively maintained data base of patients who underwent minimally invasive surgical (laparoscopic and robotic) cystgastrostomy and necrosectomy for WOPN was compared to a retrospective cohort of patients who underwent endoscopic cystgastrostomy and necrosectomy. Periprocedural outcomes were analyzed. Failure for the surgical group was defined as the need for any reintervention due to persistence of WOPN, whereas it was defined as the need for surgery in the endoscopic group.

RESULTS: Between 2008 and 2013, 15 patients underwent minimally invasive necrosectomy (robotic = 10, laparoscopic = 5) and 22 patients underwent endoscopic cystgastrosotomy and necrosectomy. The surgical cohort had a larger median cyst size compared to the endoscopic group (16 cm vs. 12 cm P = 0.03). There were no differences in age, sex, race, BMI, Charlson Comorbidity Index (CCI), etiology of pancreatitis, and location of WOPN between both groups (all P = NS). For the surgical cohort, average OR time was 195 min, average EBL was 67 cc and 60% underwent concomitant cholecystectomy for biliary etiology. There was no mortality in either group and no statistical difference in the frequency of post procedural complications; surgical group (pulmonary embolus [1]; splenic artery pseudoaneurysm [1], infected collection [2]) and endotherapy group (perforation [1], bleeding [1], infected collection [2]). Failure of WOPN to resolve occurred in 3 patients (20%) in the surgical group compared to 3 patients (13.6%) in the endoscopic group (P = 0.66). Reintervention was less common in the surgical group versus the endotherapy (20% versus 59%, P = 0.041) with a median re-intervention rate of 0 (range: 0–2) for the surgical group versus 1 (range: 0–10) for the endoscopic group (p = 0.02). Mean total length of stay-inclusive of readmissions and reinterventions- was similar between both groups (Surgical group = 9 days, Endoscopy = 18.1 days, P = 0.087).

CONCLUSION: Minimally invasive cystgastrostomy and necrosectomy is safe and feasible for the management of WOPN with similar success and complication rates compared to the endoscopic approach. It may be considered as the intervention of choice when combined with cholecystectomy for biliary etiology.

Tu1627

Maturation of Robot-Assisted Pancreaticoduodenectomy Program Within an Established Pancreatic Surgery Unit

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BACKGROUND: There are potential advantages to the application of minimally invasive techniques to pancreaticoduodenectomy (PD). Technical feasibility and patient selection are important factors that will impact outcomes. We present a single center experience focusing on trends in patient selection and outcomes of robot-assisted pancreaticoduodenectomy (RAPD).

METHODS: Retrospective review of a prospectively maintained database of all open and robotic pancreaticoduodenectomy from March 2009 to July 2013.

RESULTS: 65 patients underwent attempted RAPD at a single institution during the study period. Concurrently, 211 open PD were performed. Operations were performed by three surgeons, who perform both open PD and RAPD. Conversion rate each year ranged from 15.4% to 38.9% (p = 0.81). Utilization of RAPD per year increased from 18% in 2009 to 26% for 2012–2013 (p = 0.45). There was no statistical difference between tumor size (2 to 2.45 cm, p = 0.24), percentage of malignant lesions (30.8% to 62.5%, p = 0.36), and post-operative pancreatic fistula rate (grade A–C) (30% to 50%, p = 0.28) between the study years. Compared to the open PD cohort, mean estimated blood loss was significantly less (500 cc vs. 200 cc) (p < 0.001). Length of stay (LOS) also had a trend towards significance with average LOS of 11.5 days for the open PD versus 9 days in the RAPD cohort (p = 0.06). However, there was a significant decrease in mean LOS for the RAPD cohort, from 10 days in 2009 to 7 days in 2013 (p = 0.03). The rate of BMI increase over time for RAPD was significantly higher compared to open PD cohort (p = 0.04) (Figure). In comparison between groups in regard to overall surgical site infections, there was no difference between the open PD and RAPD groups (25% vs. 28%, p = 0.76). However, there was a trend towards a decrease rate of incisional infections in the RAPD group compared to open PD (8% vs. 15%, p = 0.32).

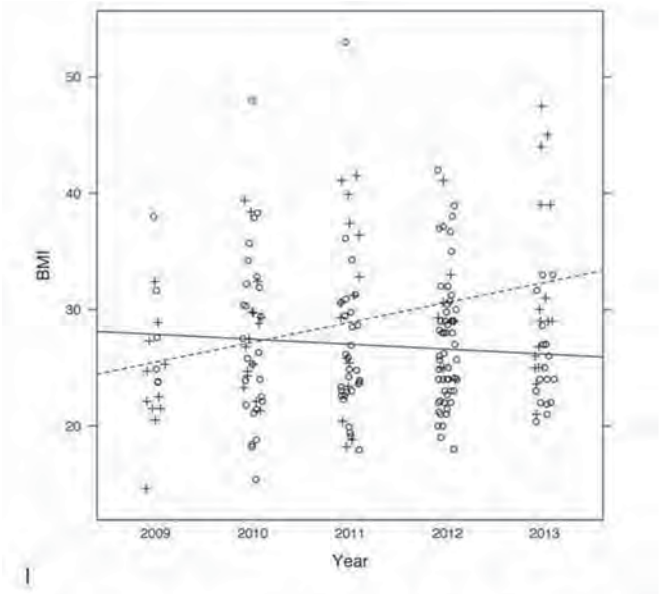

Figure 1: BMI by operation type and year. Pluses and dashed lines represent RAPD patients and trends. Circles and solid lines represent open PD patients and trends. There has been a significant increase in utilization of RAPD in high BMI patients over time (p=0.04).

CONCLUSION: Increasing experience with RAPD has led to higher overall utilization regardless of underlying patient disease. To achieve the maximal benefits of a minimally invasive approach to PD, we have significantly and purposely increased the selection of obese patients. While a larger cohort of RAPD patients is needed, our initial experience suggests that the greatest benefit of RAPD is best utilized in patients with a higher BMI.

Tu1629

Negative Impact of Elevated Pre-Treatment Albumin/Globulin Ratio on Survival in Pancreatic Cancer Patients with Normal Serum Albumin

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BACKGROUND: Albumin globulin ratio (AGR) is an inflammatory marker that was found to predict survival in breast and colorectal cancer patients. The aim of our study was to assess the predictive value of pretreatment AGR in terms of survival in pancreatic cancer patients.

METHODS: A retrospective study of a prospectively maintained database of 367 pancreatic cancer patients treated between January 2004 and December 2011. Exclusion criteria included those with hemoproliferative disorders, chronic liver disease, patients with serum albumin <3 gm/dl, or unavailable comprehensive metabolic panel before treatment (i.e. surgery/chemotherapy). Survival status was obtained from our cancer registry and social security death index. Patients were divided according to their median serum albumin (3.5 gm/dl) and AGR (1.18) values.

RESULTS: Total of 133 patients were qualified for the study. There were 57 patients underwent pancreatectomy and 76 received chemotherapy. According to Kaplan Meier survival curves, the patients with lower AGR (≤1.18) had statistical significant poor survival compared to those with AGR > 1.18 (p = 0.028), whereas the lower albumin group (≤3.5 gm/dl) showed a trend of poor survival compared to those with albumin >3.5 gm/dl (p = 0.068) (see Figure).

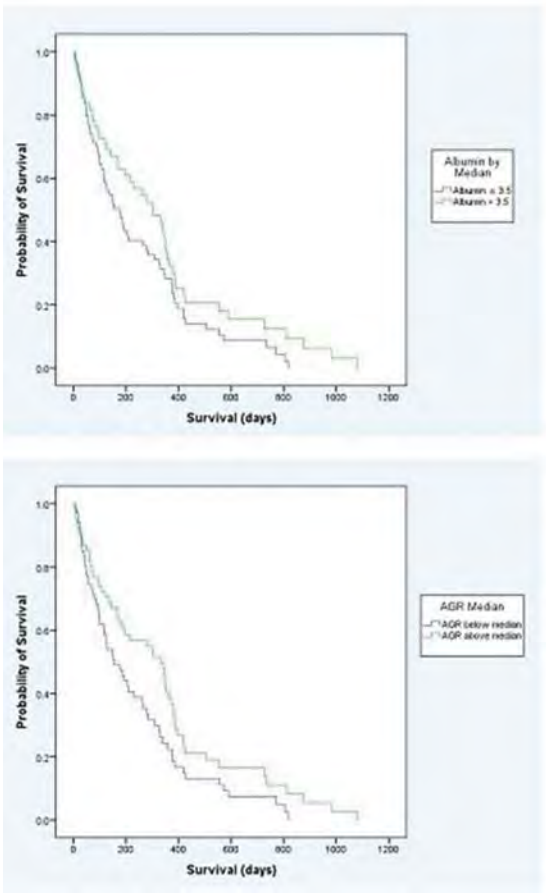

Figure: Kaplan Meier curves of the survival among the pancreatic cancer patients according to their pretreatment albumin and albumin/globulin ratio (AGR).

CONCLUSION: An elevated pretreatment AGR is a significant predictor of poor survival in pancreatic cancer patients among patients with normal serum albumin.

Tu1630

High Volume Hospitals with High- and Low-Volume Surgeons: Is There a "Field Effect" for Pancreaticoduodenectomy?

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INTRODUCTION: Since the Leapfrog Group established criteria for hospital volume for pancreaticoduodenectomy, the importance of surgeon volume over hospital volume in obtaining superior outcomes has been debated. This study was undertaken to determine if, in high-volume hospitals, low-volume surgeons attain the same outcomes as high-volume surgeons.

METHODS: The data for pancreaticoduodenectomy in Florida during 2010–2012 were obtained from the Florida Agency for Health Care Administration. High-volume hospitals were identified and surgeon volumes within were determined; postoperative length of stay (LOS), in-hospital mortality, discharge status, and hospital charges (adjusted to 2012 dollars) were examined relative to surgeon volume.

RESULTS: Six high-volume hospitals were identified to have at least one surgeon who undertook ≥12 pancreaticoduodenectomies per year and at least one surgeon who undertook <12 per year. At these hospitals during 2010–2012, there were 10 "high-volume" surgeons who undertook 714 pancreaticoduodenectomies, an average of 24 pancreaticoduodenectomies per surgeon per year, and 33 "low-volume" surgeons who undertook 225 pancreaticoduodenectomies, an average of 2 pancreaticoduodenectomies per surgeon per year. The frequency with which surgeons undertook pancreaticoduodenectomy did not predict LOS, in-hospital mortality, discharge status, or hospital charges.

DISCUSSION: At high-volume hospitals from 2010 to 2012, low-volume surgeons did not have different outcomes from the high-volume surgeons with respect to patient LOS, in-hospital mortality, percentage of patients discharged home, or hospital charges. While the discussion of volume for complex operations has shifted toward surgeon volume, hospital volume must remain part of the discussion as there appears to be a significant, though intangible, hospital "field effect."

Tu1631

Should All Branch-Duct IPMN's Be Resected?

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INTRODUCTION: Intraductal papillary mucinous neoplasia (IPMN) arising in the main pancreatic duct has been consistently shown to be associated with a higher risk of malignancy. However, the relationship between branch-duct IPMN and malignancy remains controversial and difficult to assess.

METHODS: Between 1/1/1999 and 5/1/2013, we retrospectively identified 84 consecutive patients with IPMN who underwent attempted curative resection. Clinicopathologic factors and cancer-related outcomes were assessed.

RESULTS: 84 patients were identified, 43 males and 41 females, median age of 71.5 years. Although 32 lesions were found incidentally, the majority were symptomatic (abdominal pain and/or weight loss). Prior to surgery, 55 patients underwent endoscopic ultrasounds and 58 underwent biopsy. Only 12 lesions were specified as branch-duct pre-operatively, which inconsistently correlated with the surgical specimen ($p = 0.65$). The majority of patients (62%) underwent pancreaticoduodenectomy, and the remainder had either distal pancreatectomy (36%) or central pancreatectomy (2%). Pathologic evaluation identified 28 branch-duct lesions and 54 main-duct lesions, of which 38 had concurrent branch-duct lesions; duct of origin data was unavailable for 2 specimens. Of the 82 patients where the duct was specified, 33 had associated invasive ($n = 28$) or in-situ ($n = 5$) carcinoma. There was no correlation between branch-duct origin and invasive carcinoma (main-duct 19 of 54, branch-duct 9 of 28, $p = 0.78$). Multivariate analysis including tumor size did not influence this outcome (OR 1.14, CI 0.4–3.3). Malignant tumor size did not significantly differ by duct of origin (main-duct 3.3 cm, branch-duct 3 cm, $p = 0.2$). Furthermore, 2 of 9 malignant branch duct lesions were < 2 cm in size on pre-operative imaging. Of the 6 patients with branch duct lesions ≥3 cm on pre-operative imaging, only 50% harbored invasive malignancy. The presence of symptoms preoperatively was significantly associated with malignancy (51% vs. 22%, $p = 0.01$). Weight loss or jaundice on initial presentation was associated with a subsequent diagnosis of malignancy among patients with branch-duct lesions (both $p < 0.05$). Of the 28 patients with invasive carcinoma, branch-duct lesions were significantly associated with the presence of positive lymph nodes, perineural invasion, and lymphovascular invasion (all $p < 0.05$).

CONCLUSIONS: Our data suggests that branch-duct lesions are as equally likely to be associated with invasive malignancy as main duct lesions, and may demonstrate more aggressive characteristics when invasion occurs. The malignant potential of IPMN remains clinically elusive based on current clinical strategies, particularly in regards to invasive characteristics of side-branch IPMN. Therefore, surgical resection is recommended for all IPMN lesions in order to reliably assess for concurrent malignancy.

Clinical: Small Bowel

Tu1632

High Visceral Fat Area Is Association with Postoperative Complications in Patients with Crohn's Disease Following Primary Surgery

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BACKGROUND: A majority of patients with Crohn's disease (CD) eventually require surgery. It is important to recognize predictors of perioperative outcomes in these patients. The aim of the study was to determine whether visceral fat area (VFA) based on measurements from computed tomography (CT) is associated with postoperative complications after the primary surgery in patients with CD.

METHODS: A total of 164 patients with confirmed diagnosis of CD who had preoperative abdominal CT scans met the inclusion criteria. The areas of total fat, subcutaneous fat and visceral fat were measured using established image analysis method at lumbar 3 (L3) level on CT cross-sectional image. Visceral obesity was defined by visceral fat area (VFA) ≥1.3 dm^2. Clinical variables, intraoperative outcomes and postoperative courses within 30 days were analyzed.

RESULTS: Sixty-three patients (38.4%) had postoperative complications. The mean age of the patients with complications (the study group) was 40.4 (40.4 ± 15.4) years, and in patients without complications (the control group) was 35.8 (35.8 ± 12.9) years (P = 0.049). Patients with corticosteroid use (within three months preoperatively) more likely developed complications than those without use (66.1% vs. 43.6%, P = 0.005). There were no differences in disease location and behavior classified by the Montreal Classification between patients with or without complications (P > 0.05). On multivariable analysis, VFA (odds ratio [OR] = 2.69; 95% confidence interval [CI]: 1.09–6.62; P = 0.032) and corticosteroid use (OR = 2.86; 95% CI: 1.32–6.21; P = 0.008) remained independently association with postoperative complications. Patients classified as visceral obesity had a significantly longer operative time (P = 0.012), more blood loss (P = 0.019), and longer bowel resection length (P = 0.003). The 30-day postoperative ileus (P = 0.039) and overall complications (P < 0.001) were more common in patients with visceral obesity.

Table 1: Multivariate Analysis for Predictor of Adverse Outcomes of Patients After Primary Surgery

Variables	Odds Ratio (95% CI)	P-Value
Age	0.98 (0.94–1.01)	0.220
Smoking	0.44 (0.19–1.00)	0.051
Steroids Use	2.86 (1.32–6.21)	0.008
Body mass index	0.98 (0.89–1.08)	0.646
Mesenteric fat index	1.26 (0.54–2.95)	0.587
Visceral fat area	2.69 (1.09–6.62)	0.032
Operative time	1.00 (0.99–1.01)	0.966
Estimated blood loss	1.00 (1.00–1.01)	0.080
Total bowel resection	1.00 (0.99–1.02)	0.807

Table 2: Intraoperative and Short-Term Postoperative Outcomes Comparison Between the Non-Visceral Obesity and Visceral Obesity Patients

Outcomes	Non-Visceral Obesity VFA <1.30 dm2	Visceral Obesity VFA ≥1.30 dm2	P-Value
Number of patients	114	50	
Operative time (min)[a]	155.7 ± 55.0	183.4 ± 77.3	0.012
Length of Incision (cm)[a]	5.4 ± 1.8	5.8 ± 3.4	0.520
Estimated blood loss (ml)[a]	153.1 ± 152.2	277.0 ± 339.5	0.019
Length of bowel resection (cm)[a]	39.6 ± 23.3	52.0 ± 26.9	0.003
Small bowel[a]	22.2 ± 19.3	29.4 ± 23.0	0.038
Large bowel[a]	17.4 ± 21.7	22.5 ± 28.5	0.263
Length of hospital stay (day)[a]	8.8 ± 5.2	9.1 ± 4.9	0.763
ICU stay (day) [a]	0.2 ± 1.1	0.5 ± 1.9	0.265
Readmission within 30 days[b]	18 (15.8)	6 (12.0)	0.527
Reoperation within 30 days[b]	6 (5.3)	3 (6.0)	1.000
Overall complications[b]	33 (28.9)	31 (60.0)	0.000

[a]Data expressed as Mean ± Standard Deviation; [b]Data expressed as N (%)

CONCLUSION: High VFA as measured by CT scan is associated with an increased risk for 30-days postoperative complications in patient with CD undergoing primary surgery.

Tu1633

Adult Intussusception: A Contemporary Analysis of Etiology and Management

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INTRODUCTION: Due to the relative infrequency of adult intussusception when compared to pediatric intussusception, current literature on the etiology and management of intussusception in adults is sparse. Traditionally, adult intussusceptions have been thought to be malignant, requiring surgical exploration for diagnostic purposes. Our aim, therefore, is to describe the current national experience with adult intussusception, suspecting that many are benign in origin.

METHODS: The Nationwide Inpatient Sample, a 20% stratified sample of hospitals in the United States, was queried for patients 18 years or older who were hospitalized with a diagnosis of intussusception (ICD-9 560.0) between 2002 and 2010. Only patients with an associated operative or endoscopic procedure were included to ensure accuracy of the cohort. Patients were determined to have a neoplastic or nonneoplastic etiology of intussusception using associated diagnosis codes. Neoplastic intussusceptions were further separated into malignant and benign neoplasms. Differences in demographics and history of cancer, using ICD-9 V codes, were determined for patients with neoplastic versus nonneoplastic intussusceptions using τ tests and Chi-squared tests.

RESULTS: Over the 9-year period, 5291 adults were identified. Mean (s.d.) age was 51 (19) years and most patients were female (58%). A personal history of cancer was identified in 7%. Endoscopic intervention alone was done in 12% of patients, and the remaining 88% underwent operative intervention—including 67% that underwent bowel resection and 7% that underwent reduction of intussusception without bowel resection. Neoplastic etiologies were identified in 38% of patients, including malignant neoplasms in 22% and benign neoplasms in 16%. The most common malignancy was colorectal cancer (table). The remaining 62% were identified as nonneoplastic intussusception, including 29% with other benign causes, including adhesions, previous anastomoses, and congenital diverticula, and 33% that were idiopathic or spontaneously reduced, having no associated diagnoses. Patients with a neoplastic intussusception were older (mean age 59 vs. 46 years, $p < 0.001$) and more likely to have a personal history of cancer (10% vs. 4%, $p < 0.001$) than patients with a nonneoplastic cause. Bowel resection was more frequent in patients with neoplastic intussusception (89%); however was still performed in more than half of patients with nonneoplastic causes (54%).

Table: Neoplastic Etiologies of Intussusception in Adults

Malignant Neoplasm (N = 1140)	Percent	Benign Neoplasm (N = 850)	Percent
Malignant neoplasm of large bowel or rectum	46.3	Lipoma	40.2
Secondary neoplasm of small bowel, large bowel or rectum	14.6	Colon and rectal polyps	33.9
Primary or secondary malignant neoplasm of intestine not otherwise specified, of unknown origin, or uncertain behavior	11.5	Benign neoplasm of small bowel	18.2
Lymphoma	10.8	Multiple benign neoplasms	4.5
Malignant neoplasm of small bowel	7.0	Hemangioma or lymphangioma	1.7
Multiple malignant neoplasms	6.6	Benign neoplasm of unspecified site	1.5
Primary or secondary malignant neoplasm of peritoneum or retroperitoneum	1.4		
Malignant carcinoid of small or large bowel	1.1		
Carcinoma in situ of small or large bowel	0.7		

DISCUSSION: Malignancy is not the most common cause of intussusception in adults, as most cases are idiopathic or benign. Thus, bowel resection due to potential malignancy may not be required in all patients. Further studies are needed to confirm these findings and develop updated management guidelines for adult intussusception.

Tu1634

Effect of Admission Service on Clinical Outcomes and Cost in Patients with Small Bowel Obstruction

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Small bowel obstruction (SBO) is a complication of previous abdominal surgeries, hernias, and other pathologies. Patients can be managed non-operatively or operatively, thus patients are admitted to medical and surgical services. The purpose of this study was to compare characteristics and outcomes associated with admitting service.

A retrospective medical record review was conducted of SBO admissions via the emergency department to an academic medical center in 2012. Patients were identified using discharge diagnosis codes in an administrative database. Patients with ileus without mechanical obstruction, lack of obstructive symptoms, and previous abdominal surgery within 30 days were excluded (103 patients with 107 admissions). Univariate and bivariate frequencies were used to describe the population. Chi-square and Wilcoxon rank sums tests were used to examine differences by admission service.

251 patients with 292 admissions were included in the analysis. Approximately half (n = 134; 46%) were admitted to medical services; there was no difference in age, sex, race, insurance status, or comorbidities between patients admitted to medicine vs. surgery. The most common etiologies were adhesive disease (60%) and hernias (16%). 205 admissions (70%) were managed non-operatively; 113 (55%) were admitted to medical and 92 (45%) were admitted to surgical services. There was no difference in time to bowel function, use of total parenteral nutrition (TPN), 30-day readmission rates, or mortality for patients managed on medical vs. surgical services (Table 1). Non-operative surgical admissions were associated with lower cost despite equivalent hospital length of stay (LOS). 87 admissions (30%) were managed operatively; 21 (24%) were admitted to medical and 66 (76%) were admitted to surgical services. Time from admission to operation was shorter for patients admitted to surgery (median, 0.9 days; IQR: 0.4–3.6) than medicine (median, 4.6 days; IQR: 2.2–8.3; p = 0.0002); this held true when excluding patients that were operated on within 24 hours of admission (median, 3.7 days vs. 5.0; p = 0.08). Operative intervention in patients admitted to medical services was more likely to require a bowel resection (n = 13; 62%) than surgical admissions (n = 18; 27%; p = 0.004). Major complications and mortality were also more frequent in medical (n = 8; 42%) than surgical admissions (n = 7; 15%; p = 0.02). Surgical admissions were associated with shorter hospital and post-operative LOS, less TPN use, lower mortality, and lower cost (Table 2).

Patients admitted with SBO were managed more efficiently when admitted to surgical services regardless of whether surgical intervention was required. Furthermore, patients admitted to the medical service that required surgical intervention had worse outcomes. These data support routine admission to surgical services for patients presenting with SBO.

Table 1: Outcomes of Non-Operative Management by Admit Service

	Overall	Medicine Service	Surgery Service	P-Value
Number of admissions (No. [%])	205	113 (55%)	92 (45%)	
Time to bowel movement (median [IQR])	1 (1–2)	1 (1–2)	1 (1–2)	0.58
Time to tolerating clear liquids (median [IQR])	2 (1–3)	2 (1–3)	2 (1–3)	0.78
Total parenteral nutrition (No. [%])	11 (5.4%)	4 (3.5%)	7 (7.6%)	0.20
Mortality (No. [%)]	11 (5.4%)	8 (7.1%)	3 (3.3%)	0.23
Total length of stay (median [IQR])	4 (3–7)	4 (3–7)	4 (3–5)	0.23
Total cost (median [IQR])	$4,479 (3,301–7,347)	$4,754 (3,510–8,249)	$3,904 (3,025–6,275)	0.01
Readmission within 30 days (No. [%])	59 (29%)	28 (25%)	31 (34%)	0.16
Related readmission within 30 days (No. [%])	36 (17%)	14 (12%)	22 (24%)	0.03

Table 2: Outcomes of Operative Management by Admit Service

	Overall	Medicine Service	Surgery Service	P-Value
Number of admissions (No. [%])	87	21 (24%)	66 (76%)	
Surgical complications (No. [%])	67 (77%)	19 (90%)	48 (73%)	0.09
Grade I/II	44 (66%)	11 (58%)	33 (69%)	
Grade III	8 (12%)	0	8 (17%)	0.02
Grade IV/V	15 (22%)	8 (42%)	7 (15%)	
Time to bowel movement (median [IQR])	5 (3–8)	6 (3–11)	5 (3–7)	0.29
Time to tolerating clear liquids (median [IQR])	5 (2–8)	6 (3–12)	4 (2–7)	0.05
Total parenteral nutrition (No. [%])	28 (32%)	12 (57%)	16 (24%)	0.01
Mortality (No. [%])	5 (5.8%)	4 (19%)	1 (1.5%)	0.003
Total length of stay (median [IQR])	8 (5–15)	15 (10–21)	7 (4–12)	0.0003
Post-operative length of stay (median [IQR])	7 (4–10)	9 (5–13)	6 (3–9)	0.02
Total Cost (median [IQR])	$15,331 (10,794–29,411)	$29,936 (18,165–41,130)	$14,411 (8,976–25,339)	0.0004
Readmission within 30 days (No. [%])	27 (31%)	8 (38%)	19 (29%)	0.42
Related Readmission within 30 days (No. [%])	15 (17%)	4 (19%)	11 (17%)	0.80

Tu1635

Factors That Predict Failure of Non-Operative Management of Small Bowel Obstructions

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BACKGROUND: Small bowel obstructions account for 15–20% of all acute surgical hospitalizations. Patients with partial bowel obstructions from adhesive disease are initially managed with nasogastric tube decompression, bowel rest and intravenous fluid resuscitation, if signs and symptoms of ischemia are not present. This conservative management fails in upwards of 30% of patients. Given this failure rate, investigators have developed a scoring system that may predict this failure. The purpose of this study is to identify factors which may predict failure of non-operative management of small bowel obstruction.

METHODS: The University Healthcare Consortium database was queried for all patients with small bowel obstructions on a surgical service during 2009 (n = 186). Patients were divided into two cohorts: those whose small bowel obstruction resolved with conservative management (n = 123) and those who failed conservative management and required surgery (n = 63). Patient groups were compared using two-group t-tests for quantitative variables and Chi-square tests for categorical variables. Logistic regression analysis was used to determine whether any single parameter can predict failure of conservative management.

RESULTS: We were unable to reproduce the predictive findings in previous scoring systems. Initial CT findings including small bowel (SB) lumen, SB feces sign, SB wall thickness, mesenteric edema, SB transition point were not predictive of non-operative failure, The only significant predictor of failing conservative management was the number of CT scan findings Having two or more findings doubled the risk of failing non-operative management (OR = 2.067, CI = 1.012–4.22). No physical exam findings at initial exam or laboratory values were predictive for failure of non-operative management.

CONCLUSION: No single factor was predictive of failure of non-operative management of small bowel obstruction. Two or more CT scan findings may suggest the need for surgical intervention.

Tu1636

Time to OR Does Not Effect Outcomes in Acute Uncomplicated Appendicitis

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BACKGROUND: The standard of care for patients with acute uncomplicated appendicitis is immediate operation. However, there is dispute within recent literature regarding this dictum. Some authors demonstrate that delaying surgery results in greater complication rates, while others have shown that there is no increased risk with delay. We aim to examine the correlation between complication rates and time to operative intervention in patients undergoing appendectomy at a single large urban academic medical center.

METHODS: We performed a retrospective chart review using a prospectively collected database of patients undergoing appendectomy by general surgeons at a single academic medical center over a one-year period. We identified patients with acute uncomplicated appendicitis with documentation of duration of symptoms, n = 108. Time was noted in three parts: onset to emergency department (ED) presentation, ED presentation to operating room (OR) and total time of symptoms to OR. Patients were grouped by time: 0–12 hours, 12–24 hours, 24–36, 36+ hours of total duration of symptoms. We identified 12 outcome variables for evaluation: perforation at the time of operation, conversion from laparoscopic to open appendectomy; post-operative superficial surgical site infection, deep surgical site infection or organ space infection; post-operative blood transfusion, sepsis, myocardial infarction (MI), pulmonary embolism (PE), acute renal failure (ARF), pneumonia, and death. The number of outcomes that occurred in each cohort was recorded, and the cohorts were compared to one another in a t-test analysis.

RESULTS: None of the cohorts demonstrated statistical differences in any of the measured outcomes based on t-test analysis. There were few events in any of the cohorts. Of the 12 post-op outcome variables included, five had events: seven patients were noted to be perforated at the time of operation (average total symptom duration = 35 hours), one patient required conversion to open appendectomy (total symptom duration = 85 hours), one patient had superficial SSI (88 hours), one had deep SSI (22 hours) and one had deep organ space infection (29 hours); none required blood transfusion and no patients experienced MI, PE, ARF, sepsis, pneumonia or death. However, these events were distributed across cohorts; there was no statistically significant difference in the rate of occurrence of these outcomes based on the patients' duration of symptoms.

CONCLUSION: Our data demonstrate no significant difference in the outcomes measured between the four cohorts. This data suggests that there may be a longer window for safe resuscitation prior to operative intervention, contradicting previous findings in acute appendicitis. Because the conclusions drawn from this study are derived from retrospective data, a prospective study is required to more strongly validate our results.

Clinical: Stomach

Tu1637

Can the Risk of Non-Home Discharge After Resection of Gastric Adenocarcinoma Be Predicted?

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BACKGROUND: Currently, there are no validated methods to preoperatively identify patients with an increased risk of discharge to skilled nursing facilities (SNFs; non-home discharge) following resection of gastric cancer (GC). In these circumstances, length of stay is often prolonged while arrangements are completed. Utilizing a multi-institutional database of patients who underwent surgery for GC, we sought to identify preoperative predictors of non-home discharge in an effort to anticipate and optimize transitions of care to SNFs.

METHODS: Patients who underwent resection of GC from 2000–2012 from the 7 participating institutions of the U.S. Gastric Cancer Collaborative were analyzed. In-hospital deaths following resection were excluded. Logistic regression and Fischer's exact test were used to identify preoperative factors predictive of non-home discharge.

RESULTS: 923 patients were identified. Of these, 93 (10%) were discharged to a location other than home (SNF). Univariate analysis identified the following preoperative variables as significant risk factors for non-home discharge: age, ASA score, hypertension, diabetes, albumin, creatinine, bleeding, weight loss, and neoadjuvant chemotherapy. On multivariate analysis, advanced age (OR = 1.07, 95% CI = 1.04–1.09, $p < 0.0001$) and depressed pre-operative serum albumin (OR = 0.45, 95% CI = 0.30–0.67, $p = 0.0001$) were independently associated with non-home discharge. Patients 70 yrs or older with a preoperative albumin </= 3.4 had the highest risk of non-home discharge (21.7% discharged to non-home location versus 4.2% in patients under 70 yrs with a preoperative albumin > 3.4 g/dL; see Table).

Table: Odds of Non-Home Discharge (NHD) in High-Risk vs. Low-Risk Populations

	Age ≥ 70 & Albumin ≤ 3.4 g/dL	Age < 70 & Albumin >3.4 g/dL	OR	95% CI	p-Value
% NHD (n)	21.7% (25)	4.2% (15)	6.33	3.2–12.5	<0.0001

CONCLUSIONS: Older patients with compromised nutritional status are at increased risk for non-home discharge following resection of gastric cancer. In these patients, preoperative planning for transition to skilled nursing facilities may reduce demand on hospital resources as well as ease the burden of transition of care for patients and hospital care teams.

Tu1638

Laparoscopic Surgery for Gastric Malignancy: Outcomes of a Minimally Invasive Oncologic Resection

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INTRODUCTION: Controversy remains over the safety and efficacy of laparoscopic gastric operations. The objective of this study was to evaluate the outcomes of patients who underwent laparoscopic gastrectomy and palliative bypass procedures.

METHODS: 86 patients who underwent laparoscopic intervention for gastric malignancy between January 2001 and August 2013 were reviewed. 94% of patients underwent laparoscopic gastrectomy, while 6% were found to be unresectable and required a palliative bypass. Main outcome measures included operative findings, conversion rate, hospital stay, morbidity, mortality and pathology.

RESULTS: Mean age was 68 years and 52% of patients were male. The majority of cases were performed for gastric adenocarcinoma (90%). Other indications included gastrointestinal stromal tumor (5.8%), dysplasia (1.2%), carcinoid (1.2%), and pancreatic cancer (1.2%). Eight patients (9.3%) underwent neoadjuvant therapy. Procedures performed included laparoscopic total gastrectomy (20%), subtotal gastrectomy (41%), distal gastrectomy (25%), proximal gastrectomy (5%), gastric wedge resection (3%) and palliative gastrojejunal bypass (6%). There were no conversions to laparotomy.

Eleven patients (13%) were monitored in the ICU postoperatively, with an overall mean ICU stay of 0.9 days. Median hospital stay was 4 days. There were no in-hospital or 30-day mortalities. Two intraoperative complications occurred in patients undergoing subtotal gastrectomy: ischemia of the Roux limb requiring resection and bleeding at the gastrojejunostomy anastomosis. The rate of major complications was 3.7% and minor complications was 9.9%. Anastomotic leak occurred in one patient following total gastrectomy (1.2%). Late complication rate was 11%, with stricture being the most common. Distribution of final pathology was: stage 0 (15%), stage I (47%), stage II (14%), stage III (10%) and stage IV (15%). Average number of lymph nodes resected was 19 ± 12.3.

CONCLUSION: Laparoscopic gastrectomy is safe and associated with low morbidity and mortality. A minimally invasive approach can provide good oncologic resection with equivalent lymph node harvest to open gastrectomy.

Tu1642

A Three State Analysis of Bariatric Procedures: Trends and Outcomes

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INTRODUCTION: The popularity of bariatric surgery has continued to grow over the last decade. The safety and efficacy of bariatric surgery has been previously established. Nevertheless, trends as well as patient characteristics continue to evolve and change in bariatric surgery. Herein, we report trends and outcomes following bariatric surgery from three major states over a six-year interval using the State Inpatient Databases (SID), Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality.

METHODS: Using SID data from California, Florida, and New York, we retrospectively reviewed outcomes of all laparoscopic adjustable gastric bandings (LGB), laparoscopic sleeve gastrectomies (LSG), and laparoscopic Roux-en-Y gastric bypasses (LRYGB) performed on obese patients from 2006 to 2011. Discharges analyzed for distribution of age and Deyo Comorbidity Index (Deyo score) by procedure. Furthermore, postoperative complications and mortality rates were compared and reported.

RESULTS: A total of 160,472 bariatric procedures were performed during the study period; 22.2% LGB, 15.5% LSG, and 62.4% LRYGB. Overall, females had a higher frequency of bariatric surgery (Table 1). LGB was the most frequently used procedure among males receiving bariatric procedures. The majority of patients undergoing bariatric surgery were under the age of 45 (50.4%). The highest proportion of patients undergoing LSG were >75 were (Figure A). In general, patients with the lowest Deyo score underwent LGB (P < 0.0001, Figure B). Over the past 5 years, the utilization of LGBs has decreased while the number of LSG has increased (Figure C). The number of LRYGB has remained relatively constant while the total number of bariatric procedures has increased. LSG had the highest proportion of pulmonary, cardiac and hematologic complications, while LGB had the lowest rates in the former categories (P < 0.0001) (Table 1). The incidence of postoperative ileus and nausea/vomiting was highest following LSG and lowest following LGB (P < 0.0001). The length of stay was significantly shorter following LGB, while LSG and LRYGB were equivalent (P < 0.0001). The proportion of mortality was lowest for LGB and highest for LSG (P < 0.0001). The overall mortality for all bariatric procedures was 0.4%.

CONCLUSION: Bariatric surgery remains safe and feasible. LSG is becoming more popular than LGB, especially for older patients with significantly more comorbidities; however, morbidity remains higher for LSG compared to LGB. The SID has important limitations; therefore, further analyses are necessary to identify the full impact of these findings.

Table 1: Demographic and postoperative complication information by procedure, 2006 – 2011

	LGB		LSG		LRYGB		Total Cases		P-value
	N	(%)	N	(%)	N	(%)	N	(%)	
Total	37330	(22.2)	25954	(15.4)	105092	(62.4)	168376		
Patient Demographics									
Gender									<0.0001
Male	9141	(24.8)	7621	(29.7)	21734	(20.9)	38496	(23.1)	
Female	27756	(75.2)	18048	(70.3)	82081	(79.1)	127885	(76.9)	
Age by category									<0.0001
18-45	17346	(46.5)	10254	(39.5)	54470	(52.0)	82070	(48.8)	
45-54	9909	(26.5)	6472	(24.9)	29514	(28.2)	45895	(27.3)	
55-64	7050	(18.9)	4962	(19.1)	17497	(16.7)	29509	(17.6)	
65-74	2899	(7.8)	2308	(8.9)	3291	(3.1)	8498	(5.1)	
>75	126	(0.3)	1958	(7.5)	0	(0.0)	2084	(1.2)	
Postoperative Complications									
Tachycardia	124	(0.3)	319	(1.2)	1160	(1.1)	1603	(1.0)	<0.0001
Other cardiac dysrythmia	335	(0.9)	549	(2.1)	896	(0.9)	1780	(1.1)	<0.0001
Other iatrogenic hypotension	65	(0.2)	153	(0.6)	243	(0.2)	461	(0.3)	<0.0001
Cardiac comp.	137	(0.4)	320	(1.2)	571	(0.5)	1028	(0.6)	<0.0001
Congestive heart failure	393	(1.1)	607	(2.3)	958	(0.9)	1958	(1.2)	<0.0001
Atrial fibrillation	465	(1.2)	929	(3.6)	1140	(1.1)	2534	(1.5)	<0.0001
Pleural effusion	13	(0.0)	567	(2.2)	150	(0.1)	730	(0.4)	<0.0001
Pulmonary insufficiency following surgery	98	(0.3)	609	(2.3)	487	(0.5)	1194	(0.7)	<0.0001
Pulmonary collapse	295	(0.8)	822	(3.2)	1379	(1.3)	2496	(1.5)	<0.0001
Acute respiratory failure	24	(0.1)	557	(2.1)	218	(0.2)	799	(0.5)	<0.0001
Other Respiratory Comp.	70	(0.2)	191	(0.7)	278	(0.3)	539	(0.3)	<0.0001
Paralytic ileus	52	(0.1)	739	(2.8)	595	(0.6)	1386	(0.8)	<0.0001
Nausea with vomiting	84	(0.2)	205	(0.8)	364	(0.3)	653	(0.4)	<0.0001
Other digestive system comp.	163	(0.4)	1070	(4.1)	1229	(1.2)	2462	(1.5)	<0.0001
Septic shock	5	(0.0)	349	(1.3)	79	(0.1)	433	(0.3)	<0.0001
Septicemia	10	(0.0)	569	(2.2)	172	(0.2)	751	(0.4)	<0.0001
Postoperative infection	18	(0.0)	430	(1.7)	222	(0.2)	670	(0.4)	<0.0001
Acute renal failure	48	(0.1)	526	(2.0)	419	(0.4)	993	(0.6)	<0.0001
Anemia	612	(1.6)	1398	(5.4)	2636	(2.5)	4646	(2.8)	<0.0001
Acute post hemorrhagic anemia	50	(0.1)	944	(3.6)	941	(0.9)	1935	(1.1)	<0.0001
Hemorrhage complication during a procedure	56	(0.2)	323	(1.2)	914	(0.9)	1293	(0.8)	<0.0001
Length of Stay (mean), d	1.2		5.9		5.9				<0.0001

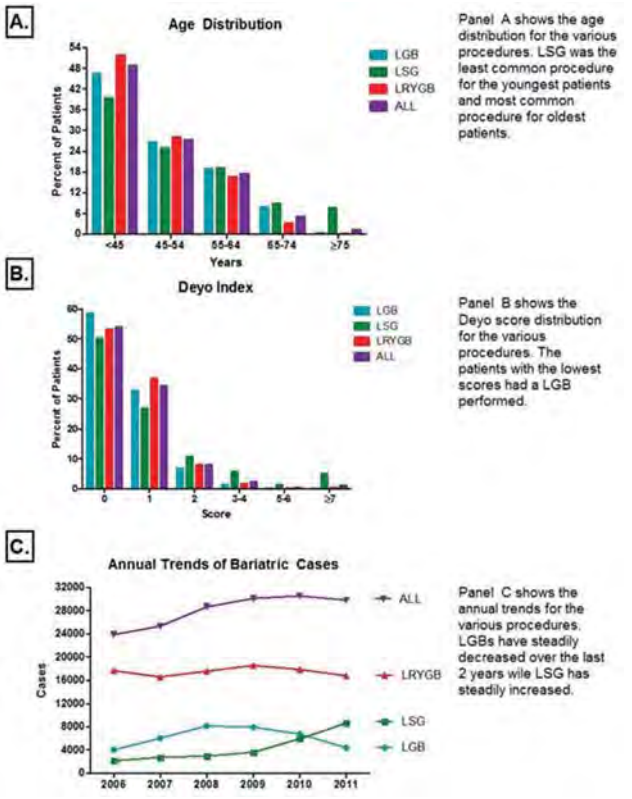

Figure: Bariatric Population Trends.

Tu1643

Combined Endoscopic and Laparoscopic Intra-Gastric Tumor Removal: A Procedure for Sub-Epithelial Tumor Located Close to the Esophagogastric Junction

Ajjana Techagumpuch[1], Chadin Tharavej[2], Patpong Navicharern[2], Suppa-UT Pungpapong[2], Suthep Udomsawaengsup[2]
[1]Surgery, Thammasat University Hospital, Bangkok, Thailand; [2]Surgery, King Chulalongkorn Memorial University Hospital, Bangkok, Thailand

INTRODUCTION: Laparoscopic approach is applicable for sub-epithelial lesion on the anterior gastric wall or greater curvature however lesion located close to the esophagogastric junction is remained challenging.

METHODS: Laparoscopic wedge resection was chosen for anterior and/or greater curvature lesions. The combined endoscopic and laparoscopic intra-gastric tumor removal was selected for the tumor located close to the esophagogastric junction. In brief, after completing the diagnostic endoscopy. The CRE dilator (18–20 mm) was applied to occlude the pylorus to maintain gastric inflation. The 5 mm and 10 mm blunted-tip trocars were carefully inserted directly into the gastric lumen. By laparoscopic instruments manipulation or by endoscopic manipulation of the tumor, Free margin resection was safely done using the Harmonic Scalpel or linear stapler under direct vision of a 5 mm, 30-degree laparoscopy and gastroscope. Bleeding was secured and gastric wall defect was approximated with intra-gastric suturing. Tumor was then retrieved endoscopically. The procedure was concluded with laparoscopic repair of port site gastric defects .We collected patients who had gastric subepithelial tumor removed. Patients who underwent combined endoscopic and laparoscopic intra-gastric tumor removal were analyzed.

RESULTS: From January 2010 to july 2013, there were 33 patients who had gastric subepithelial tumor removal by Chula Minimally Invasive Surgery Center. Eighteen had laparoscopic wedge resection. Fiftieth underwent combined endoscopic and laparoscopic intra-gastric tumor removal. Of these, 10 cases were female. Mean age was 43 years old (range: 37–82). All except one case had successfully performed without any major complication. One case that was failed the first attempt of port placement had a successful resection 3 months later. Three of patients were selected to preformed the operation by single intra-gastric port technique. The operative time was 83 minutes (range: 45–180). Blood loss was 20 ml (range: 2–200). Post-operative pain score at 1st post-operative day was 2.2 (range: 1–5). The mean hospital stay was 3.3 days (range: 3–6). The pathology results were 9 GISTs, 4 Leiomyomas, 1 ectopic pancreas and 1 carcinoid tumor. Average tumor size was 1.5 cm (range: 1–6).

CONCLUSION: Combined endoscopic and laparoscopic intra-gastric tumor removal is safe and effective for subepithelial tumor located next to the esophagogastric junction.

Tu1644

Comparing Laparoscopic to Endoscopic Resections of Gastric Tumors in a High Volume North American Center

Sara Najmeh, Jonathan Cools-Lartigue, Lorenzo E. Ferri
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INTRODUCTION: Laparoscopic gastrectomy provides excellent oncologic outcomes for appropriately selected patients with gastric cancer. Despite favorable outcomes, mortality rates of up to 5% have been reported. Endoscopic Submucosal Dissection (ESD) as an organ sparing option in the management of early cancers of the foregut is becoming increasingly accepted and allows for the en bloc removal of larger tumors. However, there is very limited data of this procedure in North America. Accordingly, we sought to compare the short-term and oncologic outcomes associated with LG versus ESD for the treatment of gastric malignant and premalignant tumors.

METHODS: All patients undergoing laparoscopic subtotal gastrectomy (LSG) or ESD from 2007 to 2013 for adenocarcinoma or dysplasia at a North American University hospital were identified from a prospectively collected database. Patients were dichotomized according to the surgical approach. Patient demographics, tumor characteristics, AJCC stage, oncologic outcome, length of stay (LOS) and postoperative complications were recorded. Data are presented as median (range). Mann-Whitney U and Fischer's exact test were used to determine significance.

RESULTS: 122 patients with gastric cancer were identified of which 38 were treated by LSG (22/38) or ESD (16/38). Adenocarcinoma was present in 31 patients and dysplasia was present in 7. No difference between groups was appreciated with regard to patient age (LSG 75.5 [51–86] vs. ESD 74 [40–85]), sex (LSG 13/21 [59%] male vs. ESD 9/16 [56.2%] male) and tumor size (LSG 2.8 [0.6–9] vs. ESD 2.2 [0.4–3.2]). Patients subject to ESD harbored more stage I lesions that did LSG patients (LSG 13/21 [61.9%] vs. ESD 10/10 [100%]*) and none presented with stage II or III disease (LSG 3/21 [14.3%] vs. ESD 0/10 for stage II) and (LSG 5/21 [23.8%] vs. ESD 0/10 for stage III). No difference in the rate of R0 resection was observed between the groups (LSG 20/22 [90.1%] vs. ESD 15/16 [93.7%]). Although no difference in overall complication rate was observed between the 2 groups (LSG 6/22 [27.3%] vs. ESD 4/16 [25%]), their severity was greater in patients subject to LSG. Accordingly, LOS was significantly shorter in patients treated by ESD group (LSG 8.5 [5–26] vs. ESD 2.0 [1–7]*).

CONCLUSIONS: In selected patients, endoscopic submucosal dissection is associated with improved short-term outcomes, and provides an appropriate oncologic resection compared to the laparoscopic approach.

Tu1645

Outcomes of Patients Undergoing Surgery for Metastatic GIST

Mihir M. Shah, Noaman Ali, Kathryn Stackhouse, Hideo Takahashi, Maitham A. Moslim, Sricharan Chalikonda
General Surgery, Cleveland Clinic Foundation, Cleveland Heights, OH

INTRODUCTION: In the era before imatinib, 30% of the patients who presented with metastatic gastrointestinal stromal tumor (GIST) were subjected to surgery with poor overall outcomes. We aim to determine the demographics and role of surgery for patients who present with metastatic GIST at their initial (first) presentation at a single institution.

METHODS: We retrospectively reviewed the electronic medical records of 416 patients with the diagnosis of GIST between August 2009 and July 2013. 26 patients (6.25%) presented with metastatic GIST at their initial presentation. Only patients who presented for the first time and were diagnosed with metastatic GIST as their initial diagnosis were included in this study. Patients with prior diagnosis of non-metastatic GIST or with any form of prior therapy for non-metastatic GIST were excluded from this study.

Continuous variables were summarized using means, standard deviation and 5-number summaries. Categorical variables were summarized using counts and percentages. All analyses were done using R software (version 3.0.2, Vienna, Austria).

RESULTS: Patients with metastatic GIST at initial presentation were found to have a median BMI of 27.4 and the median age at diagnosis of metastatic GIST was 62 years. 16 patients (62%) were men.

25 patients (96%) received medical therapy. 14 patients (54%) were subjected to surgery. 13 patients (50%) received both medical therapy and surgery. 17 patients (68%) had progressive disease and 6 patients (24%) had stable disease. The median follow-up with us after diagnosis was 26 months (Interquartile range: 12–91 months).

10 of 14 patients who underwent surgery had a median post-operative length of stay of 9 days.

In total, 19 patients (73%) received imatinib, 5 patients (19%) received imatinib and sunitinib.

Table 1 shows summaries of the continuous variables of interest in the dataset.

Table 1: Summaries of Continuous Variables

Factor	N	Mean	SD	Min	P25	Median	P75	Max
BMI	18	27.3	4.6	20.8	23.4	27.4	30.2	37.3
Age at Dx	25	61.3	16.1	33.4	49.2	61.9	70.4	89
LOS after surgery	10	15.9	18.4	3	6.5	9	16.5	65
Follow-up time after Dx	25	53	53.2	2	12	26	91	165

Table 2 shows summaries of the categorical variables of interest in the dataset.

Table 2: Summaries of Categorical Variables

Factor	Total	Percentage
Gender	26	
Male	16	61.54
Female	10	38.46
Race	25	
Black	3	12
Multiracial	1	4
White	21	84
Surgery	26	
No	12	46.15
Yes	14	53.85
Medical treatment given	26	
No	1	3.85
Yes	25	96.15
Response to treatment	25	
CR	2	8
PD	17	68
SD	6	24
Both Medical and surgical treatment given	26	
No	13	50
Yes	13	50

CONCLUSION: Demographics of patients presenting with metastatic GIST were established. In the current era of imatinib therapy, patients who presented with metastatic GIST, 54% were subjected to surgery, and 50% of the patients received both medical and surgical therapy. Overall survival at median follow-up of 26 months was 64%.

Translational: Esophageal

Tu2021

Interferon Expressing Oncolytic Adenovirus for Esophageal Cancer

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INTRODUCTION: Esophageal cancer remains a highly lethal malignancy with a low overall survival rate. In recent years, Western countries have seen a rapid increase in the incidence of esophageal adenocarcinoma. We have already demonstrated the effectiveness of cyclooxygenase-2 controlled conditionally replicative adenoviruses (CRAd) in esophageal adenocarcinoma cell lines in both in vitro and in vivo models. We now hypothesize that CRAds designed to express interferon alpha (IFN) could provide for increased cell killing capabilities. Additionally, when used as part of combination therapy with chemotherapy and radiation we hope to exploit IFN's properties as a chemoradiotherapy sensitizer to overcome barriers of conventional regimens for esophageal adenocarcinoma.

METHODS: An infectivity enhanced IFN-expressing CRAd was designed and generated (5/3 Cox2 CRAd ΔE3 ADP IFN). Crystal violet assays were used to determine the in vitro cytocidal effects of the virus across multiple esophageal cancer cell lines (OE19, OE33, and TE7) when compared to three control vectors. Furthermore, the IFN-expressing CRAd was used in conjunction with varying doses of cisplatin and radiation as part of a combination regimen.

RESULTS: Genetic modification of the virus capsid (Ad5/Ad3) was used to overcome esophageal adenocarcinoma's low expression of the primary adenovirus receptor and improve infectivity. The virus was also armed with the adenoviral death protein (ADP) to maximize adenoviral spread.

At low viral titers, the IFN-expressing CRAd had a much improved cytocidal effect compared to its otherwise identical counterpart that expressed luciferase instead of IFN. Furthermore, the IFN-expressing CRAd had an equivalent cytocidal effect as a non-selective IFN-expressing virus at later time points. The IFN-expressing CRAd also greatly outperformed the standard control adenovirus (Ad5 Wt).

The combination of the IFN-expressing CRAd with chemoradiation outperformed all monotherapy treatments (virus alone, chemotherapy alone, radiation alone) across all cell lines tested. Of note, when chemotherapy and radiation were tested in the OE19 cell line, increasing concentrations of cisplatin (up to 9 μM) and doses of radiation (up to 16 Gy) were unable to yield a complete cytocidal effect. Importantly, it was not until the addition of the IFN-expressing CRAd to the chemoradiotherapy regimen that total cancer cell death was achieved.

CONCLUSION: We have demonstrated that an IFN-expressing CRAd has a potent cytocidal effect across multiple esophageal cancer cell lines. When used as part of a combination regimen with chemotherapy and radiation, the IFN-expressing CRAd affords greatly increased cancer cell death. Given these promising results, we are currently testing the IFN-expressing CRAd in an in vivo setting.

Translational: Other

Tu2022

Optimizing Outcomes of Complex Ventral Hernia Repairs Using a Sandwich Reconstruction Technique with Novel Hybrid-VAC Closure

Pablo A. Baltodano, Kevin C. Soares, Caitlin W. Hicks, Karen K. Burce, Peter Cornell, Carisa M. Cooney, Frederick E. Eckhauser
Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD

BACKGROUND: Dual layer (sandwich) reconstruction for complex ventral hernia repair (VHR) may reduce hernia recurrence rates, but with an increased risk of surgical site occurrences (SSOs) and infections (SSIs). Previously, we demonstrated that a modified negative pressure wound therapy (Hybrid-VAC) system can decrease SSO and SSI rates following VHR with overlay mesh. In the present study, we describe postoperative outcomes following VHR with sandwich reconstruction using the Hybrid-VAC system.

METHODS: We conducted a retrospective review of all complex sandwich ventral hernia repairs (biologic mesh underlay and synthetic mesh overlay) with Hybrid-VAC system closure performed at our institution by a single surgeon (11/2010 through 01/2013). All patients had fascial defects that could not be re-approximated primarily utilizing components separation technique or other accepted adjuncts. Descriptive statistics were used to portray the incidence of SSOs, SSIs, major post-operative morbidity, readmission, reoperation, and hernia recurrence.

Table 1. Study Population Characteristics and Outcomes.

Age, years, mean ± SD	57.8 ± 12.0
Sex, male, n (%)	11 (42.3)
BMI, Kg/m^2, mean ± SD	36.5 ± 11.5
ASA score ≥3, n (%)	19 (73.1)
Smoking, n (%)	5 (19.2)
Diabetes, n (%)	8 (30.8)
Recurrent hernia repair, n (%)	18 (69.2)
Modified Hernia Grade, n (%)	
Grade 1	2 (7.7)
Grade 2	14 (53.9)
Grade 3	10 (38.5)
Operative time, minutes, mean ± SD	344 ± 121
Hernia defect size, cm^2, mean ± SD	294 ± 178
Length of Hospital Stay, days, mean ± SD	14.9 ± 12.7
Follow up, months, mean ± SD	6.7 ± 5.5
Outcomes	
Dindo-Clavien classification ≥3, n(%)	8 (30.8)
SSO, n (%)	6 (23.1)
SSI, n (%)	1 (3.9)
Overall Readmission, n (%)	4 (15.4)
Wound Related Readmission, n (%)	2(7.7)
Non-Wound Related Readmission, n (%)	2(7.7)
Reoperation, n (%)	2 (7.7)
Recurrence, n (%)	1 (3.9)

RESULTS: Twenty-six patients (57.8 ± 12.0 years, 42.3% male, mean follow-up 6.7 months) with complex ventral hernias underwent sandwich reconstruction with Hybrid-VAC closure during the 3-year study period (Table 1). Major-post-operative morbidity (Dindo-Clavien class ≥3) occurred in 8 (30.8%) patients, but incidence of SSO (n = 6, 23.1%) and SSI (n = 1, 3.9%) was low compared to historical reports. Hernia recurrence was limited to one patient (3.9%), and occurred at 10.7 months secondary to SSO.

CONCLUSION: As previously described, use of a dual layer sandwich repair technique for complex abdominal wall reconstruction is associated with low rates of hernia recurrence. The addition of a Hybrid-VAC closure system may reduce the risk of SSOs and SSIs previously reported with the sandwich technique, and deserves consideration in future prospective studies assessing optimization of VHR approaches.

Tu2023

A Current Assessment of Diversity in the Surgical Workforce

Judith French[1], Colin O'Rourke[2], Matthew Walsh[1]
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INTRODUCTION: A diverse workforce has been shown to increase profitability in business and is likely an important factor in healthcare delivery. Differing life experiences can alter the way people approach problems, impact their caregiving ability, and varied perspectives can lead to innovation. The factors that contribute to workforce diversity are unclear and it is likely valuable to look beyond gender and racial diversity to include socioeconomic status as a child, sexual orientation, previous work experience, etc.

Little is known regarding the diversity of the surgical workforce specifically when diversity is considered in its broadest context. Diversity in surgery can be compared to other medical specialties, and the implications of the findings should be explored to determine the effect on the sustainability of the profession and care of a diverse patient population. The aim of this study was to broadly assess the current status of surgical workforce diversity.

METHODS: A 25-item, anonymous questionnaire was created, and a cross-sectional survey was performed. The instrument consisted of demographic questions and Likert style questions which attempted to determine the participants' perceptions of the current level of diversity in their specialty and their perceived importance of particular diversity categories, which both can impact workforce recruitment and retention.

Descriptive statistics were calculated and comparisons were made between surgical and non-surgical specialties. A factor analysis was performed on the responses to the Likert questions addressing perceptions of present diversity from the survey.

RESULTS: Over 1,000 responses were received from U.S. based physicians across all specialties and levels of training (see Table 1). A statistically significant difference existed between surgical specialties and nonsurgical specialties with regards to gender, prior work experience, and political affiliation (see Table 2). Surgical respondents also perceived their specialties as being less diverse with regards to gender and sexual orientation when compared to respondents from the non-surgical specialties.

Factor analysis suggested four main factors behind individual's perceptions of the existing diversity in their specialty to further evaluate homogeneity: 1. Personal/Background experience diversity 2. Professional experience diversity 3. Personal health diversity 4. Sexual/gender identity diversity. In the surgical workforce there is significant perceived homogeneity regarding sexual/gender identity (p = 0.003) and trend for less life experience diversity (p = 0.087) compared to medical specialists.

Table 1: Respondent Demographics in Percentages

	Surgery	Non-Surgery
Age		
<25	2	1
26–30	47	51
31–35	28	23
36–40	6	7
41–45	3	5
46–50	3	3
>50	10	10
Professional Level		
Resident/fellow	81	77
Assistant/associate professor	12	15
Full professor	6	5
Hospital staff	<1	2
Private practice	1	<1
Other	0	<1
Race		
American-Indian or Alaskan Native	0	2
Asian	15	17
Black or African-American	9	6
Hispanic or Latino	3	6
Native Hawaiian/Pacific Islander	<1	<1
White or Caucasian	70	70
Other	5	5

Table 2: Diversity Categories

Diversity Category	Surgery	Non-Surgery	p-Value
Career Prior to MD/DO	17%	24%	0.05
Identify as female	28%	54%	< 0.001
Median political affiliation (0 = very liberal, 100 = very conservative)	48	28	< 0.001
Sexual orientation			0.13
Heterosexual or straight	95%	93%	
Gay or lesbian	2%	6%	
Bisexual	3%	2%	
Socioeconomic status as a child			0.91
Poor	3%	3%	
Lower-middle class	13%	14%	
Middle class	45%	42%	
Upper-middle class	35%	36%	
Upper class	4%	5%	

CONCLUSIONS: Surgeons and surgical trainees are less diverse than their medical colleagues, both by demographics and self-acknowledgement. The long-term impact and potential barriers to resolve this lack of diversity requires further investigation.

Translational: Pancreas

Tu2024

Identification of the Genes Associated with the Invasion Process and Prognosis for Pancreatic Ductal Adenocarcinoma: Coexpression of MUC16 and Mesothelin

Seiko Hirono, Masaji Tani, Manabu Kawai, Ken-Ichi Okada, Motoki Miyazawa, Atsushi Shimizu, Yuji Kitahata, Masaki Ueno, Shinya Hayami, Yoshinobu Shigekawa, Hiroki Yamaue
Second of Surgery, Wakayama Medical University, Wakayama, Japan

OBJECTIVE: Pancreatic ductal adenocarcinoma (PDAC) appears to arise from pancreatic intraepithelial neoplasms (PanINs). Cancerous cells break through the basement membrane from PanIN-3, they evolve into infiltrating adenocarcinoma. The invasion process is the crucial step in PDAC, because cancer cells that invade the vasculature, or lymphatic or neural vessels, can progress further to metastasis only after obtaining infiltrating status, however, the genes related to invasion remain unclear. In this study, we identified specific molecular markers, MUC16 and mesothelin, that were associated with invasion in PDAC by gene expression profiling.

METHODS: The microarray data of the infiltrating cancer and PanIN-3, which were harvested from an individual PDAC patient by laser microdissection, were compared to identify the specific genes for invasion process in PDAC. To investigate the effect of MUC16 and mesothelin expression on invasion and migration of pancreatic cancer cells, in vitro invasion and migration assays were performed in the membrane culture system. We analyzed the relationship between MUC16/mesothelin expression and PDAC clinicopathological factors by immunohistochemistry in 106 patients with PDAC.

RESULTS: We focused on MUC16 and mesothelin among 87 genes that were significant up-regulated in infiltrating components compared to PanIN-3 in all PDAC patients by gene expression profiling, because MUC16 was the most differently expressed between two regions, and mesothelin was reported as MUC16 ligand in ovarian cancer. Immunohistochemical analysis revealed that MUC16 and mesothelin were expressed simultaneously only in infiltrating components and not expressed in both all PanIN lesions and normal pancreatic tissues, furthermore, the expression of these genes increased at the invasion front in PDAC. The immunoprecipitation assay showed binding of MUC16 and mesothelin in both cell liens and surgical tissues of PDAC. The down-regulation of MUC16 by shRNA and the blockage of MUC16 binding to mesothelin by antibody inhibited both invasion and migration of pancreatic cancer cell line. Immunohistochemical analysis for 106 PDAC patients showed that a tumor size >4.0 cm, serosal invasion, invasion of other organs, and lymphatic permeation occurred significantly more often in the MUC16 high/mesothelin high expression group than in the other groups, and MUC16 high/mesothelin high expression was an independent prognostic factor for poor survival in PDAC patients (P = 0.01, HR, 1.99, 95% CI, 1.15–3.41).

CONCLUSION: MUC16 and mesothelin are involved in invasion and migration of PDAC, and they clinically represent new prognostic biomarkers and might be new therapeutic targets for patients with PDAC.

Tu2025

Pancreatic Penetration of Meropenem and Dosage Considerations Based on Site-Specific Pharmacokinetic-Pharmacodynamic Analysis

Naru Kondo[1], Kazuro Ikawa[2], Yoshiaki Murakami[1], Kenichiro Uemura[1], Takeshi Sudo[1], Yasushi Hashimoto[1], Hiroki Ohge[1], Norifumi Morikawa[2], Taijiro Sueda[1]
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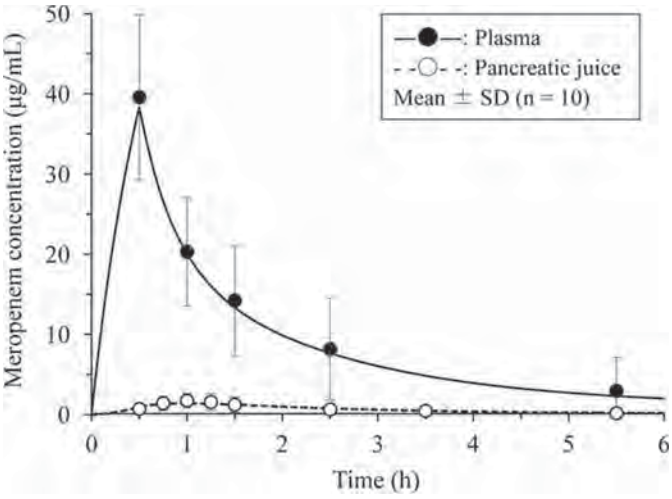
BACKGROUND AND OBJECTIVE: Very few studies have revealed the dynamics of meropenem penetration into the pancreas or pancreatic juice in humans. This study of the clinical pharmacokinetics and pharmacodynamics of meropenem in human pancreatic juice was performed to establish a basis for the validation of dosing regimens for pancreatic infections.

METHODS: Ten patients with endoscopic naso-pancreatic drainage received 500 mg meropenem over 0.5 h via intravenous infusion. Venous blood and pancreatic juice samples were collected post-infusion for up to 5.0 h and used to obtain measures of meropenem concentration. The probability of attaining the pharmacodynamic target (40% of the time above the minimum inhibitory concentration [MIC]) in pancreatic juice against MIC distributions for clinical isolates of Gram-negative bacteria was determined using a Monte Carlo simulation.

RESULTS: The patients had been diagnosed with pancreatic cancer (n = 3), acute pancreatitis (n = 2), ampullary carcinoma (n = 2), metastatic carcinoma of the pancreas (n = 1), intraductal papillary mucinous neoplasm (n = 1) and benign biliary tumor (n = 1). The mean maximum concentration of meropenem in pancreatic juice was 2.08 ± 0.94 μg/mL at 1.025 ± 0.18 h. The pancreatic juice/plasma ratio was 0.055 ± 0.028. A 0.5-h infusion of 500 mg meropenem every 8 h achieved a 99.4% probability of target attainment against Escherichia coli, 96.4% against Klebsiella species, 94.3% against Enterobacter species and 96.2% against Proteus species, but only 41.3% against Pseudomonas aeruginosa isolates.

CONCLUSION: Intravenous meropenem exhibits low penetrance into pancreatic juice. However, a dosing regimen of 500 mg meropenem (0.5-h infusion) every 8 h provides sufficient drug-exposure time in pancreatic juice against the four common Gram-negative bacteria populations.



Translational: Small Bowel

Tu2026

Major Small and Large Bowel Procedures: Emerging Realities with Decreasing Length of Stay and Payments: Impact on Translational Research

Pushwaz Virk[1], Charu Paranjape[1], Maged K. Rizk[2]
[1]Akron General Medical Center, Akron, OH; [2]Cleveland Clinic, Cleveland, OH

BACKGROUND: Centers for Medicare and Medicaid Services (CMS) released hospital level Diagnosis Related Group (DRG) payment data for the first time in 2013. Two DRGs related to major bowel procedures are in the top 100. This study aims to assess trends of payments, length of stay to inform translational efforts.

METHODS: Data obtained from CMS MEDPAR database between 2008 to 2011 was analyzed through descriptive statistics. Hospitals with at least 11 discharges in 2011 were included. DRG 329 is Major Small & Large Bowel Procedures With Major Complications or Comorbidities (MCC) and DRG 330 is With Complications or Comorbidities (CC). The third DRG 331 signifying procedures with No complications or comorbidities was evaluated at national level. Covered charges submitted by each hospital and reimbursements were averaged over the year.

RESULTS: For DRG 329, there was 12.1% increase in covered charges to $7,459,191,487 from 2008 to 2011. The payments increased 6.7% to $1,618,540,466 in this time period. The total discharges in 2011 were 56,960 with average total days of stay 14.9 in 2011. Both decreased from 2008 to 59,040 and 15.6 respectively. The highest average charge was submitted by Doctors Medical Center, CA ($557,900) and lowest by Civista Medical Center, MD ($31,804). The highest average payment was to Westchester Medical Center, NY ($101,796) and lowest to Canonsburg General Hospital, PA ($20,298). Ratio of highest to lowest statewide average charge was 5.6x and for payment was 2.1x.

For DRG 330, the covered charges increased 30.5% to $4,916,170,373 in 2011 while the Medicare reimbursement fell by 3.3% $977,007,149 despite 8.6% increase in number of discharges. For DRG 330, the highest average covered charge was submitted by Regional Medical Center of San Jose, CA ($307,161), the lowest was by Morton Hospital, MA ($15,809). The highest average payment was to Contra Costa Regional Medical Center, CA ($61,218) while the lowest was to South Texas Surgical Hospital, TX (12,201). The highest average charge was in CA, NJ, NV and average payment was for AK, MD, HI. Lowest average charge was in MD, ND, VT and lowest average payment was to AL, IA, AR. Highest state average charge was 4.9x the lowest while the ratio was 1.9x for payments.

DRG 331 also saw 30.8% increase in covered charges to $1,395,635,575 but a 6.9% decrease in reimbursements. There was 8.9% increase in total number of discharges and average total stay fell by half day.

County wise average payments are displayed in attached heat maps.

CONCLUSION: There are significant variations in hospital charges. The Medicare payments and DRGs are falling necessitating need for translation research to address these challenges.

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55th Annual Meeting

SCHEDULE-AT-A-GLANCE

All rooms at McCormick Place unless otherwise indicated.
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FRIDAY, MAY 2, 2014

8:00 AM – 4:30 PM	RESIDENTS & FELLOWS RESEARCH CONFERENCE *(By invitation only)*	King Arthur Court Room, Intercontinental Chicago

SATURDAY, MAY 3, 2014

8:00 AM – 5:00 PM	ADMIT MAINTENANCE OF CERTIFICATION COURSE The General Surgeon Performing GI Surgery: Current Management of Benign and Malignant Foregut Diseases	S504
12:00 PM – 2:00 PM	SURGICAL FELLOWSHIP FAIR *(By invitation only)*	Prairie B, Hyatt McCormick Place
4:00 PM – 5:30 PM	DDW COMBINED CLINICAL SYMPOSIUM (AASLD-Accredited) Does Bariatric Surgery Have a Role in Managing Nonalcoholic Fatty Liver Disease?	S103

SUNDAY, MAY 4, 2014

6:30 AM – 7:45 AM	ADMIT BREAKFAST WITH THE EXPERTS Paraesophageal Hernia: Where We Have Been, What We Are Doing Now	S104B
7:30 AM – 8:00 AM	OPENING SESSION	S504BCD
8:00 AM – 9:00 AM	PRESIDENTIAL PLENARY A (PLENARY SESSION I)	S504BCD
9:00 AM – 9:45 AM	PRESIDENTIAL ADDRESS Here Comes Generation Y	S504BCD
10:15 AM – 11:00 AM	PRESIDENTIAL PLENARY B (PLENARY SESSION II)	S504BCD
11:00 AM – 11:45 AM	DORIS AND JOHN L. CAMERON GUEST ORATION Philanthropy: Innovative Strategies for Sustainable Change	S504BCD
11:00 AM – 11:45 AM	ADMIT POSTER TOUR A: COLON-RECTAL (non-CME)	South Hall
12:00 PM – 2:00 PM	POSTER SESSION I (non-CME)	South Hall
2:00 PM – 3:30 PM	CONTROVERSIES IN GI SURGERY A Debate 1: Incisional Hernia Repair: Prosthetic vs. Biological Mesh Debate 2: Bariatric Surgery Center Accreditation: Yes or No?	S501
2:00 PM – 3:30 PM	DDW COMBINED CLINICAL SYMPOSIUM Advances and Controversies in Management of Locally Advanced Rectal Cancer	S103
2:00 PM – 3:30 PM	PLENARY SESSION III	S504A
2:00 PM – 3:30 PM	VIDEO SESSION I	S502
2:00 PM – 4:30 PM	STATE-OF-THE-ART CONFERENCE Advances in the Diagnosis and Management of Gastroesophageal Reflux Disease	S504BCD
4:00 PM – 5:30 PM	INTERNATIONAL RELATIONS COMMITTEE PANEL Rising Stars in Colorectal Surgery: Highlights in Landmark Publications in 2010-2012	S501
4:00 PM – 5:30 PM	PLENARY SESSION IV	S504A
4:00 PM – 5:30 PM	QUICK SHOTS SESSION I	S502

MONDAY, MAY 5, 2014

6:30 AM – 7:45 AM	ADMIT BREAKFAST WITH THE EXPERTS Tricks, Tips, and Timing for the Difficult Cholecystectomy	S104B
7:30 AM – 9:30 AM	VIDEO SESSION II: BREAKFAST AT THE MOVIES	S504BCD
8:00 AM – 9:30 AM	SSAT PUBLIC POLICY AND ADVOCACY COMMITTEE PANEL The 2014 National Debate: Expected and Unintended Consequences of the Affordable Care Act	S504A
8:00 AM – 9:30 AM	SSAT/AHPBA SYMPOSIUM Current Treatment Strategies for Hepatocellular Carcinoma	S501
10:00 AM – 11:00 AM	CLINICAL WARD ROUNDS I Personalized Treatment of Synchronous Colorectal Liver Metastases and Locally Advanced Rectal Cancer	S504BCD
10:00 AM – 11:00 AM	PLENARY SESSION V	S504A
10:00 AM – 11:00 AM	QUICK SHOTS SESSION II	S502
10:00 AM – 11:00 AM	VIDEO SESSION III	S501
10:00 AM – 11:30 AM	DDW COMBINED CLINICAL SYMPOSIUM (AGA-Accredited) Severe Colitis: More Medicines or Time for Surgery?	S103
11:00 AM – 11:45 AM	MAJA AND FRANK G. MOODY STATE-OF-THE-ART LECTURE Microbes Not Technique Cause Anastomotic Leak: Revisiting a 60-Year-Old Hypothesis	S504BCD
11:00 AM – 11:45 AM	ADMIT POSTER TOUR B: ESOPHAGEAL (non-CME)	South Hall
12:00 PM – 2:00 PM	POSTER SESSION II (non-CME)	South Hall
12:30 PM – 1:45 PM	ADMIT MEET-THE-PROFESSOR LUNCHEON Writers Workshop 1: Tips and Pitfalls in Writing and Editing Your Manuscript	S106B
2:00 PM – 3:30 PM	CONTROVERSIES IN GI SURGERY B Debate 3: Management of Small Duct Chronic Pancreatitis: Medical vs. Surgical Management Debate 4: Paraesophageal Hernias: Mesh vs. No Mesh Repair	S501
2:00 PM – 3:30 PM	DDW COMBINED CLINICAL SYMPOSIUM Prevention and Treatment of Postsurgical Bile Leaks	S103
2:00 PM – 3:30 PM	PLENARY SESSION VI	S504A
2:00 PM – 3:30 PM	SSAT/ASCRS SYMPOSIUM Improving Outcomes and Cost-Effectiveness of Colorectal Surgery	S504BCD
4:00 PM – 5:00 PM	CLINICAL WARD ROUNDS II Candidates and Techniques for Endotherapy of Superficial (T1) Esophageal Adenocarcinoma	S501
4:00 PM – 5:00 PM	QUICK SHOTS SESSION III	S504A
4:00 PM – 5:30 PM	DDW COMBINED CLINICAL SYMPOSIUM (AASLD-Accredited) Endoscopic Tools to Diagnose Hepatobiliary Malignancy	S103
5:00 PM – 6:00 PM	ANNUAL BUSINESS MEETING *(Members Only)*	S504BCD
7:00 PM – 9:00 PM	MEMBERS RECEPTION	Preston Bradley Hall, Chicago Cultural Center

TUESDAY, MAY 6, 2014

7:30 AM – 9:30 AM	SSAT/ISDS BREAKFAST SYMPOSIUM Updates in Surgery for GI Cancer	S504BCD
8:00 AM – 9:30 AM	DDW COMBINED CLINICAL SYMPOSIUM (ASGE-Accredited) Practical Management of Pancreatic Cysts	S103
8:00 AM – 9:30 AM	PLENARY SESSION VII	S504A
10:00 AM – 11:30 AM	CONTINUING EDUCATION COMMITTEE PANEL Strategies for the Deployment of Continuing Education Across the Surgeon Career Spectrum	S501
10:00 AM – 11:30 AM	DDW COMBINED CLINICAL SYMPOSIUM Evaluation and Approaches for Borderline Resectable Pancreas Cancer	S103
10:00 AM – 11:30 AM	PLENARY SESSION VIII	S504A
12:00 PM – 2:00 PM	POSTER SESSION III (non-CME)	South Hall
12:00 PM – 3:00 PM	KELLY AND CARLOS PELLEGRINI SSAT/SAGES LUNCHEON SYMPOSIUM Quality Indicators: Defining It Before Someone Else Does It for Us!	S504BCD
2:00 PM – 3:00 PM	DDW COMBINED RESEARCH FORUM (AGA-Accredited) Pancreatic Cancer: Now and in the Future	S102D
2:00 PM – 3:30 PM	DDW COMBINED CLINICAL SYMPOSIUM (AGA-Accredited) Barrett's Consensus Conference	S103
2:00 PM – 4:00 PM	BEST OF DDW 2014 (non-CME)	S102ABC