Surg Endosc (2013) 27:S251–S287
DOI 10.1007/s00464-013-2880-0

2013 Scientific Session of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Baltimore, Maryland, USA, 17–20 April 2013

Oral Presentations

S001

Is Laparoscopic Common Bile Duct Exploration Feasible without Choledochoscopy?

Ahmed A Elgeidie (presenter), Gastroenterology Surgical Center, Mansoura University

Background: Laparoscopic common bile duct exploration (LCBDE) had been proved to be a safe, efficient and cost-effective option for management of common bile duct (CBD) stones. In general, there are two guiding methods during LCBDE; fluoroscopic or choledochoscopic guidance. Most surgeons prefer the use of flexible choledochoscopy at LCBDE but flexible choledochoscopy is a fragile, delicate and expensive instrument. The aim of this work is to report our institution's experience in fluoroscopically-guided LCBDE without the use of flexible choledochoscope in terms of success/failure rate, morbidity/mortality, operative time and length of hospital stay.

Materials and Methods: A retrospective review of all patients who underwent LCBDE in Gastroenterology surgical center, Mansoura University, Egypt between March 2007 and February 2012 was performed. Patients with gallstones and concomitant CBD stones as diagnosed by clinical presentation, lab studies, and abdominal US were included. After initial assessment, all patients fulfilling the criteria of enrollment underwent MRCP, and only patients with MRCP, or ERCP, evidence of CBD stones were included. Excluded from the study were patients with cholangitis or pancreatitis, postcholecystectomy patients, and patients with contraindication to laparoscopy. Choledochoscopy was not used in any patient and we depended on fluoroscopic guidance for CBD stones retrieval in all LCBDE.

Results: A total of 290 patients were assessed for LCBDE. 76 patients were excluded, 7 patients had negative IOC, and four patients were converted to laparotomy. The remaining 203 patients were analysis. LCBDE failed in 16/203 (7.8%) with a success rate of 92.2%. The median operative time was 79 (45–180) minutes, the median hospital stay was 2.4 (1–10) days and the incidence of retained stones was 2.4%. Other complications were bile leakage ($n = 4$), mild pancreatitis ($n = 2$), wound infection ($n = 2$), port hernia ($n = 1$), and internal hemorrhage ($n = 1$).

Conclusion: Compared to published studies using choledochoscopy at LCBDE, we found a comparable results in terms of success/failure rate, morbidity and mortality, operative time and length of hospital stay. LCBDE under fluoroscopic guidance may be as safe and as efficient as choledochoscopic guidance and may be cost-effective as well. However, these conclusions should be verified by a prospective randomized study with a long term follow up on a large scale of patients.

S002

The diagnostic accuracy of transabdominal ultrasonography needs to be considered when managing gallbladder polyps

Daniel French (presenter), Phil Allen, James Ellsmere, Division of General Surgery, QEII Health Sciences Centre, Dalhousie University, Halifax NS

Introduction: Transabdominal ultrasonography (US) is the most commonly used test to diagnosis gallbladder disease. Gallbladder (GB) polyps are reported in 1–5.6% of US studies. Histopathologic studies suggest there is a relationship between GB polyps and GB cancer. GB cancer has a 5-survival of less than 5% because patients are often asymptomatic until the cancer is at advanced stage. GB polyps reported on US do not correlate well with histological findings and the eventual development of GB cancer. The standard recommendation for GB polyps detected on US that are greater than 6–10 mm is cholecystectomy. Surveillance with US is recommended for smaller polyps. Recent advances in US technology may impact these recommendations. We hypothesize the recent advances in US technology has improved the accuracy of transabdominal US for diagnosing GB polyps.

Methods: Between January 1, 2000 and December 31, 2010, 102,740 transabdominal US were performed in our tertiary teaching hospital and there were 6,612 GB polyps reported. During the same time period, 13,703 cholecystectomies were performed. There were 229 patients who underwent cholecystectomy who also had a GB polyp identified on a preoperative US. Histopathologic correlation study was performed to assess the diagnostic accuracy for transabdominal US.

Results: GB polyps were found in 6.4% of transabdominal US reports. Polyps were found in 1.2% of cholecystectomy specimens. US detected only 50% of the polyps identified on histopathology. The table lists the histopathology for the 229 patients undergoing cholecystectomy with a preoperative diagnosis of a GB polyp.

Histopathology	Number	Incidence (%)
Normal GB	8	3.4
Cholecystitis,Chronic	175	76.4
Cholelithiasis	115	50.2
Cholesterolosis	82	35.8
Cholecystitis, Acute	20	8.7
Adenomyomatosis	3	3.1
Adenomyoma	7	3.1
Cholesterol Polyp	17	7.4
Hyperplastic Polyp	4	1.7
Adenoma	2	0.9
All Polyps	23	10.5
Malignancy	3	1.3

Of the polyps found on US, 89.5% were not found on histopathology. Of the 23 polypoid lesions correctly detected by ultrasound there were 17 cholesterol polyps, 4 hyperplastic polyps, and 2 adenomas.

The sensitivity and specificity of transabdominal US for diagnosing GB polyps were 50.0 and 98.3%, respectively. The positive and negative predictive values were 10.5 and 99.8%.

Conclusion: Despite improvement in US technology, the accuracy of transabdominal ultrasonography for GB polyps remains poor. This needs to be considered when managing patients with US detected GB polyps. We recommend that the decision to operate on US detected GB polyps be largely based on symptoms and following GB polyps with US should be discouraged.

S003

LAPAROSCOPIC VS. OPEN LIVER RESECTION FOR BENIGN AND MALIGNANT SOLID LIVER TUMORS: A CASE MATCHED STUDY

Mohammad Kazem Fallahzadeh, MD (presenter), Gazi B Zibari, MD FACS FICS, Alireza Hamidian Jahromi, MD, Quyen Chu, MD FACS, Runhua Shi, MD PHD, Hosein Shokouh-Amiri, MD FACS FICS, Department of Surgery, Louisiana State University Health Sciences Center-Shreveport

Introduction: Laparoscopic liver resection (LLR) is gaining more popularity among surgical community as an alternative option to open liver resection (OLR) for the treatment of benign and malignant liver lesions. The aim of our study was to compare the surgical and oncological outcomes of LLR vs. OLR in benign and malignant solid liver tumors in a case-matched study.

Methods: In this IRB approved study, charts of 497 patients with liver lesions who had LLRs or OLR in our center were retrospectively reviewed. Among them, 54 consecutive patients with benign or malignant solid liver tumors who had LLR were matched with similar number of patients with OLR based on the pathology and extent of liver resection. Additionally, the surgical and oncological outcomes such as OR time, amount of blood transfusion requirement, free resection margin rate, length of stay, complication rate, perioperative mortality and survival were compared between two groups. Perioperative mortality was defined as any death, regardless of cause, occurring within 30 days after surgery in or out of the hospital, and after 30 days during the same hospitalization subsequent to the operation. Independent-sample t-test, chi-square and Fisher's exact tests and log-rank test were used to compare the data between two groups.

Results: Demographics, pathological characteristics of tumor and extent of liver resection were similar between the two groups. Twenty nine (54%) patients in each group had malignant lesions. There were no statistically significant differences between the two groups in terms of OR time, amount of blood transfusion requirement, free resection margin or post-op complication rate or survival. However, length of stay was significantly lower in laparoscopic group (5.9 vs. 9 days, $P < 0.05$). While no perioperative mortality was observed in patients with benign tumors, in patients with malignant tumors, 2 died perioperatively in each group.

Conclusion: Our results in accordance with previous studies demonstrate that while the oncological outcomes of LLR and OLR are comparable, LLR patients have shorter length of stay. Possible pros and cons of LLR vs. OLR for the treatment of solid liver tumors should be further compared in randomized controlled trials.

S004

Laparoscopic Liver Resection for Hepatocellular Carcinoma, 5 Year Experience

Long Tran Cong Duy, MD (presenter), Bac Nguyen Hoang, MD PhD, Thuan Nguyen Duc, MD, Dat Le Tien, MD, Viet Dang, MD, HBP Surgery

Background: The objective of this study was to evaluate the feasibility, safety and efficacy of laparoscopic liver resection for HCC in 5 year experience.

Patients and methods: Perspective and descriptive case series study. For diagnosis and treatment for HCC, we followed AASLD (2005) guideline. Laparoscopic liver resection was indicated for the unique tumor <5 cm in the right side and <10 cm for the left side. Parameters (patient data, operative time, blood transfusion, post-op complications and survival) were recorded according to the protocol and analyzed by SPSS 16.0.

Results: From Jan 2008 to Dec 20012, we performed totally laparoscopic liver resection for 194 HCC patients. According to BCLC, stages of disease were: Very early (1.1%), Early A1 (60.8%), A2 (5.8%), A4 (3.2%) and B (29.1%). Successful rate was 95.4% (185 patients). Conversion rate was 2.1%, Laparoscopic diagnostic operation in 5 patients (2.6%). Kinds of opeartions were show on below table. Laparoscopic anatomic hepatectomy in 82 patients (44.3%). Mean operative time 105 ± 48 min (30–300 min). Mean blood lost was 166.5 ± 187.6 ml (50 ml to 1200 ml). Most of our patients (97.8%) had no need for blood transfusion. Surgical margins were free of cancer in 97.8%. Post-op complications: 2 (1.1%) had bile leakage, 2 (1.1%) with temporary liver failure, 1 patient had hemorrhage from the incision and 1 pneumonia. No mortality within 30 days after the operation. The overall and disease free survival rate after 1 and 3 year were 82.5%; 76.2% and 60.5%; 45.9%.

Conclusions: This study demonstrates that laparoscopic liver resection for hepatocellular carcinoma is feasible, safe, and effective with good oncologic results. By the time, major and anatomic hepatectomy can be more and more applied by improving skills and experience. Laparoscopic liver resection become promising potential treatment with mini invasive benefit for HCC patients.

Hepatectomy	Position	Frequency	Percent
1 Segmentectomy	Segment 2	11	5.9
	Segment 3	8	4.3
	Segment 4	12	6.5
	Segment 5	13	7.0
	Segment 6	30	16.2
	Segment 7	8	4.3
	Segment 8	2	1.1
2 Segmentectomy	Posterior sector	8	4.3
	Anterior sector	2	1.1
	Lateral sector	1	0.5
	Segment 5, 6	14	7.6
	Left lobe	66	35.7
3 Segmentectomy	Left liver	7	3.8
4 Segmentectomy	Right liver	3	1.6
	Total	185	100

S005

COMBINED NEAR-INFRARED FLUORESCENCE LAPAROSCOPY OF THE EXTRA-HEPATIC BILE DUCTS AND ARTERIAL ANATOMY: RESULTS OF A FEASIBILITY STUDY

R.M. Schols, MD (presenter), N.d. Bouvy, MD PhD, A.a.m. Masclee, MD PhD, R.m. van Dam, MD, C.h.c. Dejong, MD PhD, L.p.s. Stassen, MD PhD, Departments of Surgery and Gastroenterology, Maastricht University Medical Center, The Netherlands

Introduction: Laparoscopic cholecystectomy (LC) is one of the most commonly performed laparoscopic procedures. Bile duct injury (BDI) is a rare, but serious complication during this procedure, mostly caused by misidentification of the extra-hepatic bile duct anatomy. Intraoperative cholangiography may be helpful to reduce the risk of BDI; however this is not a common procedure worldwide. Near-infrared fluorescence (NIRF) imaging using indocyanin green (ICG) is a promising alternative for the identification of the biliary anatomy.

Aim: to assess the feasibility and potential of intermittent NIRF during LC, using a newly developed laparoscopic fluorescence imaging system, for early biliary tract delineation.

Methods and procedures: Patients undergoing elective LC were included and received one intravenous injection of ICG directly after induction of anesthesia and a repeat intravenous injection at establishment of Critical View of Safety (CVS). During dissection of the base of the gallbladder and the cystic duct the extra-hepatic bile ducts were visualized using a dedicated laparoscope, which offers both conventional state-of-the-art imaging and fluorescence imaging. Intraoperative recognition of the biliary structures was registered at set time points, as well as the arterial anatomy confirmation at establishment of CVS.

Results: 30 patients were included. ICG was visible in the liver and bile ducts within 20 minutes after intravenous administration and remained so up to approximately 2 hours, using the fluorescence mode of the laparoscope. The common bile duct and cystic duct could be clearly identified at an early stage of the operation and more important, significantly earlier than with the conventional camera mode. Confirmation of the cystic artery was successfully obtained after repeat intravenous ICG injection at establishment of CVS. No prolonged preparation time before start of surgery and only a negligible extension of the operation time (<2 minutes) was observed, due to the use of the NIRF technique. No per- or postoperative complications occurred as a consequence of ICG use.

Conclusion: Intermittent fluorescence imaging using a newly developed laparoscope, after administration of ICG, seems a useful aid in accelerating visualization of the extra-hepatic bile ducts and for confirmation of the arterial anatomy during laparoscopic cholecystectomy. Thereby it most likely increases safety of the procedure.

S006

Laparoscopic hepatic resection for metastatic liver tumor of colorectal cancer: comparative analysis of short and long term results

Shuichi Iwahashi (presenter), Mitsuo Shimada, Tohru Utsunomiya, Satoru Imura, Yuji Morine, Tetsuya Ikemoto, Yusuke Arakawa, Hiroki Mori, Mami Kanamoto, Shinichiro Yamada, Hidenori Miyake, Department of Surgery, Tokushima University

Introduction: With progress of surgical technique and devices, laparoscopic hepatectomy (LH) became a realizable option for patients with liver tumors. However, the feasibility of LH for metastatic liver tumor of colorectal cancer should be guaranteed also oncologically. Therefore, we evaluate the short and long term outcome of LH compared with open hepatectomy (OH) for metastatic liver tumor patients of colorectal cancer by matched pair analysis.

Patients and Methods: *Patients* Twenty patients with metastatic liver tumor of colorectal cancer who underwent Lap-Hx were enrolled in this study. Age ranged from 47 to 92 with a median of 67.0, and male: female was 15:5. Tumors were located in the entire liver, and tumor size ranged from 1.5 cm to 4.5 cm (median 2.0 cm) in the diameter. Operative procedures consisted of left Hx in 2, left medial segmentectomy in 1, left lateral segmentectomy in 4, subegmentectomy in 2, and partial Hx in 11. *Methods* The patients were compared with 20 matched patients who underwent open Hx (Open-Hx), in which the following parameters were matched; tumor size, tumor location and operative procedure. Both short- and long-term outcomes in Lap-Hx were compared with those in Open-Hx.

Results: No difference was observed between the two groups, in age, gender, tumor size, and operative procedures. *Short-term outcome* Operative time (371 ± 132 min) in Lap-Hx was similar to that in Open-Hx (370 ± 146 min). Blood loss (184 ± 170 ml) in Lap-Hx was smaller than that in Open-Hx (312 ± 227 ml) ($P < 0.05$), and hospital stay (15.0 days) in Lap-Hx tended to be shorter than that in Open-Hx (17.5 days) ($P = 0.08$). No difference was observed in incidence and kinds of postoperative complications between the two groups. *Long-term outcome* Overall survival rate was 100% at 1-year, 82% at 3-year and 41% at 5-year in LH group and 89% at 1-year, 89% at 3-year and 76% at 5-year in OH group. Disease-free survival rate was 51% at 1-year, 11% at 3-year and 11% at 5-year in LH group and 63% at 1-year, 31% at 3-year and 23% at 5-year in OH group. There was no significant difference in overall and disease-free survival between the two groups.

Conclusion: LH is safe and feasible option for selected metastatic liver tumor patients of colorectal cancer. The short and long term outcome of LH is also considered to be acceptable.

S007

Selected transjugular intrahepatic portosystemic shunt versus laparoscopic splenectomy plus endoscopic varices ligation in the treatment of portal hypertension

Zhong Wu, PhD (presenter), Jin Zhou, PhD, Bing Peng, PhD, West China Hospital, Sichuan University

Background: Liver cirrhosis is associated with higher morbidity and reduced survival with appearance of portal hypertension and resultant decompensation. Transjugular intrahepatic portosystemic shunts (TIPS) are known to be efficacious in reducing portal venous pressure and control of complications secondary to portal hypertension such as variceal bleeding and ascites. Endoscopic variceal ligation (EVL) is very effective in controlling acute variceal hemorrhage with a favorable short-term efficacious. Splenectomy could effectively improve thrombocytopenia caused by hypersplenism and the long-term liver function. The present study was to compare elective TIPS and laparoscopic splenectomy (LS) plus EVL in their efficacy in preventing recurrent bleeding and long-term improvement in liver function in patients with liver cirrhosis and portal hypertension.

Materials and methods: Between January 2009 and March 2012, we enrolled 83 patients (55 with TIPS and 28 with LS plus EVL) with portal hypertension and a history of gastro-esophageal variceal rebleeding secondary to liver cirrhosis. The inclusion criteria were patients who were diagnosed as liver cirrhosis and had an episode of gastro-esophageal variceal bleeding (at least 72 hours after diagnostic endoscopy of bleeding). Clinical characteristics, perioperative outcomes and follow-up were recorded.

Results: No significant differences were observed between the two treatment groups with respect to patients' characteristics and preoperative variables. Within 30 days after surgery, one patient in TIPS group died of multiple organ dysfunction syndromes, while no patient in LS group died. Complication occurred in 14 patients in the TIPS group including re-bleeding (n = 5), encephalopathy (n = 4), ascite (n = 2), bleeding from a pseudoaneurysm of the thoracoabdominal aorta (n = 2) and Pulmonary infection (n = 1, 1.8%) as compared with 5 patients in the LS group including pulmonary effusion (n = 1), pancreatic leakage (n = 1) and portal vein thrombosis (n = 3). During a median follow-up of 13.6 months in TIPS group and 12.3 months in LS group, the actuarial survival was 100% in the LS group versus 85.5% in the TIPS group. Complications of TIPS group included encephalopathy (n = 8) and re-bleeding (n = 6). None sever complication occurred in LS group. Five patients had mild esophageal variceal detected by endoscopic examination. No special therapy was offered to them. Encephalopathy occurred in eight patients in the TIPS group and none in the LS group. In TIPS group, no significant difference was found between the pre- and post-operative time according to the hematological parameters (hemoglobin and platelet count) while a gradually deterioration was shown in liver function variables. In contrast, patients in LS group had an improvement in both hematological parameters and liver function.

Conclusion: LS plus EVL was superior to TIPS in the prevention of gastro-esophageal variceal rebleeding and other severe complications in cirrhotic patients. It improved long-term liver function and was associated with low rate of portosystemic encephalopathy (Table 1).

Table 1 Complications of both groups during short- and long-term follow up

Variables (short/long)	TIPS group (%/%)	LS plus EVL group (%/%)
Survival rate	98/85.5	100/100
Rebleeding rate	9.1/10.9	0/0
Encephalopathy	7.3/14.6	0/0

S008

BASELINE GLYCATED HEMOGLOBIN LEVELS PREDICT ENDOBARRIER-INDUCED WEIGHT LOSS IN MORBIDLY OBESE PATIENTS WITH AND WITHOUT TYPE 2 DIABETES

Rodrigo Muñoz, MD PhD (presenter), Angelica Dominguez, Statistician, Cesar Muñoz, MD, Milenko Slako, MD, Dannae Turiel, RN, Cecilia Gómez, RN, Fernando Muñoz, MD, Fernando Pimentel, MD, Alan Sharp, MD, Alex Escalona, MD, DEPARTAMENTO DE CIRUGIA DIGESTIVA, ESCUELA DE MEDICINA PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE

Introduction: Endoscopic treatment with the Endobarrier has shown to induce significant weight loss in morbidly obese patients. Twelve months after Endobarrier implantation, patients lose an average of 47% Excess Body Weight (%EBW). As with the weight loss seen with bariatric surgery, this weight loss is somewhat variable. We sought to identify clinical predictors of weight loss in morbidly obese patients treated with the Endobarrier for one year.

Methods and procedures: We reviewed charts from 61 consecutive patients implanted with the Endobarrier for 12 months. Patient demographics along with baseline comorbidities, anthropometrics and biochemical variables were selected for univariate and multivariate analysis.

RESULTS: Preoperative age and body mass index (BMI) were 35.4 ± 9.7 years and 43 ± 5.6 kg/m^2, respectively with 44 (72%) women. In this series, 21 patients (34%) had Type 2 Diabetes Mellitus (T2DM). Twelve months after Endobarrier treatment, patients had an average %EBWL of 46 ± 18%. Univariate analysis identified that fasting glycemia ($r2 = -0.303$, $p < 0.013$), insulin-resistance determined by HOMA (HOMA-IR) ($r2 = -0.457$, $p < 0.019$), and glycated hemoglobin A1c (HbA1c) ($r2 = -0.471$, $p < 0.013$) were inversely associated with %EBWL at one year. In this cohort of patients the multivariate analysis indicated that only baseline Hb1Ac levels were inversely associated with %EBWL after one year of treatment (β adjusted coefficient −0.758, $p < 0.016$). Importantly, no differences in %EBWL at one year were observed between patients with and without T2DM (%EBWL with T2DM 46.7 ± 20% versus without T2DM 46.8 ± 18.6%, $p = 0.988$).

Conclusions: The results of this study indicate that higher baseline HbA1c levels are independently associated with diminished body weight loss in morbidly obese patients treated with the Endobarrier independent o c status of the patient. This finding contrasts with previous reports in which T2DM patients experienced a lower weight loss. These results show that Endobarrier induces a significant weight loss in both T2DM and non-T2DM patients.

S009

PREDICTIVE FACTORS FOR CHOLECYSTECTOMY IN BARIATRIC PATIENTS UNDERGOING MEDICALLY-SUPERVISED WEIGHT LOSS

Alan Berg, MD (presenter), Jean-Claude Gauthier, MD, Fatima Haggar, MPH PhD, Tinghua Zhang, MSC, Robert Dent, MD, Jean-Denis Yelle, MD, Isabelle Raiche, MD, N'Gai Porte, MD, Joseph Mamazza, MD, Division of General Surgery, the Ottawa Hospital, University of Ottawa, the Ottawa Hospital Research Institute

Introduction: The objective of this study was to determine the prevalence of cholecystectomy in obese patients enrolled in a rapid weight loss program and to identify factors associated with an increased risk for requiring cholecystectomy.

Methods: We included data from 3436 patients enrolled in a medically-supervised weight loss program at the Weight Management Clinic, the Ottawa Hospital between 1992 and 2008. All patients who had a cholecystectomy prior to initiation of the weight loss program were excluded. We prospectively collected detailed historical, clinical, and laboratory data. Objective measurements and responses to standardized questionnaires were collected during clinic visits. A univariate analysis was performed to identify patient factors that were associated with cholecystectomy. A multivariate analysis was then performed to identify independent predictors of this outcome.

Results: Of the 3436 patients enrolled into the Weight Management Clinic at The Ottawa Hospital, 585 (17%) had a cholecystectomy prior to enrolment into the program. A total of 2851 patients were included in the final analysis. The overall prevalence of cholecystectomy in our population was 9%. Multivariate analysis revealed six variables that were independent predictors of cholecystectomy (p-value ≤0.05): Incremental BMI increase of 5, rate of weight loss >1.5 kg/week, serum triglycerides >1.7 mmol/L, menstruating females, oral contraceptives and hormone-replacement therapy. Two factors, total bilirubin >17 μmol/L and lipid-lowering drugs, were associated with significant reductions in the incidence of cholecystectomy. Factors that had no influence included gender, prior pregnancy, and serum total cholesterol >5.2 mmol/L.

Conclusion: Multiple patient factors were found to be associated with an increased risk of requiring cholecystectomy in individuals undergoing rapid medical weight loss. Future studies should determine if these factors could be predictive of who will develop symptomatic cholelithiasis and require cholecystectomy in the bariatric surgery population. This knowledge would be helpful to guide decision-making for surgeons who are considering when to offer concomitant cholecystectomy at the time of bariatric surgery.

S010

Decreases in activated caspase-1 levels are integral to improvement of metabolic profile after laparoscopic bariatric surgery - Preliminary Report of changes in caspase-1 and mitochondrial respiration after laparoscopic bariatric surgery

S Nijhawan, MD (presenter), Diego Alvarez, MD PhD, Jon Audia, PhD, William O Richards, MD, University of South Alabama, Mobile, AL

Introduction: Chronic, low-grade metabolic inflammation ('meta'-inflammation) and impaired mitochondrial function is found in patients with morbid obesity and metabolic syndrome. Caspase-1 elicits inflammation via activation of selected interleukins that are typically elevated in morbidly obese patients. However, associations between caspase-1, mitochondrial respiration, and surgically induced weight loss are unknown. The goal of this study is to measure caspase-1 and mitochondrial respiration in peripheral blood monocytes and skeletal muscle from a cohort of morbidly obese patients undergoing laparoscopic bariatric surgery.

Methods and procedures: This is an IRB approved prospective study involving morbidly obese patients (Body mass index/BMI >35) undergoing laparoscopic bariatric surgery (sleeve gastrectomy or roux-en-y gastric bypass). A cohort of healthy individuals was used for comparison and to account for any confounding variables. Levels of activated caspase-1 were measured by intracellular staining and flow cytometry in circulating monocytes using an irreversible, fluorescently labeled caspase-1 substrate (FLICA). An oxygraph O2K polarographic high-resolution respirometer was used to measure mitochondrial respiration (JO2) in peripheral blood monocytes and skeletal muscle.

Results: Mean pre-operative weight was 381.7. Mean pre-operative BMI was 63.8. Mean caspase-1 levels in patients with normal BMI as demonstrated by FLICA was 7.75 Relative Fluorescent Units (RFUs). Pre-operative activated caspase -1 level in one of our morbidly obese patients (BMI 70.3) was 28.3 RFUs. Activated caspase-1 levels in this patient dropped to 6.6 RFUs and 3.1 RFUs at 6 weeks and 12 weeks post-op, respectively. Pre-operative skeletal muscle JO2 was at the limit of detection and improved to 52 nmol/s/mg tissue/mL at 3-months post-op. Monocyte JO2 also increased from the limit of detection to 4.7 pmol/s/million cells/ml at 3-months post-op. These post-op levels were comparable to those observed in healthy, normal weight control individuals assayed in previous studies in our lab.

Conclusion: This study is the first report demonstrating decreased activated caspase-1 levels and resolution of monocyte and tissue mitochondrial respiration after laparoscopic bariatric surgery in a morbidly obese patient cohort. Importantly, these trends may represent critical parameters that positively impact improvement of metabolic profile in the morbidly obese patient after surgically induced weight loss.

S011

Laparoscopic Sleeve Gastrectomy: An Efficacious Management of Metabolic Syndrome In The Morbidly Obese

Joslin Cheverie, MD FRCSC (presenter), Garth R Jacobsen, MD FACS, Bryan J Sandler, MD FACS, Juan S Barajas-Gamboa, MD, Manuel Valero, MD, Alisa M Coker, MD, C. Aitor Macias, MD MPH, Mark A Talamini, MD FACS, Eduardo Grunvald, MD, Santiago Horgan, MD FACS, UCSD Center for the Future of Surgery

Introduction: The objective of this study is to evaluate weight loss, resolution of diabetes, and remission of obesity related co-morbidities following laparoscopic sleeve gastrectomy (LSG) in morbidly obese diabetic patients.

Methods: Under IRB approval, a retrospective review of all diabetic patients who underwent LSG was performed. Inclusion criteria included age >18, BMI > 30, and presence of diabetes with proven biochemistry and/or ongoing medical treatment. Multidisciplinary preoperative assessment involving medical, surgical, psychiatric, and dietary evaluations was completed. Patient demographics, weight, BMI, glycosylated hemoglobin level, fasting blood glucose, insulin requirements, oral hypoglycemics, antihypertensive medications, lipid profiles, and arthritis prevalence were obtained both pre- and post-operatively. Outcome measures included resolution of diabetes, extent of weight loss, percent of excess weight loss (%EWL), percent BMI loss (%BMI loss), complications, mortality, and duration of follow-up.

Results: Fifty-five obese, diabetic patients underwent LSG between August 2007 and July 2012. Female to male ratio was 2.24:1. Initial age, weight, and BMI averaged 53 years, 310 lbs, and 50 kg/m^2, respectively. Mean operative time was 113 mins (74–269). Preoperative duration of disease with respect to DM was 8.24 (0.5–30) years. Average preoperative HgA1C level was 10.4 mmol/mol (5.6–11.8), which dropped to 6.33 (5.1–9.3), 6 (5–6.8), and 6.1 (4.9–9.3) mmol/mol at 1, 6, and 12 months respectively. The mean initial fasting blood glucose level was 167 mg/dL (105–287), and at 1, 6, and 12 months this level was 106 mg/dL (75–157), 99 mg/dL (68–159), and 102 mg/dL (73–170) accordingly. One patient (1.8%) was on insulin alone, 53 patients (96%) were on oral anti-hyperglycemics, and 14 patients (25.5%) were on a combination of both. At 1 month, 28 patients (51%) were off all diabetic medications, and this increased to 37 (67%) and 39 (71%) patients at 6 and 12 months. Mean weight at 1, 6, and 12 months was 265, 238, and 227 lbs, respectively. The %EWL was 27%, 42%, 48% and %BMI loss was 14.3%, 23.1%, 26.3% at these intervals. Hypertension was present in 41 patients (75%) who required an average of 1.5 (1–4) oral medications for treatment. Hypertension prevalence decreased to 24 patients (25%) at 6 months. Hypertriglyceridemia was noted preoperatively with a mean of 193 mg/dL (71–467); average 6-month postoperative triglyceride level was 127 mg/dL (68–336). Preoperative LDL, HDL, and total cholesterol levels were 96 mg/dL (42–187), 43 mg/dL (19–76), and 180 mg/dL (99–308); postoperative measurements were 94 mg/dL (45–164), 48 mg/dL (9–76), and 165 mg/dL (107–274) respectively. Post operative complications and mortality were 0%.

Conclusions: LSG as a primary surgical treatment in obese diabetic patients maintains metabolically desirable outcomes over time. Weight loss, glucose homeostasis, and resolution of obesity-related co-morbidities in combination with zero surgical complications or mortalities supports LSG as a stand-alone procedure for metabolic syndrome.

S012

Specimen Extraction after Laparoscopic Sleeve Gastrectomy: No Need to Bag It

Eric Boyle, MD (presenter), Timothy Kuwada, MD, Dimitrios Stefanidis, MD PhD, Keith Gersin, MD, Carolinas Medical Center

Background: Laparoscopic sleeve gastrectomy (LSG) is an effective and popular bariatric procedure. In contrast to the adjustable gastric band and gastric bypass, LSG is a resectional procedure that requires removal of the relatively large gastric remnant. This often requires enlargement of a trocar site and the potentially contaminated specimen may increase the incidence of wound infection. Various techniques have been described to extract the remnant, many of which incorporate the use of a "protective" extraction bag. However, an extraction bag increases cost and may require a larger fascial incision due to bunching of the specimen, thus increasing pain and the risk of incisional hernia. The purpose of our study is to describe our technique and outcomes for bagless extraction of the stomach during LSG.

Methods: A single center, retrospective review of prospectively collected data from a consecutive series of non-revisional laparoscopic sleeve gastrectomies from 2008–2012 (3 surgeons). Wound infection and cost savings were the primary outcome of interest. Patient demographics, reoperation, leak, incisional hernia and mortality were secondary outcome measures. Disruption (spillage) of the gastric specimen was tracked in 135 consecutive patients by a single surgeon. All patients received 2 gm of intravenous Ancef within 30 minutes of skin incision, but routine postoperative antibiotics were not administered. The resected stomach was extracted at the 15 mm port site by enlarging the fascial defect to approximately 2 cm. The gastric specimen was grasped with a Kelly clamp at the corner of the first antral staple line and gently removed. The fascia was closed with a laparoscopic suture passer (figure of eight absorbable 0 suture). The skin was closed using interrupted 4–0 monocryl suture. The patient's incisions were evaluated two weeks after surgery by their attending surgeon.

Results: There were a total of 273 patients who underwent LSG during the study period. The mean age, weight and BMI was 44.1 years, 269.6 pounds, and 43.9 respectively. Females comprised 82% of the patients. The overall wound infection rate for the study group was 1.46% (4/273). All wound infections were managed at the bedside with incision and drainage. Four patients (3%) had disruption and spillage from the gastric specimen during extraction. There were no wound infections in these four patients. There were no reoperations, incisional hernias, staple line leaks or deaths. By eliminating the use of a 15 mm laparoscopic retrieval bag (Covidien Endocatch II #173049), our hospital saved over $58,000 ($213 USD per bag) in equipment costs.

Conclusion: In our series, removal of the stomach through the 15 mm port site, without an extraction bag, was associated with a low wound infection rate and appreciable cost savings. The incidence of specimen disruption with this technique was low (3%) and did not appear to increase the incidence of wound infection. The potential for reduced pain and incisional hernia by avoidance of a bigger extraction incision due to bunching of the specimen in the extraction bag requires further study.

S013

Revisional Bariatric Surgery: Perioperative Morbidity is Determined by the Type of Procedure

Kishore Malireddy, MD (presenter), Ryan Phillips, BS, Evon Zoog, BS, Timothy Kuwada, MD, Keith Gersin, MD, Dimitrios Stefanidis, MD PhD, Carolinas Healthcare System, CMC-Mercy

Introduction: Revisional bariatric procedures are on the rise and are expected to continue increasing given the high number of primary procedures being performed in the US. The higher complexity of these procedures has been reported to lead to increased risk of complications compared with primary bariatric procedures. The objective of our study was to review the indications and perioperative risk profile of revisional bariatric surgery compared with primary bariatric procedures.

Methods: A prospectively maintained database of all patients undergoing bariatric surgery by three fellowship trained bariatric surgeons between June 2005 and June 2012 at a center of excellence was reviewed. Patients who underwent revisional bariatric procedures were identified and divided into four categories: band to bypass, band to sleeve gastrectomy, bypass revision, and fundoplication to bypass. Patient age, baseline BMI, type of initial and revisional operation, number of prior gastric surgeries at time of operation, indications for revision, postoperative morbidity and mortality, length of stay, 30-day readmissions, reoperations, and leaks were recorded. These outcomes were compared between revisional and primary procedures using Mann Whitney or Chi-square tests. Under morbidity we included readmissions or postoperative ER visits, wound infections, pulmonary embolism, urinary tract infections and other less frequent complications.

Results: Out of 1519 patients undergoing bariatric surgery 74 (4.9 %) had revisional procedures during the study period. Indications for revisions included inadequate weight loss in 47 (63.5 %) patients, failed fundoplications with recurrent GERD in 25 (33.8 %) patients, recalcitrant anastomotic ulcers in one patient, and excess weight loss in one patient. Revisional procedures were associated with higher rates of readmissions and overall morbidity but no differences in leak rates and mortality compared with primary procedures. Band revisions had similar LOS and did not require reoperations compared with the respective primary procedures but patients after bypass revision or fundoplication to bypass revision had longer LOS, higher leak rate, and 20% required repeat surgery (see Table 1).

Conclusions: In experienced hands, revisional bariatric procedures can be accomplished with excellent perioperative outcomes that are similar to primary procedures. As the complexity of the revisional procedure and number of prior surgeries increases, however, so does the perioperative morbidity; fundoplication revisions to gastric bypass represent the highest risk group.

Table 1 Outcome comparison between primary and revisional bariatric procedures

Procedure	# Patients	Age	BMI	# Prior gastric operations	LOS	Morbidity	Mortality	Leaks	30-day Readmissions	Reoperations
Primary RY gastric bypass	1181	42.3	44.7	0	2.1	10%‡	0.1%	0.3%	8%‡	1.1%
Primary Sleeve gastrectomy	273	44.1	43.9	0	2.1	8%‡	0%	0%	4%‡	0.3%
Band to bypass	22	47.7	40.0	1*	2	24%*	0%	0%	14%*	0%
Band to sleeve	14	42	39.7	1*	2	28%*	0%	0%	14%*	0%
Bypass revision	13	52*†	42.5	1.3*†	3.2*†	15%*	0%	0%	15%*	15%*†
Fundoplication to bypass	25	55*†	34*†	1.6*†	7*†	40%*	0%	4%*†	40%*†	20%*†

* $p < 0.05$ compared with primary bypass or sleeve gastrectomy

† $p < 0.05$ compared with band revisions

‡ Incidence based on a random sample of 100 patients

S014

COMPARATIVE STUDY OF LAPAROSCOPIC REVISION OF FAILED GASTRIC BANDING TO SLEEVE GASTRECTOMY VERSUS ROUX-EN-Y GASTRIC BYPASS

Rodrigo Gonzalez, MD (presenter), Edwin Bran, MD, Fernando Montufar, MD, Las Americas Private Hospital

Background: Successful weight following bariatric surgery is defined as losing 50% of the excess body weight at long-term follow-up. All types of bariatric operations have a percentage of failure due to inadequate weight loss or weight regain. Revisional bariatric surgery is an alternative to induce further weight loss in these patients. However, it is still unclear which is the appropriate operation following failed gastric banding, either another restrictive procedure like the sleeve gastrectomy (SG) or a combined restrictive and malabsorptive procedure like the Roux-en-Y gastric bypass (RYGB). The aim of this study is to review outcomes between converting a failed gastric banding to SG versus RYGB.
Methods: We reviewed prospectively collected data of 916 patients undergoing gastric banding since the year 2000. Data from patients undergoing revisional surgery for failed gastric banding due to inadequate weight loss or weight regain were included in this study. The decision of the type revisional surgery to perform was made by the patients after our multidisciplinary team explained them all the details of each operation. Demographics including age, gender, and weight were analyzed. Comparisons between operative results, complications, and postoperative weight loss were performed. Continuous data were evaluated using either Student's t-test or Mann-U Whitney and ordinary data were evaluated using Fisher's exact test. Results are reported as mean ± SD or median (range), as appropriate. A $p < 0.05$ was considered statistically significant.
Results: Of the 42 (4.6%) patients undergoing revisional bariatric surgery for failed gastric banding, 22 (52%) underwent conversion to SG and 20 (48%) underwent conversion to RYGB. All patients underwent laparoscopic surgery. Weight at the time of the revisional surgery was 236 ± 26 and 257 ± 45 lb in patients undergoing revision to SG and RYGB, respectively (p = NS). There was no difference in age (35 ± 11 vs 43 ± 14 years), gender ratio (73% vs 60% male patients), estimated blood loss (163 [50–600] vs 180 [50–800] ml), rate of conversion to open surgery (9% vs 5%), intraoperative complications (9% vs 10%), postoperative complications (14% vs 20%) between patients undergoing conversion to SG and RYGB, respectively. However, there was a significant difference in operative time (155 ± 26 vs 208 ± 45 min), length of hospital stay (2 ± 0.5 vs 4 ± 2 days), and return to normal activities (7 ± 2 vs 11 ± 4 days) between patients undergoing conversion to SG and RYGB, respectively. Follow-up was similar between patients in the SG (58 ± 28 months) and RYGB (51 ± 21 months) groups. Weight loss was 66 ± 24 and 80 ± 33 lb in patients undergoing conversion to SG and RYGB, respectively (p = NS).
Conclusions: Revisional bariatric surgery through laparoscopic approach in patients with inadequate weight loss following gastric banding is safe and effective. Both procedures result in significant weight loss at long-term follow-up with low complication rates. Results of conversion to both sleeve gastrectomy and Roux-en-Y gastric bypass are comparable. However, the more demanding technical aspects of converting a gastric band to RYGB results in increased operative times, length of hospital stay and length to return to normal activities. Further analysis to determine which is the best procedure should be addressed with a prospective randomized trial.

S015

ECONOMIC EVALUATION OF HOSPITAL COSTS ASSOCIATED WITH LAPAROSCOPIC AND OPEN INGUINAL HERNIORRHAPHY

Fernando Spencer Netto, MD PhD FRCSC (presenter), Bruna Camilotti, MD, Kristen Pitzul, Todd Penner, MD FRCSC, Timothy Jackson, MD FRCSC, Fayez Quereshy, MD FRCSC, Allan Okrainec, MD FRCSC, Toronto Western Hospital, University Healthy Network, University of Toronto

Introduction: Inguinal hernia repair is one of the most common surgical procedures performed worldwide. Several studies have validated the clinical utility of laparoscopic inguinal herniorrhaphy and have demonstrated comparable long-term recurrence rates. In addition, laparoscopic surgery may enable enhanced recovery in the perioperative period. Given increasing fiscal constraints, procedural cost-effectiveness has become a critical metric in evaluating surgical procedures. The purpose of this study was to compare the total hospital costs associated with elective laparoscopic and open inguinal hernia repairs.
Methods and procedures: Using a prospectively maintained database, 211 patients who underwent elective unilateral inguinal hernia repair (117 open and 94 laparoscopic) and 33 patients following elective bilateral inguinal hernia repair (9 open and 24 laparoscopic) from April 2009 to March 2011 were identified. A retrospective review of electronic patient records was performed along with a standardized case-costing analysis using data from the Ontario Case Costing Initiative. Monetary values are shown in Canadian dollars and were converted to 2012 value using consumer price index inflationary adjustments. Chi-square and the Mann–Whitney U tests were used for categorical and continuous variables respectively.
Results: Laparoscopic repair was associated with a longer median operative time and required the use of general anesthesia in all cases. Operating room (OR) and total hospital costs (from pre-admission to discharge) for open unilateral inguinal hernia repair were significantly lower than the laparoscopic approach (median total cost for open surgery = $3386.64; TAPP = $3857.63 and TEP = $3803.23; P-value <0.05). However, OR and total hospital cost for repair of elective bilateral inguinal hernias were similar when comparing the open and laparoscopic approach (median total cost for open surgery = $4779.38; TAPP = $4891.56; TEP = $4769.33). When comparing unilateral or bilateral hernia repair within the laparoscopic cohort, there was no statistical difference in the cost (either OR or total episode of care) between the TAPP versus the TEP technique.
Conclusions: In the setting of a Canadian university hospital, when considering the repair of an elective unilateral inguinal hernia, the OR and total hospital costs of open surgery are significantly lower than the laparoscopic techniques. There is no statistical difference between OR and total hospital costs when comparing open surgery or laparoscopic techniques for repair of bilateral inguinal hernias. Further studies evaluating the economic utility and opportunity costs are necessary to elucidate the differences between elective open and laparoscopic inguinal herniorrhaphy that may extend beyond monetary evaluation alone.

S016

CURRENT NATIONAL PRACTICE PATTERNS FOR MANAGEMENT OF VENTRAL ABDOMINAL WALL HERNIA: A POPULATION BASED STUDY

L M Funk, MD MPH (presenter), Kyle A Perry, MD, Vimal K Narula, MD, Dean J Mikami, MD, W Scott Melvin, MD, The Ohio State University

Introduction: The health care burden related to the management of ventral hernias is substantial with more than 3 billion dollars in expenditures annually in the U.S. alone. Previous studies have suggested that the utilization of laparoscopic mesh repair for incisional hernia remains relatively low; however, national case volume estimates for all types of abdominal wall hernias (umbilical, incisional and other ventral) have not been reported since these procedure codes were instituted in 2008. We performed a population-based analysis to estimate the national volume of elective ventral hernia surgery, identify the proportion of laparoscopic versus open approaches, and compare the cost and length of stay for each approach.
Methods and Procedures: We analyzed data from the Nationwide Inpatient Sample to identify adults with a diagnosis of an umbilical, incisional, or ventral hernia who underwent an elective ventral hernia repair in the U.S. in 2009 and 2010. International Classification of Disease codes were used to identify the appropriate procedure codes. Cases that included major abdominal or pelvic operations, other than lysis of adhesions and/or small bowel resections, were excluded. Details of the surgical approach, including laparoscopic versus open technique and whether mesh was used were examined. National estimates of surgical volume were generated, and length of stay and total hospital charges were compared for laparoscopic versus open repairs.
Results: 110,051 elective umbilical, incisional and ventral hernia repairs were included in the analysis. 72.1% (n = 80,973) of cases were incisional hernia repairs, while umbilical hernia repairs comprised only 6.9% (n = 7,788) of the cohort. A laparoscopic approach was utilized in 26.6% (n = 29,870) of cases, including 20.6% of umbilical hernias, 26.5% of incisional hernias, and 29.1% of other ventral hernias. Mesh was placed in 85.8% (n = 96,265) of cases, including 50.0% (n = 3,841) of umbilical hernia repairs and 90.1% (n = 72,973) of incisional hernia repairs. There were no statistically significant differences in the use of laparoscopy or mesh between 2009 and 2010. Length of stay and total hospital charges were significantly lower for laparoscopic versus open umbilical, incisional and other ventral hernia repairs (p values all <.001). The average total hospital charge was $32,064 per admission for laparoscopic repairs compared to $37,377 for open repairs (p value<.001). Total hospital charges during this two year period approached 4 billion dollars ($936 million for laparoscopic repair versus $3 billion for open repair).
Conclusions: The utilization of laparoscopy for elective abdominal wall hernia repair remains low in the U.S. Only one-quarter of patients underwent laparoscopic umbilical, incisional or other ventral hernia repair in both 2009 and 2010 despite the fact that a laparoscopic approach was associated with a shorter hospitalization and lower inpatient cost. Given the substantial financial burden associated with these hernias, future research focused on preventing the development and optimizing the surgical treatment of ventral abdominal wall hernias is imperative.

S017

A COMPARISON OF OUTCOMES FOR SINGLE-INCISION LAPAROSCOPIC AND TRADITIONAL 3-PORT LAPAROSCOPIC INGUINAL HERNIORRHAPHY AT A SINGLE INSTITUTION

Sharon Monsivais, BA (presenter), Hannah Vassaur, MS PAC, Nicole E Sharp, MD, John Eckford, MD, Rob Watson, MD, Daniel Jupiter, PhD, F. Paul Buckley III, MD, Division of General Surgery, Scott and White Healthcare

Purpose: A retrospective chart review comparing single-incision laparoscopic (SILS) inguinal hernia repair and traditional 3-port laparoscopic (LAP) inguinal hernia repair was conducted to assess the safety and feasibility of the minimally invasive laparoscopic technique.
Methods: All SILS and LAP inguinal hernia repairs performed by three surgeons at a single institution between August 1, 2008 and July 30, 2012 were reviewed. Statistical evaluation included descriptive analysis of demographic data including age, gender, BMI, and hernia location (unilateral or bilateral) in addition to bivariate analyses of operative outcomes including operative times, conversions to open, case complexity and complications.
Results: 129 patients who underwent SILS inguinal hernia repair and 76 who underwent LAP inguinal hernia repair were compared. Cases included 92.68% men with a mean age of 55.36 (range 8–86) and a mean BMI of 26.49 (range 17.3–41.7); there were no significant differences in these variables between SILS and LAP cases. A one sided t-test for superiority indicated that average operative time for SILS unilateral cases was statistically significantly shorter than for LAP unilateral cases (57.51 versus 66.96 minutes; p = 0.043). For bilateral cases, average operative time for SILS and LAP were similar (81.07 versus 81.38 minutes), but a t-test for non-inferiority, with a non-inferiority margin of five minutes, was not statistically significant (p-value=0.18). In a linear model for operative time including the covariates surgery type, BMI, case complexity, and hernia location, an increase of 1 kg/m^2 in BMI increased operative time by 1.33 minutes on average, which was statistically significant. Bilateral cases also took an average of 21.5 minutes longer than unilateral cases, also significant. The presence of an incarcerated or recurrent hernia also proved to be a significant factor, showing an average increase in operative length of 9.23 minutes. Using this model, a test for non-inferiority showed that the SILS technique took no more than five minutes longer than the LAP technique (p-value=0.031). There were no conversions from SILS to multiport technique, but five (3.88%) SILS and three (3.95%) LAP cases were converted to either Kugel or Lichtenstein repairs; this was not a significant difference in conversion rate (Fisher exact p-value 1). Additionally, there was no significant difference in complication rates between SILS and LAP (chi-squared p-value 0.65).
Conclusion: SILS inguinal hernia repair is both a safe and feasible alternative to traditional LAP inguinal hernia repair and can be successfully conducted with similar operative times, conversion rates and complication rates. This comparative study will serve as a starting point for prospective trials, which are essential to confirming equivalence in these areas as well as revealing differences in patient satisfaction with post-operative pain, cosmesis, and quality of life.

S018

FEASIBILITY, SAFETY AND OUTCOMES OF TOTALLY EXTRA-PERITONEAL (TEP) LAPAROSCOPIC HERNIA REPAIR IN PATIENTS PREVIOUSLY HAVING PROSTATECTOMY

Philip A Le Page, MBBS hons (presenter), Doug Fenton-Lee, AssProf, Ania Smialkowski, Dr, John Morton, Dr, St. Vincent's Hospital, Sydney

Introduction: The laparoscopic Total Extra-Peritoneal (TEP) approach to inguinal hernia repair is facilitated by balloon dissection of the extraperitoneal space. Prostatectomy can produce adhesions which can obliterate the extraperitoneal plane. Historically, laparoscopic (TEP) surgery for these patients would be contra-indicated, however the benefits of the TEP approach, particularly with reduced pain and early return to work, may benefit these patients too. The aim of our study was to assess the feasibility, safety and outcomes of the TEP approach for hernia repair in patients having had a previous prostatectomy.

Methods: A retrospective case control study was conducted on patients undergoing Laparoscopic (TEP) hernia repair between 2004 and 2011 at St Vincent's Hospital, Sydney. There were 52 consecutive cases undergoing TEP hernia repair who had a previous prostatectomy and they were matched to 102 control cases. Clinical data for both groups was collected from the hospital records.

Surgery was undertaken by accessing the infraumbilical extra-peritoneal plane and insufflating the space with balloon and then CO_2. Careful dissection of the hernia and cord structures was undertaken followed by placement of parietex mesh. In cases following prostatectomy, the same process was followed but adhesions were carefully dissected, and when bilateral, separate incision and insufflation was undertaken either side of the midline. Outcome data was obtained from notes and contacting patients by phone and mail and included operative time, intraoperative complications, conversion rate, length of hospital stay, post operative complications (including wound complications and pain) and early and late recurrence.

Results:

	Previous prostatectomy n = 52	Control group n = 102
Average age (years)	69	67
ASA status (median)	2	2
Mean F/U (mths)	22	14
Mean operative time (minutes)	76	54
# Intraoperative complications	0	0
# Conversion to open surgery	1	0
Minor post-op complications (%)	15	11
Major post-op complications (%)	0	0
Hernia recurrence (%)	0	1%
Mean length of stay (days)	1.5	1.3
Chronic pain (%)	9	12
Patient satisfaction (%)	100	100

Conclusion: This study shows that TEP hernia surgery following prostatectomy is a feasible and safe procedure when conducted in experienced hands, with equivalent low complication, recurrence and pain rate compared to patients not having undergone this previous surgery. Importantly no intra-operative, major complications or recurrence were encountered in this group. Operative time is modestly longer and understandable given the adhesions, and may be justified given the benefits of early discharge and less post-operative pain. Further study dedicated to quality of life issues and comparison to open repair would clarify this.

S019

EFFICACY AND SAFETY OF MESH IN LAPAROSCOPIC SURGERY FOR GROIN HERNIA: SYSTEMATIC REVIEW AND META-ANALYSIS

Xueli Jia, MBBS PhD (presenter), Michelle HsinXuan Ting, MBBS MSc, Kathleen Irvine, BSc MCLIP, Angus JM Watson, BSc MB ChB FRCSEd, Department of General Surgery, Ward 4a, Raigmore Hospital, Old Perth Road, Inverness, UK, IV2 3UJ

Introduction: The efficacy and safety of mesh in laparoscopic surgery for groin hernia is uncertain. A systematic review is conducted to compare the efficacy and safety between different types of mesh for totally extraperitoneal (TEP) or transabdominal preperitoneal (TAPP) groin hernia repair.

Methods: Randomised controlled trials (RCTs) and non-randomised comparative studies published by May 2012 were sought by searching electronic databases including MEDLINE, EMBASE and CLib (CENTRAL), and by scanning reference lists of retrieved papers. Two reviewers independently screened titles/abstracts, undertook data extraction and study quality assessment.

Results: Nine studies involving 2281 patients were included of which five were RCTs and four were non-randomised comparative studies. Four RCTs and three non-randomised comparative studies reported TEP and the other two studies reported TAPP. The study quality was generally high. Median follow up was 16 months (range: 2 to 60 months). Partially-absorbable mesh had a higher hernia recurrence rate (2.4%, 25/1028) compared to non-absorbable mesh (1.6%, 18/1137; 4 studies, RR 1.51, 95% CI 0.80–2.84; Figure 1) but had a significantly lower risk of chronic pain after procedure (5 studies, n = 1223, RR 0.25, 95% CI 0.12–0.52; Figure 2). There were no significant differences in the rate of hernia recurrence between light-weight non-absorbable mesh (0.9%, 3/328) and heavy-weight non-absorbable mesh (1.9%, 6/319; 4 studies, RR 0.72, 95% CI 0.19–2.80) or in the risk of chronic pain (one study, n = 455, RR 0.52, 95% CI 0.05–5.75).

Conclusions: The use of partially-absorbable mesh in laparoscopic hernia repair significantly reduces chronic pain after procedure. Rigorous long-term RCTs are required to determine the comparative efficacy of partially absorbable, light-weight and heavy-weight non-absorbable mesh.

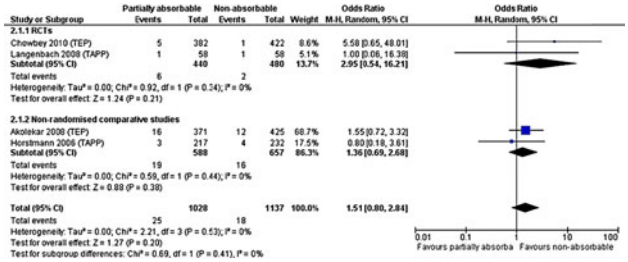


Fig. 1 Partially absorbable versus non-absorbable mesh—hernia recurrence

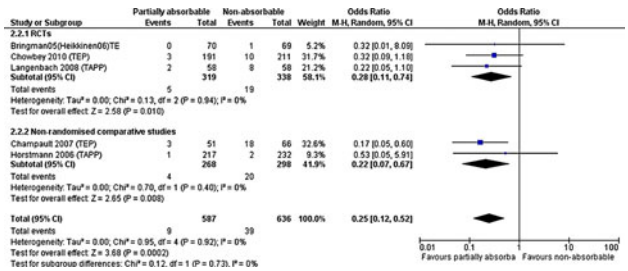


Fig. 2 Partially absorbable versus non-absorbable mesh—chronic pain

S020

RECURRENCE RATE OF PARAESOPHAGEAL HERNIAS AT ONE YEAR: SYNTHETIC VS. BIOLOGIC MESH

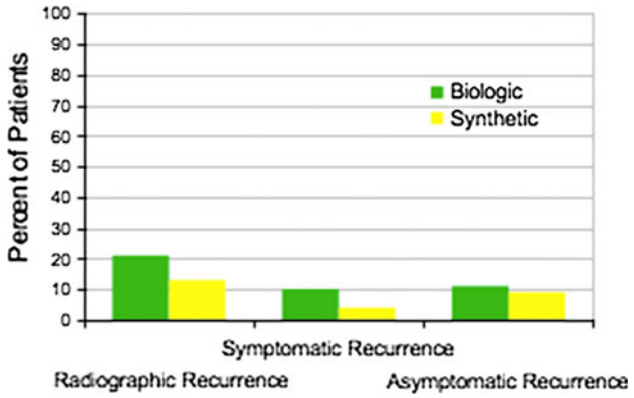
Maria C Michael, MA MD (presenter), Edward Borrazzo, MD, Fletcher Allen Health Care

This retrospective study examines the recurrence rates of paraesophageal hernias repaired with synthetic mesh (Crurasoft, Bard) and biologic mesh (Alloderm, Lifecell) at one year follow up. Paraesophageal hernias are uncommon but have potentially high risks of morbidity and mortality from gastric volvulus and incarceration if left uncorrected. The introduction of synthetic and biologic mesh into the procedure have each been shown to reduce the incidence of recurrence and subsequent reoperation in comparison to primary crural repair (Granderath et al. 2005; Oeschlager et al. 2006). However, synthetic and biologic mesh products have not yet been compared directly.

A total of 124 patients underwent laparoscopic paraesophageal hernia repair at FAHC from 2002-2011, and 93 patients had one year follow up including 23 with synthetic mesh and 70 with biologic mesh. Recurrence was assessed using barium esophagram at one year post-procedure. Statistical analysis was performed using Pearson's Chi Square test, Fischer exact test, and two sided T-test.

Radiographic recurrence with biologic mesh and synthetic mesh was 21% (15/70) and 13% (3/23) ($p = 0.3$), respectively, with an overall recurrence rate of 18%. Symptomatic recurrences, complaints beyond mild dysphagia and bloating attributable to the antireflux procedure, were much less at 10% (7/70) and 4% (1/23) respectively. Gender, age, BMI, and the type of wrap did not have a statistically significant impact on recurrence for repairs with synthetic or biologic mesh.

While the sample size prevents definitive conclusions about the superiority of synthetic or biologic mesh, these observations of patient outcomes give support to the claims that synthetic and biologic mesh are at least equally successful in primary paraesophageal hernia repair.



Granderath FA, Schweiger UM, Kamolz T, Asche KU, Pointner R. Laparoscopic Nissen fundoplication with prosthetic hiatal closure reduces postoperative intrathoracic wrap herniation: preliminary results of a prospective randomized functional and clinical study. Arch Surg. 2005 Jan;140(1):40–48. PubMed PMID: 15655204.

Oelschlager BK, Pellegrini CA, Hunter J, Soper N, Brunt M, Sheppard B, Jobe B, Polissar N, Mitsumori L, Nelson J, Swanstrom L. Biologic prosthesis reduces recurrence after laparoscopic paraesophageal hernia repair: a multicenter, prospective, randomized trial. Ann Surg. 2006 Oct;244(4):481–490. PubMed PMID: 16998356; PubMed Central PMCID: PMC1856552.

S021

EVALUATION OF LAPAROSCOPIC MANAGEMENT OF INGUINAL HERNIA WITHOUT PERITONEAL SAC

P C Munipalle, T Garud, Y K S Viswanath (presenter), South Tees Hospitals NHS Foundation Trust

Introduction: It has been noticed with the advent of laparoscopic repair of inguinal hernia that there is a category of patients experiencing groin pain and or lump due to protrusion of extraperitoneal fat into the inguinal canal in the absence of demonstrable peritoneal sac. We present a series of such cases in patients undergoing Laparoscopic Trans Abdominal Pre- Peritoneal (TAPP) repair and discuss their symptoms, management and follow up.

Methods: A total of 92 TAPP laparoscopic repairs were carried out in 65 patients in a single unit over the period of 4 years. They were studied prospectively to evaluate those cases with significant groin lump related symptoms and no demonstrable peritoneal sac. In those patients with groin symptoms suggestive of a hernia but no clear physical findings, ultrasound or MRI where appropriate has been performed. These patients have been followed up in terms of improvement in symptoms and recurrence of hernia.

Results: Among 92 consecutive laparoscopically repaired inguinal hernias, 11 hernias in 10 patients were found not to have demonstrable peritoneal sac. Two hernias had lump with expansile cough impulse, two had groin pain and the remaining 7 had both expansile lump and groin pain. All these patients were treated by excision of the 'lipoma' and placement of a mesh preperitoneally. Patients' symptoms improved significantly in all the patients till to date. None of them had a recurrence over a median follow up period of 4 years.

Conclusions: A proportion of patients presenting with groin pain/ with or without expansile groin lump will have an extra peritoneal fat herniation with no demonstrable peritoneal sac. The symptoms could be explained by the protrusion of extra peritoneal fat ('lipoma') in to the inguinal canal causing 'Inguinal compartment syndrome'. Clinical awareness and targeted treatment will help in resolution of symptoms.

S022

Facilitated Delayed Closure of Open Abdomen in Septic Patients Combining Negative Pressure Assisted Closure (NPAC) With a Dynamic Fascial Suture (DFS)

René H Fortelny, MD (presenter), Alexander H Petter-Puchner, MD, Simone Gruber-Blum, MD, Andreas Gaderer, MD, Karl S Glaser, MD, Department of General, Visceral and Oncological Surgery, Wilhelminenspital, Vienna Austria

Introduction: The aim of this prospective controlled trial is to define the optimal timepoint for delayed closure after negative pressure assisted closure in the treatment of the open abdomen in septic patients after abdominal surgery.

The delayed closure of the abdominal wall after abdominal NPAC treatment is currently a problem due to the high tension of sutures due to the lateralisation of the edges of the fascia. We present early results of an innovative combination of NPAC with a new fascial-approximation technique using dynamic fascial sutures (DFS) and delayed closure of the abdominal wall.

Methods: During the first surgical procedure using NPAC-technique the fascia in the midline are approximated with a running suture of elastic vessel loop. At final closure the abdomen can be closed in the midline using a running nonresorbable suture and in some cases in combination with a anterior component separation.

Results: 89 patients suffering from an open abdomen following surgery for secondary peritonitis were treated with NPAC and DFS. Delayed closure was achieved in 66 patients (74%) after 9.3 (1–63) days and 4 (1–42) number of revisions. Mortality rate was 28%. 8 superficial and 2 deep wound infection occurred. In 3 cases enteroatmospheric fistulas had to be treated. We recorded no technique-specific complication. 3 incisional hernia were detected in a follow up of 22.9 (1–53) month.

Discussion: Using a new technique combining NPAC and DFS in the treatment of the OA, the delayed wound closure by tension-less running suture of the fascia can be achieved easily with low risk of bursting abdominal walls and incisional hernias.

S023

Quality of life after TAPP repair comparing sports hernia and groin hernia

Gerwin A Bernhardt, MD (presenter), Benjamin Molderings, Christian Giessauf, MD, Hans-Jörg Mischinger, MD, Department of Surgery, Medical University of Graz

Introduction: Sports hernia is a clinical diagnosis of chronic, painful musculotendinous injury to the medial inguinal floor occurring with athletic activity without the existence of a groin hernia. Long term results for laparoscopic hernia repair especially data on quality of life (QOL) are lacking. To the best of our knowledge there are no data on QOL after sports hernia. The aim of this study was first, to compare postoperative QOL data in patients undergoing transabdominal preperitoneal patch technique (TAPP) for inguinal hernia with data from patients undergoing TAPP for sports hernia ans second to compare these results with QOL data of the Austrian norm population.

Methods: In this retrospective analysis we included all patients ($n = 559$) undergoing TAPP repair between 2000 and 2005. Fifty patients (8.9%) were operated because of sports hernia or chronic groin pain; the remaining patients because of groin hernia. Thirty-eight patients died of unrelated causes during the follow-up period. We sent out a self constructed hernia questionnaire including the short form thirty-six health survey (SF-36) for QOL evaluation to the remaining patients. QOL data were compared with data from an age and sex matched Austrian norm population.

Results: Finally 362 (70% response rate) completed questionnaires could be evaluated. Patients mean age was 62 ± 16 years. The mean follow-up time was 93 ± 20 months. Thirty-four patients (68% response rate) with sports hernia returned a completed questionnaire. There were no significant differences between groin hernia and sports hernia patients. There was no statistically significant difference between the summary measures PCS and MCS compared to the Austrian population norms (see Table 1); however differences in the SF-36 subscales could be detected.

Discussion: Long term results of QOL after TAPP repair for groin hernia as well as sports hernia are comparable to the norm population. Differences in subscales need to be further analysed.

Table 1 SF-36 results (summary measures)

	PCS	MCS
Groin hernia	42.2 ± 4.6	57.9 ± 12.0
Sports hernia	41.7 ± 5.2	59.1 ± 14.5
Norm population	42.6 ± 10.7	53.1 ± 10.7

S024

ROLE OF DYNAMIC ULTRASOUND SCAN IN THE ASSESSMENT OF GROIN PRIOR TO LAPAROSCOPIC REPAIR IN PATIENTS WITH SPORTSPERSON'S GROIN

P C Munipalle, J Dean, T Garud, Y K S Viswanath (presenter), South Tees Hospitals NHS Foundation Trust

Introduction: Persistent groin pain without clinically evident hernia poses a challenge to the attending clinician in patients with Sportsperson's groin. We report our initial experience of using dynamic ultrasound scan (DUS) as the primary assessment tool and compared the scan results with operative findings.
Methods: All patients clinically suspected with Sportsperson's groin hernia based on history and clinical findings were subjected to dynamic ultrasound. The results were corroborated with operative findings.
Results: A total 32 groins were assessed by DUS in 20 consecutive young athletes with suspected Sportsperson's groin. Among these 12 had bilateral and 8 had unilateral groin symptoms. All patients underwent surgery in the form of Transabdominal preperitoneal (TAPP) repair. The intraoperative findings were well corroborated with DUS findings except in two. Two patients who underwent surgery on clinical grounds with preoperative negative dynamic ultrasound scan had unilateral and bilateral hernias respectively. The positive predictive value (PPV) of dynamic ultrasound in diagnosing occult groin hernias is 95%.
Conclusion: Dynamic ultrasound scanning of groin in young athletes with groin pain should be the preferred choice of investigation.

S025

Laparoscopic Component Separation with Bio-prosthetic Reinforcement: A Single Surgeon's Experience

Ibrahim Daoud, MD, Brian Pellini, MD, Randall Kimball, MD (presenter), St. Francis Hospital, Hartford, CT

Introduction: Laparoscopic component separation has the advantages of preserving the abdominal wall vasculature and does not require the formation of skin flaps. These advantages have the potential to reduce post-operative complications. This study reports a single surgeon's experience with laparoscopic component separation with bioprosthetic reinforcement.
Method: We present a series of 33 laparoscopic component separations with bioprosthetic mesh over a two year period from February 2010 to July 2012. Data collected included demographics, operative time, length of stay and complications
Results: Thirty three patients were included with a median age of 63 (36–83). 90% had preexisting comorbidities (40% ASA 2, 55% ASA 3). 60% had at least one prior ventral hernia repair. The median defect width was 11 cm (6–19), and median operating time was 225 minutes (150–325). 80% were bilateral component separations: 91% were completely laparoscopic, 6% were combined, and 4% ($n = 1$) were converted. All mesh was biologic (human acellular or non-crosslinked porcine). The median length of stay was 6 days, with return of bowel function in 5 days. 8 (24%) patients experienced complications, with 1 (3%) infected seroma and 2 (6%) reoperations for failure of the repair.
Conclusions: Our series correlates with the literature in showing reduced wound complications and similar length of procedure with laparoscopic component separation. Bioprosthetic mesh can be safely used in the repair of ventral hernia using laparoscopic component separation. Long term follow up is necessary to assess the durability of bioprosthetic mesh in these patients. This is one of the largest single surgeon experiences with laparoscopic component separation reported, and one of the first reporting on the routine use of bioprosthetic mesh.

S026

A PROCEDURAL COST MINIMIZATION ANALYSIS FOR HERNIA REPAIRS AND MINOR PROCEDURES BETWEEN A UNITED STATES ACADEMIC INSTITUTION AND A MEDICAL MISSION TO THE DOMINICAN REPUBLIC

Jaime A Cavallo, MD MPHS (presenter), Jenny Ousley, BS, Christopher Barrett, MD, Sara Baalman, MA, Kyle Ward, DO, Margaret M Frisella, RN, Brent D Matthews, MD, Section of Minimally Invasive Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, Missouri

Introduction: Material supplies and medications constitute the greatest per capita costs for surgical missions to underserved populations. Nonprofit organizations that provide healthcare materials have the potential to minimize procedural costs and increase the number of patients served during limited-budget surgical missions. We hypothesize that supply acquisition at nonprofit organization (NPO) costs will lead to significant cost-savings compared to supply acquisition at US academic institution (USAI) costs from the provider perspective for hernia repairs and minor procedures during a surgical mission.
Methods: Individual items acquired for a surgical mission to the Dominican Republic (DR) in 2012 were uniquely barcoded for accurate accounting of consumption. Traceability Made Easy® (MASS Group®, Inc.) software was used to generate a custom inventory system. Both the NPO and the USAI unit costs were associated with each item in the inventory. For each procedure sampled, barcodes for all used items were scanned and assigned to the corresponding procedure record. Doses for all administered medications were recorded and assigned to the corresponding procedure record. Mean material costs for each procedure type were calculated, and a cost-minimization analysis between the NPO and the USAI platforms ensued. A two-tailed Wilcoxon matched-pairs test was applied to each set of costs at a significance level of $\alpha = 0.05$. Results are presented as means ± SDs, and all costs are presented in US dollars. To reproduce our mission experience, item utilization analysis was used to generate lists of most frequently used materials by procedure type.
Results: A total of 126 procedures were performed on 110 patients (M:F = 80:30; age = 45.6 ± 20.4 years). Sampled among these procedures were 13 unilateral inguinal hernia repairs (IHR), 3 bilateral inguinal hernia repairs (BIHR), 9 hydrocelectomies (HC), 3 femoral hernia repairs (FHR), 8 umbilical hernia repairs (UHR), 26 minor procedures (MP) including excisions of benign superficial masses, and 7 pediatric inguinal hernia repairs (PIHR). For each procedure type, the mean material costs under the NPO versus the USAI platforms, respectively, and the mean cost savings (CS) were as follows: IHR: \$62.17 ± \$0.74 versus \$502.79 ± \$684.51 ($p = 0.0002$), CS=\$482.86 ± \$683.79; BIHR: \$51.85 ± \$26.87 versus \$351.27 ± \$184.20 ($p = 0.2500$), CS=\$332.46 ± \$184.09; HC: \$53.73 ± \$23.66 versus \$141.68 ± \$14.11 ($p = 0.0039$), CS=\$127.26 ± \$13.18; FHR: \$55.47 ± \$13.44 versus \$253.81 ± \$54.32 ($p = 0.2500$), CS=\$232.92 ± \$56.49; UHR: \$47.56 ± \$31.35 versus \$133.05 ± \$31.54 ($p = 0.0078$), CS=\$120.90 ± \$30.51; MP: \$4.59 ± \$13.34 versus \$38.55 ± \$19.03 ($p < 0.0001$), CS=\$36.59 ± \$17.76; PIHR: \$23.92 ± \$11.49 versus \$134.22 ± \$16.61 ($p = 0.0156$), CS=\$120.66 ± \$14.61. Notably, NPO costs exceeded USAI costs for narcotics, antibiotics, and normal saline.
Conclusion: Supply acquisition at nonprofit organization costs leads to significant cost-savings compared to supply acquisition at US academic institution costs from the provider perspective for IHR, HC, UHR, MP, and PIHR during a surgical mission to DR. Item utilization analysis can generate minimum-necessary material lists for each procedure type to reproduce cost-savings for subsequent missions.

S027

The Outcomes of Non-Trauma Splenectomy from Nationwide Inpatient Sample

A Y Zemlyak, MD (presenter), V B Tsirline, MD, S El Djouzi, MD, A L Walters, MS, A E Lincourt, PhD MBA, R F Sing, DO, B T Heniford, MD, Carolinas Medical Center

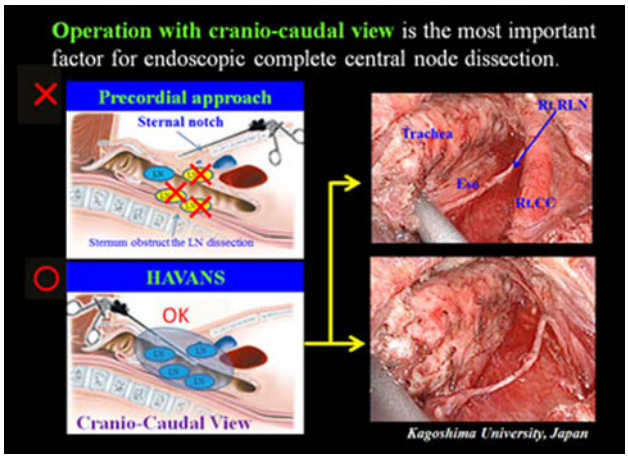
Introduction: Due to the impact of LeapFrog and other outcomes measurement organizations and studies, a strong push toward regionalization for many solid organ operations began in the early 2000s. This study examines the effects of regionalization for medically indicated, non-trauma splenectomies (NTS) in USA.
Methods: Nationwide Inpatient Sample data were analyzed for NTS based on ICD-9-CM codes for 1998–1999 (1990s) and 2008–2009 (2000s). Demographics, co-morbidities and complications were compared by hospital status (teaching vs non-teaching) and location (urban vs rural) using standard statistical methods.
Results: NIS recorded 7,062 cases performed in 1990s and 5,530 in 2000s. Teaching hospitals accounted for 55.5% of NTS in 1990s vs 61.5% in 2000s ($p < 0.001$). In 1990s, 86.9% of cases were performed in urban hospitals vs 91.3% in 2000s ($p < 0.001$). In both decades patients were older in non-teaching versus teaching hospitals (47.6 vs 43, $p < 0.0001$ and 51.4 vs 46.2, $p < 0.0001$). The Charlson Co-morbidity Index (CCI) scores did not differ between hospitals in either decade. Non-teaching hospitals had more medical morbidities: CHF (1990s: 6.05% vs 3.91%, $p < 0.0001$ and 2000s: 5.84% vs 3.36%, $p < 0.0001$) and COPD (8.6% vs 6.56%, $p = 0.001$ and 13.8% vs 10.2%, $p < 0.0001$). In 1990s in-hospital mortality was higher in teaching (7.31% vs 5.16%, $p = 0.0002$) and urban (6.64% vs 4.45%, $p = 0.01$) hospitals; there was no difference in the 2000s. In 1990's, teaching hospitals had more patients with severe liver disease and HIV (2.04% vs 1.37%, $p = 0.032$ and 1.15% vs 0.64%, $p = 0.025$). The same pattern was observed in urban vs rural hospitals (1.89% vs 0.76%, $p = 0.014$ and 1.04% vs 0.11, $p = 0.002$); there was no difference in 2000's. In both decades in-hospital mortality correlated strongly with the presence of severe liver disease ($p < 0.0001$), and with HIV in 2000's ($p = 0.0003$). Surgical complication rate (including bleeding/hematoma, abscess, pancreatic fistula and re-operation) was below 0.5% in both decades and not different per the hospital setting.
Conclusion: Although non-trauma splenectomies are performed increasingly in urban and teaching hospitals, the surgical outcomes are not affected by regionalization. The spectrum of presenting co-morbidities differs per hospital setting, however. Inpatient mortality appears to be primarily related to severe liver disease despite the decade of care.

S028

Hybrid approach of Video Assisted Neck Surgery (HAVANS) - Endoscopic complete central node dissection with cranio-caudal view for thyroid carcinoma

Akihiro Nakajo, MD PhD (presenter), Hideo Arima, MD PhD, Munetsugu Hirata, MD, Yoshie Takae, MD, Yuko Kijima, MD PhD, Heiji Yoshinaka, MD PhD, Shoji Natsugoe, MD PhD, Department of Surgical Oncology, Breast and Thyroid Surgery, Kagoshima University

Aims: Endoscopic thyroid surgery including Robotics with extracervical approaches is a safety and well-accepted technique. As the next step, we have to apply these endoscopic techniques widely in thyroid cancer treatment, and aim to establish the technique of complete lymph node dissection with same or further quality than conventional open surgery. With the trans-axillary approach or precordial approach which is current mainstream, however, complete dissection of the paratracheal lymph nodes beside the clavicula or sternal notch is likely to be inadequate. For complete endoscopic lymph nodes dissection around the trachea, we consider that operation under the cranio-caudal view is the most important. We developed a new hybrid approach of Video Assisted Neck Surgery (HAVANS) for central node dissection in thyroid cancer treatment. We will introduce the endoscopic complete central node dissection for thyroid cancer patients via the excellent cranio-caudal view in this presentation.
Methods: To get the fine cranio-caudal view, we developed the new Hybrid approach of Video Assisted Neck Surgery (HAVANS). Hybrid approach technique combines different approaching pathway to the cervical lesion. Prior to the lymph node dissection, we performed total or hemi thyroidectomy via gasless precordial or axillary approach. After thyroidectomy, three ports (2–5 mm) inserted in front of upper neck lesion of submandibular area for lymph node dissection. In this methods, we can get an excellent cranio-caudal view and access to pre-tracheal and latero-tracheal lymph nodes is easy.
Results: Total of 25 patients with thyroid papillary cancer received HAVANS and were progressing satisfactorily after surgery. Additional time for endoscopic central node dissection is from 35 to 65 minutes. There is no patient with recurrent laryngeal nerve injury and palsy. One patient had Horner syndrome by injury of cervical sympathetic nerve.
Conclusions: Cranio-caudal view is considered to be necessary for complete central neck node dissection. HAVANS provide easy access to the central node compartment for dissection in endoscopic thyroid cancer surgery.



S029

Laparoscopic Adrenal Metastectomy: Appropriate, safe, and feasible

Judy Chen, MD (presenter), Ali Tavakkoli, MD, Brigham and Women's Hospital

Background: The role of adrenal resection in management of metastatic adrenal tumors is not well established. Furthermore, whether such resections should be done laparoscopically or through open surgery is unknown. We aimed to evaluate outcomes of patients who underwent adrenal metastectomy, comparing outcomes between laparoscopic vs. open approach.
Methods: We retrospectively reviewed our institutional experience with adult patients who underwent an adrenal metastatectomy between 1997 and 2012. Pre-operative tumor size, status of resection margin, OR time, length of stay and use of chemotherapy in the immediate post-operative period were assessed. Median values are reported and p values calculated using Mann–Whitney U test.
Results: Total of 38 patients were identified with lung being the primary site of malignancy in 50% cases; 47.4% (n = 18) were resected laparoscopically and 52.6% (n = 20) patients were done open. In the laparoscopic group, median tumor size was 2.7 cm (range 1–10 cm) vs. 4.6 cm in the open group (range 2.1–9.8 cm) (p = 0.03) (Table 1). A negative resection margin was achieved in all laparoscopic cases and 85% of the open cases. Median OR time in the laparoscopic group was 140 min vs. 175 for the open group (p = 0.41). Median length of stay was significantly shorter in the laparoscopic group (4 vs. 5.5 days for the open group; p = 0.02) (Table 1). Over 40% of patients did not require post-operative chemotherapy, with 75% of the cohort alive with a follow up range of 3–90 months.
Conclusions: This series, one of the largest in the literature, confirms that adrenal metastatectomy can lead to good oncological outcomes in selected patients with over 40% of not requiring continuation chemotherapy in the immediate post-operative period. Laparoscopic approach leads to excellent oncological resection margins without increasing OR time, but with a reduction in length of stay (LOS).

Table 1

	Laparoscopic approach (n = 18)	Open approach (n = 20)	P-value
Median patients age	63	60	0.186
Max tumor size (cm)	2.7	4.6	0.030
Negative Resection Margin	100%	85%	NS
OR Time (mins)	140	175	0.408
LOS (days)	4	5.5	0.017
No Post-operative Chemotherapy	40%	44.5%	NS

S030

Perioperative Assessment of Patients with Primary Aldosteronism at the Toronto University Health Network

Nicholas Gaudet, MD (presenter), Usmaan Hameed, MD, Allan Okrainec, MD, Todd Penner, MD, David R Urbach, MD, University of Toronto, University Health Network

Background: Laparoscopic adrenalectomy for primary aldosteronism due to unilateral hypersecretion has become the gold standard of surgical management. Current recommendations advocate confirmatory testing after initial diagnosis, followed by subtype classification and localization of the offending lesion.
Objectives: We aim to describe our experience in preoperative evaluation over the past 9 years at the Toronto University Health Network Tertiary Care Center.
Methods: Data collection from electronic hospital records were used to compile patient demographics undergoing laparoscopic adrenalectomy from 2003–2011. A chart review of hospital records and outside referral workup was conducted including only biochemical investigations and diagnostic imaging obtained within one year of surgery.
Results: A total of 147 patients (mean age 52.5 yrs) underwent laparoscopic adrenalectomy from 2003–2011. Primary aldosteronism (PA) was the indication for surgery in 31 (21.2%) patients. PA was diagnosed in 28 (90.3%) patients by aldosterone: renin activity and was further investigated by saline suppression test in 9 (29.0%) patients, selective adrenal venous sampling in 15 (48.4%) patients, and MRI in 8 (25.8%) patients. One patient had evidence of PA after surgery, and was discovered to have a functioning aldosteronoma on the contralateral gland.
Conclusions: Primary care physicians and endocrinologists often complete a significant portion of the initial assessment of hyperaldosteronism. Surgeons must further confirm laterality and plan operative approach using adjunctive tests. Selective adrenal venous sampling was used in approximately half our patients with PA, and might have prevented one case of missed contralateral aldosteronoma if used more liberally.

S031

Present Comparison of over 12,000 Patients who Underwent Open, Laparoscopic, and Robotic Nissen Fundoplications

Benjamin Owen (presenter), Anton Simorov, MD, Andy Siref, Jeremy Parcells, MD, Dmitry Oleynikov, MD FACS, University of Nebraska Medical Center

Background: Conventional laparoscopic fundoplications have been the gold standard for Nissen fundoplications for two decades. The advent of a robotic approach for fundoplication procedures creates a potential alternative. Thus, we used a national database to examine perioperative outcomes with respect to open, laparoscopic, and robotic approaches.
Methods: The University Health System Consortium is an alliance of medical centers, numbering over 115 academic institutions and their 271 affiliated hospitals. We used International Classification of Disease codes to identify patients over the age of 18 who received Nissen fundoplication procedures.
Results: A total of 12,507 patients of similar demographic background received fundoplication procedures from October 2008 to June 2012. Of those, 2,205 were open approaches (OF), 9,945 were laparoscopic (CLF), and 357 were robot-assisted (RALF). Laparoscopy had better perioperative outcomes compared to open approach with respect to mortality (0.1% vs. 0.6%, P = 0.001), morbidity (4% vs. 11%, P = 0.001), length of stay (2.8 ± 3.6 vs. 6.1 ± 7.2, P = 0.001), 30-day readmission (1.7% vs. 3.1%, P = 0.001), ICU cases (23.1% vs. 8.4%, P = 0.001), and cost ($7,968 ± $6,969 vs. $12,766 ± $13,982, P = 0.001). Laparoscopy and robot-assisted displayed no significance in mortality (0.1% vs. 0%, P = 0.5489), morbidity (4.0% vs. 5.6%, P = 0.1744), length of stay (2.8 ± 3.6 vs. 2.9 ± 3.5, P = 0.3242), and ICU cases (8.4% vs. 11.5%, P = 0.051). However, laparoscopy remained superior with a lower 30-day readmission rate (1.8% vs. 3.6%, P = 0.0215) and cost ($7,968 ± $6,969 vs. $10,644 ± $6,041, P = 0.001)
Conclusion: Current data suggests that robot-assisted Nissen fundoplication procedures do not yet have equivalent perioperative outcomes as conventional laparoscopic procedures.

S032

Surgical completeness of robotic thyroidectomy; A prospective comparative study of Robotic thyroidectomy versus open conventional thyroidectomy

Sohee Lee, MD (presenter), Cho Rok Lee, MD, Seulkee Park, MD, Haiyoung Son, MD, Jung Woo Kim, MD, Sang-Wook Kang, MD, Jong Ju Jeong, MD, Kee-Hyun Nam, MD, Woong Youn Chung, MD, Cheong Soo Park, MD, Department of Surgery, Yonsei University College of Medicine

Introduction: With the application of da Vinci robot system, surgeons can complete a secure thyroidectomy without a noticeable scar in the neck. The aim of this study is to compare the surgical completeness of transaxillary robotic thyroidectomy (RT) with conventional open procedure (OT) in papillary thyroid cancer (PTC) patients.
Methods and procedures: From April 2009 through January, 2011, 71 patients with PTC underwent bilateral total thyroidectomy with central node dissection at the Department of surgery of Yonsei University Health System. All patients performed 30 mci radioactive iodine (RAI) ablation and diagnsotic RAI scan after ablation. We compared the patient's clinicopathologic characteristics, and surgical completeness between two groups prospectively.
Results: Thirty-seven patients were OT and 34 were RT. Mean age was significantly younger in RT. Tumor size, the frequency of capsular invasion, multifocality, bilaterality and central nodal metastasis showed no differences between two groups. Stage III was more frequent in OG due to different age spectrum. There was no significant difference in number of retrieved central node, and the incidence of postoperative complications. In terms of surgical completeness, there was no significant difference in RAI uptake ratio in both 30 mci RAI ablation and diagnostic scan between two groups. In terms of serum Tg level, both TSH-suppressed and TSH-stimulated Tg showed no significant differences between two groups.
Conclusions: Transaxillary robotic thyroidectomy can be done as effective and the results are as complete as conventional open total thyroidectomy in papillary thyroid cancer patients.

S033

THE MULTI-PHASIC LEARNING CURVE OF ROBOTIC-ASSISTED RECTAL SURGERY FOR AN EXPERIENCED LAPAROSCOPIC COLORECTAL SURGEON: AN ANALYSIS OF 197 RECTAL CANCER PATIENTS

Kevin K Sng, Dr (presenter), Masayasu Hara, Dr, Jae Won Shin, Dr, Byung Eun Yoo, Dr, Kyung-Sook Yang, Seon Hahn Kim, Dr, Division of Colorectal Surgery, Department of Surgery, Korea University Anam Hospital, Korea University College of Medicine, Seoul, Korea

Introduction: Robotic rectal surgery is gaining popularity. We aimed to define the learning curve of an experienced laparoscopic colorectal surgeon in performing robotic rectal cancer surgery. We hypothesized that there are multiple phases in this learning process.
Methods and Procedures: This is a retrospective analysis of data from our colorectal database. Consecutive patients undergoing robotic rectal surgery between July 2007 and August 2011 were identified and placed in chronological order based on operation dates. The CUSUM (cumulative sum) technique was used to analyze the total operating, total robotic, console and docking times. We applied the process of model fitting on the CUSUMs as a fourth-order polynomial, to highlight the different phases in each chart. Pearson Chi-squared test, Fisher's exact test, Independent Samples t test, One-way ANOVA, Kruskal–Wallis test and the Mann-Whitney test were used as appropriate. P value of <0.05 was considered statistically significant.
Results: We identified 197 patients who underwent robotic rectal resection. The median total operative, total robot, console and docking times (minutes) were 265 (145–515), 140 (59–367), 135 (50–360) and 5 (3–40) respectively. CUSUM analysis of docking time showed that the learning curve for robot docking was reached after 20 cases. CUSUM analysis of total operative, robot and console times demonstrated 3 phases. The first phase from case number 1 to 35 represented the initial learning curve. The second and third phases included cases 36 to 128, and 129 to 197 respectively. The second phase involved more technically challenging cases associated with an increase in operative time. The third phase represented the concluding phase in the learning curve when the operative time decreased and stabilised. Inter-phase comparisons of gender, age, BMI and ASA grading showed no significant differences. In comparing phase 1 with phase 2/3, we found parameters indicating the increased complexity of cases in the latter 2 phases. In phase 1, 45.7% of patients had their tumours within 7 cm from the anal verge compared to 64.2% in phases 2/3 ($p = 0.042$). Neoadjuvant chemo-radiotherapy was administered to 2.9% of phase 1 patients compared to 32.7% in phase 2/3 ($p = 0.000$). Splenic flexure was mobilised in 8.6% of phase 1 patients compared to 56.8% in phase 2/3 ($p = 0.000$). Median blood loss was under 50 ml in all 3 phases. Between phases 1 and 2/3, there were no significant differences in median lymph nodes harvested (19 vs 15, $p = ns$) and median distal margin (1.8 cm vs 1.7 cm, $p = ns$) but the patients in phase 2/3 had a significantly longer hospital stay compared to those in phase 1 (9 days vs 8 days, $p = 0.002$). No patients in phase 1 had Clavien-Dindo grade 3a/3b complications compared to 8.6% of patients in phase 2/3 ($p = ns$). Anastomotic leak rate was 5.7% in phase 1 and 10.5% in phase 2/3 ($p = ns$). Our conversion rate was 0.
Conclusion: At least 3 phases in the learning curve of robotic-assisted rectal surgery are defined for an experienced laparoscopic colorectal surgeon.

S034

A COMPARATIVE STUDY OF ROBOTIC SLEEVE GASTRECTOMY AND ROBOTIC GASTRIC BYPASS: A SINGLE INSTITUTION EXPERIENCE

Anthony M Gonzalez, MD FACS FASMBS, Jorge R Rabaza, MD FACS FASMBS, Rupa Seetharamaiah, MD FACS, Charan Donkor, MD, Rey Romero, MD (presenter), Radomir Kosonovic, MD, Jonathan Arad, MD, Baptist Health South Florida, Florida International University Herbert Wertheim College of Medicine

Introduction: Obesity has evolved into a worldwide epidemic affecting people of all ages, races and creeds. To date, Minimally Invasive Surgery (MIS) has shown optimal results for weight loss in bariatric patients dealing with morbid obesity. Furthermore, impressive results have been seen with the introduction of the daVinci robotic to bariatric surgery due to its multiple advantages i.e. 3-D visualization, instrument articulation and improved surgeon ergonomics. Accordingly, yet to be determined, is which minimally invasive robotic surgery is the best procedure for weight loss in patients with morbid obesity. The purpose of this study is to compare our preliminary experiences of Robotic Sleeve Gastrectomy (RSG) and Robotic Gastric Bypass (RGB).
Methods: We retrospectively collected, under IRB approval, RSG & RGB data (from 09/2009–06/2012 & 08/2009–05/2012, respectively) that was performed by two surgeons at a single surgery center. All of the robotic procedures were performed using the daVinci® Surgical System. Follow up was achieved at 1–3, 4–6, 7–9 and >12 months after surgery. Information was collected focusing on surgical time, hospital length of stay, preoperative BMI, complications (i.e. leakage, strictures, bleeding, obstruction and/or ulcer formation) and Excess of Weight loss Percentage (EWL%).
Results: This study included 134 RSG and 165 RGB patients. The mean age was 43 (±12.6) and 44.7 (±13.3) years old ($P = 0.28$), and the mean initial BMI was 45 (±7) and 47.4 (±9.8) kg/m^2 ($P < 0.02$), in RSG and RGB respectively. Mean surgical time in the RSG cohort was 106.6 and 140.7 min in the RGB cohort ($P < 0.01$), as well as a similar mean hospital length of stay of 2.2 days in both groups. Perioperative complications, which occurred in the RSG were: 1 (0.7%) sleeve torsion and 2 (1.4%) thrombotic events, while those seen in the RGB were: 1 (0.6%) stricture, 3 (1.8%) bleeding events and 3 (1.8%) cases of an ulcer formation, in addition there were no leaks noted in either cohort. Postoperative follow up in both groups (RSG and RGB) was conducted at 1–3, 4–6, 7–9 and >12 months showing an EWL% of 23.3% and 25.1%, 46.2% and 46.5%, 55% and 57.6%, and 71.5% and 68.9% respectively.
Conclusions: Our results show that both RSG and RGB are safe and effective procedures for the treatment of morbid obesity showing comparable weight loss results, low rates of bleeding, strictures and no evidence of leaking from the anastomotic sites. At one-year follow up, EBL% are similar in both operations. Additional studies with larger numbers, longer follow-up and evaluation of patient satisfaction are still needed.

S035

LAPAROSCOPIC VERSUS ROBOTIC-ASSISTED SURGERY FOR MEDIAN ARCUATE LIGAMENT SYNDROME

Michael Do, MD (presenter), William Richardson, Abbas Abbas, MD, Charles Sternbergh, MD, Hernan Bazan, MD, Taylor Smith, MD, Ochsner Clinic Foundation

Introduction: In this study we compare our outcomes using laparoscopic and robotic-assisted treatment of MALS. Median arcuate ligament syndrome (MALS) is an uncommon disorder characterized by postprandial abdominal pain, weight loss, and vomiting related to the compression of the celiac artery by the median arcuate ligament. This syndrome has been classically treated with an open approach. More recently, laparoscopic and robotic approaches have been described.

Methods: A retrospective review was performed on all patients treated for MALS from March 2006 to August 2012 at a single institution. Statistical analysis was performed using Microsoft Excel with two-tailed t tests.

Results: A total of 16 patients with MALS were treated, 12 patients via a laparoscopic approach and 4 patients via a robotic-assisted approach. Patient characteristics and comorbidities were similar between groups. There were no intraoperative or perioperative conversions, complications, or deaths. The mean operative time for the laparoscopic approach was significantly shorter than for the robotic approach (101.7 minutes vs 145.8 minutes, P = 0.049). There was no significant difference in length of hospital stay (1.7 days vs 1.3 days, P = 0.65). Mean length of follow-up for laparoscopically treated patients was 6.8 months, for robotically treated patients 1 month (P = 0.34). Four patients (33%) in the laparoscopic group and one patient (25%) in the robotic group had recurrent post-operative abdominal pain (P = 0.77). Two laparoscopically treated patients (50%) and two robotically treated patients (67%) had stopped taking chronic narcotics post-operatively.

Conclusion: Both laparoscopic and robotic approaches to MALS treatment can be performed with minimal morbidity and mortality. The laparoscopic approach was associated with significantly shorter operative time. While innovative, the true advantages to robotic-assisted MALS surgery are yet to be seen.

S036

LAPAROSCOPIC MONITORED COLONOSCOPIC POLYPECTOMY VS LAPAROSCOPIC RIGHT HEMICOLECTOMY: A COMPARATIVE ANALYSIS ON 187 PATIENTS WITH POLYS IN THE RIGHT COLON

Morris E Franklin Jr, MD FAS, Song Liang, MD PHD (presenter), Jeffrey L Glass, MD FACS, Texas Endosurgery Institute

Background: This prospective comparison study focused on the patients with colonoscopic nonresectable polyps in right colon who underwent either laparoscopic right hemicolectomy (LRH) or laparoscopic monitored colonoscopic polypectomy (LMCP) and was specifically aimed at investigating if LMCP can be accepted as a simple and effective approach for removing difficult polyps due to loss of visibility on the polyp's base, non-accessible locality of polyp, tortuosity of the right colon.

Method: A prospectively designed database of a consecutive series of patients with either LRH or LMCP for benign polyps in right colon from 1991 to 2012 at Texas Endosurgery Institute was analyzed, and all the statistical calculations was performed with on-line MedCalc.

Results: A total 119 patients had LMCP for removing the polyps in the right colon while 77 patients were operated with RHC to manage the benign polyps. In comparison, LCMP showed significant difference from LRH arm on operative time (125.4 $\pm$ 22.3 minutes vs. 144.6 $\pm$ 23.3 minutes $p = 0.0006$), estimated blood loss (34.9 $\pm$ 22.7 ml vs. 114.7 $\pm$ 44.5 ml, $p < 0.0001$), hospital stay (8.6 $\pm$ 6.3 days vs. 1.85 $\pm$ 1.09 days, $p < 0.0001$). However no difference was found on the size of removed polyps (2.4 $\pm$ 1.0 cm vs. 2.8 $\pm$ 0.7, $p = 0.16$) and intraoperative as well as postoperative complication rates. Moreover 7 patients (5.8%) with LMCP were converted to LRH for the intraoperative pathology of adenocarcinoma, and 5 patients (4.25%) with LMCP also were further managed with partial cecacetomy or primary repair due to colonic wall damage from colonoscopic polypectomy. Lastly all the patients with LMCP had been followed from 6 to 196 months to find no recurrence.

Conclusions: This comparison study demonstrated that LMCP is not only safe and effective approach also causes less surgical damage to the patients with significantly decrease operative time and days of hospital stay, thus it can be promoted to be a alternative approach to remove colonoscopic nonresectable polyps in right colon.

S037

Feasibility of Full thickness gastric resection using MASTER Endoscopic Robot and closure by Overstitch? A preclinical study

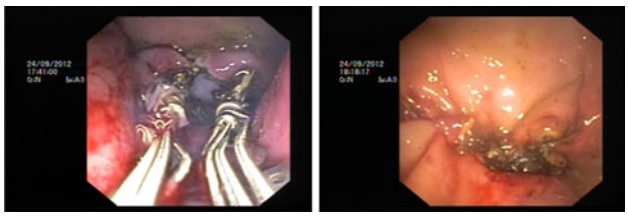
Philip W Chiu, MD (presenter), Sj Phee, Z Wang, Z Sun, Carmen C Poon, T Yamamoto, I Penny, Jyy Wong, James Lau, MD, Ky Ho, MD, Department of Surgery,Institute of Digestive Disease, The Chinese University of Hong Kong; School of Mechanical

Objective: Gastric submucosal tumors are often treated by laparoscopic wedge resection. This study aimed to examine the feasibility of performing gastric full thickness resection through a totally endoscopic approach using the MASTER (Master and Slave Transluminal Endoscopic Robot), a novel robotic endosurgical system with two slave manipulators, a grasper and an electrocautery hook deployed through a dual channel endoscope and controlled by surgeon through an intelligent human-machine interface.

Method: The operation was performed in two live porcine models under general anesthesia using the MASTER. Firstly, the anterior wall of the stomach was slung to the abdominal wall using percutaneous suturing device. An imaginary lesion of 5 cm was first marked using needle knife. After initial mucosal incision was then made using IT knife, the MASTER was introduced through a long overtube. A circumferential mucosal incision was completed with the MASTER to expose the muscularis propria which was grasped and incised to the serosal layer by electrocautery applied through the hook of the MASTER. The full thickness resection of the gastric wall was completed with retraction using the grasper and dissection using the hook. While the defect was being created, the luminal space was maintained with traction of the percutaneous sutures. The defect was closed with suture plication using Apollo Overstitch device.

Results: Two full thickness gastric resections were performed in two non-survival porcine models with body weight of 30 kg and 35 kg respectively using the MASTER. The total procedural time was 56 minutes for the first model, and 70 minutes for the second model. The luminal view was maintained during the whole procedure, and there was no damaged to surrounding organs throughout the whole procedure. The gastric defects were successfully closed using Overstitch with satisfactory gastric distension and no gas leakage afterwards.

Conclusion: The current experiment demonstrated the feasibility and safety of a total endoscopic approach for treatment of gastric submucosal tumors - full thickness resection of with MASTER and successful closure of the defect using Overstitch. This serve as important foundation for further clinical trial.



S038

ENDOSCOPIC MANAGEMENT OF HIGH GRADE DYSPLASIA AND INTRAMUCOSAL CARCINOMA: EXPERIENCE IN A LARGE ACADEMIC MEDICAL CENTER

Kyle A Perry, MD (presenter), Mario Salazar, MD, Andrew Suzo, Jon Walker, MD, Jeffrey W Hazey, MD, W S Melvin, MD, The Ohio State University Medical Center

Background: Traditionally, esophagectomy has been the standard treatment for patients with high grade dysplasia and early esophageal cancer. Recently, endoscopic treatment with endoscopic mucosal resection (EMR) and radiofrequency ablation (RFA) has become the preferred approach for the management of these patients in some specialized centers. We report a single institution series of patients undergoing endoscopic management of Barrett's esophagus (BE) with high grade dysplasia or intramucosal adenocarcinoma.

Methods: A retrospective review of a prospectively-collected database was conducted for patients undergoing endoscopic treatment for BE with biopsy proven high grade dysplasia or intramucosal carcinoma from 2009 to 2012. Patients with nodular BE were managed with EMR followed by RFA, while those with flat BE received RFA alone. The primary outcome measure was progression of BE necessitating esophagectomy. Secondary outcomes included complete eradication of BE, complete eradication of dysplasia, recurrence or progression of BE or dysplasia, and complications of endoscopic treatment. Patients were followed for a median follow up interval of 8 months following completion of RFA treatment. Data are presented as incidence (%) or median (range) as appropriate.

Results: During the study period, 87 patients underwent RFA for treatment of BE, and 19 met the inclusion criteria for this study. Three (16%) had a presenting diagnosis of intramucosal adenocarcinoma, and 16 (84%) were treated for high grade dysplasia. Twelve (63%) had long segment BE, and the median length of BE was 5 cm. Ten (53%) patients had nodular BE and underwent EMR prior to ablative therapy. Intramucosal cancer was identified in 3 EMR specimens, and a margin negative resection was achieved in each case. Complete eradication of dysplasia was achieved in 89% of patients, and complete eradication of BE was achieved in 58%. A median of 2 (1–7) treatments were required, and there were no immediate post-procedure complications. No patients in this series developed strictures requiring endoscopic dilation following RFA. Three patients (16%) developed recurrent dysplasia following complete eradication of BE, and each case was successfully managed with repeat RFA. Three patients (16%) required esophagectomy within 6 months following RFA treatment. Two of these developed nodules containing adenocarcinoma with subsequent margin positive EMR, and the other had persistent nodular BE with extensive low and high grade dysplasia. A complete surgical resection was achieved in each case, and none of the patients developed lymph node metastases.

Conclusions: Complete eradication of high grade dysplasia and intramucosal adenocarcinoma can be achieved via endoscopic therapy, thus avoiding esophagectomy in the majority of patients. However, a subset of patients will fail this treatment approach and require surgical resection. With aggressive endoscopic treatment and surveillance, these patients can be identified at an early stage while curative resection is still possible. Long-term follow up studies are required to determine the rate of recurrent BE and progression rate to cancer over time following successful initial endoscopic therapy in this patient population.

S039

Cholecystectomy after ERCP in the over 80's: Adding insult to injury?

Rebecca L Teasdale, Miss (presenter), Mukhtar Ahmad, Mr, Bussa R Gopinath, Mr, North Tees and Hartlepool NHS Trust

Aim: To investigate the outcome of patients, over the age of 80, found to have common bile duct (CBD) stones at endoscopic retrograde cholangio-pancreatography (ERCP).
Methods: Retrospective analysis of endoscopy database and case notes was carried out on all patients 80 years and over who underwent ERCP between February 2007 and December 2008. Those found to have CBD stones were included. Cases were followed up to present.
Results: 68 patients were evaluated. Mean age was 85 (range 80–94). 50 were female, 18 Male. 3 already had and 5 went on to have a cholecystectomy. The patients who did proceed to a cholecystectomy had a mean hospital stay of 14 days (range 3–25) and all developed post-operative complications. 3 were carried out laparoscopically and 2 were converted to open. 2 patients went into acute renal failure post-op (both open cholecystectomy), 2 were treated for a lower respiratory tract infection and 1 for a urinary tract infection. 1 patient had an intra-abdominal collection, which was treated conservatively. 1 represented with biliary stricture and sepsis. 60 did not have surgery following their ERCP. 3 patients died during the same admission from cholangitis and the remaining patients were deemed unfit or declined surgery. 11 (18%) patients re-presented over the follow-up period. 2 patients had biliary colic, 2 cholecystitis, 2 cholangitis, 4 with CBD stones and 1 with a CBD stricture. 2 of these patients presented more than once and 1 died from biliary sepsis. 2 of these patients did not have a sphincterotomy performed, due to abnormal clotting. 9 patients died within the follow-up period from non-gallstone related disease.
Conclusions: Surgery in the over 80's is associated with greater length of hospital stay and incidence of post-operative complications. In patients who do not have symptoms of gallstone disease non-operative management of CBD stones post ERCP + sphincterotomy is a safe alternative.

S040

The Efficacy of Endoscopic Drainage of Pancreatic Pseudocysts

Kristina Spate, MD (presenter), Hannah Palin, Michael Egger, MD, Gary C Vitale, MD, Department of Surgery, University of Louisville

Introduction: Mature, symptomatic pancreatic pseudocysts can be managed by an operative or endoscopic approach. The goal of our study is to report the outcomes following a large series of patients who underwent endoscopic pseudocyst drainage at our institution.
Methods: A retrospective chart review was performed on all patients who underwent endoscopic drainage of a pancreatic pseudocyst during the years 2007 to present. The patient data was analyzed with respect to demographics, presence of infection, average number of ERCPs performed, time to resolution following intervention, rate of failure requiring operative drainage and overall morbidity and mortality.
Results: A total of 56 patients had an endoscopic pseudocyst drainage by either a transgastric, transpapillary or combined approach attempted during the study period. There were 27 females and 29 males with a mean age of 55 years. 7 patients were determined to not be amenable to drainage at the time of endoscopy for a total of 49 patients included in this study. Patients underwent endoscopic drainage by a transmural ($n = 18$), transpapillary ($n = 16$), or a combined approach ($n = 15$). The mean size of pancreatic pseudocyst was 11.2 cm (range 2–22 cm). 37 patients (75%) had sterile pancreatic pseudocysts while 12 patients (25%) had an infected pseudocyst at the time of drainage. 80% of patients ($n = 39$) had complete resolution of their pseudocyst while 8% ($n = 4$) had a greater than 50% reduction in the size following intervention. 2% ($n = 1$) failed to have a reduction in size of their pseudocyst. 10% of patients ($n = 5$) did not improve after endoscopic drainage and required operative intervention. The mean time to resolution was 7.5 months (range 2–24). The overall complication rate was 6% ($n = 3$) with bleeding ($n = 2$) and a tension pneumothorax ($n = 1$) associated with the procedure. There were 2 unrelated deaths in patients with metastatic cancer which were not procedure related during the study period.
Conclusion: Endoscopic drainage of a symptomatic, mature pancreatic pseudocyst can be performed safely with an overall success rate of 88% and should be attempted prior to an operative approach when an endoscopic drainage is technically feasible.

S041

LONG-TERM OUTCOMES OF ENDOSCOPIC FUNDOPLICATION: 2 YEAR RESULTS FROM THE PROSPECTIVE MULTICENTER U.S. STUDY

Reginald CW Bell, MD FACS, William E Barnes, MD FACS, Bart J Carter, MD FACS, Robert W Sewell, MD FACS, Peter G Mavrelis, MD, Glenn M Ihde, MD, Kevin M Hoddinott, MD FACS, Mark A Fox, MD FACS, Tanja Gunsberger, DO, Mark G Hausmann, MD FACS, David Dargis, SurgOne, PC, Englewood, Colorado

Objective: Endoscopic fundoplication (EF) is a recognized procedure for the relief of chronic medically-refractory symptoms associated with gastroesophageal reflux disease (GERD). Safety and effectiveness of EF performed with the EsophyX devices have been demonstrated in >25 studies but few studies have reported long-term outcomes. The aim of this study was to prospectively assess long-term outcomes of EF in a multi-center setting.
Methods: To date, 33 patients who were enrolled in a multi-center registry completed 2-year follow-up. Clinical assessments, including the objective documentation of GERD such as abnormal esophageal acid exposure or esophagitis, suggested that these patients were appropriate candidates for fundoplication. Outcomes included symptom assessment using three GERD validated instruments [GERD-Health Related Quality of Life (GERD-HRQL), Gastroesophageal Reflux Symptom Scale (GERSS) and Reflux Symptom Index (RSI)], satisfaction with current health conditions, proton-pump inhibitors (PPIs) use, healing of esophagitis and normalization of esophageal acid exposure. Daily bothersome symptoms were considered eliminated if any scores >2 at baseline on each of the GERD-HRQL and RSI questions were ≤2 at 2-year follow-up. The normalization rate was calculated for patients who presented with an abnormal value of interest before EF.
Results: At the time of the procedure, the mean age was 57 (SD 15.1) years, BMI was 26.3 (4.2) and 27% (9/33) were male. Esophagitis was present in 56% (18/33) of patients. The mean duration of GERD was 9.8 (5.6) years. All patients suffered from medically-refractory GERD symptoms while taking daily PPIs for a mean of 8.7 (5.7) years. At 2-year follow-up, 22 patients underwent endoscopy. No denovo esophagitis developed. Esophagitis was eliminated in 89% (8/9) and improved from grade C to grade B in one patient. Hiatal hernia remained the same or was reduced in 65% (11/17) and increased in size in 29% (5/17) of patients. One patient developed denovo hiatal hernia. The mean heartburn and regurgitation scores were reduced from 13.7 (8.0) and 13.5 (8.3) on PPIs to 5.8 (6.2) and 4.3 (5.5) respectively, $p < 0.001$. Daily bothersome heartburn and regurgitation were eliminated in 64% (14/22) and 78% (14/18) of patients. The mean RSI score was reduced from 21.3 (10.8) on PPIs to 9.6 (7.6), $p < 0.001$. Daily bothersome cough and globus sensation were eliminated in 65% (11/17) and 100% (13/13) of patients. The mean GERSS score was reduced from 30.3 (15.8) on PPIs to 12.5 (11.8), $p < 0.001$. Seventy percent (23/33) of patients completely discontinued PPI therapy. The proportion of patients on daily PPI therapy was reduced from 97% (32/33) before to 21% (7/33) after EF, $p < 0.001$. Fifteen percent of patients remained dissatisfied with their current health conditions compared to 93% before EF, $p < 0.001$. Esophageal acid exposure and number of reflux episodes were normalized in 55% (5/9) and 67% (6/9) of patients with comparable pH tests.
Conclusion: According to the present data, the EF with the EsophyX device achieved sustained symptomatic control over a two year period in up to 78% of patients. The need for daily PPIs was eliminated in 79% of patients.

S042

SHORT TERM RESULTS ACCORDING TO GENDER BY PROSPECTIVE STUDY OF 490 LAPAROSCOPIC c-STAGE 0/I RECTAL CANCER RESECTION

Shigeki Yamaguchi, MD (presenter), Seiichiro Yamamoto, MD, Junji Okuda, MD, Koki Otsuka, MD, Masanori Sugito, MD, Takashi Yamaguchi, MD, Yoshiharu Sakai, MD, Takatoshi Nakamura, MD, Kenichi Yoshimura, Masahiko Watanabe, MD, Saitama Medical University International Medical Center and the Japan Society of Laparoscopic Colorectal Surgery

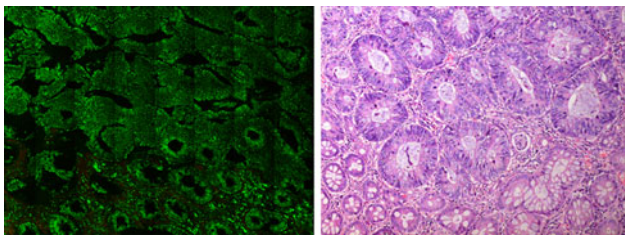
Introduction: Gender is known as one of the risk factor of postoperative complication especially leakage after proctectomy. Multi-center prospective study had registered for 490 laparoscopic rectal cancer resections since 2008 to 2010. This study was accessed about difference of short term results between male and female for laparoscopic proctectomy.
Patients and Methods: There were 281 males (M) and 110 females (F). Mean age was 59.6 each. BMI and prior abdominal operation were 23.3, 21.9 ($p < 0.01$) and 16.4%, 32.5% ($p < 0.01$), respectively. Mean tumor location from anal verge was 6.7 cm each. Procedures were anterior resection (AR): 79%, 86%, intersphincteric resection (ISR): 19%, 12%. Rates of pathological Stage 0/I were 70% and 66%, respectively. Student's t test, the Mann-Whitney U test, Chi-square test, and Fisher's exact test were used as appropriate.
Results: Median operative time and blood loss were 283 min, 256 min ($p < 0.01$) and 35 g, 20 g (n.s.). Conversion rates were 1.8% (5 cases) and 1.4% (3 cases) (n.s.). Intraoperative organ injury and anastomotic trouble including rectal transection were 1.8%, 2.5% (n.s.) and 2.5%, 0.4% ($p < 0.05$). There was no mortality in both gender. Postoperative complications occurred in 30.6% and 14.8% ($p < 0.001$). Popular complications were as follows; wound complication: 13.2%, 3.3% ($p < 0.01$), ileus: 8.5%, 2.9% ($p < 0.05$), anastomotic leak of AR and ISR: 11.7%, 3.9% ($p < 0.01$). Anastomotic leak of only AR was 11.8% (26/221) and 3.9% (7/179) ($p < 0.01$). Median postoperative hospital stay was 12 and 11 days ($p < 0.01$).
Conclusion: Male was risk factor of postoperative complications, especially anastomotic leak and wound complication in laparoscopic proctectomy.

S043

Real-time Optical Diagnosis for surgical margin in low rectal cancer Using Multiphoton Microscopy

Jun Yan, MD (presenter), Shuangmu Zhuo, PhD, Gang Chen, Mingang Ying, MD, Department of Surgery, Fujian Provincial Tumor Hospital, Teaching Hospital of Fujian Medical University, Fuzhou, 350014, P.R.China; Institute of Laser and Optoelectronics Technology, Fujian Provincial Key Laboratory for Photonics Technology, Key Laboratory

Background: Multiphoton microscopy (MPM), based on the advancement of the field of non-linear optics and femtosecond lasers, has been shown to provide real-time detailed information on tissue architecture and cell morphology in live tissue. The purpose of this study was to evaluate the feasibility of using MPM to make real-time optical diagnosis for surgical margin in low rectal cancer.
Methods: Thirty fresh, unfixed, and unstained full-thickness surgical margins in low rectal cancer underwent MPM examination and then went through routine intra-operative pathological frozen procedure. MPM images were compared with golden standard hematoxylin-eosin (H-E) stained images.
Results: MPM images were obtained by two photon-excited fluorescence signals from tissue sample. Peak multiphoton autofluorescence intensity was detected in mucosa excited at 800 nm. In the normal area of surgical margin, MPM revealed regular tissue architecture and cell morphology, including a typical foveolar pattern with central, round crypt openings, and glands lined by epithelian cells and goblets cells. In the cancerous area of surgical margin, MPM demonstrated irregular tubular structures, reduced stroma, and cellular and nuclear pleomorphism. Cancer cells, characterized by irregular size and shape, enlarged nuclei, and increased nuclear-cytoplasmic ratio, were identified by MPM images, which were comparable to H-E stained images.
Conclusions: It is feasible to use MPM to make real-time optical diagnosis for surgical margin in low rectal cancer. With miniaturization and integration of colonoscopy or probe, MPM has the potential to provide real-time non-invasive "optical biopsy" for surgical margin in low rectal cancer in the near future.
Keywords: Multiphoton microscopy; Real-time diagnosis; Surgical margin; Low rectal cancer; Pathology.



S044

Systematic review and Meta-Analysis of the Effectiveness of Colorectal Cancer Tumor Boards

S Shah (presenter), S Arora, T Athanasiou, G Atkin, R Glynne-Jones, P Mathur, A Darzi, N Sevdalis, Imperial College London, Barnet Hospital, Mount Vernon Cancer Centre

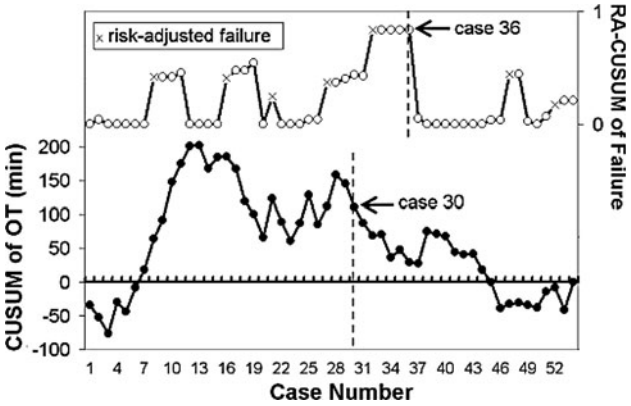
Introduction: Over the last few decades, decision-making in colorectal cancer management has evolved from individual surgeons and oncologists, to Multi-Disciplinary treatment planning. There is almost universal approval for this strategy, despite the fact that to date, there is little evidence for its effectiveness in improving outcomes. The aims of this review and meta-analysis were to identify the available literature on Colorectal Cancer Multidisciplinary teams. Specific questions concerned identifying studies that investigated tumor board processes and implementation of decisions, as well as the impact of tumor boards on decisions and clinical outcomes.
Methods and Procedures: Systematic literature searches of Embase, Medline, PsycINFO and Cochrane Library were undertaken. Search terms included "colorectal", "cancer", "multidisciplinary" and relevant MESH derivatives. Reference lists and the grey literature were also searched. Only empirical articles were included by two independent reviewers, with any discordant decisions arbitrated by a third reviewer. After title screening, abstract and full text review (according to PRISMA guidelines), 26 articles were finally included in the review. Data abstracted from the included papers included population size, patient characteristics, healthcare professional characteristics, setting of the tumor board, study design, and study findings. The studies were divided into three groups—studies that presented data on tumor board running and implementation, the impact of tumor boards on pre-treatment decisions, and the impact of tumor boards on patient outcomes. Meta-analysis of three separate sub-groups was undertaken—use of MRI/TRUS for staging in rectal cancer, positive margins and 3 year overall survival rates. Random effects meta-analysis was used to aggregate the data, and the odds ratio (OR) was the summary statistic used.
Results: A total of 3116 articles were retrieved. Application of the inclusion criteria excluded 3092 articles. 6 further articles were identified from hand-searching, and of these 2 fitted the inclusion criteria. A final list of 26 included articles from 8 countries was completed, published in peer reviewed journals between 2003 and 2012 inclusive. Reported data suggested that not all hospitals had weekly tumor boards, and attendance of core members was often low. However clinicians found working within tumor boards useful, and it positively affected pre-treatment decisions such as use of appropriate imaging and adherence to guidelines. Furthermore there was some improvement in clinical outcomes dependent upon the tumor board meeting. Meta-analysis demonstrated a significant association between the introduction of tumor boards and improved use of MRI / TRUS for local staging in rectal cancer (four studies, 965 patients, OR 7.62, 95% CI 2.07 to 28.02), the decrease of positive resection margins (three studies, 823 patients, OR 0.33, 95% CI 0.17 to 0.67) and improved overall survival at 3 years (three studies, 1375 patients, OR 1.81, 95% CI 1.13 to 2.91).
Conclusions: Colorectal cancer tumor boards are becoming increasingly popular with evidence to suggest they have improved colorectal cancer care and survival. Early involvement of the multi-disciplinary team and discussion of patients at tumor board meetings maybe an optimal strategy for delivering cancer care fit for the 21st Century.

S045

CRITICAL APPRAISAL OF LEARNING CURVE FOR SINGLE INCISION LAPAROSCOPIC RIGHT COLECTOMY

Javier Nieto, MD, Madhu Ragupathi, MD, Chirag Patel, MD, Ali Aminian, MD, Eric M Haas, MD FACS FASCRS (presenter), Colorectal Surgical Associates, Ltd, LLP / Minimally Invasive Colon and Rectal Surgery, Department of Surgery, The University of Texas Medical School / Michael E. DeBakey Department of Surgery, Baylor College of Medicine / Houston, TX

Introduction: Single incision laparoscopic colectomy (SILC) has emerged as a viable minimally invasive (MI) approach with benefits and limitations yet to be fully elucidated. Although shown to be safe and feasible, determination of the learning curve has not been fully addressed. Our aim was to identify a learning curve for SILC right hemicolectomy (RH) and to determine the incidence of operative failure and complication rates during this phase.
Methods and Procedures: Over a two-year period, data from 54 consecutive SILC RH cases performed by the same surgeon were tabulated in an IRB approved database. A learning curve was generated utilizing cumulative sum (CUSUM) methodology of the operative time (OT) across the case sequence. A separate learning curve was generated utilizing risk-adjusted CUSUM (RA-CUSUM) analysis taking into account patient risk factors and operative failure. Risk factors were defined as age ≥75 years, ASA ≥3, BMI ≥30 kg/m^2, ≥3 prior abdominal surgeries, or presence of a bulky tumor (>6 cm on CT scan). Operative failure was defined as OT ≥1.5 standard deviation (SD) above the mean, conversion, length of stay (LOS) ≥1 SD above the mean, reoperation, readmission, or complications. In malignant cases, failure also included positive surgical margins or fewer than 12 resected lymph nodes.
Results: Patients had a mean age of 63.6 ± 11.5 years, BMI of 27.3 ± 3.9 kg/m^2, and median ASA of 2. The mean OT and LOS were 123.5 ± 28.9 min and 3.4 ± 2.4 days, respectively. There were a total of 10 complications, no conversions and no oncologic failures. CUSUM analysis of OT identified the achievement of the learning phase after 30 cases. When taking into account both analyses, the rate of operative failure was not statistically different between the initial 30 and the final 24 cases.
Conclusions: We present a multi-dimensional learning curve analysis for SILC RH taking into account OT, risk factors and failure rates. In our experience, the learning curve is achieved between 30 to 36 cases. Most importantly, results indicate that offering this MI approach does not result in increased complications or harmful results even in the early phases of the learning curve.



S046

IMPACT OF COMORBIDITY ON OUTCOMES AND OVERALL SURVIVAL AFTER OPEN AND MINIMAL INVASIVE ESOPHAGECTOMY FOR LOCALLY ADVANCED ESOPHAGEAL CANCER

James P Dolan, MD (presenter), Taranjeet Kaur, MBBS, Brian S Diggs, PhD, Renato A Luna, MD, Paul Schipper, MD, Brandon Tieu, MD, Brett C Sheppard, MD, John G Hunter, MD, Oregon Health & Science University

Introduction: Minimally invasive esophagectomy (MIE) was introduced with the intent of lessening the mortality and morbidity related to esophagectomy as compared to the open approach. More recently, comparisons have been made in regard to oncological equivalence between the two approaches. The aim of this study was to examine the impact of the Charlson Comorbidity Index on predicting outcomes and overall survival after Open and MIE.

Methods: We conducted a retrospective analysis of a prospective database between1995 and 2011. All patients who underwent esophagectomy for locally advanced esophageal cancer (stage II and III) were selected. A total of 146 patients were analyzed and separated into two groups, Open esophagectomy (Open) and MIE. Risk adjustment for each patient was performed using Charlson Comorbidity Index-Grade (CCI-G). The outcomes of interest were operative time, intraoperative estimated blood loss (EBL), lymph node harvest, length of hospital stay (LOS), major complications, 30-day mortality and overall survival. Multivariate linear, logistic and cox proportional hazard models were used to adjust for the effect of approach, age, gender, BMI, and CCI-G on the outcomes.

Results: Sixty four patients (44%) underwent Open while seventy one (49%) had MIE. An additional eleven (7%) had to be converted and were classified with the MIE for further analysis. There was no significant difference between MIE and Open in terms of operative time but MIE had less intraoperative EBL (mean 234 mL, $p < 0.001$). Lymph node harvest was also higher (mean 7 nodes, $p < 0.001$) and LOS was shorter for MIE (ratio 0.80, $p = 0.018$). Major complications occurred in 33% of patients in the MIE and 33% of patients in the Open group ($p = 0.988$) while 30-day mortality was 2% in MIE and 5% in Open ($p = 0.459$). Estimated survival at 3 years was 52% for MIE, 48% for Open and at 5 years 42% for MIE and 37% for Open ($p = 0.513$). Age, gender and BMI did not have any significant effect on the outcomes or overall survival. Charlson Comorbidity Index-Grade influenced outcomes with the operative time (mean 129 minutes, $p = 0.004$), LOS (ratio 2.3, $p < 0.001$), and major complications (odds ratio 10.1, $p = 0.048$) worse for CCI-G 3 compared to CCI-G 0. Overall survival was worse for CCI-G 1 in comparison with CCI-G 0 (hazard ratio 1.99, $p = 0.027$).

Conclusions: MIE is a safe alternative to Open esophagectomy for treatment of locally advanced esophageal cancer. Compared with Open esophagectomy, MIE decreases intraoperative EBL and LOS without increasing operative time, morbidity, or mortality related to the procedure. In addition, presence of comorbidities, as measured by CCI-G, increases operative time, length of hospital stay and post-operative complications while worsening overall survival.

S047

Does Laparoscopic Adrenalectomy Jeopardize Oncologic Outcomes for Patients with Known or Suspected Adrenocortical Carcinoma?

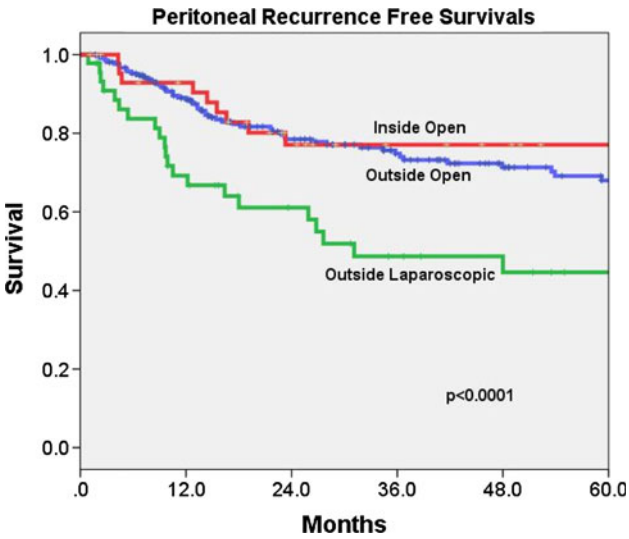
Amanda Cooper, MD (presenter), Mouhammed Habra, MD, Elizabeth Grubbs, MD, Brian Bednarski, Anita Ying, MD, Alexandria Phan, MD, Nancy Perrier, MD, Jeffrey Lee, MD, Thomas Aloia, MD, The University of Texas M.D. Anderson Cancer Center

Introduction: For patients with known or suspected adrenocortical carcinoma (ACC), considerable controversy exists over the use of laparoscopic adrenalectomy. The purpose of this project was to assess recurrence patterns in patients with a pathologic diagnosis of ACC treated with laparoscopic versus open adrenalectomy.

Methods and Procedures: All patients referred to our center with a diagnosis of ACC from April 1, 1993 to May 1, 2012 were reviewed. Three groups of patients were compared: those referred after open resection elsewhere, those referred after laparoscopic resection elsewhere, and those treated primarily at our center (all resected by open approach). Overall survivals were compared between groups using Kaplan-Meier curves.

Results: During the study period, 46 patients presented after laparoscopic resection at an outside institution, 215 patients after open resection at an outside institution, and 45 patients were treated at our institution with open resection. For the laparoscopic group, median pathologic tumor size was 8.0 cm (range 1–15 cm) vs. 12.0 cm (3.5–16 cm) for the open at outside institution group and 12.0 cm (4–30 cm) for the group resected at our institution ($p = 0.002$). In the laparoscopic group, 52.2% of patients developed a peritoneal recurrence at a median time of 9.9 months, compared to 27.4% at a mean time of 14.2 months in the open at outside institution group and 20.0% at a mean time of 14.4 months in the open at our institution group ($p = 0.002$ for % peritoneal recurrence, Figure). Peritoneal recurrence after laparoscopic resection was salvageable with subsequent surgery in only 8.3% of patients versus 18.6% in the open group.

Conclusion: Despite typically being performed in patients with smaller tumors, laparoscopic adrenalectomy for ACC is associated with higher rates of peritoneal recurrence. For patients with known or suspected ACC, the oncologic benefits of open resection outweigh the short-term benefits of minimally invasive surgery.



S048

The NOSAR Prospective Randomized Trial of Conventional Laparoscopic versus NOTES cholecystectomy

S D Schwaitzberg, MD (presenter), M L Kochman, MN, Cambridge Health Alliance

Nearly 1 million minimally invasive cholecystectomies are performed in the United States yearly. While a number of techniques are described to perform this procedure, they are rarely compared in a prospective and randomized fashion. NOSCAR, the Natural Orifice Surgery Consortium for Assessment and Research created by SAGES and ASGE initiated a prospective randomized of natural orifice translumenal endoscopic surgery (NOTES) cholecystectomy versus conventional laparoscopic cholecystectomy. Originally patients were to be randomized to three groups: laparoscopic cholecystectomy (LC), transvaginal NOTES cholecystectomy (TV) and transgastric NOTES cholecystectomy (TG) in a device agnostic prospectively. The latter group was closed for non-accrual.

83 patients were randomized in this study powered to evaluate non-inferiority between conventional and NOTES techniques. Intraoperative and postoperative events such as OR time, pain, complications, and cosmesis were recorded. Data, data, data . data

Transvaginal NOTES cholecystectomy was equally efficacious safe in terms of both procedure and access. Removal of the experimental label for transvaginal access and TV cholecystectomy is warranted.

S049

End-to-end hand sewn anastomosis versus side-to-side stapled anastomosis in laparoscopic right colectomy. A prospective randomized controlled trial

M Bun, MD (presenter), A Canelas, MD, F Carballo, MD, E Grzona, MD, M Laporte, MD, C Peczan, MD, N Rotholtz, MD, Colorectal Surgery Division - Hospital Alemán de Buenos Aires. Argentina

Background: The superiority of the different techniques for ileocolic anastomosis is controversial.
Although many trials trying to compare both techniques in right colectomies, there is no publications until today comparing these alternatives using the laparoscopic approach.
Objective: The aim of this study is to compare the outcome of the End-to-end hand sewn anastomosis versus side-to-side stapled anastomosis in patients undergoing laparoscopic right colectomy.
Design: Experimental, randomized controlled trial.
Materials and Methods: Patients candidates of laparoscopic right colectomy between January 2006 and May 2012 were included. Patients that required conversion to open surgery; emergency procedures; Crohn's disease; and surgeries associated with other surgical procedures were excluded. To avoid any bias during colectomy, randomization was performed once completed this stage and proceeded to make the incision for the specimen extraction. Two groups were randomized: End-to-end hand sewn anastomosis (GI) and Side-to-side stapled anastomosis (GII). Surgical time; major and minor complications; reoperation rate; recovery of intestinal function and hospital stay were analyzed. The statistical significance level was defined as $p < 0.05$. Statistical analysis was performed using the statistical software "SPSS 19".
Results: A total of 230 laparoscopic right colectomies were performed in the study period. One hundred fifty three patients met the inclusion criteria. The mean age was 65.6 (23–90) years. Eighty six (56.3%) patients were male. 144 (94%) were operated for malignant disease. After randomization, 74 (48.3%) patients belonged to the GI whereas 79 (51.7%) GII. Mean operative time was 127.8 ± 34.7 minutes. There was a tendency for having significantly shorter operative time in GII (GI vs. GII: 146.8 ± 49.47 vs G2: 123.8 ± 34.7, $P < 0.05$). There were no other significant differences between the groups.
Conclusions: The operative time of laparoscopic right colectomy is lower when a stapled anastomosis is performed without affecting any other postoperative variable.

S050

Volume and Outcome relationship in Bariatric Surgery in the Era of Laparoscopy

Mehraneh D Jafari, MD (presenter), Monica T Young, MD, Vinh Q Nguyen, PhD, Brian R Smith, MD, Michael J Stamos, Ninh T Nguyen, MD, University of California, Irvine

Introduction: The rapid adoption of the laparoscopic approach for bariatric operations over the past decade has been accompanied by an exponential growth in the number of procedures performed annually. Multiple studies have examined the effects of volume on surgical outcomes for bariatric surgery. However, these studies were analyzed in the era of open surgery and the absence of national accreditation centers. It has been shown that volume is an independent predictor of serious complications. Mortality associated with bariatric surgery has decreased tremendously over the past decade. The purpose of this study is to demonstrate the effect of volume on surgical outcomes in bariatric surgery within the era of laparoscopy and national accreditation.
Methods and procedures: Using the Nationwide Inpatient Sample, a retrospective review of elective admission of bariatric surgical cases was conducted between 2006–2010. Patient demographics, comorbidities, serious postoperative morbidity, and in-hospital mortality were reviewed. Outcomes were analyzed according to low volume (LVH, <50 cases), medium volume (MVH, 50–100 cases) and high volume hospitals (HVH, >100 cases). A multivariate analysis was conducted to estimate and test the association of volume on mortality and serious morbidity while controlling for age, gender, hospital factors (teaching, size, and location), comorbidities, and procedure type (stapling and non-stapling). Separate a priori specified models were fit to consider the effect of volume for stapling (gastric bypass and sleeve gastrectomy) and non-stapling procedures (gastric band).
Results: Among the estimated 381,674 cases sampled, 74% of cases were performed in HVH. Gastric bypass and sleeve gastrectomy accounted for 72% of cases. Patient age, gender distribution, race, hospital type and comorbidity score were similar for all groups. Hospital charges were highest in the LVH, while length of stay and anastomotic leak were similar among the three groups. In-hospital mortality was higher in the LVH (0.14%) compared to HVH (0.06%). Using multivariate analysis and controlling for confounding variables, procedures performed in a LVH were associated with 2.9 fold increase in mortality rates (95% CI [1.5, 5.7]; $p < 0.02$) and a 1.3 fold increase in serious morbidity (95% CI [1.2, 1.5]; $p < 0.01$) compared to HVH. Stapling procedures performed in LVH were associated with a 2.9 fold increase in mortality rates (95% CI [1.4, 6.1]; $p < 0.04$) and a 1.3 fold increase in serious morbidity (95% CI [1.1, 1.4]; $p < 0.01$) compared to HVH. Non-stapling procedures performed in LVH are associated with a 1.6 fold increase in mortality rates (95% CI [1.2, 2.2]; $p < 0.01$) compared to HVH.
Conclusion: In the era of laparoscopy, hospitals with high case volumes continue to have improved serious morbidity and mortality. We were unable to differentiate if the improved outcomes at high volume centers are related to their higher volume or their status of accreditation as centers of excellence.

S051

Long Term Follow up of Endoscopic Sclerotherapy for Dilated Gastrojejunostomy after Gastric Bypass

Magdy Giurgius, MD (presenter), Nicole Fearing, MD, Alexandra Weir, BA, Lada Micheas, MS, Archana Ramaswamy, MD, University of Missouri

Introduction: Endoscopic sclerotherapy with sodium morrhuate has been used to treat patients with weight regain following Roux-en-Y Gastric Bypass with the presumed etiology of loss of restriction due to gastrojejunostomy dilation. Weight loss and stability have been demonstrated in several studies with short term follow up, though no long term results have been reported.
Methods: A retrospective review of all patients who underwent sclerotherapy for a dilated gastrojejunostomy between 2007 and 2012 was performed.
Results: Forty-eight patients were identified with a median follow up of 22 months (12–60 months). The median age was 42.5 years (range: 22–63 years) and 92% were female. The original gastric bypass procedures were performed between 1991 and 2007. Average weight loss from the primary procedure was 120 pounds (lbs.) (range: 65–273 lbs.). Median weight regain from lowest weight to maximum weight prior to sclerotherapy was 34 lbs. (range: 0–227 lbs.). The median time between initial surgery and sclerotherapy was 8.5 years (range: 2–15 years). Patients underwent a median of 2.5 sclerotherapy sessions (range: 1–4). Preprocedure measured median gastrojejunostomy diameter was 25 mm (range: 15–35 mm). Median volume of sodium morrhuate injected was 12.5 ml per session (range: 3–22 ml). 56.2% patients had 1 year or more of follow up, 39.5% had 2 years or more of follow up, and 15% had 4 or more years of follow up. Median weight loss from sclerotherapy to final documented weight was 9.5 lbs., with a range of 53 lbs. lost to 34 lbs. gained. This was not a statistically significant value. The outcomes remained unchanged on multivariate analysis even when controlling for volume of sodium morrhuate injected, patient age, gastrojejunostomy diameter, number of sclerotherapy sessions and number of years of follow-up.
Conclusion: At long term follow-up of patients undergoing sclerotherapy of the gastrojejunostomy for weight gain following gastric bypass, there is only a marginal weight loss which was not statistically significant in our study population.

S052

Submucosal Endoscopy with Mucosal Resection (SEMR): a new hybrid technique of endoscopic submucosal dissection in the porcine rectosigmoid colon

Kohei Takizawa, MD (presenter), Christopher J Gostout, MD, Mary A Knipschield, Developmental Endoscopy Unit, Division of Gastroenterology and Hepatology, Mayo Clinic, USA

Introduction: In Western countries ESD has not prevailed due to training issues and a target patient population. We have recently developed a new hybrid technique, SEMR which combines the mucosal safety valve flap (SEMF) method with traditional ESD technique for undermining the flat and laterally spreading colorectal polyp. The SEMF hybrid technique may be easier and safer. The aim of this study was to evaluate the feasibility of SEMR for the removal of large areas of the mucosa in the porcine rectum and colon.
Methods and Procedures: All animals underwent general anesthesia with endotracheal intubation. Targeted sites in the rectum and the distal colon were marked by spot coagulation. Submucosal fluid cushions (SFC) were created using 0.83% hydroxypropyl methylcellulose with added Mesna (sodium 2-sulfanylethanesulfonate), followed by a circumferential mucosal incision (IT knife, Olympus America, Center Valley, Pa). After isolation of the targeted mucosa, balloon dissection was initiated. We used two balloon types, a blunt-tip prototype compliant balloon (4–8 mm, Fast Forward Medical, Minneapolis, Mn) was used only in first 3 pigs and blunt tipped ERCP stone extraction balloons (8–11.5 mm, Model No. B7-2LA, Olympus America, Center Valley, PA) were used in other 26 pigs. The Balloon was inserted deep into SFC and repeatedly pulled back toward the endoscope tip to disrupt the submucosa and expose the muscularis. Residual strands of submucosa were cut. Dissections were rated by using a visual analog scale ranging from 0 (easy complete dissection) to 5 (failed dissection). This study underwent Institutional Animal Care and Use Committee (IACUC) review, assignment of animal numbers for the study, and approval.
Results: Twenty-nine domestic cross-breed pigs with preprocedure weights of 58.9 ± 6.2 kg were used. Total 58 lesions (29 in rectum and 29 in distal colon) were resected using SEMR technique. The complete resection rate was 94.8% (55/58). There were three incomplete resections, 2 due to an errant site location too proximal in the colon where we could not create a robust SFC and 1 due to the floppy prototype balloon catheter tip. The median resected size was 6.0 cm (range 2.0–8.6). The median procedure time was 25 min (8–104). Dissection difficulty ranged from 0 to 5, with a median of 1 and mean of 1.5 ± 1.5. The perforation rate was 1.7% (1/58), a single uninflated balloon catheter perforation of the MP occurred in a dissection site just above 20 cm from the anus with a suboptimal fluid cushion. There were no mucosal perforations and no other major complications.
Conclusions: Large mucosal target sites in the rectum and distal colon of the pig could be safely removed en bloc by means of a hybrid technique, SEMR, combining elements of ESD with our SEMF method.

S053

MULTIVARIATE ANALYSIS OF RISK FACTORS FOR WOUND INFECTION AFTER LAPAROSCOPIC COLORECTAL SURGERY

Joe Drosdeck, MD (presenter), Syed Husain, MBBS, Nilay Shah, MD, Andrew Suzo, BS, Alan Harzman, MD, Mark Arnold, MD, The Ohio State University Wexner Medical Center

Introduction: Surgical site infection is the most common complication after colorectal surgery. Laparoscopic colorectal surgery appears to lower the incidence of wound infection. The aim of this study is to identify the risk factors associated with surgical site infection after laparoscopic colorectal resection.

Methods: Patients undergoing colorectal resections at Ohio State University Medical Center between Jan 2006 and Dec 2012 were included in the study. Univariate and multivariate analyses were performed. The following variables were assessed: cancer, inflammatory bowel disease, BMI, diabetes, COPD, use of hand assistance, use of immunosuppressant medications, smoking and utilization of Pfannenstiel incision for specimen extraction.

Results: A total of 333 patients met inclusion criteria. The overall incidence of wound infection was 11%. A higher BMI, presence of IBD, and hand assist procedures were associated with a significantly higher risk of infection whereas use of a Pfannenstiel extraction site was associated with lower infection rates. Logistic regression model with significant predictors showed that these factors retained statistical significance. Odds ratio for wound infection with IBD, hand assistance and BMI (per unit increase) were 4, 2 and 1 respectively.

Conclusion: While most infections are associated with no modifiable risk factors, our study suggests that use of Pfannenstiel extraction site and avoidance of hand assistance may result in lower infection rates.

S054

Systematic Evaluation of Decision-making in Colorectal Cancer Tumour Board meetings: Development and validation of a Quality assessment tool

S Shah (presenter), S Arora, G Atkin, R Glynne-Jones, P Mathur, A Darzi, N Sevdalis, Imperial College London, Barnet Hospital, Mount Vernon Cancer Centre

Introduction: Tumor board meetings have become an accepted mechanism for decision-making in colorectal cancer management. However the quality of these meetings can be variable resulting in sub-optimal decisions and poor treatment outcomes. This study aimed to systematically examine aspects of colorectal cancer decision-making, so as to develop and validate an evidence-based, user informed tool that could reliably measure the quality of colorectal tumour board meetings.

Methods and Procedures: A multi-phased approach comprising of quantitative and qualitative methodology identified the current best evidence on colorectal cancer tumor boards(phase 1: systematic review) and expert user opinion on outcomes measures for assessing how well colorectal cancer tumor boards functioned (phase 2: qualitative semi-structured interviews with 20 Attendings of the tumour board; analysed independently by 2 researchers using emergent theme methodology). This information was used to develop a tool, termed Colorectal Multidisciplinary Team Metric for Observation of Decision-Making (MDT-MODE), which was content and face validated (phase 3; questionnaire study with 27 experts on Colorectal cancer). Finally MDT-MODE was used by two blinded observers to independently assess decision-making in colorectal MDTs (phase 4; observational study, t-test used to analyse whether scores were better than average). Inter-observer reliability was assessed using Intraclass-correlation-coefficient ($p < 0.05$ = significance).

Results: Phase 1 and 2: A total of 26 articles were included in the systematic review. This suggested that tumour boards affect pre-treatment decisions, adherence to guidelines and clinical outcomes. Interviews highlighted that team member contributions alongside the quality of data presented significantly impact upon the decision-making process. This information was used to construct the MDT-MODE assessment tool which measures the presentation of case history, radiological and pathological information, chair's effectiveness, and contributions to decision making by all members of the tumor board on a 5 point scale(min = 1, max=5). Phase 3: The content validity index for MDT-MODE was excellent at 0.82, with each individual item having high content and face validity with experts. Phase 4: 267 patient cases were assessed in 840 minutes of observations across 11 tumor board meetings. Inter-rater reliability was high (ICC = 0.79). Regarding quality of information presented, radiological (mean 4.2, SD. 1.58) and pathological information (mean 3.8, SD 0.92) was significantly above average ($p < 0.01$). Presentation of patient views (mean 2.1, SD 1.28) and psychosocial history (mean 1.8, SD 1.44) was significantly below average ($p < 0.01$). Contributions of the surgeon (mean 4.8, SD 0.54), the oncologist (mean 3.8, SD 1.60), the radiologist (mean 4.4, SD 1.54 and the pathologist (mean 3.4, SD. 0.54) to the decision-making process was rated as above average (all ps < 0.01). A decision was reached in 258/267 cases. In cases where a treatment decision was not reached, absence of a key member of the MDT was noted.

Conclusions: Colorectal MDT-MODE provides an evidence-based, end-user informed approach to assessing decision-making in the management of colorectal patients. By quantifying the quality of a tumor board meeting, it has the potential to identify areas for improving practice so as to optimize decision making for cancer care.

S055

IMPACT OF TRAINING SYSTEMS IN LAPAROSCOPIC COLORECTAL SURGERY. COMPARATIVE ANALYSIS OF THE LEARNING CURVE BETWEEN GENERAL SURGERY RESIDENTS, COLORECTAL SURGERY FELLOWS, AND COLORECTAL SURGEONS

M Galván, MD (presenter), E Grzona, MD, A Canelas, MD, M Bun, MD, M Laporte, MD, C Peczan, MD, N Rotholtz, MD, Colorectal Surgery Division - Hospital Alemán de Buenos Aires. Argentina.

Background: Laparoscopic colorectal surgery requires specific training to achieve adequate results. A number of studies show that volume and learning curve are factors that directly affect the outcome. Laparoscopic colectomy is a complex procedure not usually included in the general surgery residency curricula.

Objective: The objective of this study is to compare the results when laparoscopic colorectal surgery is perform by colorectal surgeons, colorectal surgery fellows and general surgery residents and determine if the procedure is perform safely during their learning curve.

Design: Retrospective comparative study (prospective database).

Patients and Methods: Elective laparoscopic resections of right and left colon for malignant and benign pathology were analyzed in the period between June 2000 and June 2012. The series was divided into three groups: procedures performed by staff colorectal surgeons (GI); colorectal surgery fellows (GII); and general surgery residents (GIII). Patients demographics data; operative time; postoperative recovery variables; length of hospital stay; morbidity and mortality rate were compared. Complex colonic resections as well as rectal surgeries were excluded. The statistical significance level was set at $p < 0.05$. Statistical analysis was performed using the statistical software "SPSS 19".

Results: 619 laparoscopic resections were included. GI: 332 (53.6%), GII: 141 (22.8%) and GIII: 146 (23.6%). Right colectomies were done as follows: GI 96 (15.6%); GII 42 (6.8%); and GIII 62 (10%). Left colectomies: GI 236 (38.1%); GII 99 (15.9%); and GIII 84 (13.6%). There were no differences in parients demographic data between the groups. Conversion rate was higher in GI (GI: 7.5% vs GII: GIII 4.9% vs. 4.7% $p < 0.05$). Intraoperative complications rate was comparable between the groups and there was no difference in recovery parameters. Hospital stay was comparable. The rate of postoperative complications was lower in GI (GI: 72 (21.6%) vs GII: 40 (28.3%) vs GIII: 42 (28.7%), $p < 0.05$). There were no differences in the anastomotic leak rate nor in the mortality rate between the groups.

Conclusion: General surgery residents and colorectal fellows can perform laparoscopic colectomies safely during their training.

S056

Quality of Life impairment after Endoluminal Loco-Regional Resection (ELRR) and Laparoscopic Total Mesorectal Excision (LTME)

Emanuele Lezoche, MD (presenter), Bernardina Fabiani, MD, Alessandro M. Paganini, MD PhD, Andrea Balla, MD, Annarita Vestri, MD, Lorenzo Pescatori, MD, Daniele Scoglio, MD, Giancarlo D'Ambrosio, MD, Giovanni Lezoche, MD, Department of Surgery 'P. Stefanini', Policlinico Umberto I, 'Sapienza' University of Rome

Introduction: In selected patients with rectal cancer Endoluminal Loco-Regional Resection (ELRR) by Transanal Endoscopic Microsurgery (TEM) is an alternative treatment option instead of Laparoscopic Total Mesorectal Excision (LTME). Quality of life (QoL) data after laparoscopic TME are controversial and few studies have reported QoL evaluation after TEM. Aim is to compare the short and medium term QoL in T1 rectal cancer patients undergoing LTME or ELRR.

Methods and Procedures: Prospectively collected data from 36 patients with T1, N0 rectal cancer undergoing TEM ($n = 17$) or LTME ($n = 18$) were compared. QoL was evaluated using EORTC QLQ-C30 and QLQ-C38 questionnaires, that patients completed preoperatively and at 1, 6 and 12 months after surgery.

Results: One month after LTME, statistically significant worsening was observed in all items of both questionnaires; worsening did not reach significance, as compared to preoperative status, only in global health status ($p = 0.205$). One month after TEM a statistically significant difference was observed in gastrointestinal ($p = 0.005$) and defecation problems ($p = 0.001$) by QLQ-CR38, and in global health status ($p = 0.014$), in physical ($p = 0.02$) and role functioning ($p = 0.003$), in fatigue ($p = 0.002$) and in pain ($p = 0.001$) by QLQ-C30. Six months after LTME there was a statistically significant worsening in body image ($p = 0.009$), micturition ($p = 0.035$) and gastrointestinal ($p = 0.011$) problems by QLQ-CR38 and physical ($p = 0.003$) and role functioning ($p = 0.002$), fatigue ($p = 0.004$) and nausea/vomiting ($p = 0.030$) by QLQ-C30. Six months after TEM both QLQ-CR38 and QLQ-C30 questionnaires showed no statistical significance. However, global health status and physical functioning improved. Twelve months after LTME there was significant improvement in defecation problems ($p = 0.004$) and weight loss ($p = 0.003$) in QLQ-CR38 and in global health status ($p = 0.001$), nausea/vomiting ($p = 0.003$) and pain ($p = 0.005$) in QLQ-C30. Twelve months after TEM a significant improvement was observed in emotional functioning ($p = 0.012$) in QLQ-C30. No significant difference was observed in QLQ-C38.

Conclusions: Functional sequelae and postoperative symptoms are present up to one month after TEM and up to six months after LTME. However, no significant worsening in quality of life was observed 12 months after both procedures. Based on the present study, in selected patients with T1,N0 rectal cancer functional outcomes and QoL are improved six months after TEM, as compared to LTME.

S057

Prevalence of residual neoplastic tissue after endoscopic resection of colonic neoplastic polyps: correlation with the surgical specimen

M Bun, MD (presenter), L Pereyra, MD, E Grzona, MD, A Canelas, MD, C Fisher, MD, M Laporte, MD, C Peczan, MD, D Cimmino, MD, N Rotholtz, MD, Colorectal Surgery and Endoscopy Divisions - Hospital Alemán de Buenos Aires. Argentina.

Prevalence of residual neoplastic tissue after endoscopic resection of colonic neoplastic polyps: correlation with the surgical specimen

Background: Endoscopic resection of neoplastic colonic polyps may be curative depending on the depth of invasion and the presence of polypectomy margins free of disease. Information about the prevalence of residual neoplastic tissue (RNT) after polypectomy is scarce.

Aim: Determine the prevalence of RNT in surgical specimens from patients undergoing colectomy after endoscopic resection of malignant colon polyps, and evaluate the relationship between RNT status and the type of polypectomy, the resection margins and the depth of invasion

Methods: Patients with colonic neoplastic polyps treated by laparoscopic colectomy in a university hospital in Buenos Aires between January 2003 and March 2011 were prospectively analyzed. Those with polyps containing in situ or invasive carcinoma in whom an endoscopic polypectomy with curative intention was performed before surgery were included. The polyp resection margins informed by the pathologist were classified into three groups: complete, incomplete and indeterminate. Primary outcome: proportion of patients with RNT in the surgical sample.

Results: 155 patients undergoing colectomy for colonic polys, 46 with in situ or adenocarcinoma and a previous attempt of curative endoscopic polypectomy were included 52% were men, average age was 63 (40–91). Polyp morphology: 0-Is (sessile) 64%, 0-Ip (pedunculated) 17% and 0-IIa (slightly elevated) 13%, average polyp size was 18 mm (3–35) 72% of the polyps contained in situ carcinoma and 26% invasive adenocarcinoma. RNT was found in the surgical specimens of 56% the patients. Prevalence following polypectomy with forceps (71%), EMR (55%), snare polypectomy 26%). RNT was found in 51%, 43% and 0% of incomplete, indeterminate and complete resections respectively.

Summary and Conclusions: A high prevalence of RNT was observed following forceps polypectomy, and when incomplete or indeterminate polypectomy resection margins were informed

S058

The role of hand-assisted laparoscopy in the age of single incision laparoscopy: an effective alternative to avoid open conversion in colorectal surgery

Kyung Uk Jung, MD (presenter), Seong Hyeon Yun, MD PhD, Yoon Ah Park, MD, Yong Beom Cho, MD PhD, Hee Cheol Kim, MD PhD, Woo Yong Lee, MD PhD, Ho-Kyung Chun, MD PhD, Samsung Medical Center

Introduction: Hand-assisted laparoscopic colectomy has been accepted as an alternative method of traditional open procedure, as well as conventional laparoscopic colectomy. However, it needs an incision for hand and two or more incisions for camera and instruments. In the other hand, there has been continuous effort to make fewer incisions and single incision laparoscopic surgery has rapidly emerged as the preferred surgical approach. If so, is the hand-assisted laparoscopic technique behind the time? We introduce the way to take advantage of it, in the age of single incision laparoscopy, as an effective alternative to avoid open conversion.

Methods and Procedures: Between August 2009 and August 2012, 562 single-incision laparoscopic colectomies were performed by a single surgeon. During this period, 12 cases needed some changes from the initial approach, giving the conversion rate 2.1% (12/562). Among these 12 cases, five cases were converted to hand-assisted laparoscopy. Conversion was completed by lengthening of the original incision for SILS and addition of two incisions for trocars. Since we used custom-made glove port consisted with three trocars, we disassembled it and used each trocars. No additional cost was incurred.

Results: The indications for conversion were thick adhesion to adjacent structures due to previous inflammation in two patients, excessive tumor fixit in two patents, and extraordinary thick mesentery and uncontrolled bleeding due to preexisting liver cirrhosis in another one patient. Four of them were successfully completed without the need for open conversion. One patient with rectosigmoid colon cancer invading bladder was finally opened to avoid vesical trigone injury. The mean operation time of the four patients was 265.0 minutes. The mean estimated blood loss was 587.5 milliliter. The postoperative course was uneventful in except for one patient who had prolonged ileus and wound inflection. The patient discharged on postoperative days 34 after conservative management.

Conclusions: Conversion from single incision to hand-assisted laparoscopy in colorectal surgery is feasible and effective. It adds minimal morbidity while preserving advantages of minimally invasive surgery. It could be considered as an alternative to open conversion in cases of single incision laparoscopic surgery, especially when the conversion to conventional laparoscopy doesn't seem to be helpful.

S059

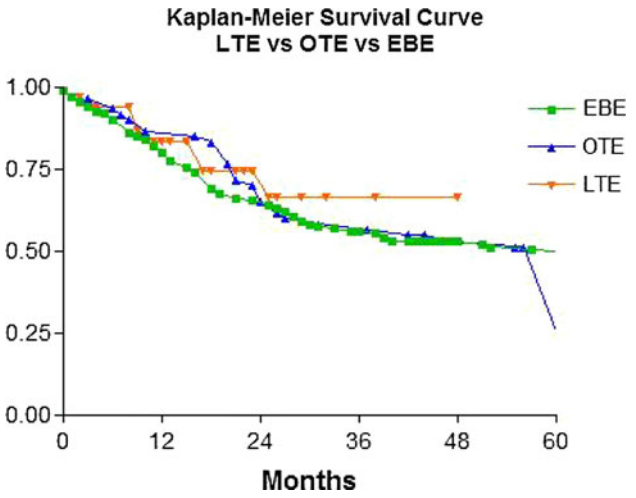
Outcome Following Laparoscopic Trans-Hiatal Esophagectomy for Esophageal Cancer

J C Cash, MD (presenter), J Zehetner, MD MMM, Babek Heyadati, Peter F Crookes, MD, Namir Katkhouda, MD, Rodney J Mason, MD, John C Lipham, MD, University of Southern California Department of Surgery, Keck Medical Center of USC

Background: Minimally invasive techniques for esophagectomy have been published and most involve a multiple field approach including combined laparoscopic and thoracoscopic mobilization of the esophagus. A laparoscopic transhiatal esophagectomy with cervical anastomosis should potentially reduce the complications caused by thoracotomy. The aim of this study is to compare outcomes of laparoscopic transhiatal esophagectomy (LTE) as a single therapy compared to open transhiatal esophagectomy (OTE) and en-bloc esophagectomy (EBE).

Methods: A retrospective chart review was performed on all patients that had a LTE for cancer between July 2008 and July 2012, performed by a single surgeon (JL). Data was compared to a historic cohort of patients who underwent OTE and EBE at the same institution from July 2002 to July 2008.

Results: There were 33 patients with LTE, compared to 60 patients with OTE and 139 patients with EBE. Median age was 72 years, 75.5 years and 61 years, respectively ($p < 0.0001$). Prevalence of co-morbidities was 76%, 83% and 63% ($p = 0.01$). The presence of minor operative complications was similar among the groups ($p = 0.36$), but major complications (defined as those requiring intervention other than conservative management, prolonging hospital stay, or any anastomotic complication) were significantly less common in the LTE group (12%, 23%, 33% respectively, $p = 0.04$). The median number of blood transfusions during hospitalization was significantly lower in the LTE group (0, 2.5, 3, $p = 0.005$). Median tumor size was significantly smaller (1.5 cm, 2.2 cm, 3 cm, $p = 0.03$) but the LTE group had a significantly higher % of patients with neo-adjuvant treatment (39%, 14%, 29%, $p = 0.008$). Median Lymph-node yield for LTE was lower compared to OTE and EBE (22, 33, 49.5, $p < 0.0001$), but the % of patients with positive nodes was similar (33%, 33%, 39%, $p = 0.69$). The LTE group had a conversion rate of 6.1%. Mortality was not significantly different among the groups (0, 2%, 4%, $p = 0.38$). The median length of stay for the LTE group was significantly lower (10 days, 13 days, 15 days, $p < 0.0001$). Overall survival was not different between the 3 groups ($p = 0.80$) with a median survival at 36 months of 70%, 65% and 65% respectively.



Conclusion: Laparoscopic transhiatal esophagectomy can be performed safely with significantly less major complications and shorter hospital stay than open esophagectomy. The reduced lymph-node harvest did not impact overall survival.

S060

PRE-OPERATIVE EVALUATION OF GASTRIC GASTROINTESTINAL STROMAL TUMORS: ENDOSCOPIC ULTRASOUND VS CT SCAN

K B Williams, MD MS (presenter), J F Bradley, MD, B A Wormer, MD, D Banerjee, A L Walters, MS, K T Dacey, MHA, A E Lincourt, PhD MBA, B T Heniford, MD, Carolinas Medical Center

Introduction: The aim of this study is to compare the preoperative anatomic localization and tumor size measurements of endoscopic ultrasound (EUS) vs abdominal computer topography (CT) in the resection of gastric gastrointestinal stromal tumors (GIST).

Methods and Procedures: Patients undergoing resection of a gastric GIST from 2006 to 2012 in our institution were identified. Only patients who had both pre-operative EUS and CT were included in final analysis. Pre-resection tumor characteristics (anatomic location and size) resulted by EUS and CT were compared to operative location and final pathologic specimen. Pre-operative imaging complications were also examined.

Results: One-hundred thirty-two abdominal GIST resections (42.4% male) were identified. Average patient specifics included: age- 61.6 ± 15.2 years, BMI- 29.4 ± 7.6 kg/m^2, tumor size- 5.4 ± 4.2 cm, and LOS- 5.6 ± 3.5 days. Most common presenting symptoms (in order of decreasing frequency) were signs of GI bleeding, abdominal pain, asymptomatic/incidental finding and anemia. Tumors were most commonly located in the greater curve (19.9%), body (15.3%) and fundus (14.5%). Seventy-nine resections were performed laparoscopically, 38 were open, 10 were laparoscopic hand-assisted, 4 were robotic and there was a single conversion of laparoscopic to open procedure.

Pre-operatively, all patients underwent EGD, 84 underwent CT and 48 underwent EUS; 27 patients were identified who underwent both (CT + EUS). Five CT+EUS were given neoadjuvant therapy (imantinib) and therefore were not included in location or size analysis. Anatomic location and tumor size as determined by EUS and CT were compared to operative anatomic location and final pathologic size. Percent agreement comparing anatomic location determined by EUS and CT to operative location were both high (86.4% for EUS, 77.3% for CT) with no statistical difference between the two ($p > 0.05$). Using linear regression analysis, tumor size determined by EUS and CT were both shown to be significantly correlated when compared to final pathologic size ($p < 0.001$); there was no significant difference in deviation between tumor size measurements from either modality ($p > 0.05$). Spindle cell cytology from EUS-guided fine needle aspiration or cold forceps biopsy was noted in 21 of the 27 EUS+CT patients and all 21 were confirmed GIST by c-kit positive immunostaining. There were 2 incidents of post-procedure hemorrhage after EUS-guided FNA which required intervention for hemostasis (endoscopic clipping or endoscopic Argon electrocautery). There were no complications noted from pre-operative CT imaging.

Conclusions: Pre-operatively, EUS and CT are equivalent for anatomic localization and size determination of gastric GISTs. EUS had a higher rate of complications and does not offer benefits beyond CT other than potential tissue diagnosis, if one is indicated prior to resection of a gastric mass. Masses in the stomach suggestive of a GIST on CT do not require EUS workup prior to surgery.

S061

PHARYNGEAL PH MONITORING BETTER PREDICTS A SUCCESSFUL OUTCOME FOR EXTRA-ESOPHAGEAL REFLUX SYMPTOMS AFTER ANTI-REFLUX SURGERY

Stephanie G Worrell, MD (presenter), Steven R DeMeester, MD, Daniel S Oh, MD, Jeffrey A Hagen, MD, DEPARTMENT OF SURGERY, KECK SCHOOL OF MEDICINE, UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA

Introduction: Gastroesophageal reflux disease can be associated with extra-esophageal symptoms (hoarseness, cough, asthma, and globus). However, these symptoms may have a multi-factorial etiology. Proximal pH monitoring has been proposed as a means of identifying patients where reflux is the cause of the extra-esophageal symptoms. To date, it has not been convincingly shown that proximal pH monitoring accurately predicts a satisfactory surgical outcome. Pharyngeal pH monitoring may be a more accurate alternative. The aim of this study was to determine whether proximal esophageal or pharyngeal pH monitoring better identified patients with extra-esophageal symptoms that improved after anti-reflux surgery.

Methods: A retrospective chart review was performed to identify all patients who had anti-reflux surgery for extra-esophageal symptoms and had pre-operative esophageal and pharyngeal pH monitoring. Esophageal pH monitoring consisted of either a Bravo capsule or dual probe catheter. Pharyngeal pH monitoring was performed using the Restech® system. A composite score was used to define an abnormal result with each test. Post-operative outcome was assessed at a mean of 20 months. A successful outcome was defined as improvement or resolution of extra-esophageal symptoms.

Results: There were 18 patients (men = 6 and women = 12) with extra-esophageal symptoms such as hoarseness (67%), cough (61%), asthma (33%), and globus (33%). Typical reflux symptoms were also present in 15/18 patients [dysphagia (39%), regurgitation (44%), and heartburn (67%)]. Distal pH monitoring was abnormal in 13 patients (72%). Anti-reflux surgery led to a successful outcome in 12 patients (67%.) The presence of typical reflux symptoms in addition to extra-esophageal symptoms did not significantly increase the likelihood of a successful outcome. The relationship between results of proximal esophageal and pharyngeal pH monitoring and a successful outcome are shown (Table 1). Restech better identified patients with extra-esophageal symptoms who had a successful outcome with anti-reflux surgery (4/9 based on abnormal proximal probe versus 11/12 based on abnormal Restech, $p < 0.05$). In two patients with a successful outcome Restech was the only positive test.

CONCLUSION: In patients with extra-esophageal reflux symptoms, proximal pH monitoring failed to identify more than half of the patients who had a successful outcome after anti-reflux surgery. In contrast, an abnormal Restech pH test was present in more than 90% of patients with a successful outcome. Further, a negative Restech study more reliably indicated the absence of reflux induced extra-esophageal symptoms. Our results indicate that Restech pharyngeal pH monitoring should be utilized in the evaluation of patients with extra-esophageal symptoms that may be associated with reflux disease.

Table 1

Location of pH monitoring	Abnormal pH Score	Positive predictive value	Nagative Predictive value	Patients with successful outcome	Proportion of all patients with successful outcome who had an abnormal test
Proximal Esophagus	6/14 (43%)	4/6(67%)	3/8(38%)	9	4/9(44%)
Pharynx (Restech)	14/18(78%)	11/14(79%)	3/4(75%)	12	11/12(92%)

S062

Urgent Laparoscopic Repair of Acutely Symptomatic PEH is Safe and Effective

David M Parker, MD FACS (presenter), Amrit A Rambhajan, MD, Anna R Ibele, MD, Kathleen Johanson, DO, Vladin Obradovic, MD, Jon D Gabrielsen, MD FACS, Anthony T Petrick, MD FACS, Geisinger Medical Center

Introduction: Acute incarceration of paraesophageal hernias (PEH) requiring urgent or emergent surgery is rare. Patients are often elderly with significant comorbidities and have historically been treated with open incisions. Our study was designed to evaluate the feasibility, safety and efficacy of laparoscopic repair (LPEHR) in patients with PEH and acute gastric volvulus.

Methods: We reviewed our prospectively maintained database and identified 269 patients undergoing an initial LPEHR at Geisinger Medical Center between January 2003 and January 2012. Patients were divided into group A (Acute), Group B (elective patients matched 1:3 to group A by age and comorbidity), and group C (all elective repairs). Group A included those admitted with acute symptoms related to PEH undergoing urgent repair. The age, Charlson score, operative time, LOS, morbidity, mortality and recurrence rates were compared using the Wilcoxon rank sum test.

Results: Patients in each group were A (n = 25), B (n = 65) and C (n = 242). Eight patients could not be matched due to high Charlson scores. Group A was similar to the matched group B, with no significant differences in age (73.2 vs 73.0, $p = 0.978$), Charlson score (5.56 vs 4.83; $p = 0.371$), BMI (29.6 vs 29.5; $p = 0.864$) or mean operative time (182.9 vs 171.2 minutes; $p = 0.652$). The LOS was significantly longer for the acute group (4.56 vs 2.72 days; $p < 0.001$) and 20% of patients in A required an ICU stay compared to no ICU admissions in B ($p < 0.001$). Group A had 4 major and 16 minor complications (88%) compared with overall morbidity of 17% in group B ($p < 0.001$). However, the recurrence rate was similar between groups (4% vs 3%; $p = 0.858$) at a mean follow up of 16.6 months (A) and 29.4 months (B; $p = 0.032$) There were no mortalities in either group and all patients underwent successful laparoscopic repair.

When compared to all patients undergoing elective LPEHR, Group A was older (mean 73.3; range 54–91) compared to group C (mean 63.2; range 32–98) ($p = 0.008$) and had a higher Charlson score (5.56 vs 3.24; $p < 0.001$). The groups had similar BMIs (29.6 vs 29.4; $p = .998$) and operative times (182.9 min vs 175.7 min; $p = .957$). LOS was longer in the acute group A (4.6 vs 2.6 days; $p < .001$) and morbidity was significantly higher than group C (88.4% vs 16.7%; $p < 0.001$). Both groups had a low recurrence rate (4% vs 4.6%; $p = .891$) at mean follow up of 16.6 and 24.1 months respectively ($p = 0.045$). There was no significant difference in mortality (0% vs 0.8%; $p = .648$),

Conclusion: Historically patients presenting with acute symptoms related to PEH have required open repair associated with significant morbidity and mortality. The acute group was older and sicker than our elective LPEHR patients and had more adverse events resulting in a longer LOS even when matched. However, the LOS remained shorter than reported for open repair and did not result in any mortality. The recurrence rates in all groups were low and comparable to elective repairs. We believe that laparoscopic repair of acute PEH is feasible, safe and effective when done in experienced centers.

S063

DIAPHRAGMATIC RELAXING INCISIONS DURING LAPAROSCOPIC PARAESOPHAGEAL HERNIA REPAIR

Christina L Greene, MD (presenter), Steven R DeMeester, MD, Joerg Zehetner, MD, Daniel S Oh, MD, Jeffrey A Hagen, MD, Keck Hospital of the University of Southern California, Los Angeles, CA

Introduction: Laparoscopic paraesophageal hernia (PEH) repair is associated with a high recurrence rate. In a recent randomized trial the recurrence rate exceeded 50% at five years. Similar to repair of other hernias, minimizing tension is a critical factor in preventing recurrence with PEH repair. At the hiatus, tension can occur secondary to a shortened esophagus or widely splayed crura. A Collis-Gastroplasty can address esophageal shortening while diaphragmatic relaxing incisions can address crural tension. The aim of this study is to describe the technique and review the outcomes of laparoscopic diaphragmatic relaxing incisions in patients undergoing PEH repair.

Methods and Procedures: Records were reviewed to identify patients who had a relaxing incision during laparoscopic PEH repair. We considered patients to have a PEH when 50% or more of the stomach was intra-thoracic. The right relaxing incision was performed by opening the right crus next to the inferior vena cava, saving a 3 mm cuff of tissue along the cava to allow a patch to be sewn into place. The incision was full-thickness into the right pleural space, starting halfway up the right crus and stopping just below the anterior crural vein (Figure 1). The left relaxing incision starts lateral to the hiatus and follows the course of the rib laterally, typically beyond the spleen (Figure 2). The defect in each case was repaired with a suitably sized 1 mm Gortex patch (Figure 3 & 4). Patients were followed by chest X-Ray and videoesophagram at three months and annually.

Results: From November 2010 to May 2012, 57 patients had PEH repair and 12 had a relaxing incision to accomplish crural closure. Eight patients were women and four were men, with a mean age of 72 years (58–84). The relaxing incision was right-sided in ten, left-sided in one and bilateral in one patient. All procedures were completed laparoscopically and included a fundoplication. In six patients a wedge- fundectomy Collis-Gastroplasty was performed. There were no major complications. At a median follow-up of 11.8 months, one patient had an asymptomatic mildly elevated right hemidiaphragm. All 12 patients had intact fundoplications without recurrent hiatal hernia or evidence of diaphragmatic disruption.

Conclusion: Crural tension likely contributes to the high recurrence rate noted with laparoscopic PEH repair. Relaxing incisions allow crural approximation with good short term outcomes and no major complications. Advanced laparoscopic surgeons should be aware of this option when faced with a large hiatus in a patient with PEH.

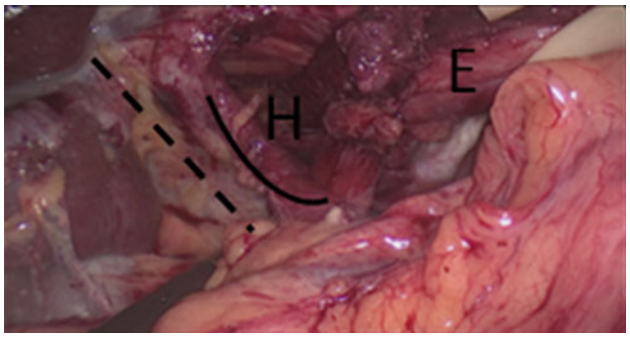


Fig. 1 Right Relaxing incision indicated by dashed line E = Esophagus and H=Hiatus indicated by solid line

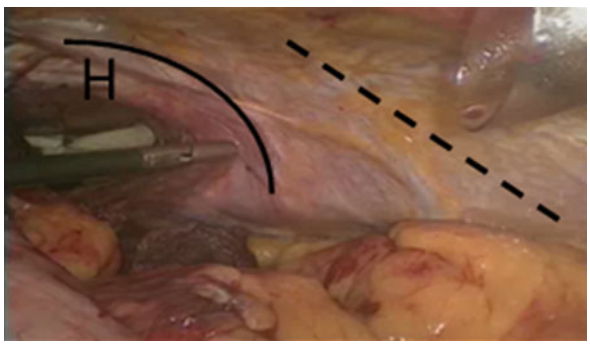


Fig. 2 Left Relaxing incision indicated by dashed line H = Hiatus indicated by solid line

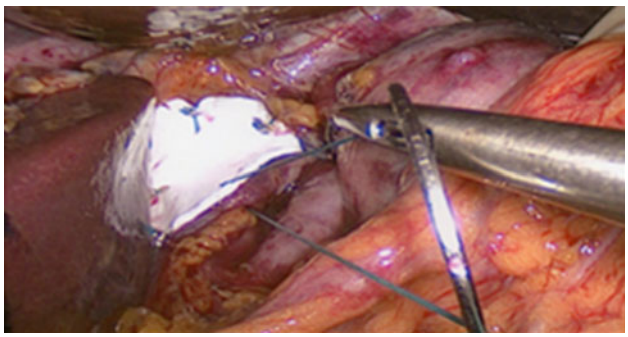


Fig. 3 Right relaxing incision with mesh sewn in place

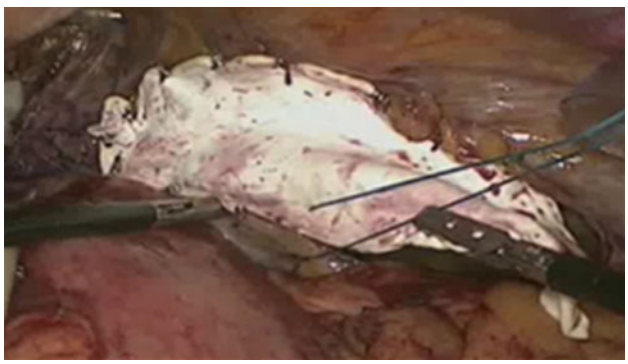


Fig. 4 Left relaxing incision with mesh sewn in place

S064

OUTCOMES OF MINIMALLY INVASIVE SURGERY FOR EARLY GASTRIC CANCER IS COMPARABLE TO OPEN SURGERY Â– ANALYSIS OF 1,013 MIS AT A SINGLE INSTITUTE

Seung-Young Oh, MD (presenter), Sebastianus Kwon, MD, Yun-Suhk Suh, MD MS, Hwi-Nyeong Choe, RN, Seong-Ho Kong, MD MS, Hyuk-Joon Lee, MD PhD, Woo Ho Kim, MD PhD, Han-Kwang Yang, MD PhD, Seoul National University Hospital

Introduction: The aim of this study was to compare short and long-term results of minimally invasive surgery (MIS) and open surgery for primary early gastric cancer (EGC) at a single high-volume institute.

Methods and procedures: Clinicopathologic and survival data of primary gastric cancer patients who underwent a minimally invasive radical gastrectomy at Seoul National University Hospital from December 2003 to January 2012 were retrospectively analyzed. For comparison of short-term outcomes, data on 1,112 patients who underwent a radical open gastrectomy from 2007 to 2011 were collected. For long-term outcome analysis, data on 1,214 patients who underwent a radical open gastrectomy from 2004 to 2006 were collected. Because MIS was performed in EGC patients, only patients who were deemed to have EGC by endoscopy and/or endoscopic ultrasound were included in order to match the surgical indications of these two control groups to the MIS group.

Results: Review of our database identified 1,013 patients who underwent MIS for gastric cancer; 942 laparoscopic gastrectomies and 71 robotic gastrectomies. The number of MIS increased from 27 cases in 2004 upto 40.6% of all operations for gastric cancer in 2011. 749 distal gastrectomies (DG), 19 total gastrectomies (TG), 36 proximal gastrectomies (PG), and 209 pylorus preserving gastrectomies (PPG) were performed. In the short-term outcome analysis, MIS group showed statistically better result than open group in the post-operative hospital stay (8.7 days vs. 11.3 days, $P < 0.001$), the estimate blood loss (75.4 cc vs. 142.3 cc, $P < 0.001$), and the complication rate (17.5% vs. 24.4%, $P < 0.001$). In the subanalysis of TG and PG groups, the complication rates were not significant different between two groups but much higher than DG and PPG groups. Univariate analysis revealed that age, sex, several comorbidities, surgical approach, type of gastrectomy and whether there was any combined resection or not were the significant influencing factors on the complication rate. Multivariate analysis showed that not only surgical approach but also age, chronic liver disease, chronic renal disease and whether there was any combined resection or not had significant effect. In the long-term outcome analysis, there was no significant difference between two groups in the 5-year survival rate.

Conclusions: MIS for EGC showed better operative results, fewer complication rate and comparable 5-year survival rate. But TG and PG in MIS group were associated with higher complication rate than open group, so caution seems to be needed to overcome the learning-curve.

S065

COMPARISON OF EGJ DISTENSIBILITY CHANGES DURING POEM AND HELLER MYOTOMY USING INTRAOPERATIVE ENDOFLIP

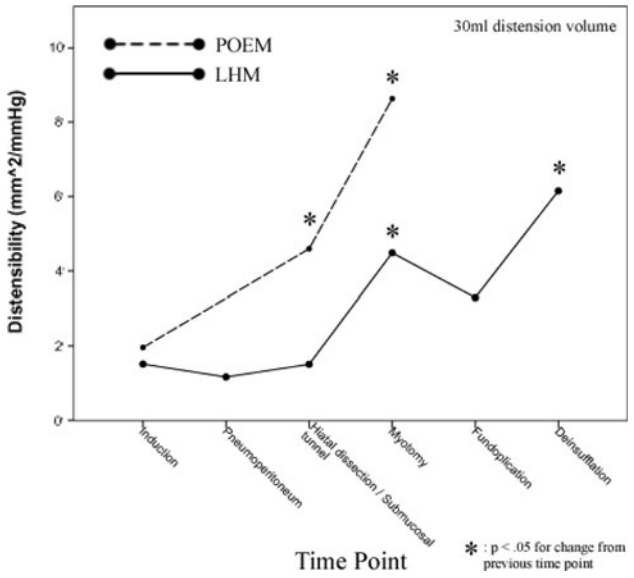
Ezra N Teitelbaum, MD (presenter), Lubomyr Boris, BS, Fahd O Arafat, MD, Frederic Nicodeme, MD, Peter J Kahrilas, MD, John E Pandolfino, MD, Nathaniel J Soper, MD, Eric S Hungness, MD, Northwestern University

Introduction: Peroral esophageal myotomy (POEM) is a novel endoscopic procedure for the treatment of achalasia. The comparative effects of POEM and laparoscopic Heller myotomy (LHM) on esophagogastric junction (EGJ) physiology are unknown. A novel measurement tool, the endoscopic functional lumen imaging probe (EndoFLIP), allows for real-time evaluation of EGJ physiology intraoperatively. Using impedance planimetry, the EndoFLIP balloon-tipped catheter measures both esophageal lumen anatomy and intra-balloon pressure. EGJ distensibility is calculated by dividing the cross-sectional area of the EGJ at its narrowest point by intra-balloon pressure.

Methods: Distensibility was measured with EndoFLIP intraoperatively in patients undergoing POEM and LHM using balloon distension volumes of 30 ml, 40 ml, and 50 ml. Separate measurements were taken after each operative step to evaluate each component's specific effect on EGJ physiology. Both procedures were performed under general anesthesia with endotracheal intubation and paralysis. During POEM, measurements were taken after: 1) induction of anesthesia, intubation, and paralysis, 2) submucosal tunnel creation, and 3) myotomy. During LHM, after: 1) induction of anesthesia, intubation, and paralysis, 2) insufflation of pneumoperitoneum, 3) crural opening and hiatal dissection, 4) myotomy, 5) partial fundoplication, and 6) deinsufflation.

Results: 8 POEM patients and 8 LHM patients underwent intraoperative EndoFLIP measurements. Baseline distensibilities were similar between patients undergoing POEM and LHM. At a balloon distension volume of 30 ml, POEM resulted in an overall increase in mean distensibility (pre 2 ± 2.5 vs. post 8.6 ± 2.5 mm^2/mmHg; $p < .001$). Taken individually, creation of the submucosal tunnel caused an increase in distensibility (from 2 ± 2.5 to 4.6 ± 2.7 mm^2/mmHg; $p = 0.02$), as did myotomy (from 4.6 ± 2.7 to 8.6 ± 2.5 mm^2/mmHg; $p < .01$). Changes were similar using 40 and 50 ml distension volumes, except that the increase in distensibility after myotomy was not significant with 50 ml (5.4 ± 4 to 6.5 ± 1 mm^2/mmHg; $p = .14$). At an EndoFLIP distension volume of 30 ml, LHM also resulted in an overall increase in mean distensibility (pre 1.5 ± 1 vs. post 6.1 ± 4 mm^2/mmHg; $p = .02$). For LHM, neither insufflation of pneumoperitoneum nor hiatal dissection effected EGJ distensibility. Myotomy caused a significant increase in distensibility (from $1.5 \pm .9$ to 4.5 ± 0.8 mm^2/mmHg; $p < .001$). Partial fundoplication (Toupet in 5 cases, Dor in 3) resulted in a trend towards decreased distensibility (from $4.5 \pm .8$ to 3.3 ± 1.4 mm^2/mmHg; $p = .07$), and final deinsufflation of pneumoperitoneum caused an increase in distensibility (from 3.3 ± 1.4 to 6.1 ± 4 mm^2/mmHg; $p < .05$). Changes were similar using 40 and 50 ml distension volumes, except that the decrease in distensibility after partial fundoplication was significant with 50 ml (from 4.6 ± 1.3 to 3.4 ± 1 mm^2/mmHg; $p = .02$). Overall increases in distensibility as a result of POEM and LHM were similar (30 ml distension volume: 6.7 ± 1.6 vs. 4.6 ± 4.1 mm^2/mmHg; $p =$ NS, 40 ml: 6.7 ± 2 vs. 5.6 ± 3.2 mm^2/mmHg; $p =$ NS, 50 ml: 5.7 ± 1 vs. 4.7 ± 2.4 mm^2/mmHg; $p =$ NS).

Conclusions: POEM and LHM result in similar increases in EGJ distensibility intraoperatively. During LHM, the steps of myotomy and final deinsufflation increase distensibility, whereas partial fundoplication may decrease distensibility. During POEM, both submucosal tunnel creation and myotomy increase distensibility. Further study is needed to correlate intraoperative EndoFLIP measurements with postoperative symptomatic and physiologic outcomes.



S066

Lower Esophageal Sphincter (LES) Electrical Stimulation Eliminates Proximal Esophageal Acid Exposure in Patients With GERD—One Year Results.

Michael D Crowell, PhD, Leonardo Rodriguez, MD, Edy Soffer, MD (presenter), Mayo Clinic in Arizona, Surgery, CCO Obesidad Y Diabetes, University of Southern California

Introduction: Chronic electrical stimulation of the LES in patients with GERD, using EndoStim LES stimulation system (EndoStim BV, the Hague, Netherlands), has been shown to enhance LES pressure, decrease distal esophageal acid exposure and improve GERD symptoms.

Aim: To evaluate, in a post-hoc analysis, the effect of electrical stimulation of the LES on proximal esophageal acid exposure measured at 23 cm above the manometric upper border of the LES.

Methods: Nineteen patients (median age 54 yrs.; IQR 47–64; 10 men) with GERD at least partially responsive to PPIs, hiatal hernia <3 cm, esophagitis <LA grade C underwent laparoscopic implantation of the LES stimulation system. Electrical stimulation at 20 Hz, 220 μs, 5–8 mAmp in 6–12, 30 minutes sessions was delivered starting on day 1 post-implant. Esophageal acid exposure at baseline and after 12-months of LES electrical stimulation therapy was measured using dual channel pH probe with pH sensors 5 and 23 cm above the manometric upper border of LES.

Results: Total, upright and supine values of median (IQR) proximal esophageal acid exposure at baseline were 0.4 (0.1–1.35), 0.6 (0.2–2.1) and 0 (0.0–0.15) %, respectively. The corresponding values for each of these variables after 12-months of LES electrical stimulation therapy were 0 (0–0) % ($p = 0.001$ for total and upright and $p = 0.043$ for supine comparisons). Distal esophageal pH improved from 10.2 (7.6–11.7) to 3.6 (1.5–7.5) % ($p = 0.001$). Seven (37%) patients had abnormal proximal esophageal acid exposure of > 1.1% at baseline. All seven patients normalized their proximal esophageal acid exposure ($p = 0.008$). In the 7 patients with abnormal proximal esophageal pH, total, upright and supine median proximal esophageal acid exposure values at baseline were 1.7 (1.3–4.1), 2.9 (1.9–3.7) and 0.3 (0–4.9) %, respectively. The corresponding values after 12-months of LES electrical stimulation therapy were 0 (0–0.1), 0 (0–0.2) and 0 (0–0) % ($p = 0.018$ for total and upright and $p = 0.043$ for supine comparisons). Distal esophageal pH for this group improved from 9.3 (7.8–17.2) to 3.4 (1.1–3.7) % ($p = .043$). There were no GI side-effects of dysphagia, gas-bloat or diarrhea reported with electrical stimulation therapy. There were no device or procedure related serious adverse events.

CONCLUSION: Electrical stimulation therapy of the LES is associated with normalization of proximal esophageal acid exposure in patients with GERD and may be useful in treating proximal GERD. The LES electrical stimulation therapy is safe and not associated with GI side-effect seen with typical antireflux surgery.

S067

Incidence, mechanisms, and outcomes of esophageal and gastric perforation during laparoscopic foregut surgery: A retrospective review of 1223 cases

Linda P Zhang, MD (presenter), Ronald Chang, BA, Brent D Matthews, MD, Michael Awad, MD, Bryan Meyers, MD, J. Chris Eagon, MD, L. Michael Brunt, MD, Washington University

Introduction: Intraoperative perforation is a potentially major complication of laparoscopic (lap) foregut surgery. We analyzed the incidence, mechanism, and outcomes of intraoperative perforations during these procedures in a large institutional experience.

Methods: All patients who underwent lap foregut surgery including lap antireflux surgery (LARS), paraesophageal hernia (PEH) repair, Heller myotomy, and reoperative hiatal hernia (redo HH) repair at our institution from August 2004 to September 2012 were reviewed retrospectively. Perforation events and postoperative outcomes were analyzed and complications were graded by modified Clavien system. All data are mean SD (or median) as specified. Statistical analysis was by Fisher exact and Mann Whitney U tests.

Results: A total of 1223 patients were analyzed (381 LARS, 379 PEH repair, 313 Heller myotomy, 150 redo HH). Overall, 51 patients (4.2%) had 55 perforations. The perforation incidence was 1.0% for LARS (N=4), 1.8% for PEH repair (N=7), 5.8% for Heller myotomy (N=18, 5 of which were redo myotomies), and 14.7% for redo HH. Redo HH were significantly more likely to have perforations than primary LARS and PEH repairs ($p < 0.001$). Location of perforations were esophageal in 13 (24%), gastric in 39 (71%), and indeterminate in 3 (5%). Mechanism of perforations for primary LARS were during suture placement (N=3) and bougie insertion (N=1), and in lap PEH repair, traction (N=3), suture placement (N=1), thermal (N=1), and bougie (N=2). Most lap Heller myotomy perforations (N=14, 77%) occurred during the myotomy. Redo HH perforations (N=23) were due to dissection/wrap take-down in 83% (N=19) and traction injury in 17% (N=4). None of the perforations in any group were related to the retroesophageal dissection. Perforations were recognized and repaired intraoperatively in 43 cases (84%), and postoperatively in 8 patients (16%). Compared to patients with perforations repaired intraoperatively, those discovered postoperatively were more likely to require reoperation (75% vs 2%, $p < 0.001$), had more GI and radiologic interventions (50% vs 2%, $p = 0.004$), and longer total length of stay (median 11.5 vs 4 days, $p = 0.01$). Perforations discovered postoperatively also had higher 30-day perioperative morbidity (88% vs. 30%, $p = 0.004$), and with higher Clavien grade (≥Grade III: 75% vs 9%, $p =$ NS) One patient in the LARS group whose perforation was recognized intraoperatively died at postoperative day 2 from a pulmonary embolism (2% mortality in perforated patients).

Conclusions: In a high volume center, intraoperative perforations are uncommon during first time LARS or PEH repair, and are highest with reoperative HH repair. If recognized and repaired intraoperatively, most perforations require minimal postoperative intervention. Unrecognized perforations usually require reoperation, and result in more GI and radiologic interventions, extended hospital stays, and significantly greater morbidity.

S068

COMPLETELY LAPAROSCOPIC TOTAL GASTRECTOMY FOR EARLY AND ADVANCED GASTRIC CANCER

Fabrizio Moisan, MD (presenter), Enrique Norero, MD, José Galindo, MD, Fernando Crovari, MD, Nicolás Jarufe, MD, Eduardo Viñuela, MD, Sergio Báez, MD, Pérez Gustavo, MD, Camilo Boza, MD, Alex Escalona, MD, Ricardo Funke, MD, Hospital Clínico Pontificia Universidad Católica de Chile. Hospital Dr. Sótero del Río.

Introduction: The application of laparoscopic gastric surgery has increased rapidly for the treatment of early gastric cancer. However, total laparoscopic gastrectomy for proximal and middle third advanced tumors remains controversial, particularly in terms of oncologic outcomes.
Aim: To report the perioperative morbidity and 5-year survival of laparoscopic curative total gastrectomy in early and advanced gastric cancer.
Methods: Retrospective cohort study. Patients between 2005 and 2012 with an R0 resection operated in two Chilean centers were included. A totally laparoscopic technique was used and D2 lymph node dissection was practiced routinely. An intracorporeal hand-sew esophagojejunostomy was performed in all cases. Tumor stage was classified according to TNM AJCC 7th edition. Kaplan-Meier analysis with log rank test was performed to calculate survival.
Results: Forty-eight patients were included; mean age was 61 ± 13 years, with 63% of males. Perioperative complication rate was 23% (mayor complications: Esophagojejunostomy leak 6.3%, duodenal stump leak 2.1%), and no perioperative mortality was observed in this series. Median hospital stay was 8 (IQR 8–12) days. Median number of resected lymph nodes was 32 (IQR 23–46). Deep of invasion was: T1 52%, T2 13%, T3 15% and T4a 20%. Lymph node category was N0 70%, N1 8%, N2 11% and N3 11%. The AJCC stages were 1, 2 and 3 in: 59%, 22% and 19% respectively. Median follow-up period was 30 (IQR 8–51) months. The overall 5 year survival was 77%. Five year survival in advanced and early tumors was 60% and 90% respectively, in N+ and N0, 55% and 85% respectively, and according to different AJCC stages, 92%, 53% and 38% in stage 1, 2 and 3, respectively.
Conclusion: In this series, with only proximal tumors and half of the patients with advanced gastric cancer treated with laparoscopic total gastrectomy, morbidity and 5 year overall and stage-by-stage survival was similar to open gastrectomy series.

S069

Laparoscopic versus open resection for colon cancer based on 9-year data : results of our hospital study in 1065 patients

Akiyo Matsumoto, MD (presenter), Kaida Arita, MD, Tetsuya Tajima, MD, Tomohiro Narita, MD, Masashi Okuda, MD, Hisashi Fujiwara, MD, Masaki Tashiro, MD, Shigeo Haruki, MD, Shinsuke Usui, MD, Kouji Ito, MD, Noriaki Takiguchi, MD, Susumu Hiranuma, MD, Katsuh, Tsuchiura Kyodo General Hospital

Purpose: The aim of this study was to compare the long-term out come of laparoscopic-assisted colectomy (LAC) and open colectomy (OC) for nonmetastatic colon cancer.
Materials and Methods: From January 2003 to December 2011 all patients with adenocarcinoma of the colon were assessed for entry. Adjuvant chemotherapy and postoperative follow-up were similar in both groups. Primary end point was disease free survival and secondary end points were overall survival, complications, variables related to recovery and the quality of life.
Results: Five hundred and thirty-nine patients entered the study (299 LAC group and 240 OC group). There was a tendency of higher overall survival (St 0: $p = 0.0567$, NS. St 2A: $p = 0.1971$, NS. St 2B: $p = 0.2982$, NS. St 3A: $p = 0.6171$, NS. St 3B: $p = 0.3243$, NS. St 3C: $p = 0.8873$, NS.) for the LAC group. There was a tendency of higher disease free survival (St 0: $p = 0.0567$, NS. St 2A: $p = 0.0968$, NS. St 2B: $p = 0.2863$, NS. St 3A: $p = 0.1267$, NS. St 3C: $p = 0.5572$, NS.) in the LAC group. Overall survival was higher (St 1: $p = 0.0012$) in the LAC group. Disease free survival was higher (St 1: $p = 0.0012$. St 2: $p = 0.0478$. St 3B: $p = 0.0498$. St 3: $p = 0.0108$) in the LAC group when compared with OC group. Blood loss was lower ($p = <0.0001$), fluid intake was faster ($p = <0.0001$), hospital stay was shorter ($p = 0.0003$) in the LAC group. The occurrence rates of bowel obstraction, wound infection and abdominal wall hernia were lower ($p = <0.0001$) in the LAC group. There were no differences in the reoperation rate ($p = 0.1976$, NS) or 30-day mortality ($p = 0.1138$, NS).
Conclusions: LAC is more effective than OC in the treatment of colon cancer.

S070

Minimally invasive colectomy for complicated diverticular disease in the emergency setting: a safe choice?

François Letarte, MD (presenter), Hallet Julie, MD, Roger C Grégoire, MD FRSCS, Jean-Pierre Gagné, MD FRSCS, Alexandre Bouchard, MD FRSCS, Drolet Sébastien, MD FRSCS, Philippe Bouchard, MD FRSCS, Claude Thibault, MD FRSCS, Hôpital Saint-François d'Assise, CHUQ

Introduction: Although minimally invasive surgery has now been proven to be the standard of treatment in elective cases of diverticular disease, very few studies have analysed its role in non-elective cases. The objective of this study is to prove that MIS is a safe and feasible option in the treatment of complicated diverticular disease in the emergency setting.
Methods and Procedures: Consecutive patients who underwent emergent colectomy for complicated diverticular disease from 2000 to 2011 in a single academic center were analysed from a retrospectively collected database. Morbidity and outcomes were compared between patients who had minimally invasive surgery (MIS) versus those who had open surgery (OS). A second analysis was planned for the sub-group of patients surgically treated because of failure of the medical management.
Results: A total of 125 patients were analysed, 39 in the MIS cohort and 86 in the OS cohort. Both cohorts were comparable in terms of age, BMI, ASA and APACHE score. There was a higher proportion of Hinchey III complicated diverticulitis in the OS cohort (47.4% vs 21.9%). Operating time was longer in the MIS cohort (273.6 min vs 241.8 min) but blood losses (170.6 cc vs 441.9 cc), primary anastomosis (84.6% vs 54.6%), overall morbidity (26.6% vs 52.3%), length of hospital stay (5 vs 8 days), time to normal diet (3 vs 6 days), mortality (0 vs 4 deaths) and permanent stomas (5.1% vs 13.9%) all significantly favoured the MIS cohort. Anastomotic leaks were similar in both cohorts (5.1% vs 3%) and only two laparoscopic resections required conversion to open surgery. A sub-group of patients (24 in the MIS cohort vs 18 in the OS cohort) in whom medical treatment failed and had to undergo surgery, was also analysed. Results showed the same benefits in the MIS cohort. In that case, cohorts were comparable in terms of Hinchey classification.
CONCLUSION- Minimally invasive surgery seems to be a safe and feasible option in the treatment of complicated diverticular disease in the emergency setting in selected patients. Results of our study suggest that the benefits associated with laparoscopic colectomy found in comparative studies of elective cases could be applied to urgent complicated cases.

S071

Laparoscopic versus open parastomal hernia repair: an ACS-NSQIP analysis of short-term outcomes

Wissam J Halabi, MD (presenter), Mehraneh D Jafari, MD, Vinh Q Nguyen, PhD, Joseph C Carmichael, MD FACS FASCRS, Steven Mills, MD FACS FASCRS, Micheal J Stamos, MD FACS FASCRS, Alessio Pigazzi, MD PhD FACS, University of California-Irvine, Medical Center Department of Surgery

Background: Parastomal hernia is a frequent complication following the performance of an ostomy. A significant number of cases require operative management. Available data on the use of laparoscopy in the management of parastomal hernia is limited.
Methods: Using prospectively collected data from the American College of Surgeons National Surgical Quality Improvement Program 2005 to 2010, we performed a retrospective analysis of cases that underwent open or laparoscopic repair of a parastomal hernia. Variables such as patient age, gender, BMI, comorbidities, ASA class, wound class, and surgery type (elective vs. emergency) were listed. These were adjusted for on multivariate analysis. Outcomes were compared using linear and logistic regression.
Results: Of the 1,720 identified cases, only 174 (10.12%) were performed laparoscopically. Mean patient age was 63 years in the open group and 64 years in the laparoscopic group. The majority of patients were female: 55.2% in the open group and 62.1% in the laparoscopic group. Compared to open repair, laparoscopy was associated with shorter operative times (138 vs. 151 minutes; $p < 0.05$). On multivariate regression analysis, laparoscopic parastomal hernia repair was independently associated with shorter length of hospital stay by 3.6 days (mean difference: 2.7–4.5 days; $p < 0.01$), lower risk of overall morbidity AOR=0.35 (95% CI: 0.21–0.57; $p < 0.01$), and lower risk of surgical site infections AOR=0.28 (95% CI: 0.14–0.60; $p < 0.01$). No mortality occurred in laparoscopic group whereas it was 1.62% in the open group.
Conclusion: Laparoscopic parastomal hernia repair is safe and appears to be associated with better short-term outcomes compared to open repair in selected cases. Large prospective randomized trials are needed to confirm those results.

S072

National Disparities in Laparoscopic Procedures for Colon Cancer

Monirah Al Nasser, MD (presenter), Eric Schneider, PhD, Susan Gearhart, MD, Elizabeth Wick, MD, Sandy Fang, MD, Adil Haider, MD MPH, Jonathan Efron, MD, Johns Hopkins University

Introduction: Racial disparity in the treatment of colorectal cancer has been cited as a potential cause for differences in mortality. This study compares the rates of laparoscopic procedures performed for colon cancer with respect to race, insurance status, geographic location, and hospital size.

Methods: The Healthcare Cost and Utilization Project: Nationwide Inpatient Sample (HCUP-NIS) database was queried to identify patients with the diagnosis of colorectal cancer (CRC) by the International Classification of Diseases, Ninth Revision (ICD-9) codes. Multivariate logistic regression was performed to look at age, gender, insurance coverage, academic vs. non-academic affiliated institutions, rural vs. urban settings, location, and proportional differences in laparoscopic procedures according to race.

Results: 14,502 patients were identified. 4,691 (32.35%) underwent laparoscopic colorectal procedures and 9,811 (67.65%) underwent open procedures. The proportion of laparoscopic procedures did not differ significantly by race: Caucasian 32.4%, African-American 30.04%, Hispanic 33.99%, and Asian-Pacific Islander 35.12%. ($p \leq 0.080$). Among Caucasian and African-American patients, those covered by private insurers were more likely to undergo laparoscopic procedures compared to those covered by Medicare, Medicaid, and the uninsured; whereas, within the Hispanic patients those with Medicare were more likely to have a laparoscopic procedure (see Table 1). The Odd of receiving a laparoscopic procedure at teaching hospitals was 1.37 times greater than in non-teaching hospitals, 95% CI [1.27–1.47] and did not differ across race groups. Patients treated at urban hospitals demonstrated higher odds of laparoscopic surgery, 2.25, 95% CI [1.97–2.57] than patients in rural hospitals; this relationship was consistent within races. The odds of undergoing laparoscopic surgeries was lowest in the Midwest region (0.87, 95% CI [0.80–0.96]) but higher in the Southern region (1.15, 95% CI [1.07–1.24]) compared to the Eastern and Western regions.

Conclusion: Nearly one third of all colon cancer operations are laparoscopically performed. Race does not appear to play a significant role in the selection of the laparoscopic approach for colon cancer. However, there are significant differences in the selection of laparoscopy for colon cancer patients based on insurance status, geographic location, and hospital type.

Table 1 Rates of laparoscopic colonic resections comparing race and insurance type

	Medicare	Medicaid	Private	Uninsured	p
Caucasian	30.81%	24.92%	7.40%	20.47%	<0.001
African Americans	28.85%	17.47%	36.92%	20.22%	<0.001
Hispanic	38.49%	20.49%	37.42%	16.67%	<0.001

S073

Short-term results of randomized study between laparoscopic and open surgery in elderly colorectal cancer patient (Eld Lap study)

Shoichi Fujii, Phd MD (presenter), Atsushi Ishibe, PhD MD, Mitsuyoshi Ota, Phd MD, Shigeru Yamagishi, PhD MD, Kazuteru Watanabe, PhD MD, Jun Watanabe, PhD MD, Amane Kanazawa, MD, Yasushi Ichikawa, PhD MD, Mari Saito, PhD, Satoshi Morita, Ph D, Chikara Kun, Yokohama City University Medical Center

Background: In surgical treatment to the elderly patient who has the dysfunction of the main internal organs, coexisting of securing safety of surgery and the radical cure is a problem.

Purpose: To verify safety and the validity of the laparoscopic surgery to the elderly patient's colorectal cancer

Patient and method: The laparotomy (Group O) and the laparoscopic surgery (Group L) were examined by randomized study in the cTis-T4a colorectal cancer patients who were 75 or more. The exclusion criteria were patients who had a bulky tumor larger than 8 cm in diameter, lower rectal cancer that required pelvic side wall lymphadenectomy, and the past history of laparotomy of the colon resection. The makeup factor was the tumor location (right colon, left colon and rectum). The registration period was three years, and the scheduled number of patients was 200. The primary endpoint was short-term postoperative complication rate, and the secondary was 3-years relapse-free survival rate. The term and Grade of complication were classified by CTCAEver4.0.

Result: The registration period was extended for one year. One hundred patients (right side 43, left side 28, and rectum 29) were registered in each group from August, 2008 to August, 2012, respectively. There were no differences between both groups in the patient's factors such as age (80.1:79.8), gonad, the concomitant disease, ASAscore, cT, and f-Stage. There were no differences in the treatment factors such as procedure types and surgeon's skill, too. The patients that were converted to open surgery in group L were 3 cases (3%). The reason for conversion was an uncontrollable bleeding, a peritoneum metastasis excision purpose, and patient's hope immediately before the operation, respectively. In the short-term results (O: L), there were significant differences in Grade2 or more complication (%) (30:18), ileus (%) (12:4), the amount of bleeding (ml) (157:63) and operation time (min) (150:172), and the duration of postoperative hospital stay (days) (14.4:11.7). There was no significant difference in the pathological proximal margin (mm) (109:109), the distal margin (mm) (74:85), positive rate of circumferential margin (%) (4:3), the number of dissected lymph nodes (24.8:22.7), and the residual tumor rate (%) (95:99). In the examination according to the tumor location, there were significant differences in Grade2 or more complication (32.4:15.5), the amount of bleeding (135:42) and operation time (137:160), and the duration of postoperative hospital stay (13.0:10.0) in the colon cancer. There was a significant difference only in amount of bleeding (212:113) in the rectal cancer.

Conclusion: The laparoscopic surgery to the elderly colorectal cancer patients did not have the difference in the radical cure compared with the open surgery and short-term results except the operation time were excellent. It is an effective therapeutic procedure for the elderly colorectal cancer patients.

S074

Predicting Who Will Fail Early Discharge After Laparoscopic Colorectal Surgery with an Established Recovery Pathway

Deborah S Keller, MD (presenter), Blake Bankwitz, MS, Justin K Lawrence, MD, Brad J Champagne, MD FACS, Harry L Reynolds, Jr., MD, Sharon L Stein, MD FACS, Conor P Delaney, MD MCh PhD, University Hospitals-Case Medical Center

Purpose: Despite using laparoscopy and enhanced recovery protocols (ERP), some patients are not ready for early discharge. The goal of this study was to identify predictors for patients who might fail early discharge, so that any defined factors might be addressed and optimized.

Methods: A review of a prospectively maintained database identified all major elective laparoscopic colorectal surgical procedures between 2009–2012. Patients were divided into Day of Discharge groups: ≤ 3 days and > 3 days. All followed a standardized ERP. Demographic and clinical data was compared using students paired t-tests or Fisher's Exact test, with p-value < 0.05 statistically significant. Regression analysis was performed to identify significant variables.

Results: There were 275 ≤ 3 days patients and 273 > 3 day patients. There were significant differences between groups in BMI ($p = 0.0123$), co-morbidities ($p = 0.0062$), ASA Class ($p = 0.0014$), operation time ($p < 0.001$), post-operative complications ($p < 0.001$), and 30-day re-operation rate ($p = 0.0004$). There were no significant differences in intra-operative complications ($p = 0.724$), readmissions ($p = 0.187$), or mortality rate ($p = 1.00$). Significantly more patients were discharged directly home in the ≤ 3 days cohort. Using logistic regression, every hour of operating time increased the risk of length of stay >3 days by 2.35%.

Conclusions: Elective colorectal surgery patients with longer operation times and more co-morbidities are more likely to fail early discharge. These patients should have different expectations of the ERP, as an expected 2–3 day stay may not be achievable. By identifying patients at risk for failing early discharge, resources and post-operative support can be better allocated.

S075

Laparoscopic complete mesocolic excision (CME) for colon cancer: study design and preliminary outcome from an randomized controlled trial NCT01628250

Bo Feng, MD (presenter), Aiguo Lu, MD, Mingliang Wang, MD, Junjun Ma, MD, Minhua Zheng, MD, Surgery Department of Ruijin Hospital, Shanghai Minimally Invasive Surgery Center,Shanghai Jiaotong University School of Medicine

Background and Objective: With the standardization of total mesorectal excision (TME), outcome of rectal cancer surgery was significantly improved. Recently, Hohenberger demonstrated a novel concept, complete mesocolic excision (CME), for colon cancer surgery, which is associated with a better 5-year overall survival. It is suggested that CME might be a standard surgery for colon cancer. Laparoscopic complete mesocolic excision(LCME) is a concept that using laparoscopic surgery technique to perform a resection for colon cancer. Besides, the segment of the colon containing the tumor, the resection area should include an intact mesocolon as an envelope to encase the possible route for metastasis. The routes include blood vessels, lymphatic drain and etc. Such hypothesis predicts better histopathological and higher oncological results which turns into better survival rate and better quality of life. The aim of this study was to compare the clinical results of LCME and D3-laparoscopic colectomy(L-D3) for colon cancer.

Design: It was a randomized controlled trial. The primary outcome measures: Histopathological outcomes obtained through the surgeries.The contents of histopathological outcomes are obtained from the surgeries, including the tissue morphometry; number of lymph nodes retrieved; and the plane of the resected mesocolon. The secondary outcome measures: Oncological result and 3-year survival rate.

Results: There were 20 cases and 19 cases in the LCME group and L-D3 group, respectively. All the 20 cases were successfully performed laparoscopic CME and the 19 specimens were evaluated pathologically as mesocolic plane,which is more than that in the L-D3 group. The total number of lymph nodes removed in LCME group was significantly higher than that of the L-D3 group. No significant difference was found in terms of the median operation time, median time for passage of flatus and hospitalization and complications between the two groups.

Conclusions Laparoscopic CME with medial access is technically feasible and might become the standardized procedure for colon cancer.

S076

THE USE OF NASOGASTRIC TUBE DECOMPRESSION IN THE ERA OF MINIMALLY INVASIVE SURGERY

Noam Shussman, MD (presenter), Maria Brown, Michael C Johnson, Giovanna da Silva, MD, Steven D Wexner, MD, Eric G Weiss, MD, Cleveland Clinic Florida

Introduction: Laparoscopic surgery is associated with well-known benefits, one of which is earlier return of bowel function. Hand-assisted laparoscopic surgery (HALS) may allow complex cases to be carried in a minimally invasive manner. The possible shorter operative time with HALS favors earlier return of bowel function, but the longer incision may adversely impact the development of postoperative ileus. The aim of this study was to assess and compare the incidence of postoperative ileus and the need for nasogastric tube decompression in these patients.

Methods and procedures: Following IRB approval, we performed a retrospective chart review of patients who underwent elective left-sided large bowel resections with primary anastomosis between 2009 and 2012. Exclusion criteria were urgent operation, stoma creation, ASA IV classification, and postoperative anastomotic leakage. The patients were divided into three groups: conventional laparoscopic surgery, HALS, or open surgery. We evaluated the incidence of postoperative ileus as measured by the use of nasogastric decompression, the time to first flatus and bowel movement, and the time to solid diet tolerance in each group.

Results: Two hundred fifty-one patients were included in this study. Eighty patients underwent open surgery, 89 patients underwent HALS, and 82 patients underwent conventional laparoscopic surgery. Demographic characteristics were similar in all three groups. The proportions of patients who needed postoperative nasogastric decompression, the duration of such decompression, the time from surgery to first flatus and first bowel movement, the time to tolerance of solid diet, and the total length of stay were all significantly reduced in the laparoscopic and HALS groups compared with the open surgery group. There were no significant differences in any of these measures between the laparoscopic group and the hand-assisted group. The data are summarized in the following table:

	Open	laparoscopic	HALS	P values		
				Open-HA	Open-Lap	HA-LAP
Patients (n)	80	89	82			
NGT patients (n)	20	4	4			
NGT patients (%)	25.0	4.5	4.9	<0.001	<0.001	0.90
NGT days/patient	0.65	0.21	0.17	0.049	0.01	0.82
Length of stay	7.9	5.3	5.7	<0.001	0.001	0.42
First BM (d)	4.8	3.7	3.7	<0.001	<0.001	0.95
First flatus (d)	3.9	3.1	3.0	0.007	0.006	0.69
Tolerated solids (POD)	5.6	3.9	3.7	<0.001	<0.001	0.65

Conclusions: HALS involves less postoperative ileus than open surgery and is comparable to conventional laparoscopy. Open surgery is still associated with a high incidence of postoperative ileus requiring nasogastric tube decompression.

S077

EMBRYONIC-NOTES THORACIC SYMPATHECTOMY FOR PALMAR HYPERHIDROSIS: RESULTS OF A NOVEL TECHNIQUE AND COMPARISON WITH THE CONVENTIONAL VATS PROCEDURE

Weisheng Chen, MD (presenter), Lihuan Zhu, MD, Shengsheng Yang, MD, Dazhou Li, MD, Wen Wang, MD, Long Chen, MD PhD, Department of Cardiothoracic Surgery, Fuzhou General Hospital

Introduction: Thoracic sympathectomy is considered as the most effective method to treat palmar hyperhidrosis. Although video-assisted thoracic surgery (VATS) confers better cosmesis, some patients are still concerned with the chest wall paresthesia and post-operative pain associated with the chest incision. In order to avoid these disadvantages, we developed a novel surgical technique for performance of sympathectomy by embryonic natural orifice transumbilical endoscopic surgery (E-NOTES) with flexible endoscope. In this study, we compare the outcomes of E-NOTES with needlescopic VATS thoracic sympathectomy for palmar hyperhidrosis.

Methods and procedures: From January 2010 to April 2011, a total of 66 patients with severe palmar hyperhidrosis were treated with thoracic sympathectomy in our department. 34 transumbilical -diaphragmatic thoracic sympathectomy were performed via a 5 mm umbilicus incision with ultrathin gastroscope, compared with 32 conventional needlescopic thoracic sympathectomies. Retrospective statistical analysis of a prospectively collected group of patients was performed.

Results: There was no significant difference with regard to gender, mean age, body mass index (BMI), and length of hospital stay between these two groups. The operative time for E-NOTES thoracic sympathectomy was longer than that of VATS thoracic sympathectomy (56 vs 40 min $p < 0.01$). There was no mortality, diaphragmatic hernia, and Horner's syndrome in both groups. Postoperative questionnaires were returned by all of the treated patients, the mean time from operation to follow-up was 1.4 ± 0.3 years. All 66 patients receiving sympathectomy reported successful treatment of their palmar hyperhidrosis following surgery as defined by completely dry hands. Compensatory hyperhidrosis was noticed in 7 (20.1%) patients and 6 (18.8%) in the E-NOTES and VATS groups respectively ($p > 0.05$). Post-operative pain and paresthesia was significant less for the E-NOTES group at each interval, and the aesthetic effect of the incision is superior to VATS groups (Table 1).

Table 1 .

		E-NOTES	VATS	P value
Pain score (visual analogue scale)	4 h after operation, (mean±SD)	1.4 ± 0.5	3.3 ± 0.7	<0.001
	8 h after operation, (mean ± SD)	3.1 ± 0.7	4.4 ± 0.6	<0.001
	12 h after operation, (mean ± SD)	2.1 ± 0.8	4.1 ± 0.6	<0.001
Paresthesia distinct from wound pain	1 day post-op, No. (%)	4 (11.8%)	12 (37.5%)	0.015
	1 week post-op, No. (%)	0 (0.0%)	6 (18.8%)	<0.001
	1 month post-op, No. (%)	0 (0.0%)	2 (6.3%)	<0.001
Satisfaction of aesthetic result, No. of patients (%)		32 (94.1%)	23 (71.9%)	0.036

Conclusions: Transumbilical-diaphragmatic thoracic sympathectomy is a safe and efficacious alternative to the conventional approach. It can further reduce post-operative pain and chest wall paresthesia. In addition, this novel procedure affords maximum cosmetic benefits because the surgical incision is hidden in the umbilicus.

S078

A Randomised Controlled Trial to Evaluate the Impact of Instrument and Laparoscope Length on Performance and Learning Curve in Single Incision Laparoscopic Surgery

Sathyan Balaji, BSc (presenter), Pritam Singh, MBBS MA MRCS, Mikael H Sodergren, MBBS MRCS PhD, Harry Corker, BSc, Richard M Kwasnicki, BSc, Ara Darzi, MBBS MD KBE FMedSci FRCS FACS, Paraskevas Paraskeva, MBBS PhD FRCS, Imperial College London, London, United Kingdom

Introduction: This randomised controlled trial evaluated the effect of varying instrument length on simulated Single Incision Laparoscopic Surgery (SILS) performance. SILS further reduces the invasiveness of laparoscopic surgery. The potential benefits include enhanced cosmesis and reduced pain. However, instrumentation entering adjacent to each other creates difficulties by reducing triangulation and potentially increasing both internal and external collisions. An innovative method of overcoming some of these challenges is to vary instrumentation length.

Method: Surgeons were eligible if they had performed a minimum of 5 laparoscopic procedures as primary surgeon. Participants completed baseline testing involving one repetition of both the peg transfer (PEG) and pattern cutting (CUT) tasks from the validated Fundamentals of Laparoscopic Surgery (FLS) curriculum using a conventional laparoscopic setup. Subjects were stratified based on surgical experience and randomised into one of 3 trial arms: The control group used standard length instruments (31 cm) and a standard length laparoscope (30 cm), Group 1 used 1 longer bariatric length instrument (42 cm) and 1 standard length instrument and a standard length laparoscope and Group 2 used standard length instruments and a longer bariatric length laparoscope (42 cm). The trial was undertaken in two phases using a validated SILS modified FLS box trainer. Phase one involved 25 repetitions of PEG. Phase two involved 5 repetitions of CUT. FLS scoring parameters and the validated hand tracking Imperial College Surgical Assessment Device (ICSAD) measured performance. NASA TLX workload assessment was issued at trial completion. Learning curves were generated using non-linear regression allowing calculation of the learning plateau (surgeons theoretical maximum performance) and learning rate (number of repetitions to reach 90% of maximum score). A non-parametric approach was used for statistical analysis.

Results: Twenty-three surgeons were recruited to Control ($n = 7$), Group 1 ($n = 9$) and Group 2 ($n = 7$). There were no significant differences in operative experience or baseline FLS scores of PEG and CUT. Phase 1: Peak FLS score was significantly higher in Group 1 compared to control ($p < 0.05$). Learning curves demonstrated no difference in learning rate; however, Group 1 had a significantly higher learning plateau than control ($p < 0.05$). Fifteen surgeons completed CUT in phase 2: Control ($n = 5$), Group 1 ($n = 6$) and Group 2 ($n = 4$). Group 1 revealed a trend towards higher peak FLS scores over control group ($p = 0.067$). NASA TLX workload assessment showed participants in Group 2 ($P < 0.05$) subjectively perceived higher performance than control. ICSAD revealed no significant differences in total path length or number of hand movements between groups in both phases.

Conclusions: This study demonstrates that varying instrument length can improve performance in a simulated SILS model. The combination of 1 bariatric length and 1 standard length instrument conferred highest performance. This could be a feasible and simple solution to optimise SILS ergonomics with equipment readily available in many minimally invasive surgical units.

S079

Blend Mode Reduces Unintended Thermal Injury By Monopolar Instruments: A Randomized Controlled Trial

Edward L Jones, MD (presenter), Thomas N Robinson, MD, Paul N Montero, MD, Henry R Govekar, MD, Gregory V Stiegmann, MD, University of Colorado School of Medicine, Aurora, CO

Introduction: The monopolar "bovie" is used in virtually every laparoscopic operation. When active, the bovie emits radiofrequency energy that can cause unintended thermal injury to nearby structures without direct contact by capacitive and antenna coupling. The PURPOSE of this study was to compare histologic evidence of thermal injury at the epigastric and umbilical incisions following laparoscopic cholecystectomy performed using the higher voltage coag mode versus the lower voltage blend mode. We hypothesize that the higher voltage coag mode will create more unintended thermal tissue injury in comparison to the lower voltage blend mode.

Methods and Procedures: We performed a prospective, blinded randomized controlled trial of patients undergoing elective laparoscopic cholecystectomy at a University hospital. Patients were randomized to have the operation performed with either the higher voltage coag mode or lower voltage blend mode delivered to the monopolar instrument. The generator was set at 30 Watts power for both groups. At the completion of the operation, skin was biopsied from the epigastric trocar incision (the incision through which the monopolar instrument was inserted) and the umbilical trocar incision (the incision through which the laparoscope was inserted). Thermal injury was determined by a blinded pathologist using both hematoxylin & eosin, and picro Sirius red stains. Statistical analysis was performed using two-sided Fisher's exact test for categorical data and non-parametric t-test for continuous data.

Results: Forty patients were randomized (twenty per group). Baseline demographic data in the two study groups (blend versus coag mode groups) were similar for age, gender, body mass index, operative time and blood loss. The incidence of thermal injury was higher for all skin biopsies obtained in the coag mode group in comparison to the blend mode group (45% versus 10%; $p < 0.001$) (Table 1).

Table 1 Incidence of thermal injury to skin by location

	Blend mode (lower voltage) n = 20	Coag mode (higher voltage) n = 20	p
Epigastric incision skin biopsy	5% (1)	35% (7)	0.044
Umbilical incision skin biopsy	15% (3)	55% (11)	0.019
Total thermal injuries	10% (4)	45% (18)	<0.001

Conclusion: Radiofrequency energy emitted from the monopolar "bovie" causes unintentional thermal injury to skin adjacent to the epigastric and umbilical trocar incisions. The incidence of thermal injury at both the umbilical and epigastric incisions was reduced by using the lower voltage blend mode in comparison to the higher voltage coag mode. In sum, unexplained laparoscopic complications may arise from unintentional thermal injury and can be reduced by using lower voltage energy modes during laparoscopic cholecystectomy.

S080

COMPREHENSIVE ASSESSMENT OF SKILL-RELATED PHYSICAL AND COGNITIVE ERGONOMICS ASSOCIATED WITH ROBOTIC AND TRADITIONAL LAPAROSCOPIC SURGERIES

Gyusung Lee, PhD (presenter), Mija Lee, PhD, Tameka Clanton, MS, Michael Marohn, DO, Johns Hopkins University School of Medicine, Baltimore, MD; University of Maryland School of Medicine

Introduction: We conducted the current study to investigate how physical and cognitive workloads exhibited by surgeons would differ between robotic and laparoscopic surgeries and whether any ergonomic differences would be related to surgeons' robotic surgery skill level. To date, only a few studies have investigated the ergonomic advantages of robotic surgery. However, these studies did not investigate skill-related ergonomic differences. Our hypothesis is that the unique features in robotic surgery will demonstrably skill-related results both in substantially less physical and cognitive workload and uncompromised task performance.

Methods and Procedures: Thirteen MIS surgeons were recruited for this IRB-approved study and categorized into three groups based upon their robotic surgery experiences: laparoscopy experts with no robotic experience ($n = 6$), novices with no or little robotic experience ($n = 4$), and robotic experts ($n = 3$). Each participant performed six surgical training tasks: FLS pegboard transfer, FLS circle cutting, tension running suturing, curved wire ring transfer, simulated para-esophageal hernia repair, and simulated bowel anastomosis. All participants completed these tasks using traditional laparoscopy and robotic surgery. Subjects were asked to complete each task within ten minutes. Percentage completion rates were calculated for tasks not completed within 10 minutes. Physical workload assessment was performed using surface electromyography (EMG) to measure muscular activation levels and timing from eight muscles (biceps, triceps, deltoid, trapezius, flexor carpi ulnaris, extensor digitorum, thenar compartment, and erector spinae). Cumulative muscular workload was calculated from the percentage maximum voluntary contraction (%MVC). Mental workload assessment was conducted using objective and subjective cognitive tools including the NASA-Task Load Index (TLX) and secondary time estimation.

Results: Our physical workload analysis showed that the cumulative muscular workload from the biceps (32,593 %MVC) and the flexor carpi ulnaris (60,220 %MVC) while performing robotic surgery was significantly lower than the CMW associated with laparoscopy (46,347 and 84,779 %MVC, respectively) ($p < 0.05$). Interestingly, the cumulative muscular workload from the trapezius was significantly higher with robotic surgery (114,526 %MVC) than with laparoscopy (65,719 %MVC) ($p < 0.05$), but this difference was only observed in laparoscopic experts and novices. NASA-TLX workload analysis showed that robotic surgery novices and experts expressed lower global workloads (26.3 and 24.4, respectively) with robotic surgery than with laparoscopy (44.1 and 40.5, respectively) while laparoscopic experts showed higher global workload with robotic surgery (45.0) than with laparoscopy (38.2) ($p < 0.05$). Time estimation analysis showed that performing robotic surgery was substantially less demanding for robotic experts ($p < 0.05$) when compared to other groups. Regardless of skill level, participants demonstrated faster and better performances or could complete more task components within 10 minute limit ($p < 0.05$) with robotic surgery.

Conclusions: This study demonstrated that the physical and cognitive ergonomics associated with performing robotic surgery were significantly less challenging than those associated with laparoscopic performance. Additionally, several ergonomic components were demonstrated skill-related. Robotic experts were able to benefit the most from the ergonomic advantages offered by the robotic surgery platform with uncompromised task performance. These results emphasize the need for well-structured training programs and well-defined ergonomics guidelines to maximize the ergonomic benefits available to surgeons utilizing the robotic surgery.

S081

Single incision cholecystectomy: Comparative study between Laparoscopic, Robotic and Spider Platforms

Anthony M Gonzalez, MD FACS FASMBS, Juan-Carlos Verdeja, MD FACS, Jorge R Rabaza, MD FACS FASMBS, Rupa Seetharamaiah, MD FACS, Charan Donkor, MD FACS (presenter), Rey Romero, MD, Radomir Kosanovic, MD, Francisco Perez-Loreto, MD, Jonathan Arad, MD, Baptist Health South Florida, Florida International University Herbert Wertheim College of Medicine

Introduction: The benefits of Single Incision Cholecystectomy (SIC) include better cosmetics, decreased parietal trauma and possible facilitation of postoperative recovery. Many series have shown the feasibility and safeness of Single Incision Laparoscopic Cholecystectomy (SILC), nevertheless this technique still has limitations, such as lack of triangulation, poor visualization, and instrument collision. Recently two different platforms, Robotic and SPIDER, attempt to ameliorate such problems. The purpose of this study is to compare three different techniques of SIC: Laparoscopic, Robotic and SPIDER, performed by a single surgical practice with three surgeons.

Methods: We retrospectively collected, under IRB approval, data from our first 166 Single Incision Robotic Cholecystectomy (SIRC) and compared with the data of our first 166 SILC and last 166 Spider. All the SILC were performed with 3 trocars placed in one umbilical incision with the gallbladder retraction obtained with a prolene stitch; all the robotic cases were performed using the daVinci® Single Site Surgical System; and all the SPIDER procedures were performed using the SPIDER® Surgical System. There was major selection bias for SILC, no selection bias for SIRC and minor selection bias for SPIDER. Follow up was documented 30 days after surgery.

Results: Each group (SILC, SIRC and SPIDER) included 128 (77.1%), 131 (78.9%) and 136 (81.9%) females. Mean age (years) was 45.3 (±13.6), 51.5 (±15.9) and 46.3 (± 15.1); Mean BMI (kg/m^2) was 29.1 (±5.5), 29.4 (±6.1) and 27.4 (±4.8); and presence of previous abdominal surgeries were documented in 79 (47.6%), 60 (36.1%) and 86 (51.8%) for SILC, SIRC and SPIDER respectively. Mean Surgical Time (min) was 36.4 (range 17- 73), 63.1 (range 33–221) and 52.6 (range 24–121); and total hospital length of stay (days) was 1.3, 1.1 and 1.5 for SILC, SIRC and SPIDER respectively. Complications were seen in 3 (1.8%) SILC, 3 (1.8%) SIRC and 1 (0.6%) SPIDER and conversion to multiport 3 (1.8%) SIRC and 3 (1.8%) SPIDER.

Conclusions: Results of this study demonstrate similar results in most of the parameters measured among the three platforms. SILC appears to be superior in terms of surgical time compared to SIRC and Spider, nevertheless selection bias could be the influence. SILS, SIRC and SPIDER are all similar in terms of complication profile. It can be concluded that SILC, SIRC and SPIDER are all feasible and safe alternatives when used for SIC.

S082

THE ERGONOMICS OF WOMEN IN SURGERY

Erica R Sutton, MD (presenter), Myra Irvin, BS, Craig Ziegler, MA, Gyusung Lee, PhD, Adrian Park, MD, Hiram C. Polk Jr. Department of Surgery, University of Louisville School of Medicine, Louisville, KY, Department of Surgery, The Johns Hopkins University School of Medicine, Baltimore, MD, Department of Surgery, Anne Arundel Medical Center, Annapolis, MD

Introduction: We hypothesize that women may be experiencing more ergonomic difficulties than men for whom the operating room and surgical instruments - though uniformly perilous- have more traditionally accommodated. Among surgeons who regularly perform minimally invasive surgery, as many as 87% report injuries or symptoms related to job performance. Operating room and instrument design have traditionally favored surgeons who are taller and who possess hands that are in general, large and strong. Thus, using a comprehensive survey assessing the physical impact of minimal access techniques, we looked specifically at the interaction of women and surgical ergonomics.

Methods: A 23-item web-based survey was offered via email to 2000 laparoscopic surgeons and fellows currently practicing. Subjects contacted were members of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). The survey addressed four categories: demographics, physical symptoms, ergonomics, and environment/equipment. Key questions allowed us to identify which body part (eyes, neck, shoulders, elbows, wrists, hands, back, lower body) experienced which symptoms (numbness, stiffness, fatigue, pain).

Results: There was a 15.7% overall response rate. Among respondents, 17% (54/314) were female. Women were significantly younger, shorter, had smaller glove size, and fewer years in practice than men surveyed (all p values < 0.0001). Of women reporting, 86.5%—comparable to men—attribute physical discomfort to laparoscopic operating. Statistical analysis using odds ratio calculations were performed on the survey's data to compare female and male surgeon's symptoms and treatments of body areas related to doing surgical procedures. The analysis showed that female surgeons are more likely to receive treatment for their hands, which includes the wrist, thumb, and fingers (OR 3.5, $p = 0.028$). When men and women of the same glove size were compared, women with a larger glove size (7–8.5) reported more cases of treatment for their hands than men of the same glove size. (21% vs. 3%, $p = 0.016$). Women who wore a size (5.5–6.5) surgical glove reported significantly more cases of discomfort in their shoulder area (neck, shoulder, upper back) than men who wore the same size surgical glove (77% vs. 27%, $p = 0.004$). When asked about the cause of their symptoms, 84% percent of women surgeons (40/48) and 73% of male surgeons (161/222) cite instrument design as a reason for their physical symptoms. Forty-three percent of men (95/222) and an equal percentage of women (21/48) attribute their physical symptoms to OR table height. Women, more so than men, were more likely to report laparoscopic staplers as being too big for their hands (78% and 28%, respectively, OR 8.85, $p < 0.001$).

Conclusions: Women surgeons are experiencing more discomfort and treatment in their hands than male surgeons, though they report fewer years in surgical practice. Lacking is the anthropometric data required to design ORs and instruments that will meet the needs of all surgeons- a group that includes an increasing proportion of women, who on average are shorter and wear a smaller glove size. Redesign of laparoscopic instrument handles and improvements to table height comprise the most promising solutions to these ergonomic challenges.

S083

LOCATION AND NUMBER OF SUTURES PLACED FOR HIATAL HERNIA REPAIR DURING LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING: DOES IT MATTER?

Nabeel R Obeid, MD (presenter), Spencer Deese-Laurent, BA, Bradley F Schwack, MD, Heekoung Youn, RN CCRC MA, Marina S Kurian, MD, Christine Ren Fielding, MD, George A Fielding, MD, New York University Medical Center

Introduction: It has been demonstrated in previous literature that simultaneous hiatal hernia repair (HHR) during laparoscopic adjustable gastric banding (LAGB) decreases the rate of reoperation. However, the technical aspects of how the HHR is performed are not standardized. Specifically, the number of sutures and location of suture placement (anterior hiatus, posterior hiatus, or both) can be quite variable. It is currently unknown whether or not such technical details are associated with rates of reoperation for band-related problems.

Methods: A retrospective analysis of prospectively-collected date was performed from a single institution (university hospital setting). The database was collected from 2,301 patients undergoing LAGB with HHR from 7/1/2007 to 12/31/2011. The LAGB was performed with a standard pars flaccida technique. The HHR was performed with simple, interrupted Prolene sutures, with the number and location of suture placement left to the judgment of the surgeon. The independent variables were number of sutures and location of sutures. The data collected included demographics, OR time, length of stay (LOS), follow-up time, postop BMI/%EWL at yearly intervals, and rates of readmission and reoperation. Statistical analyses included ANOVA for continuous data and chi-squared tests for categorical data. Kaplan-Meier, log-rank, and Cox regression tests were used for follow-up data, as well as for reoperation rates, in order to account for differential length of follow-up and confounding variables, respectively.

Results: The total number of patients in our database was 2,301. In comparing groups based on number of sutures used, there was no difference in length of follow-up, with 91–97% follow-up at 1 year, and 66–77% at 4 years. The majority of patients had 1 suture (55%, n = 1,282; 2 sutures = 784, 3 sutures = 188, 4+ sutures = 47; range = 1–6). Patients with fewer sutures had shorter OR time (1 suture 45 min vs. 4+ sutures 56 min, p-value < 0.0001). LOS, 30-day readmission, band-related reoperation, and postop BMI/%EWL were not statistically significant.

Of the original 2,301 patients, location of suture placement was known for 2,246 (98%), and there was no difference in length of follow-up, with 91–93% follow-up at 1 year, and 50–68% at 4 years. The majority of patients had anterior sutures (61%, n = 1,378; posterior = 735, both = 133). OR time was shorter in those with anterior suture (41 min vs. posterior 56 min vs. both 59 min, p-value < 0.0001). Patients with posterior suture had a longer LOS (84% 1 day vs. anterior 74% 1 day vs. both 74% 1 day, p-value < 0.0001). There was no difference in 30-day readmission, band-related reoperation, and postop BMI/%EWL.

Conclusions: Patients with fewer or anterior sutures have shorter OR times. However, 30-day readmission, band-related reoperation, and postop weight loss are not affected by number or location of suture. The technical aspects of HHR do not appear to be associated with readmission or reoperation, and therefore a standardized approach may be unnecessary.

S084

Roux-En-Y Fistulojejunostomy for Post-Sleeve Gastrectomy Fistula

Elie K Chouillard, MD PhD (presenter), Jean Biagini, MD FACS, Nelson Trelles, MD, Mohammad Al Jarallah, MD, PARIS POISSY MEDICAL CENTER

Introduction: Fistula is still a concern after Sleeve Gastrectomy (SG) in patients with morbid obesity. Although the risk of fistula is relatively low (< 5 %), its treatment is long, non standardized, and complex. Surgery may be indicated in selected cases. In this study, we present ou experience with Roux-en-Y fistulo-jejunostomy (RYFJ) in selected patients with fistula after SG.

Methods and Procedures: Between January 2005 and December 2011, we treated 51 patients with post SG fistula. Sixteen of these had RYFJ.

Results: 8 patients were operated laparoscopically and 8 had open surgery. No major operative incident was encountered. Mortality was 0 %. No patient was transfused. Operative duration was 160 minutes (120–330 minutes). The healing rate of the fistula was 100 %.

The mean postoperative follow-up was 39 months (13–66). The fistulojejujonstomy remained patent in all but one patient upon endoscopy. Ten patients had chronic diarrhea (62,5 %). Sixpatients (37,5 %) suffered from chronic pancreatic insufficiency. All patients needed vitamine and oligoelements medication. Adequate weight loss and comorbidity remission was achieved in all patients.

Conclusions: RYFJ for post SG fistula is a feasible and sure option. The metabolic outcome of this procedure is ill-known.

S085

REVISIONAL WEIGHT LOSS SURGERY AFTER FAILED LAPAROSCOPIC GASTRIC BANDING: AN INSTITUTIONAL EXPERIENCEREVISIONAL WEIGHT LOSS SURGERY AFTER FAILED LAPAROSCOPIC GASTRIC BANDING: AN INSTITUTIONAL EXPERIENCE

Tung T Tran, MD MSc (presenter), Vinay Singhal, MD, Ryan Juza, MD, Eric Pauli, MD, Jerome Lyn-Sue, MD, Randy Haluck, MD, Ann Rogers, MD, Penn State Milton S. Hershey Medical Center

Introduction: Increasing experience with laparascopic adjustable gastric bands (LAGB) has demonstrated a high rate of complications and inadequate weight loss. Laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG) have been reported to be safe and effective in selected patients. The purpose of our study was to evaluate the incidence and outcomes of revisional weight loss surgery after laparoscopic gastric banding at our institution.

Methods: From June 2006 to August 2012, all patients undergoing LAGB and those requiring revision were retrospectively analyzed. All procedures were performed by two surgeons with extensive experience in bariatric surgery. Parametric data are presented as mean ± SD, nonparametric data are presented as median and interquartile range [IQR].

Results: During the study period, 253 patients underwent LAGB. 101 patients (40%) required reoperation. 55 patients (51 women, mean age 46 ± 12) with a median BMI of 42 [39–45] successfully underwent reoperative weight loss surgery (48 RYGB, 7 LSG). Indications for surgery included dysphagia in 34 patients (62%), inadequate weight loss in 16 patients (29%), symptomatic reflux in 2 patients (4%), gastric prolapse in 2 patients (4%) and needle phobia in 1 patient (2%). 2 of the 55 patients required conversion to an open RYGB due to extensive adhesions. Revisional surgery was undertaken approximately 33 ± 13 months after LAGB. A staged removal of gastric band and revisional weight loss procedure was performed in 15 patients with a median interval of 2.5 [1.2–7] months between procedures. Median operative time was 160 [142–183] min. Median hospital length of stay was 2 [1–3] days. Early complications occurred in 9 patients (16%) including 2 anastomotic leaks. 12 patients (22%) presented with late complications requiring intervention. There was one death. At a median follow up of 7 months, excess body weight loss was 42 ± 24% and 49% of patients achieved a BMI of less than 33.

Conclusion: LAGB is associated with a high incidence of reoperation. Reoperative weight loss surgery can be performed in selected patients with a higher rate of complications than primary surgery. Good short term weight loss outcomes can be achieved.

S086

A CALL TO ARMS: OBESE MEN WITH MORE SEVERE COMORBIDITIES OF OBESITY AND UNDER UTILIZATION OF BARIATRIC OPERATIONS. A STUDY OF 1368 PATIENTS

Gina N Farinholt, MD (presenter), Aaron D Carr, MD, Mohamed R Ali, MD, University of California, Davis

Introduction: Despite similar rates of obesity among American men and women, population-based studies suggest that bariatric surgery patients are disproportionately female. The UC Davis experience suggests that when the obese male does present for bariatric surgery, his obesity is more advanced and comorbid diseases are more severe. We sought to quantitatively assess this observation.
Methods: Demographic, anthropomorphic, and comorbidity data were prospectively collected from 1368 consecutive patients evaluated for bariatric surgery over a four-year period. The prevalence of depression (DEP), diabetes mellitus (DM), dyslipidemia (DYS), gastroesophageal reflux disease (GERD), hypertension (HTN), back pain (BP), and obstructive sleep apnea (OSA) were assessed. A severity score from 1–5 had been assigned to each comorbidity, upon patient presentation, based on the Assessment of Obesity Related Comorbidities Scale (AORC). Patients requiring treatment or those who had complications of the disease were given a score of 3, 4, or 5 and designated as having "complicated" comorbid disease. Metabolic syndrome (MetS) was defined as the concurrent presence of DM, HTN and DYS. Statistical significance was considered at the α=0.05 level.
Results: The majority of patients were female (n = 1115, 82%). Male patients were older (44.5 ± 9.5 years vs 42.6 ± 9.6 years, $p < 0.01$) and had higher body mass index (BMI) (48.7 ± 7.8 kg/m^2 vs 46.6 ± 7.4 kg/m^2, $p < 0.0001$). More women presented with class I or II obesity (BMI < 40 kg/m^2) (14.3% vs 5.1%, $p < 0.0001$), while more men presented with class IV obesity (BMI 50–59 kg/m^2) (29.6% vs 22.8%, $p < 0.05$). The differences in patients with class III and class V obesity was not statistically significant.
On average, men presented with 4.54 serious comorbidities and 3.70 "complicated" comorbidities, while women presented with 4.15 serious comorbidities and 3.08 "complicated" comorbidities. More men presented with DM (36.4% vs 29.0%, $p < 0.05$), HTN (68.8% vs 55.3%, $p < 0.0001$), OSA (71.9% vs 45.7%, $p < 0.0001$) and MetS (20.9% vs 1.5%, $p < 0.0001$). Men also presented with more "complicated" DM (32.4% vs 23.9%, $p < 0.01$), DYS (36.8% vs 23.3%, $p < 0.0001$), HTN (58.5% vs 44.5%, $p < 0.0001$), BP (26.1% vs 18.9%, $p < 0.05$), OSA (56.5% vs 30.0%, $p < 0.0001$) and MetS (17.8% vs 10%, $p < 0.001$).
More women presented with GERD (52.7% vs 41.5%, $p < 0.01$), "complicated" GERD (26.6% vs 18.2%, $p < 0.01$) and "complicated" depression (37.4% vs 28.9%, $p < 0.01$).
Conclusion: Although men typically comprise less than 20% of bariatric surgery patients, they have more to gain from these operations. Men present later in life, with more advanced obesity, and with more "complicated" comorbidities. Most notably, they have a significantly higher incidence of metabolic syndrome and are, thus, predisposed to cardiovascular disease. Such findings mandate more research and resources to investigate this barrier to treatment and to provide the morbidly obese male with the surgical care he clearly needs.

S087

Laparoscopic greater curvature plication for morbidly obese patients: Early experience of Alexandria University

Mohamed Sharaan, MD (presenter), Khaled Katry, MD, Tamer Abdelbaki, MS, Faculty of Medicine, University of Alexandria

Background: Laparoscopic greater curvature plication of the stomach is a new bariatric procedure considered as a one new restrictive technique for morbidly obese patients. It offers a way to reduce incidence of gastric leakage of that of sleeve gastrectomy and also reduce risk of gastric erosion produced by laparoscopic adjustable gastric banding. The aim of this study was to assess this bariatric procedure as an alternative bariatric procedure for morbidly obese patient to loose weight. We included in this study 52 morbidly obese patients, all of them were fit for surgery and with no history of previous upper abdominal surgery, and with BMI above 35 kg/m^2. We performed laparoscopic greater curvature plication using two layers, first one interrupted ethibond 2/0 and second one continuous prolene 2/0 starting from the funds till the level of the crow foot of the stomach. Mean BMI was 44.5 (36 to 49). Mean age was 38 years. We had 35 female and 17 male. Mean operative time was 122.6 minutes (100 to 188 minutes), and mean hospital stay was 1.5 days. No intraoperative complications, we had no leakage, we had two case of persistent postoperative vomiting due to obstructive gastric outlet cause of narrow pouch, one was treated just by upper endoscopy and dilatation and the other by removal of sutures near the outlet. The mean percentage of excess weight loss was 25% after 3 months and 38% after 6 months and 47% after 12 months postoperative. Conclusion: the laparoscopic greater curvature plication of the stomach is a feasible and safe procedure for morbidly obese patients with low morbidity and reversible in case of obstructive symptoms. More comparative randomized controlled trials are needed to justify more on its benefits for weights loss maintenance and morbidity.

S088

GASTRIC BAND EROSION: DIAGNOSTIC AND TREATMENT ALTERNATIVES

Rodrigo Gonzalez, MD (presenter), Edwin Bran, MD, Fernando Montufar, MD, Las Americas Private Hospital

Background: Band erosion is a known complication following gastric banding and physicians are increasingly being exposed to patients with this problem. Its presentation can sometimes be subtle, making it difficult to diagnose even for physicians with ample experienced in bariatric surgery. Therefore, it is important to determine the most common signs or symptoms that are present in order to diagnose this complication. Besides endoscopy, other less expensive and less invasive methods might be useful in its diagnosis. Treatment is not always possible through endoscopy and surgical approach is not always straightforward. Our aim is to review the presentation and the different alternatives for diagnosis and treatment of intragastric band erosion.
Methods: We reviewed prospectively collected data of 916 patients undergoing gastric banding since the year 2000. Data from patients developing gastric band erosion at our institute, including clinical presentation, diagnostic methods and treatment alternatives were assessed. All patients with band erosion underwent band removal through endoscopy when the buckle of the band was inside the stomach. Otherwise patients underwent laparoscopic division and removal of the band. In cases with abundant intraabdominal adhesions hindering the safe access to the band, a gastrotomy in the anterior gastric wall and intragastric division and removal of the band was performed. Data were evaluated using Student's t-test and are reported as mean ± SD. A $p < 0.05$ was considered statistically significant.
Results: Twenty-four (2.6%) patients developed gastric band erosion at 49 ± 23 months follow-up. Average age was 42 ± 11 years and 14 (58%) were male. BMI decreased from 44 ± 7 to 30 ± 5 kg/m^2 ($p < 0.05$) at the time of the diagnosis. Clinical presentation included oozing from the port incision (69%), epigastric pain (60%), vomiting (56%), and decreased oral intake (12%). Fifteen patients (63%) presented only one symptom. For the diagnosis of band erosion, positive findings were found in the following tests: 24/24 (100%) patients who underwent endoscopy, 14/16 (88%) patients who underwent a CT scan, 7/19 (32%) who underwent an upper gastrointestinal series, and 4/16 (25%) who underwent an abdominal plain X-ray. The band was removed through endoscopy in 11 (46%) patients, laparoscopic division of the band in 10 (42%) patients, and laparoscopic gastrotomy with intragastric removal of the band in 3 (12%) patients. There were no conversions to open surgery, length of hospital stay was 2 ± 0.5 days, oral intake was started at 1 ± 0.5 post-operative days complications occurred in 2 (6%) patients including neumonia and wound infection.
Conclusions: The clinical presentation of gastric band erosion is usually nonspecific and most patients present with only one sign or symptom. Although endoscopy is the standard diagnostic method, we believe that other less invasive and less expensive diagnostic methods, especially the CT scan, can be used to diagnose this problem. In our experience, endoscopic removal of the band is technically demanding only possible in less than 50% patients with band erosion. Consequently, other options should be considered in these patients. When laparoscopic division and removal of the band is not possible, the intragastric removal of the band being is a viable and safe option.

S089

CAN LAPAROSCOPY FOR COLON RESECTION REDUCE THE NEED FOR DISCHARGE TO SKILLED CARE FACILITY?

Abhijit S Shaligram, MD (presenter), Lynette Smith, MS, Pradeep Pallati, MD, Anton Simorov, MD, Jane Meza, PhD, Dmitry Oleynikov, MD FACS, Nebraska Medical Center, University of Nebraska, Omaha

Objective: A significant proportion of patients, especially the elderly undergoing colon resections are likely to be discharged to a skilled care facility. This study aims to examine whether the technique of colectomy, open vs. laparoscopy contributed to their discharge to the skilled care facility.
Method: This was a retrospective analysis using discharge data from Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality. Adult patients who underwent colectomy in 2009 were evaluated. SAS and SUDAAN software were used to provide weighted estimates and to account for the complex sampling design of the NIS. We compared routine discharge to non-routine discharge defined as transfer to short term hospital, skilled nursing facility, intermediate care, home health and another type of facility.
Results: A weighted total of 221,294 adult patients underwent colectomy in 2009 and had the primary outcome of discharge available. Of these colon resections, 70,361 (32%) were performed laparoscopic and 150,933 (68%) by open technique. 139,047 (62.8%) patients had routine discharge and 73,572(33.3%) non-routine. 8,445 (3.8%) patients died while in the hospital, and 229 (0.1%) left against medical advice and were excluded from further analysis. On univariate analysis, age > 65 years, female gender, open technique (compared to laparoscopic), Medicare/Medicaid insurance status, co-morbidity index of one or more, and diagnosis (like hemorrhage, malignancy or inflammatory bowel disease) predicted non-routine discharge. A multivariate logistic model was then used to predict non-routine discharge in these patients using variables significant in the univariate analysis at the alpha=0.05 significance level. In the multivariate analysis, open compared to laparoscopic technique was independently associated with increased likelihood of discharge to skilled care facilities (odds ratio, 2.85; 95% CI, 2.59–3.14).
Conclusions: In addition to the expected factors like advancing age, female gender and increasing comorbidity index, open compared to laparoscopic technique for colectomy is associated with the increased risk of discharge to skilled care facilities. When feasible, laparoscopic technique should be considered as an option especially in the elderly patients who require colon resection as it may reduce their risk of discharge to skilled care facility.

S090

PATIENT CENTERED OUTCOMES FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY

Matthew Zapf, BA (presenter), Woody Denham, MD, Ermilo Barrera, MD, Zeeshan Butt, PhD, John Linn, MD, JoAnn Carbray, RN, Hongyan Du, MS, Michael Ujiki, MD, NorthShore University HealthSystem, University of Chicago Pritzker School of Medicine, Northwestern University Feinberg School of Medicine

Introduction: Laparoscopic cholecystectomy is the second most common general surgical operation performed in the United States, yet little has been reported on patient centered outcomes during the long-term post-operative course. This study aimed to describe long-term quality of life outcomes in a cohort of these patients.
Methods and Procedures: We prospectively followed 100 patients for two years after laparoscopic cholecystectomy as part of an Institutional Review Board-approved, multi-hospital, multi-surgeon study. The Surgical Outcomes Management System (SOMS) was used to quantify pain, bowel dysfunction, fatigue, cosmesis, physical function and overall satisfaction. SOMS scales were administered pre-operatively, at 24 hours, 72 hours, 1 week, 3 weeks, 6 months, 1 year and 2 years post-operatively. Patients were seen in clinic with physical exam up to two years post-op. A mixed-effect regression model was constructed with unspecified variance-covariance structure. Pair-wise comparisons were made between time points, and p-values were Bonferroni adjusted.
Results: Maximum pain was reported 24 hours after surgery (19.7 ± 6.8), and decreased at each time point up to and including 3 weeks (All $P < 0.01$). At 1 week post-op, patients reported equivalent pain to pre-op (11.6 ± 5.4 v 12.6 ± 4.4 $p = 0.37$), and at 3 weeks (7.9 ± 3.2) they had significantly less pain than at pre-op ($P < 0.01$). Bowel function worsened from pre-op to 1 week post-op (12.6 ± 4.4 v 14.8 ± 3.9 $p = 0.03$), improved at week 3 (11.1 ± 3.4 $p < 0.01$), and then remained constant at 6 months, (11.6 ± 4.2) and 1 year (11.5 ± 4.0). Twenty percent reported urgent or loose stools up to one year after surgery, which decreased to 11% at 2 years. Physical function worsened from pre-op (31.6 ± 6.2) to 1 week post-op (27.3 ± 5.4, $P < 0.01$), but then surpassed pre-op levels during week 3 (33.6 ± 3.2 $p = 0.025$), and was equivalent for the rest of the 2 year post-op course. Subjects reported returning to the activities of daily living after 6.2 ± 4.4 days and work after 11.1 ± 9.1 days. Patient-perceived cosmesis improved from post-op week 3 (5.2 ± 1.8) to 6 months (4.7 ± 1.6 $p = 0.026$) when 72% reported that the procedure had no effect on cosmesis, and then remained unchanged through 2 years. Fatigue increased from pre-op (15.9 ± 6.1) to week 1 (20.8 ± 6.3 $P < 0.01$) before improving (13.8 ± 5.2 $p = 0.025$) at week 3, where it remained equivalent through 2 years. Satisfaction with the procedure was high, averaging 9.44 out of a max score of 11, and was equivalent across post-op week 3, 6 months, 1 year and 2 years.
Conclusions: Physical function, pain, fatigue and bowel function surpassed pre-operative levels by week three. Satisfaction with the procedure and cosmesis were high throughout and maximum cosmesis was achieved by 6 months post-op.

S091

Gravity Line Strategy Can Reduce Risk of Intraoperative Injury during Laparoscopic Surgery

Anlong Zhu, PhD (presenter), Yanwei Xing, MS, Daxun Piao, PhD, Tao Jiang, MD, Hongchi Jiang, Prof, general surgery, 1st Affiliated Hospital of Harbin Medical University

Background: Intraoperative injuries are the most common cause of morbidity and mortality after laparoscopic surgery. It is accepted that most injuries are the result of misidentification of anatomical structures, which may be due to the new visual pattern different from open surgery and the lack of experience in laparoscopic surgery, especially for surgeons with insufficient training. It is of great importance to build a correct concept for the perception and judgment of a relative position of visual field during the laparoscopic surgery. With the concept, Camera drivers and beginner surgeons would get a better learning curve and a low risk of intraoperative injuries during the later operations. In this study, we aimed to find new causes of complications related to the view shown on the monitor in laparoscopic operations and solution of safe laparoscopic procedure especially for inexperienced surgeons.
Method: A series of 425 consecutive patients from September 2006 to January 2012 who received laparoscopic LAR and APR for rectal cancer in our center were included. Among these patients, 398 medical videos of laparoscopy for sigmoid colon and rectal disease were reviewed. We established a method to measure rotation angle of the operating field on the monitor. The pictures at the time of injury creation in each video were reviewed and rotational angles were measured according to the reference line based on several anatomic landmarks. Statistical analysis was performed using Chi-square, Fisher's exact, and Mann-Whitney U tests, where appropriate.
Results: 398 medical videos of 425 patients for sigmoid colon and rectal disease were reviewed. The incidence of complications was 8.3% including ureter injury, bladder injury, vagina injury and hemorrhage. Rotation of the operation views, which were found at different degrees (as <15°, 15°–30° and >30°), shown on monitor was found in a relative high rate of the medical videos (31.4%), more frequently occurred in the first 100 cases. Compared with Uncomplication Group (UG), rotation angles in Complication Group (CG) were found in all operations (UG/CG: 100%/25.7%). In most injury cases (UG/CG: 91.9%/6.4%) the rotation angles were >15° ($p < 0.001$), and in other cases (UG/CG: 9.1%/93.1%) were <15° ($p < 0.001$).
We also noted that there was a high incidence of intraoperative complication (72.7%) and rotation angle >15 o (26%) in the first 100 cases and a steady low rate (complication: 6.1–15.2%; rotation angle >15 o: 9–11%) in the second 100, third 100 and last 98 cases.
Conclusion: Rotation of the camera is not uncommon during laparoscopic procedures. Inexperienced camera drivers and surgeons often make such a mistake because of their ignorance and lose the critical vision of parts of an operation. The rotated views increased the risk of laparoscopic procedures in intraoperative injury. Therefore, keeping the camera in the right direction is recommended during laparoscopic procedures. We propose the "Gravity Line Strategy" principle as a basic operating criterion for laparoscopic operations. It is especially important for the inexperienced camera drivers and beginner surgeons.

S092

LAPAROSCOPIC SPLENECTOMY: A SURGEONÂ'S EXPERIENCE OF 302 PATIENTS WITH ANALYSIS OF POSTOPERATIVE COMPLICATIONS

Xin Wang, MD (presenter), Yongbin Li, MD, Mingjun Wang, MD, Zhengguo Yang, MD, Bing Peng, MD PhD, Shuangchen Ke, West China Hospital, Sichuan University, Chengdu, China

Introduction: The aim of this study was to evaluate the operative and clinical outcome in a series of 302 consecutive laparoscopic splenectomies and to analyze the risk factors of postoperative complications.
Methods and Procedures: We retrospectively reviewed 302 consecutive patients who underwent laparoscopic splenectomy by a single surgeon between 2003 and 2012. The patients were classified into three groups according to clinical diagnosis: benign spleen-related disease (Group1, n = 196), malignant spleen-related disease (Group2, n = 42) and splenomegaly secondary to portal hypertension (Group3, n = 64). Hand-assisted technique was selectively applied in a number of patients with supramassive splenomegaly (spleen size >22 cm) and patients with splenomegaly secondary to portal hypertension at the discretion of the surgeon. Comparisons were conducted among the three groups in terms of perioperative data. Postoperative complications were classified into three groups according to the Clavien-Dindo Classification of Surgical Complications and our previous experience: no complications, mild complications (grade I and grade II in Clavien-Dindo classification) and severe complications (grade III and above in Clavien-Dindo classification). Multivariate logistic regression was used to analyze the independent risk factors of postoperative complications. Other statistical methods applied in our study included Analysis of Variance, Chi-square test and Fisher's exact test.
Results: In these comparisons among the three groups, patients in Group1 were younger and had higher BMI, lower ASA score and smaller spleen than the other two groups with statistical significance. There were fewer patients in Group1 requiring hand-port than the other two groups: 5 out of 196 patients in Group1; 20 out of 42 patients in Group2; 25 out of 64 patients in Group3. Group1 had significantly lower operative times (117 ± 52 vs 142 ± 59, 181 ± 58), required fewer transfusions (5.1% vs 19%, 23%), had lower incidence of complications (15% vs 38%, 39%) and shorter postoperative stays (7.2 ± 2.8 vs 10.2 ± 5.6, 8.4 ± 2.9) than Group2 and Group3. Compared to Group1, Group3 had significantly more blood loss (196 ± 272 vs 93 ± 103) during the surgery. In the analysis of complications, high ASA score was an independent risk factor for occurrence of complications. Both high ASA score and larger spleen size were independent risk factors for occurrence of severe complications. Compared with total laparoscopic splenectomy, data including the hand-assisted cases showed a reduction in OR (odds ratio) of both occurrence of complications and occurrence of severe complications. In patients who underwent total laparoscopic splenectomy (n = 252), patients with supramassive splenomegaly were 22 times (OR) more likely to suffer from severe complications than patients with normal spleen size (<15 cm). However, with the help of hand-assisted technique (n = 302), the OR (supramassive splenomegaly/normal spleen) decreased to 6.713.
Conclusions: Although the treatment of malignant spleen-related disease and portal hypertension with laparoscopic splenectomy is more challenging than for benign disease, it is still safe and effective for these patients. High ASA scores is an independent risk factor for occurrence of complications while high ASA scores and larger spleen size are both independent risk factors for occurrence of severe complications. The appropriate introduction of hand-assisted technique may facilitate the laparoscopic procedure and reduce postoperative complications.

S093

Long-Term Subjective Outcomes of Reintervention for Failed Fundoplication: Redo Fundoplication Versus Roux-en-Y Reconstruction

Se Ryung Yamamoto, MD (presenter), Department of Surgery, Creighton University Medical Center, Omaha, NE, USA

Background: Redo fundoplication (Redo) is the mainstay of treatment for failed previous fundoplication, but is not always feasible. A subset of patients require Roux-en-Y reconstruction (RNY) for symptom relief. The aim of the study was to assess the long term subjective outcomes between Redo and RNY in patients with failed fundoplication.
Methods: In this retrospective review of prospectively maintained database, we identified 119 consecutive patients with Redo fundoplication (mean 54.1 years, 78 women) and 64 patients with RNY (mean 54.8 years, 35 women) between December 2003 and September 2009. Data variables analyzed were, patients' characteristics, esophageal manometry, 24 h pH study, type of procedure, peri-operative findings, complications, pre and post symptom (heartburn, regurgitation, dysphagia and chest pain) scores (scale 0–3), and patients' satisfaction score (scale 1–10). Patients with grade 2 and 3 were considered to have severe symptoms. In addition, the use of proton pump inhibitors (PPI) and histamine 2 (H2) receptor antagonists were analyzed.
Results: There were significant differences noted in BMI (29.6 vs 31.5 kg/m^2, $p = 0.023$), pre op BMI > 35 kg/m^2 (16/119 13 vs 17/64 27%, $p = 0.028$), operative time (190 vs 240 min, $p < 0.001$), estimated blood loss (100 vs 200 ml, $p = 0.001$), length of hospital stay (3 vs 6 days, $p < 0.001$) between Redo and RNY groups respectively. Of the 183 patients, long term (>3 years) follow up is available in 108 (78 redo and 30 RNY) patients. Both procedure showed significant improvement in symptom scores after the procedure. There was no significant difference in patient's satisfaction between Redo and RNY groups. In the subset analysis, patients with BMI>35 kg/m^2 have better satisfaction with RNY compared to Redo ($p = 0.044$).
Conclusions: Redo fundoplication in patients with previously failed intervention is associated with satisfactory long term outcomes. However, Roux-en-Y reconstruction is a useful surgical option for patients with failed previous antireflux surgery and especially, patients with BMI> 35 kg/m^2 should be considered for Roux en Y reconstruction.

S094

ACS NSQIP ANALYSIS: RISK FACTORS FOR COMPLICATIONS AFTER LAPAROSCOPIC AND OPEN ANTIREFLUX SURGERY.

Subhash Reddy, MD (presenter), Jonathan Grotts, MA, David Thoman, MD, Santa Barbara Cottage Hospital

Background: Antireflux surgery and paraesophageal hernia repair are increasingly done in the elderly and those with multiple comorbidities. We sought to identify risk factors for adverse postoperative events after open or laparoscopic fundoplication by querying a large national database.
Methods: Under the data use agreement for the American College of Surgeons National Surgical Quality Improvement (NSQIP) Program Public Use File, and with the institutional review board approval, we reviewed perioperative variables of patients who underwent fundoplication with or without paraesophageal hernia repair from 2006 to 2010. Patients who underwent a revision of a previous fundoplication or fundoplication for Heller myotomy as the principal procedure were excluded. The primary endpoint was mortality and secondary endpoints included post-operative adverse events. A multivariate model was used to control for pre-operative morbidity, age and BMI. Odds ratio, Chi square, logistic regression were performed using SPSS 2011.
Results: Of 6,667 fundoplications analyzed, 5,571 (83.5%) were laparoscopic fundoplications and 1,725 paraesophageal hernia repairs. Overall, patients who had an open approach had more comorbidities than laparoscopic group. Using multivariate logistic regression preoperative variables likes Age > 70, and sepsis were independently associated with mortality, respiratory, urinary complications and transfusion requirements ($P < 0.05$), BMI >30 and steroids ($P < 0.05$) were associated with wound infections. Laparoscopic procedure ($P < 0.05$) showed protective effect for all post operative complications. Respiratory and cardiac comorbidities were not independently associated with postoperative adverse events ($P > 0.05$). Demographics and adverse events are summarized in Table 1.

Table 1 Demographics and adverse events with P value

Variables	Open (n = 1096)	Laparoscopic (n = 5571)	p value
Mean AGE	62.7 years	55.4 years	0.001
Male	410(37.4%)	1999(35.8%)	0.29
Mean BMI	29.1	29.7	0.001
Mean operation time	96 minutes	75 minutes	0.001
Total length of stay	5 days	2 days	0.001
Wound class-contaminated	34(3.1%)	61(1.1%)	0.001
Postooperative wound infection	86(7.8%)	5491%)	0.001
Postoperative respiratory events	69(6.4%)	75(1.3%)	0.001
Postoperative cardiac events	3	7	0.3
Return to OR in 30 days	52(4.7%)	91(1.6%)	0.001
Blood requiring transfusions	21(1.9%)	25(0.4%)	0.001
Mortality	21(1.9%)	17(0.3%)	0.001

Conclusion: Patients undergoing open fundoplication are of a higher acuity then patients undergoing laparoscopy. After controlling for risk factors, an open procedure does not result in higher mortality, but is associated with significantly increased morbidity.

S095

Should routine UGI after bypass be standard of care?

Gregory J Coffman, MD MS (presenter), Ochsner Clinic Foundation

Because of the risk of significant morbidity and mortality in bariatric patients routine upper GI (UGI) is used postoperatively for early identification of complications such as gastro-jejunal leak. Our program, as well as many others, has adopted routine use of post operative day one UGI. There is controversy in the literature regarding the sensitivity of UGI versus clinical signs for timely and accurately identification of complications. The purpose of this study is to determine the necessity of UGI studies after gastric bypass surgery.
METHOD AND MATERIALS
This was a retrospective study using a prospectively gathered patient database. Inclusion criteria were patients who had an open or laparoscopic roux-en-y gastric bypass at Ochsner Clinic Foundation. Primary outcome variables were anastomotic leak, delayed gastric emptying, gastric outlet obstruction or fistula formation, either by radiographic analysis or operative exploration. Secondary outcome variables were any of the clinical signs of post-surgical complications: nausea or vomiting, temperature greater than 101, heart rate greater than 120, WBC >12,000.
RESULTS
Nine-hundred fifty-six patients met inclusion criteria. Eleven patients had delayed gastric emptying, five gastric outlet obstruction and three leaks were identified by UGI. None of these patients required operative intervention. There was one negative UGI where leak was identified by CT 21 days later and reoperation was performed. There were no other false negatives. For every abnormal UGI there was at least one clinical sign. There were no deaths in this series.
CONCLUSION
This large study failed to demonstrate the need for the routine use of post operative UGI. There is a false negative rate with UGI for leak and clinical signs must be evaluated properly. Larger studies will have to be performed to confirm our findings.

S096

Laparoscopic Approach to Repair Traumatic Diaphragmatic Injuries: A National Trauma Databank Comparison

Wissam Raad, MD MRCS (presenter), J. Alexander Palesty, MD FACS, Saint Mary's Hospital, The Stanley J. Dudrick Department of Surgery, Yale Affiliate

Introduction: Traumatic diaphragmatic Injury (TDI) usually occurs secondary to multiple trauma. Prompt diagnosis and repair of those injuries is important. Multiple approaches to repairing the diaphragmatic hernia have been described in the literature. The goal of this study is to compare the laparoscopic versus other non-laparoscopic approaches to TDI repair.
Methods and Procedures: Retrospective review of all trauma patients undergoing laparoscopic or open abdominal diaphragmatic hernia repair from the National Trauma Databank for the admission years 2009 and 2010. Patient demographics, number of hours to procedure, type of trauma center, and mechanism of injury were observed. Hemodynamic characteristics were evaluated by Injury Severity Score ISS, systolic blood pressure, pulse, respiratory rate, percent oxygen saturation, and Glasgow Coma Scale in the emergency department. Resource utilization was evaluated by examining the number of patients transferred to the Intensive Care Unit (ICU), patients transferred to the operating room (OR transfers), hospital length of stay (LOS), intensive care unit LOS, number of ventilator days, and hospital disposition comparison. Outcomes were measured by reviewing the mortality rate and major complication rates in both approaches. Levene's test and Student's t-test were used for statistical analysis.
Results: There were 138 cases of TDI repair included through in the study period (27 laparoscopic and 111 labeled open or other repairs). The male to female ration was 1.7:1 in the laparoscopic approach group, and 3:1 in the open approach (P-value = 0.028). The average age was 42 and 43 respectively (P-value = 0.005) and the number of hours to procedure was 110 and 84 respectively (P value = 0.612). Level I trauma centers performed 7(25.9%) laparoscopic repairs, and 49 (44.1%) utilizing a non-laparoscopic approach (P-value = 0.000), while Level II trauma centers performed 12 (44.4%) and 27 (24.3%) respectively (P-value = 0.004). On the other hand, community centers performed 17(63%) laparoscopicaly, and 44(39.6%) non-laparoscopic repairs (P-value = 0.029), while university trauma centers performed 9 (33.3%) and 58 (52.3%) (P-value = 0.001), and non-teaching trauma centers performed 1 (3.7%) and 9 (8.1%) repairs respectively (P-value = 0.432). The remaining data is summarized in the tables below.
Conclusion(s): The male to female ratio for patients undergoing laparoscopic repair is lower indicating a trend to utilize laparoscopy more frequently on females. Patients undergoing laparoscopic repair are younger. Level II trauma centers and community trauma centers are performing more laparoscopic repairs compared to level I and University centers respectively. Patients undergoing laparoscopic repairs have a lower GCS and ISS and their average length of stay is 1 day longer. There was a higher incidence pulmonary embolism in the laparoscopy group. This brief retrospective study would indicate that the laparoscopic approach is a relatively safe and viable technique. However, prospective studies are needed to appropriately evaluate the safety of this approach in the trauma population.

Hemodynamic Stability (Mean)	Laparoscopic	Other	P value
SBP	132	120	0.055
Pulse	97	102	0302
RR	20	20	0927
O2 Sat (%)	97	97	0644
GCS	14	12	0.024
ISS	17	26	0.003
Resurce utilization	**Laparoscopic**	**Other**	**P Value**
ICU Admission	9(33.3%)	31(27.9%)	0.661
OR transfer	12(44.4%)	63(56.8%)	0.180
LOS days	21	20	0.007
ICU days	15	13	0.630
Vent days	8	11	0.356
Discharge Home	14(52%)	64(58%)	0.588
Discharge to Rehab	12(44.4%)	38(34.2%)	0.326
Outcomes	**Laparoscopic**	**Other**	**P Value**
Mortalitiy	1(3.7%)	9(8.1%)	0.432
Wound-related Infection	2(7.4%)	12(10.8%)	0.603
Bleeding	1(3.7%)	5(4.5%)	0.856
DVT	3(11.1%)	7(63%)	0.391
MI	0	0	
Stroke	0	0	
PE	3(1L1%)	1(0.9%)	0.004
Pneumonia	0	2(1.8%)	0.486

S097

LAPAROSCOPIC ADHESIOLYSIS IN SMALL BOWEL OBSTRUCTION REDUCES 30-DAY COMPLICATIONS AND LENGTH OF STAY

Kristin N Kelly, MD (presenter), James C Iannuzzi, MD, Aaron S Rickles, MD, Veerabhadram Garimella, MD MRCS, John RT Monson, MD FRCS, Fergal J Fleming, MD FRCS, University of Rochester Surgical Health Outcomes & Research Enterprise, Department of Surgery

Introduction: Small bowel obstruction (SBO) requiring adhesiolysis is a frequent and costly problem in the United States accounting for approximately 118 hospitalizations per 100,000 patients in 2005 and expenditures exceeding 1.4 billion dollars[1]. There is limited high quality evidence available regarding the most effective and safest surgical management strategies. This study examines the differences in 30-day surgical outcomes between patients treated with laparoscopy for SBO and their counterparts undergoing open procedures.

Methods and Procedures: Patients with a discharge diagnosis of adhesive SBO (ICD-9 560.81) were selected from the ACS National Surgical Quality Improvement Program (NSQIP) database from 2005–2010. Cases were classified as either laparoscopic or open adhesiolysis groups, with or without small bowel resection using Common Procedural Terminology (CPT) codes. Chi-square and Student's T-test were used to compare patient and surgical characteristics with 30-day outcomes including: major complications, incisional complications, and mortality. Factors with a $p < 0.1$ were included in the multivariate logistic regression for each outcome. A propensity score analysis for probability of being a laparoscopic case was performed, but did not significantly affect results. A two sided p-value <0.05 was considered significant.

Results: Of the 9,619 SBO included in the analysis, 14.9% adhesiolysis procedures were performed laparoscopically. Patients undergoing laparoscopic procedures had shorter mean operative times (77.2 vs. 94.2 minutes, $p < 0.001$) and decreased post-operative length of stay (4.7 vs. 9.9 days, $p < 0.001$). After controlling for comorbidities and surgical factors, patients having open adhesiolysis were more likely to develop major complications (OR = 1.57, CI: 1.29–1.90, $p < 0.001$) and incisional complications (OR = 4.62, CI: 3.10–6.90, $p < 0.001$). The 30-day mortality was 4.7% in the open group versus 1.3% in the laparoscopic group (OR = 2.08, CI: 1.26–3.44, $p = 0.004$). In patients requiring small bowel resection in addition to adhesiolysis the laparoscopic rate fell to 4.3% of cases. There were more major complications (OR = 2.63, CI: 1.46–4.73, $p = 0.001$) and incisional complications (OR = 2.29, CI: 1.18–4.45, $p = 0.014$) in the resection group for open compared to laparoscopic procedures. Mean operative times in the resection plus adhesiolysis group did not significantly differ between open and laparoscopic cases (127.7 vs. 116 minutes, $p = 0.119$); however, post-operative length of stay remained significantly shorter in the laparoscopic cases (11.6 vs. 7.8 days, $p < 0.001$).

Conclusions: Laparoscopic adhesiolysis requires a specific skill set and experience and may not be appropriate in all patients. Notwithstanding this, the laparoscopic approach demonstrates a benefit in length of stay, mean operative time, and 30-day morbidity and mortality even after controlling for preoperative patient characteristics. Given these findings in over 9,000 cases and consistent rates of SBO requiring surgical intervention in the United States, increasing the use of laparoscopy could be a feasible way of improving patient outcomes and decreasing attendant costs.

(1) Sikirica et al. The inpatient burden of abdominal and gynecological adhesiolysis in the US. BMC Surgery 2011, 11:13.

S098

IMPACT OF OPERATIVE DURATION ON POSTOPERATIVE PULMONARY COMPLICATIONS IN LAPAROSCOPIC VS OPEN COLECTOMY

Rachel M Owen, MD (presenter), Sebastian D Perez, MSPH, S. Scott Davis, MD, Edward Lin, DO, Ankit D Patel, MD, Nathanial Lytle, MD, John F Sweeney, MD, Emory University Department of Surgery, Division of General and Gastrointestinal Surgery

Introduction: Prolonged operative duration is associated with increased postoperative morbidity and mortality. Although laparoscopic colectomy (LC) is commonly associated with longer operative duration when compared to open colectomy (OC), research shows paradoxically decreased morbidity following LC vs. OC. The direct impact of operative duration on postoperative pulmonary complications (PPC) following LC vs. OC has not been analyzed.

Methods: We queried the ACS/NSQIP 2009–2010 Public Use File for patients who underwent elective LC and OC. The associations between operative duration and a PPC (pneumonia, intubation >48 hours, and unplanned intubation) as well as 30-day mortality were evaluated. Multivariable regression models were created to determine the independent effect of operative time on the development of PPC while controlling for LC vs. OC.

Results: 25,419 colectomies (13,741 laparoscopic and 11,678 open) were reviewed. 765 (3.0%) patients experienced at least one PPC. Regression modeling demonstrated that for both LC and OC, each 60-minute increase in operative time up to 480 minutes was associated with 13% increased odds of PPC (OR 1.13; 95% CI 1.07–1.19). Beyond 480 minutes, each additional 60-minute interval was associated with 33% increased risk of PPC (OR 1.33; 95% CI 1.12–1.58). Overall, PPCs occurred half as often following an LC (270 [2.0%] laparoscopic vs. 497 [4.3%] open; OR 0.45, 95% CI 0.39–0.53).Figure 1

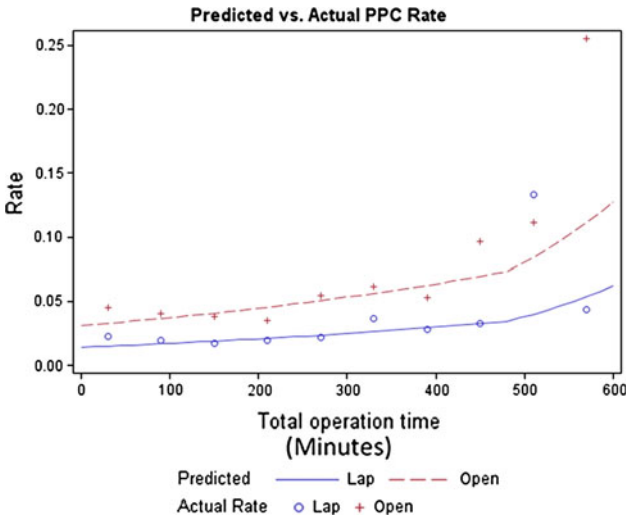


Fig. 1 Predicted and actual rate of postoperative pulmonary complication in lap vs. open colectomy

Conclusions: Operative duration is independently associated with increased risk of PPC in patients undergoing LC and OC. However, a laparoscopic approach carries half the absolute risk of PPC and, when safe, should be preferentially utilized despite a potential for prolonged operative duration.

S099

Laparoscopic common bile duct exploration versus intraoperative sphincterotomy for Management of Common Bile Duct Stones: A Prospective Randomized Trial

Ahmed A Elgeidie (presenter), Mohamed M Elshobary, Yussef E Naeem, Mohamed M Elhemaly, Gamal K Elebeidy, Gastroenterology Surgical Center, Mansoura University

Background: Laparoscopic cholecystectomy (LC) combined with intraoperative endoscopic sphincterotomy (IOES) was prospectively and randomly compared with laparoscopic common bile duct exploration (LCBDE) in an attempt to find the best single-session minimally invasive treatment for cholecystocholedocholithiasis.
Methods: Between March 2008 and April 2012, patients with gallstones (GS) and common bile duct (CBD) stones diagnosed by preoperative ultrasonography and magnetic resonance cholangiopancreatography (MRCP) were divided at random into LCBDE group and LC-IOES group. The surgical success rates, surgical times, postoperative complications, retained common bile duct stones, and postoperative lengths of stay were compared prospectively.
Results: Out of 365 patients with suspected CBD stones 274 patients fulfilled the inclusion criteria and were analyzed. They were randomized into LCBDE (n = 138) and LC-IOES (n = 136). There were no differences between the two groups in terms of surgical time, surgical success rate, and postoperative length of stay. Pancreatitis and bleeding sphincterotomy were significantly more in LC-IOES group, while bile leakage and retained CBD stones were significantly more in LCBDE group.
Conclusion: Both LC-IOES and LC-LCBDE were shown to be safe, effective, minimally invasive treatments for cholecystocholedocholithiasis but the former option may be preferred when facilities and experience for endoscopic therapy do exist.

S100

Glucose and Insulin Response to GTT: A prospective comparison between Roux En Y Gastric Bypass, Vertical Sleeve Gastrectomy and Duodenal Switch at 1 year

Mitchell S Roslin, MD FACS (presenter), Yuriy Dudiy, MD, Joanne Weiskopf, PA, Paresh C Shah, MD FACS, Lenox Hill Hospital, North Shore-LIJ Health System

Background: Long term glucose and insulin homeostasis after bariatric surgery is still poorly understood. Reactive hypoglycemia after Gastric Bypass has been characterized by our group and others as having a strong hyperinsulinemia component which may contribute to weight regain thru food seeking behaviors. This prospective, non randomized IRB approved study is designed to assess the impact of 3 common stapling procedures (RYGB, VSG, DS) on glucose and insulin as measured by liquid and solid Glucose Tolerance Testing at 6,9, and 12 months post operatively. 38 patients were enrolled.
Methods: All patients enrolled had a Oral Glucose Tolerance Test (OGTT) as well as fasting glucose, insulin, HbA1c, c Peptide levels pre-operatively and at 6, 9, and 12 months post-operatively. The 9 month testing was performed with a solid meal. Ratios of Glucose and Insulin at 1 h/2h and fasting/1 h were calculated. Statistical Analysis was performed with ANOVA and students paired T test.
Results: All groups were similar at baseline other than the DS group having a higher BMI. The results of GTT between liquid and solid challenges were not statistically different. All operations resulted in significant weight loss, reduction of fasting glucose, and improved insulin sensitivity. The rates of increase and the peak glucose and insulin levels after GTT were greatest in RYGB patients. The 1 h insulin level was higher than the pre-operative in this group. This was accompanied by a faster decline in glucose at 2 hrs. In comparison, the DS patients had a slower and lower total rise in glucose and insulin and the lowest HGBA1c levels ($p < 0.05$). The VSG patients had results that were in between RYGB and DS, but were significantly different from RYGB as well.
Conclusions: The RYGB has a significantly dysfunctional insulin response to OGTT and creates hypoglycemia as a result. The VSG and DS preserve a more physiologic insulin response to OGTT without the supra-normal peaks. The DS response is substantially better than the VSG as well, suggesting that pyloric preservation, is not the only factor contributing to improved glucose homeostasis.

		# of pts	BMI	Glucose, fasting	Glucose, 1 h	Glucose, 2 h	Insulin, fasting	Insulin, 1 h	Insulin, 2 h
RYGB	Preop	12	47.3 ± 10	105.5 ± 32	182.0 ± 82	160.2 ± 91	25.9 ± 23	76.7 ± 81	56.2 ± 82
	6 mo	12	36.8 ± 7	86.9 ± 14	165.3 ± 87†	88.9 ± 51	3.6 ± 1	76.25 ± 45†‡	15.7 ± 23
	9 mo	11	36.1 ± 8	84.7 ± 10	138.6 ± 64*†	87.2 ± 42	3.9 ± 2.4†	72.8 ± 74	11.4 ± 9.5†
	12 mo	9	30.8 ± 8	96.0 ± 27	165.5 ± 100	90.8 ± 68	8.7 ± 7.2°	136.9 ± 111*°	10.8 ± 6.8*
VSG	Preop	13	45.7 ± 8‖	98.2 ± 26	146.6 ± 61	127.5 ± 74	25.7 ± 26	59.9 ± 35	46.2 ± 48
	6 mo	13	35.3 ± 6	83.0 ± 10	131.2 ± 59	82.2 ± 50	11.8 ± 25	70.2 ± 48	32.9 ± 63
	9 mo	13	35.0 ± 10	81.9 ± 13	97.9 ± 32*	83.0 ± 27	11.0 ± 23	40.0 ± 44	24.8 ± 55
	12 mo	10	33.8 ± 5	85.8 ± 20	133.7 ± 62	82.7 ± 40	12.0 ± 26	56.9 ± 43.0*	40.2 ± 62*‡
DS	Preop	13	54.1 ± 9‖	97.2 ± 39	151.8 ± 74	125.8 ± 79	13.8 ± 9	77.2 ± 50	50.3 ± 31
	6 mo	13	38.2 ± 7	77.9 ± 18	102.9 ± 61†	80.8 ± 31	3.4 ± 1.6	36.6 ± 28†‡	15 ± 9
	9 mo	9	30.5 ± 14	79.8 ± 14	97.3 ± 27†	79.0 ± 21	3.2 ± 1.4†	29.0 ± 32	6.7 ± 3.4†
	12 mo	8	28.0 ± 7	83.0 ± 23	102.7 ± 42	68.7 ± 24	3.1 ± 1.1°	31.1 ± 15°	6.5 ± 5.2‡

* $p < 0.05$ RYGB versus VSG
† $p < 0.05$ RYGB versus DS
‡ $p < 0.05$ VSG versus DS
° $p < 0.01$ RYGB versus DS

S101

Laparoscopic Intra-peritoneal Mesh Repair combined with clean contaminated surgeries- Feasibility and safety.

C Palanivelu, MS FACS, P Praveen Raj, MS (presenter), P Senthilnathan, MS, R Parthasarathi, MS, M K Ganesh, GEM Hospital & Research Centre

Since the first report of laparoscopic ventral hernia repair in 1992, this procedure has gained popularity with benefits of shorter hospital stay, improved patient outcome and fewer complications than the traditional open procedures. Many at times patients will have multiple surgical problems and laparoscopy offers the ability to tackle these problems in the same sitting. In this novel paper we try to study the safety of combining laparoscopic intraperitonial mesh repair (IPOM) with clean contaminated surgeries like cholecystectomy and hysterectomy. We hereby report the technical details and immediate post-operative result of such procedures.
Material and methods
Between 2006 and 2011 we did 246 cases of laparoscopic IPOM in combination with clean contaminated surgeries. Out of that 126 were hysterectomies and 120 were cholecystectomies. The details of these surgeries and the immediate postoperative out comes were collected in retrospective as well as in a prospective manner and analysed.
Results
Indications for combined procedure were Hysterectomy for non-malignant causes and Cholecystectomy for symptomatic stones with non- inflamed gall bladder associated with Incision hernia. The commonest surgery associated with incisional hernia was Caesarean section. Mean operating time for laparoscopic IPOM with cholecystectomy was 136 minutes (112–172 minutes) and 224 minutes (196–285 minutes) for laparoscopic IPOM with hysterectomy. The average hospital stay were 4.3 days (3–7 days) for laparoscopic IPOM with hysterectomy and 2.73 days (range: 1– 5 days) for laparoscopic IPOM with cholecystectomy. We had 36 cases (14.6 %) of seroma, for which 16 patients (6.5%) warranted aspiration. We had a single mesh infection. The complication rates were comparable to our results of Intra-peritoneal mesh repair when performed alone.
CONCLUSION
Laparoscopic intra peritoneal onlay mesh can be performed simultaneously with selected clean contaminated surgeries with acceptable morbidity. The infective complications of combined procedures are not different from IPOM performed alone. Combining certain selected clean contaminated surgeries does not alter the outcome of the procedure.

S102

REVISIONAL SURGERY AFTER FAILED ADJUSTABLE GASTRIC BANDING: INSTITUTIONAL EXPERIENCE WITH 90 CONSECUTIVE CASES

Keng-Hao Liu, MD (presenter), Michele Diana, MD, Michel Vix, MD, Hurng-Sheng Wu, MD, Jacques Marescaux, MD FACS HonFRCS HonFJSES, 1- Chang Gung Memorial Hosp at Linkou, Chang Gung University, Taoyuan, Taiwan 2- IRCAD-IHU, Department of General, Digestive and Endocrine Surgery, University Hospital of Strabourg, France 3- IRCAD-AITS, Show Chwan Health Care System, Changhua, Taiwan

Introduction: Revisional surgery may be required in a high percentage of patients (up to 30%) after Adjustable Gastric Banding (AGB). There is currently no consensus on the most adapted timing and the bariatric procedure to perform after failed AGB. Our aim is to evaluate the results of revisional surgery with respect to age, gender, revisional procedure and timing.
Methods and Procedures: Data originated from our prospectively collected bariatric surgery database and analyzed retrospectively. From January 1996 to November 2011, a total of 243 AGB were placed at our Institute. Within the same period, 130 AGB (53.5%) were removed and 90 patients (37.7% of the total) underwent further revisional surgery. RYGB was performed when gastroesophageal reflux disease, post-AGB esophageal motility disturbance, hiatal hernia, or diabetes were present. Sleeve Gastrectomy (SG) was proposed if not contraindicated. One-stage revisional surgery consisted in removing the AGB and performing the bariatric procedure simultaneously. Two-stage surgery consisted in removing ABG and performing revisional surgery 3–6 months later.
Results: In two cases, revisional surgery by laparoscopy was aborted due to the impossibility to approach safely the upper stomach for severe adhesions. Eighty-eight patients (74 females; mean age 42.79 ± 10.03 years; mean body weight 123.22 ± 23.09 kg; mean BMI 44.73 ± 6.19Kg/m^2) successfully underwent revisional SG (n = 48) or RYGB (n = 40). One-stage surgery was performed in 29 cases and two-stage surgery in 59 cases. The follow up rate was 78.2% (n = 61) and 40.9% (n = 36) at 12 and 24 months respectively. One major complication after SG (staple-line leakage), was managed surgically. Mortality was nil. During follow-up, 10 additional complications were observed, including 6 port-site hernias, 2 unexplained cases of abdominal pain and vomiting with negative imaging and laparoscopic exploration, 1 internal herniation managed by laparoscopic repair, and 1 gastro-jejunostomy stricture managed through endoscopic dilatations. Overall postoperative Excess Weight Loss (%EWL) was 31.24%, 40.92%, 52.41%, and 51.68% at 3, 6, 12, and 24 months of follow-up respectively. EWL at 1-year was independent of 1) the revisional procedure (49.84% after SG vs. 56.49% after RYGB p = 0.18); 2) the reasons for AGB removal (52.82% after failure to lose weight vs. 51.03% if removed for complications; p = 0.52); 3) the timing of revision (51.04% one-stage vs.54.11% two-stage p = 0.43); 4) initial BMI (42.64% in patients with BMI≥ 50 kg/m^2 vs.55.27% in patients with BMI <50 kg/m^2 p = 0.05). There was a statistically significantly higher %EWL in patients <50 years old (55.90% vs. 41.50% in patients >50 years-old; p = 0.01), in patients of female gender (55.22% vs. 40.73% in male; p = 0.04), and in patients in which the AGB was in place for less than 5 years (57.09% vs. 47.43% if > 5 years, p = 0.02).
Conclusions: Revisional surgery is safe and feasible in patients who failed to lose weight or who underwent AGB-related complications. Selected patients aged less than 50, of female gender, and with the AGB in place for less than 5 years had better %EWL after revisional surgery. No differences were found regarding timing or type of surgery.

S103

FUNDAMENTALS OF ENDOSCOPIC SURGERY: CREATION AND VALIDATION OF THE HANDS-ON TEST

M C Vassiliou, MD MEd (presenter), P Kaneva, MSc, B J Dunkin, MD, G M Fried, MD, J D Mellinger, MD, T Trus, MD, K I Hoffman, PhD, C Lyons, MD, J R Korndorffer, MD, M Ujiki, MD, V Velanovich, MD, G Korus, MD, D J Scott, MD, J Martinez, MD, S Tsuda, MD, J S, McGill, Methodist, Southern Illinois, Dartmouth, USC, Tulane, NorthShore, South Florida, U Penn, UTSW, U Miami, U Nevada, U Maryland, Case Western

INTRODUCTION

The Fundamentals of Endoscopic Surgery (FES) program consists of online educational materials and both didactic and skills based tests. All components must be shown to measure the skills and knowledge required to perform safe flexible endoscopy. The purpose of this multicenter study, performed by the FES task force, was to evaluate the reliability and validity of the hands-on component of the FES examination.

METHODS

Expert educators and endoscopists identified the critical skill set required for flexible endoscopy by deconstructing the procedural components of upper and lower endoscopy. The skills were then modeled in a virtual reality simulator (GI MentorII, Simbionix Ltd., Israel) and metrics were created. Several pilot studies and iterations were needed in order to refine the skills and metrics. Scores were designed to measure both speed and precision. Validity was assessed by correlating performance with self-reported endoscopic experience (surgeons and gastroenterologists (GI)). Internal consistency of each test task was assessed using Cronbach's alpha. Test-retest reliability was determined by having the same participant perform the test a second time and comparing their scores. Passing scores were determined by a contrasting group methodology and use of receiver operating characteristic curves.

RESULTS

The 5 simulated tasks include: scope navigation, loop reduction, retroflexion, mucosal evaluation and targeting. 158 participants (16% GI) performed the simulator test. Scores on the 5 tasks showed sufficient internal consistency reliability and all had significant correlations with the participants' level of endoscopic experience as measured by self-reported number of cases performed. A composite score was obtained by averaging the five task scores. The composite scores correlated .72 with participants' level of endoscopic experience providing evidence of their validity and their internal consistency reliability (Cronbach's alpha) was .82. Test-retest reliability was assessed in 7 participants, and the ICC was .96 (CI .74; .99). The passing score for the minimally qualified candidate was determined and is estimated to have a sensitivity (True positive rate) of .81 and a 1-specificity (False positive rate) of .21 given the pilot sample.

CONCLUSIONS

The FES hands-on skills test examines the basic procedural components required to perform safe flexible endoscopy. It meets rigorous standards of reliability and validity required for high stakes examinations, and, together with the knowledge component, may help contribute to the definition and determination of competence in endoscopy.

S104

Trans-Vaginal Organ Extraction: Potential For Broad Clinical Application

Juan S Barajas-Gamboa, MD (presenter), Alisa M Coker, MD, Joslin Cheverie, MD, C. Aitor Macias, MD MPH, Bryan J Sandler, MD FACS, Garth R Jacobsen, MD FACS, Mark A Talamini, MD FACS, Santiago Horgan, MD FACS, UCSD Center for the Future of Surgery

Introduction

Natural Orifice Transluminal Endoscopic Surgery (NOTES) procedures evolved over the past few years. A trans-vaginal approach is a promising alternative for intraperitoneal procedures. Our objective was to evaluate the safety and feasability of trans-vaginal organ extraction.

Methods and Procedures

This IRB-approved protocol involved retrospective review of an on-going prospective study. Female subjects who presented to our hospital for elective cholecystectomy, appendectomy, or sleeve gastrectomy were offered participation in the study. Eligible patients met the following criteria: ages between 18 and 75, diagnosis of gallbladder disease, acute appendicitis, or morbid obesity who desired surgical treatment. A hybrid natural orifice approach was used in this series. This involved a conventional laparoscopic surgical approach to the disease, followed by trans-vaginal organ extraction at the completion of the procedure. Vaginal access was performed under direct laparoscopic visualization. After dilating the cervix and placing a uterine mobilizer, a 15-mm trocar was placed in the posterior cul-de-sac of the vagina under direct view. An endoscope was then placed through the vaginal trocar with an endoscopic snare for organ extraction. At the conclusion of the case, a single figure-of-eight absorbable stitch was used to close the defect.

Results

Thirty-four women underwent trans-vaginal organ extraction between March 2008 and January 2012. The mean age was 40 years (±12.1) (range 23–63). The mean body mass index (BMI) was 27 (±6.4) (range 16–43). All patients had an ASA classification of 2 or below. The mean operative time for cholecystectomy, appendectomy, and sleeve gastrectomy was 90, 71, and 135 minutes respectively. There were no conversions to open operation and no intra-operative complications. The mean hospital stay was 2 days for all cases. Patients were followed for a mean of 24 months (range 1 - 61). There were 2 pregnancies and 2 successful vaginal deliveries. Six patients (18%) had minor complaints of spotting or heavy menses in the immediate post-operative period that resolved with conservative measures. There were no abdominal wall complications. There were no long-term complications and no mortalities.

Conclusions

This initial experience suggests that this surgical approach is safe, does not increase length of stay, and has no long-term vaginal complications. Given this attractive profile, a trans-vaginal approach may prove to be a superior mode of organ extraction, although randomized studies and long-term follow-up are needed.

S105

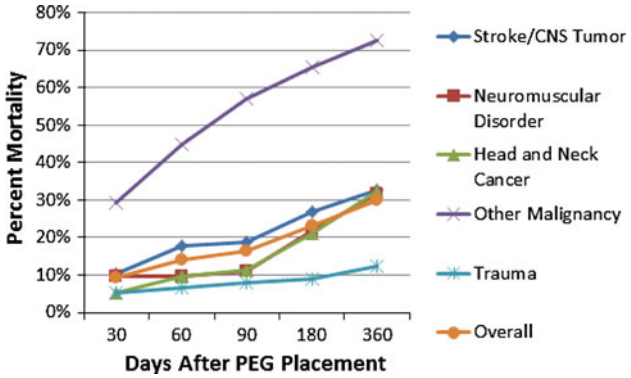
Disease-Based Mortality After Percutaneous Endoscopic Gastrostomy: Utility of The Enterprise Data Warehouse

Benjamin K Poulose, MD MPH (presenter), Joan Kaiser, RN MS, William C Beck, MD, Pearlie Jackson, PhD, William H Nealon, MD, Kenneth W Sharp, MD, Michael D Holzman, MD MPH, Vanderbilt University Medical Center

Percutaneous Endoscopic Gastrostomy (PEG) remains a mainstay of enteral access. Thirty day mortality for PEG has ranged from 16–43%. This study aims to discern patient groups that demonstrate limited survival after PEG placement. The Enterprise Data Warehouse (EDW) concept allows an efficient means of integrating administrative, clinical, and quality of life data. Based on this concept, we developed the Vanderbilt Procedural Outcomes Database (VPOD) and analyzed these data for evaluation of post-PEG mortality over time.

Methods: Patients were identified using the VPOD from 2008–2010 and followed for one year post-procedure. Patients were categorized according to common clinical groups for PEG placement: stroke or CNS tumor, progressive neuromuscular disorder, head and neck cancer, other malignancy, or trauma. All-cause mortality at 30, 60, 90, 180, and 360 days was determined by linking VPOD information with the Social Security Death Index. Chi-square analysis was used to determine significance across groups.

Results: Nine hundred fifty-three patients underwent PEG placement during the study period.



$p < 0.05$ between all groups at each time point

Mortality over time was greatest for patients with malignancies other than head and neck cancer and least for trauma patients. Patients with neuromuscular disorders had a similar mortality curve as head and neck cancer patients.

Conclusion: PEG mortality was much higher in patients with malignancies other than head and neck cancer compared to previously published rates. PEG should be employed with great caution in these and other high risk patient groups. This study demonstrates the power of an EDW based database to evaluate large numbers of patients with clinically meaningful results.

S106

PRELIMINARY DATA ON ANTI-SCARRING AGENTS IN THE PREVENTION OF POST ESOPHAGEAL ENDOSCOPIC SUBMUCOSAL DISSECTION (EESD)

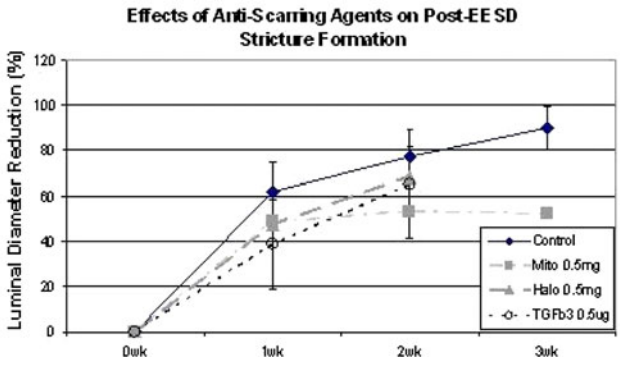
Yuhsin V Wu, MD (presenter), Eric M Pauli, MD, Steve J Schomisch, PhD, Cassandra N Cipriano, Amitabh Chak, MD, Jeffrey L Ponsky, MD, Jeffrey M Marks, MD, University Hospitals Case Medical Center

Introduction: Esophageal endoscopic submucosal dissection (EESD) is an effective minimally invasive therapy for early esophageal cancer and high grade Barrett's dysplasia. However, severe esophageal stricture formation following circumferential or large EESDs has limited its wide adoption. Mitomycin C (DNA crosslinker), Halofuginone (an inhibitor of type I collagen synthesis), and Transforming Growth Factor β3 (TGFβ3) (naturally found in healing wounds) exhibit anti-scarring effects which may be of benefit in preventing stricture formation after EESD.

Methods: An endoscopic band ligator and snare were used for the initial mucosa incision in a porcine model. An 8–10 cm circumferential mucosal segment was then excised using standard ESD techniques. The exposed muscularis was either left without intervention (Control n = 5) or received 4 quadrant, 1 cm interval injections of anti-scarring drug immediately and followed by weekly injections for up to three weeks. Three drugs were used in both high and low doses: Mitomycin C 5 mg (n = 2), 0.5 mg (n = 2); Halofuginone 1.5 mg (n = 2), 0.5 mg (n = 2); TGFβ3 2ug (n = 2), 0.5ug (n = 2). The degree of esophageal stricture formation was assessed endoscopically and with a barium swallow on a weekly basis. Animals were followed clinically and euthanized when stricture formation prevented further therapy.

Results: The control group had a mean luminal diameter reduction of 77.7 ± 12.1% by two weeks and was euthanized by 3 weeks. Compared at two weeks, the halofuginone group showed decreased stricture formation with a luminal diameter reduction of 68.4 ± 13.3% (low dose) and 57.7 ± 38.3% (high dose). The TGFβ3-low dose group luminal diameter reduction was 65.3 ± 2.0% compared to TGFβ3-high dose group of 76.2%. The second animal in the TGFβ3-high dose group was euthanized after one week with a stricture of 64.1%, preventing further therapy. Mitomycin C was the most effective in stricture prevention with luminal diameter reduction of 53.6 ± 11.8% (low dose) and 35 ± 10.2% (high dose). Of concern, gross inspection of the mitomycin C treated esophageal wall appeared to be necrotic and lead to perforation after three weeks in one animal. In contrast, the resected area of TGF-β3 and halofuginone animals appeared re-epithelialized and healthy. Final histology of the tissues is pending.

Conclusion: From our primary data with a small number of animals, anti-scarring drugs such as mitomycin C, halofuginone, and TGFβ3 show promise in reducing post-EESD stricture formation. Repeat experiments and further investigations on optimal dose and delivery systems need to be studied to prevent complications and determine overall efficacy of anti-scarring therapy.



S107

RATIONALE FOR THE FUNDAMENTAL USE OF SURGICAL ENERGYÂ™ (FUSE) EDUCATIONAL PROGRAM

Liane S Feldman, MD (presenter), Pascal Fuchshuber, MD PhD, Daniel B Jones, MD, Jessica Mischna, BA, Malcolm G Munro, MD, Steven Schwaitzberg, MD, Fuse Task Force, McGill University, The Permanente Medical Group,Harvard Medical School, SAGES, UCLA, Cambridge Health Alliance

Introduction: Energy devices are ubiquitous in modern operating rooms. The combination of electrical current, heat generation, the wide variety of devices and the complex environments in which they are used can result in complications such as fire or iatrogenic thermal injuries. There is no standard curriculum or assessment for energy-based devices most surgeons are not adequately trained to prevent these problems. The Fundamental Use of Surgical Energy™ (FUSE) program will include a curriculum and certification examination to address this safety issue. The aim of this study was determine the self-perceived knowledge level of practicing surgeons related to energy devices and safe practices and identify areas to emphasize for the assessment component of the program.

Methods: In the context of developing a valid assessment tool, psychometricians led 15 content experts in a systematic process to define the knowledge and skills (competencies) required to use energy devices safely. These were categorized into 10 sections, each including 2 to 20 objectives (total 63). A survey was sent to 102 SAGES leader (Board, FUSE task force, Quality, Outcomes and Safety Committee) and selected members of the AORN and AAGL. Participants were asked to weight the relative importance of the 10 sections. In addition, they rated each objective for frequency, relevance and importance on a seven-point scale. These ratings were averaged to yield a single number from 1 to 7 for each objective. The survey also included five demographic and self-assessment questions.

Results: 50 people responded to the survey. Only 28% considered themselves "expert" in their knowledge of energy-based devices, while 60% were "somewhat knowledgeable". 84% had used an energy-based device in addition to electrosurgery in the preceding three months. The most common source of knowledge for these practitioners was "industry sales representative or course" (42%). The highest-rated objectives (>6 out of 7) for the FUSE program included "Identify various mechanisms whereby electrosurgical injuries may occur", "Identify general patient protection measures for setup and settings for the electrosurgical unit" and "Identify circumstances, mechanisms, and prevention of dispersive electrodes-related injury". The highest weighted section was "Prevention of Adverse Events with Electrosurgery", followed by "Fundamentals of Electrosurgery" and "Integration of Energy Systems with Other Medical Devices".

Conclusion: Although basic and advanced energy-based devices are commonly used, training has come through industry representatives or industry-sponsored courses and few surgeons consider themselves experts. Competencies that emphasize electrosurgical safety and the integration of energy systems with other devices were viewed as most important for the FUSE assessment.

S108

The feasibility of remote proctoring for the Fundamentals of Laparoscopic Surgery (FLS) Skills Test

Allan Okrainec, MD (presenter), Melina Vassiliou, MD, Andrew Kapoor, MSc, Kristen B Pitzul, MSc, Oscar Henao, MD, Pepa Kaneva, MSc, Timothy Jackson, MD, E. Matthew Ritter, MD, Toronto Western Hospital Â– University Health Network, Temerty/Chang Telesimulation Centre, Toronto, Ontario; McGill University Health Centre, Montreal, Quebec; Uniformed Services University, Bethesda, Maryland

INTRODUCTION: Fundamentals of Laparoscopic Surgery (FLS) certification currently requires that tests be administered at accredited test centers. Establishing and maintaining these test centers requires substantial investment of human and financial resources. In addition, test-takers may need to travel, which has both time and financial impacts. Previous studies have demonstrated that it may be possible to reliably score the FLS manual skills remotely using inexpensive web-based technologies such as videoconferencing. However, there have been no investigations examining the feasibility of administering and scoring the FLS exam remotely without the presence of an official onsite proctor. The objective of this study was to the assess the feasibility of remotely administering and scoring the FLS examination using live videoconferencing in comparison to standard onsite testing.

METHODS: Twenty participants of varying skill levels were tested at 2 accredited FLS testing centers - the University Health Network in Toronto and McGill University Health Centre in Montreal. Videoconferencing was set up at both sites using a telesimulation platform. An official FLS proctor administered and scored the FLS exam remotely while another on-site proctor scored the participants live. The remote proctor could monitor both the participants themselves in addition to an inside view of the FLS box using two videoconferencing connections. Onsite proctors were instructed only to intervene if necessary, and only if the remote proctor was not administering the exam as per protocol. The entire testing session was recorded at both institutions. Inter-rater reliability was compared using Intra class correlation coefficients (ICC) and modified grounded theory was used to identify themes for barriers to feasibility.

RESULTS: Mean total FLS score (+SD) for onsite proctors was 63.5 (22.76), and for remote proctors was 57.8 (25.23). There was a strong significant correlation between onsite and remote raters (ICC=0.995; $p < 0.0001$). Similar correlations were observed for all five FLS tasks. Barriers to remote FLS test proctoring were classified into 3 distinct time points: (1) pre-task, (2) intra-task, and (3) post-task. Several challenges emerged during the FLS testing: (1) incorrect instrumentation and task setup (2) failure of internet connection, adjustment of camera view (3) failure to correctly present materials for scoring, and security of materials for scoring.

CONCLUSIONS: This study demonstrates that web-based remote proctoring of the FLS skills test is feasible with minor alterations to examination setup. Remote proctoring did not affect evaluation in comparison to onsite testing, although several barriers were identified. Further investigations are needed to determine solutions to these barriers, and whether they will impact the reliability and validity of the test. This study provides evidence for a potential alternative to address the high cost and human resource investment currently needed to administer FLS tests worldwide.

S109

A PROFICIENCY BASED SKILLS TRAINING CURRICULUM FOR THE SAGES STEP (SURGICAL TRAINING FOR ENDOSCOPIC PROFICIENCY) PROGRAM

Victor T Wilcox, MD (presenter), Ted Trus, MD, Jose M Martinez, MD, Brian J Dunkin, MD, The Methodist Hospital, Dartmouth-Hitchcock, the University of Miami

INTRODUCTION The STEP program is a collaborative project between SAGES and Olympus America Inc. dedicated to providing flexible endoscopy equipment and a curriculum for training to all surgical residency programs in the US. Currently, the STEP curriculum does not include proficiency based training on physical models that can be used with the equipment. This study developed two novel flexible endoscopy simulators, purchased a third, and then established face and content validity as well as proficiency metrics for training on all three using the STEP endoscopic equipment.

METHODS Three flexible endoscopy simulators were tested. The first was an upper gastrointestinal (UGI) tract model made from foam and cardboard that requires navigation and target identification using a gastroscope. The second was a commercially available colonoscopy model (CM-15, Olympus, Japan) configured with a redundant sigmoid colon. The third was an endoscopic targeting model (as required in biopsy and polypectomy) created from pool vacuum hose and the Operation Game (Hasbro, USA). Performance metrics with time and accuracy measures were developed for the models and the performance of twelve expert surgical endoscopists recorded for each. Proficiency scores were calculated by discarding the best and worst performance times and then calculating a mean expert proficiency time. Face and content validity were established through post test questionnaires using a 5-point Likert scale with strong descriptors.

RESULTS All experts were right handed males, average age 40, with a mean of 8 years of endoscopic practice (range 1–24). Eighty three percent teach residents or fellows and use simulation to do so. Most perform over 50 upper endoscopies (51 to > 500) and 100 colonoscopies (101 to > 500) per year. The average time for complete navigation of the UGI model with correct identification of all targets was 133 ± 52 seconds. Complete navigation of the colonoscopy model with correct loop reduction averaged 285 ± 97 seconds. Proper orientation and successful targeting using the Operation Game model averaged 250 ± 94 seconds with 3 errors. The Operation Game simulator had the strongest face and content validity results (100% agreed or strongly agreed that the technical skills required reflected those needed in clinical endoscopy and that the task encompassed skills sets an experienced endoscopist should have) followed by the colonoscopy model (82% respectively) and the UGI model (64% and 73% respectively). The Operation Game simulator was also the most favorably reviewed in regard to appropriate difficulty (100% agreed), usefulness for training (100% agreed), and suitability for initial training in flexible endoscopy (82% agreed). The estimated cost of the UGI model is less than $5; colonoscopy model ~ $1,800; and Operation Game model ~ $50.

CONCLUSION This study proves face and content validity for three physical flexible GI endoscopy simulators that can be used to train in upper and lower endoscopy as well as instrument targeting. It also establishes expert proficiency metrics that can be used by trainees for structured rehearsal. These relatively inexpensive models will be incorporated into the STEP curriculum.

S110

Simulation-Based Training Improves Operative Performance of Totally Extraperitoneal (TEP) Laparoscopic Inguinal Hernia Repair - A Randomized Controlled Trial

Yo Kurashima, MD PhD (presenter), Liane S Feldman, MD, Pepa A Kaneva, MSc, Gerald M Fried, MD, Simon Bergman, MD, Sebastian V Demyttenaere, MD, Melina C Vassiliou, MD MEd, McGill University

INTRODUCTION

Laparoscopic inguinal hernia repair (LIHR) is associated with reduced post-operative pain and earlier return to normal activities compared to open repair, however, the procedure is difficult to learn. The purpose of this randomized controlled trial was to measure the impact of a novel LIHR curriculum incorporating the McGill Laparoscopic Inguinal Hernia Simulator (MLIHS) by comparing operative performance of residents trained with this new curriculum to those with traditional training.

METHODS

17 surgical residents (PGY 2–5) participated in a half-day didactic LIHR course, and were then randomized to the simulation-based proficiency curriculum (Training, T) or standard residency training (Control, C). We used MLIHS for the LIHR simulation training. The simulator and its metrics were previously validated for assessment. Simulator and operative performances were evaluated in both groups at baseline and after the study period during totally extraperitoneal (TEP) repair, using the validated Global Operative Assessment of Laparoscopic Skills–Groin Hernia (GOALS-GH, maximum score=25). Simulator practice was partly proctored and additional assistance was available upon request. Training was complete when an expert-level GOALS-GH score of 24 was reached in the simulator. OR evaluators were blinded to the training status of participants. GOALS-GH scores were compared between T and C groups using t-test. Results reported as mean (95% CI) or median [IQR]. P <0.05 was considered significant.

RESULTS

Of the 17 participants who were randomized, 14 completed their final evaluations (5 T: PGY 3 and 9 C: PGY 2–5). There were no differences in LIHR numbers as primary operator between T group 1 [0;3] and C group 1 [1;5] (P = 0.84) or baseline GOALS-GH scores (T 14.8 (12.8–16.8) and C 13.6 (12.3–14.8), P = 0.20). The mean number of training sessions to achieve proficiency was 4.8 (95% CI 4.4–5.2) and mean time of total training was 109 min (95% CI 61.9–149.1). T group participants reported high educational efficiency and value of TEP simulation-based proficiency curriculum (mean 4.4 on scale of 1–5). After training, OR performance improved in the T group by +3.4 (2.0 - 4.8) points (P = 0.002), whereas no significant change was seen in the C group by +1.2 (−1.1 - 3.6), (P = 0.27). Final GOALS-GH scores were higher in the T group compared to the C group (18.2 (14.9 - 21.5) vs. 14.8 (12.4 - 17.1), P = 0.06).

CONCLUSION

This study demonstrates the transfer of skills acquired using a low-cost procedure-specific simulator to the OR. Residents who trained to proficiency on the MLIHS performed better in the operating room compared to those who had not. These results provide evidence to support the use of simulation to teach LIHR.

S111

Simulated Colonoscopy Objective Performance Evaluation (S.C.O.P.E.): A non-computer based tool for assessment of endoscopic skills

Tiffany C Cox, MD, Kristen Trinca, MD, Jonathan P Pearl, MD, E. Matthew Ritter, MD (presenter), Norman M. Rich Department of Surgery, Uniformed Services University / Walter Reed National Military Medical Center, Bethesda Maryland. Department of Surgery, University of Maryland, Baltimore MD

Introduction: Virtual reality(VR) simulators have dominated the assessment of endoscopic skills. While VR simulators have significant benefits, they are frequently limited by high startup and maintenance costs, suboptimal durability with heavy use, and difficulty creating the "real feel" of GI endoscopy. These limitations led us to develop our physical model for endoscopic skills assessment, similar to models seen in other aspects of surgical skills assessment and training. The Simulated Colonoscopy Objective Performance Evaluation (S.C.O.P.E.) was developed to fill the need of a lower cost, non-VR based, valid assessment tool. The purpose of this study was to evaluate the ability of this new tool to objectively assess endoscopic skills.

Methods: Four tasks were created to evaluate the core skills for diagnostic endoscopy using the Kyoto Kagaku colonoscopy model (Kyoto Kagaku Co Ltd, Japan) as a base platform. The four tasks include: Scope Manipulation requiring use of torque and tip deflection to align a shape in the colon with a matching shape on the monitor screen. Tool Targeting requires coordination with biopsy forceps to contact a metal target. Loop Management requires prevention, recognition and reduction of a redundant sigmoid colon with navigation to the cecum. Mucosal Inspection requires identification of simulated polyps placed randomly throughout a length of simulated colon and rectum, including retroflexion. Key performance metrics were identified and a scoring system developed based on these parameters. Scores for each task were normalized to allow equal weighting for all four tasks. Thirty-five subjects were recruited for this prospective study and stratified into 3 cohorts based on colonoscopy experience: novice (0–50 colonoscopies)(n = 11), intermediate (51–139)(n = 13), and experts (>140)(n = 11). Subjects performed 2 trials of all 4 of the above tasks. Mean normalized scores were compared between groups for both the individual tasks and the total S.C.O.P.E. score by one way ANOVA. Test-retest reliability was determined using intraclass correlation coefficient.

Results: Across all four tasks, experts (E) consistently outperformed intermediates (I), who, in turn, outperformed novices (N). These differences were statistically significant for all tasks. Mean normalized scores with 95% confidence intervals for each group on each task are as follows: Scope Manipulation [N-54 (26–82), I-90 (77–104), E-106 (93–118), p = 0.0007], Tool Targeting [N-40 (24–55), I-79 (65–93), E-88 (72–105), p < 0.0001], Loop Management [N-51 (24–79), I-78 (57–99), E- 101(98–105), p = 0.003], Mucosal Inspection [N-73 (53–92), I-87 (77–96), E-100 (91–108), p = 0.013], and Total S.C.O.P.E. Score [N-218 (155–280), I-334 (296-372), E-395 (371–419), p < 0.0001]. Initial Test - retest reliability for the expert Total S.C.O.P.E. score was respectable at 0.6.

Conclusions: A non-virtual reality, simulation based assessment tool has been created to evaluate the skills required to perform diagnostic endoscopy. Validity evidence shows that scores on these tasks can differentiate between groups expected to have different levels of technical skill. This model shows promise as a low technology tool for objective assessment or training of endoscopic skills. While larger scale validity evidence is needed, the S.C.O.P.E. model shows promise for potential incorporation into programs requiring objective assessment of endoscopic skills, like the Fundamentals of Endoscopic Surgery.

S112

Laparoscopic vs. Open Elective Repair of Primary Umbilical Hernias: A Review of the ACS NSQIP Database

S Cassie, MD FRCSC (presenter), A Okrainec, MDCM MHPE FACS FRCSC, F Saleh, MD FRCSC, F A Quereshy, MD MBA FRCSC, T D Jackson, MD MPH FRCSC, Department of Surgery, University of Toronto, Toronto, ON, Canada

Introduction

Over 150,000 umbilical hernia repairs are completed in the United States annually. While the laparoscopic approach has been widely embraced for a variety of hernia repairs, there remains controversy regarding the optimal approach for the repair of primary umbilical hernias. The objective of this study was to compare 30-day outcomes of elective primary open (OHR) and laparoscopic (LHR) umbilical hernia repairs, using a prospectively collected data set.

Methods

We performed a retrospective cohort study using the American College of Surgeons National Surgery Quality Improvement Program (ACS NSQIP) Participant Use Files during 2009 and 2010. Patients greater than 16 years old undergoing repair of primary umbilical hernias were included for analysis. Both CPT codes and post-operative ICD-9 diagnostic codes were used to identify patients to include in this study. Primary outcomes included composite endpoints of 30-day overall complications, 30-day major complications, and 30-day mortality for the LHR and OHR groups. Both univariate analyses and multivariate logistic regression were performed controlling for relevant patient characteristics. Secondary outcomes included a comparison of mean operative time and mean hospital length of stay.

Results

A total of 14,885 patients were identified, 13,326 (89.5%) in the open group and 1559 (10.5%) in the laparoscopic group. At baseline, the LHR group had a significantly higher mean BMI, male predominance, and a higher ASA class. Univariate analyses of our primary outcomes demonstrated similar 30-day morbidity and mortality between the two groups. In our multivariate model, however, after controlling for BMI, gender, ASA, COPD, and type of anaesthetic, the odds ratio (OR) for overall complications favored the laparoscopic group (OR 0.59, p = 0.01). This difference was driven primarily by the lower rate of wound complications in the LHR group (OR 0.41, p = 0.01). The multivariate model for major complications did not reveal a significant difference between the two groups (OR 1.01, p = 0.95). There were too few events to perform multivariate analysis on 30-day mortality. The secondary outcome of mean operative time was significantly higher for the LHR group (57.5 min, SD 32.5) compared to the OHR (38.4 min, SD 23.0) group (p < 0.001). The mean length of stay was significantly longer after a laparoscopic repair compared to open repair (0.29 days, SD 0.68 vs. 0.17 days, SD 1.49), p = 0.002.

Conclusions

This study identifies potential decreased morbidity associated with the laparoscopic approach for elective primary umbilical hernia repairs. However, LHR was found to have an increase in mean operative time and length of stay. These results should be considered within the context of a retrospective study with its inherent associated risks of bias and limitations.

S113

THE GLOBALIZATION OF LAPAROSCOPIC SURGERY: TRANSLATING LAPAROSCOPIC SURGICAL PRACTICE INTO RESOURCE-RESTRICTED CONTEXTS

Ian Choy, BEng MEd MD (presenter), Simon Kitto, DipEd PhD, Adu-Aryee Nii, MD MHPE, Allan Okrainec, MD MHPE, Div. General Surgery, The Wilson Centre, Temerity/Chang Telesimulation Centre, Toronto Western Hospital, University Health Network; University of Toronto; Korle-Bu Teaching Hospital, University of Ghana;

INTRODUCTION
The adoption of laparoscopic surgery in Africa has been sporadic and minimal. While the most commonly cited explanation for this has been an apparent lack of resources and training, recent studies and numerous training courses have demonstrated that these constraints may not be as significant as previously denoted in the literature. Moreover, there has been a growing interest amongst the surgical community, and more specifically surgical societies and academic institutions, to develop laparoscopic programs in resource restricted contexts. The overall objective of this study was to explore and analyze the potential barriers to the adoption of laparoscopic surgery in a resource restricted hospital, with a view to inform future development of laparoscopic surgical training programs in these contexts. More specifically, this study aimed to: 1) Identify the key actors and institutional processes in the hospital environment that affect the adoption of laparoscopic surgery, 2) identify surgical and institutional attitudes towards laparoscopic surgical practice, and 3) explore how these actors and processes affect the adoption of laparoscopic surgery.
METHODS AND PROCEDURES
This qualitative study employed a case study design to frame the investigation of facilitators and barriers to the adoption of laparoscopic surgery in a tertiary hospital in Sub-Saharan Africa. The hospital had purchased laparoscopic equipment 4 years prior to this study, and a number of surgeons at this hospital had undergone FLS training 2 years afterwards. The exploratory case study employed a combination of over 600 hours of participant observation, 13 semi-structured interviews and a discourse analysis of relevant documents over three months. During this time, a remote telesimulation FLS course was conducted on campus and this was also observed. A thematic analysis was conducted iteratively throughout the data collection period. In addition, data triangulation enhanced the rigour and depth of the analysis. The study findings were further explored and connected to current literature about knowledge translation and laparoscopic surgical training programs.
RESULTS
The study findings indicated that aside from resource constraints and training limitations, there were several other significant contextual barriers to the adoption of laparoscopic surgery. More specifically, cultural, social and institutional barriers directly influenced the partial uptake of laparoscopic surgery. Additionally, the opinions, attitudes and incentives of local surgeons towards laparoscopic surgery often varied significantly from those of their Western colleagues. Consequently, this led to constant negotiation concerning global pressures and local needs, which influenced training sessions and clinical practice.
CONCLUSIONS
This exploratory case-study approach to examining the barriers to the adoption of laparoscopic surgery in a resource restricted context exemplifies a novel approach to addressing issues that have plagued surgeons across low to middle income countries for many years. An understanding of such barriers is an essential step in translating new knowledge into tangible practice changes and clinical outcomes. This study can inform the development of future laparoscopic training curricula and the implementation of training programs in resource-restricted countries.

S114

COST ANALYSIS OF OPEN AND LAPAROSCOPIC PANCREACTICODUODENECTOMY: A SINGLE INSTITUTION COMPARISON

Marc G Mesleh, MD (presenter), John A Stauffer, MD, Steven P Bowers, MD, Horacio J Asbun, MD, Mayo Clinic Florida

Introduction: The laparoscopic approach to pancreaticoduodenectomy has progressed in technique and efficiency, and its utilization is increasing. While laparoscopic pancreaticoduodenectomy (LPD) has been shown to be safe and feasible, comparing its cost in relation to open pancreaticoduodenectomy (OPD) has not been examined. The aim of this study is to examine the cost of LPD compared to OPD at a single institution over a three year time period.
Methods: An institutional database was analyzed to compare patients who underwent OPD and LPD (including Whipple resections and total pancreatectomy) between May 2009 and June 2012. A cost analysis was performed which included the use the hospital billing database to assess operating room (OR) costs, hospital admission costs, and overall cost of the patient's care during the index admission. The operative costs were further analyzed with respect to OR time and OR supplies. Standard statistical analysis was performed to assess for significance.
Results:In the study time period, 123 patients underwent pancreaticoduodenectomy, including 48 OPD (39%) and 75 LPD (61%). The groups were similar with respect to age, gender, ASA, vein resection, and indication for surgery. Included in the LPD group, there were 3 cases which used hand assist (4%) and 10 cases which converted to open (13%). Additionally, 10% of the OPD group underwent total pancreatectomy ($n = 5$), compared to 21% of the LPD ($n = 16$). Median hospital stay for OPD and LPD was 8 days (range: 5–63), and 7 days (range: 4–68) respectively ($p = 0.5$).
The LPD group was associated with significantly higher OR cost due to both increased time and supply cost. However, mean hospital admission cost associated with OPD was greater in comparison to the LPD group, though not significant. The overall total cost of care was similar between the two groups.
Analysis of the subgroup of cases that were converted from laparoscopic to open revealed the mean OR cost was similar at $18,461. However, the mean associated hospital cost was $69,328, and therefore the mean overall cost was significantly increased at $87,790 ($p = 0.001$).
Conclusion: LPD is associated with equivalent overall cost when compared to OPD. While operating time and supply costs were higher for LPD, this was balanced by decreased cost of the postoperative admission. Patients undergoing LPD with conversion to open were noted to have the highest overall costs of both groups.

	Open ($n = 48$) $^{Mean \pm STD}$	Laparoscopic ($n = 75$) $^{Mean \pm STD}$	*p-value*
OR Cost	$12,061 ± $3525	$16,401 ± $3217	<0.0001
OR Time Cost	$8208 ± $2392	$10,774 ± $2464	<0.0001
OR Supply Cost	$3762 ± 2079	$5396 ± $1695	<0.0001
Admission Cost	$32,768 ± $37,265	$28,972 ± $42,017	0.61
Total Cost	$44,829 ± 39,365	$45,372 ± $44,095	0.95

S115

LIMITED HELLER MYOTOMY WITHOUT ANTI REFLUX PROCEDURE IS SIMILAR TO POEM AND DOES NOT INDUCE SIGNIFICANT GERD.

Luis C Zurita MV, MD (presenter), Radu Pescarus, MD, Lukas Wasserman, MD, Izabela Apriasz, MD, Dennis Hong, MD MSc FRCSC FACS, Scott Gmora, MD FRCSC, Margherita Cadeddu, MD FRCSC, Mehran Anvari, MB BS PhD FRCSC FACS, Department of Surgery, Centre of Minimal Access Surgery, St. Joseph's Healthcare, Hamilton, ON, Canada.

Introduction. Laparoscopic Heller myotomy with partial fundoplication is the gold standard treatment for achalasia, although around 30% of patients complain of gastroesophageal reflux disease (GERD) after surgery. Laparoscopic limited Heller myotomy without dissection of the angle of His and with no anti-reflux procedure is another possible option. This surgery is the premise for the peroral endoscopic myotomy (POEM).
Methods and procedures. A review of prospectively collected data was performed on patients who underwent laparoscopic limited Heller myotomy (myotomy of 8 cm distal esophagus and LES) without dissection of the angle of His and with no anti-reflux procedure from January 1998 to December 2012. Patients underwent extensive pre and 6 months postoperative clinical evaluation including: gastroscopy, esophageal manometry, 24 hours pH-metry and the achalasia severity symptom score (ASSS) and SF-36 questionnaires were answered. Comparison between outcomes was performed with paired t student test.
Results. One hundred twenty six patients underwent laparoscopic limited Heller myotomy. Of these, 60 patients had complete motility studies performed pre and postoperatively, while 53 patients were just followed up clinically and endoscopically, and 13 patients did not reach the 6 months follow up threshold.
From the 60 patients with complete motility studies, 34 patients were female and 26 male. Patient mean age was 45.7 ± 15.2 years and mean follow up was 10.53 ±11.1 months. Mean operative time was 56.1 ± 16.2 minutes and mean length of stay was 1.7 ± 0.6 days. After surgery, patients gained a mean of 12 ±15.5 lbs. (162.35 vs. 174.52; $p < 0.001$).
A significant decrease in the lower esophageal sphincter (LES) resting pressure (29.1 ± 18 vs. 7.1 ± 6; $p < 0.001$) and in the LES nadir (16.4 ± 11.9 vs. 4.3 ± 4.6; $p < 0.001$) was observed when the preoperative and postoperative data was compared.
After surgery, normal total pH<4% (mean 0.67%±0.89%) and DeMeester score (mean 3.66 ±4.12) were observed in 68.3% patients. Never the less, from the 31.6% with GERD by ph-metry, only 24.1% patients were clinically symptomatic, requiring daily proton pump inhibitors. All patients with GERD were properly controlled with medical treatment and no patient required further anti-reflux surgery.
There was a significant improvement on dysphagia (9.82 ± 3.4 vs 2.05 ± 3.1; $p < 0.001$), heartburn (3.82 ± 3.9 vs 1.72 ± 2.8; $p < 0.01$) and regurgitation (7.55 ± 4.4 vs. 0.65 ± 1.9; $p < 0.001$) scores after surgery. Patients reported a significant quality of life improvement after surgery according to the SF-36 questionnaire (physical ($p < 0.001$) and mental component summary ($p < 0.01$)).
One patient (0.8%) presented significant dysphagia after surgery and transthoracic Heller myotomy with an anti-reflux procedure was performed.
Conclusion. Limited Heller myotomy without dissection of the angle of His and with no anti-reflux procedure is an effective treatment for achalasia. Postoperatively, a significant manometric, symptomatic and quality of life improvement is obtained while conserving a similar GERD rate as the traditional Heller myotomy with an anti-reflux procedure. We should expect similar clinical results from POEM.

S116

An ongoing prospective study evaluating self-gripping mesh (Parietex Progrip?) without additional fixation during laparoscopic total extraperitoneal (TEP) inguinal hernia repair: interim analysis at one year

Andrew S Wu, MD (presenter), Min Li, MS, Mark Reiner, MD, Brian P Jacob, MD, Mount Sinai Medical Center, New York City

Background: Self-gripping mesh may eliminate the need for any additional fixation devices during inguinal hernia repairs. However, its use and outcomes (quality of life and recurrence rates) are not yet prospectively studied in a controlled fashion for laparoscopic TEP repairs.

Methods: After completing more than 50 laparoscopic inguinal hernia repairs using self-gripping mesh, under an IRB-approved prospective study we began evaluating our next 100 TEPs. Patient demographics and intraoperative data (defect location, size, mesh deployment time) are recorded. Carolinas Comfort Scale ™ (CCS), a validated 0–5 pain and quality of life (QoL) score where a mean score of >1.0 is considered symptomatic pain, is employed to evaluate pain and quality of life in the recovery room and post-operatively at 2 weeks, 6 months, and one year. Morbidities, narcotic usage, days to full activity, days to return to work, and CCS scores for the initial patients enrolled are reported.

Results: Since July 2011, we repaired 93 hernias in 66 patients with self-gripping mesh without any additional fixation. 19 hernias were direct defects (average size 2.8 cm), 66 were indirect, and 2 were femoral while 6 were Pantaloon hernias. Two minor intraoperative morbidities (minor bleeding and transient bradycardia) occurred and average mesh deployment time was 198 seconds. Recovery room pain was 1.1 / 5. At the 2 week visit, total average oxycodone/acetaminophen (5 mg/325 mg) usage was 5.4 tablets, days to full activity was 1.7, and return to work was 4.5 days. 12 small asymptomatic seromas were palpated without any recurrences or groin numbness. All seromas resolved by the 6 month visit. Transient testis discomfort (present at first visit, but not subsequent visits) was reported in 8 patients. Urinary retention was 3%. Mean CCS™ scores for groin pain laying, bending, sitting, walking, and step-climbing were 0.2, 0.6, 0.3, 0.5, and 0.07 respectively. Mean CCS scores greater than 1.0 occurred in 6% of 66 patients at the first post op visit (range 0–1.78), but 0 % of 30 patients at 6 months, and thus far 0% of 11 patients at one year (range 0–0.8). Of the first 11 patients over a year out, none have a recurrence or chronic pain.

Conclusions: Results of this study suggest that using self-gripping mesh without additional fixation during laparoscopic TEP repairs for direct, indirect, and femoral hernias is feasible, leading to a durable repair without significant morbidity. CCS™ pain and QoL scores are very favorable at subsequent post-operative visits followed out for over a year.

S117

LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING AND LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS: A COMPARATIVE ANALYSIS OF LONG-TERM REOPERATION AND FAILURE RATES

James G Bittner IV, MD, Angel M Reyes, MD (presenter), Luke G Wolfe, MS, Jill G Meador, RN BSN, James W Maher, MD, John M Kellum, MD, Department of Surgery, Virginia Commonwealth University Medical Center, Richmond, VA

Introduction: Laparoscopic adjustable gastric banding (LAGB) is considered by many to be a safer and equally effective option compared to laparoscopic Roux-en-Y gastric bypass (LRYGB). Consequently, LAGB quickly became the second most common weight loss operation performed in the United States. Scrutiny of long-term outcomes after LAGB has revealed significant complication and failure rates. We hypothesized that LAGB has higher rates of reoperation, weight loss failure, and overall failure compared to LRYGB at long-term follow-up.

Methods: A matched case-control study was performed using prospectively collected data. Patients who underwent primary LAGB or LRYGB at a university hospital between 2004 and 2011 were matched for age, gender, race, preoperative body mass index (BMI), and the presence of hypertension, diabetes mellitus, obstructive sleep apnea, and hyperlipidemia. All LAGB procedures were performed using the pars flaccida technique. Outcomes included patient demographics, percent excess weight loss (% EWL), BMI units lost, BMI at most recent follow-up, and rates of reoperation, weight loss failure (<50% EWL), and overall failure (procedure-related reoperation and/or <50% EWL) at 3 and 5-year follow-up. Using propensity scoring to select control LRYGB patients, matched cohorts were compared using Chi square and Fisher's exact tests as appropriate ($P < 0.05$).

Results: In all, 228 LAGB and 228 LRYGB patients were matched. At 3 and 5 years, LAGB compared to LRYGB patients had a significantly lower % EWL, lost fewer BMI units, and had a higher BMI (Table 1). At longest follow-up, a similar proportion of LAGB and LRYGB patients underwent primary procedure-related reoperation. Rates of weight loss failure were appreciably higher after LAGB than LRYGB at 3 and 5 years (Table 2). This remained true even when weight loss failure was defined as <25% EWL (31.3% vs. 1.5% at 3 years and 81.5% vs. 15.4% at 5 years, both $P < 0.01$). Overall failure rates, defined as procedure-related reoperation and/or <50% EWL, were higher after LAGB at all time points. Band-related complications included erosion (0.4%), port/band infection (0.4%), leak (0.9%), incisional hernia (0.9%), port inversion (0.9%), slippage (7%), and pouch/esophageal enlargement (9.7%). Procedure-related complications after LRYGB were bleeding (1.7%), incisional hernia (2.6%), anastomotic leak (3.5%), and internal hernia (4.8%). Over the study period, morbidity was higher among LAGB compared to LRYGB patients (19 vs. 12.7%, $p = 0.04$). Procedure-related mortality was low after both LAGB (0%) and LRYGB (0.4%).

Table 1 LAGB and LRYGB outcomes at 3 and 5 years of follow-up

	LPGB		LRYGB	
Outcome	3-year (n = 67)	5-year (n = 27)	3-year (n = 67)	5-year (n = 26)
EWL (%)	35*	29.3*	71*	66.7*
BMI units lost (kg/m^2)	7.4 ± 0.6*	5.9 ± 0.9*	15 ± 0.5*	14.6 ± 1.1*
Post-op BMI (kg/m^2)	36.6 ± 0.7*	37.9 ± 1.3*	29 ± 0.4*	29.4 ± 1.0$^+$

$^{*,+}$ Between-group differences are siginificant ($p < 0.05$)
Continuous variables are presented as mean and standard error

Table 2 LAGB and LRYGB complication at 3 and 5 years follow -up

Complication	LAGB		LRVGB	
	3-year (n = 67)	5-year (n = 27)	3-year (n = 67)	5-year (n = 26)
Reoperation (%)	6	11	9	11.5
<50% EWL (%)	75*	81.5†	10.5*	15.4†
Overall failure‡ (%)	77.6*	81.5†	18*	23†

*,† Between-group diffrences are siginificant ($p < 0.05$)
‡ Overall failure = band, bypass-related reoperation and/or <50% EWL

Conclusions: Based on this single-center study of long-term outcomes, LAGB has similar rates of procedure-related reoperation and significantly higher rates of weight loss failure compared to LRYGB. Additionally, overall failure rates, defined as procedure-related reoperation and/or weight loss failure, are greater after LAGB than LRYGB. While LAGB may be considered for well-informed and motivated patients, these data suggest that long-term effectiveness of LAGB might be limited.

S118

AGE INFLUENCE ON WEIGHT LOSS AND GLYCOL-LIPID PROFILE AFTER LAPAROSCOPIC SLEEVE GASTRECTOMY: EXPERIENCE WITH 308 CONSECUTIVE PATIENTS

Yoshihiro Nagao, MD PhD (presenter), Michele Diana, MD, Michel Vix, MD, Antonio D'Urso, MD, Didier Mutter, MD PhD FACS, Jacques Marescaux, MD FACS HonFRCS HonFJSES, IRCAD-IHU, Department of General, Digestive and Endocrine Surgery, University Hospital of Strasbourg, France

Introduction Sleeve gastrectomy (SG) is gaining acceptance as a standalone bariatric procedure with proven efficacy on weight loss and comorbidity improvement. The aim of this study is to evaluate the impact of age on weight loss and on related glycolipid profile changes at two-year follow-up after SG.

Methods and procedures From July 2005 to July 2010, 336 patients underwent SG and 308 completed a two-year follow-up. Mean age was 39.7 years (SD 10.7), mean weight was 127.9 kg (SD 24.5), mean Body Mass Index (BMI) was 45.9 kg/m^2 (SD 6.8). To analyze the effect of age on bariatric outcomes, patients were classified according to age into three groups: 1) young (18–29 years old, n = 64); 2) intermediate (30–49 years old, n = 183) and 3) seniors (≥ 50 years old, n = 57). BMI, Excess Weight Loss (%EWL), Homeostasis Model Assessment for Insulin Resistance (HOMA-IR), cholesterol and triglycerides were assessed at 1 month, 6, 12, and 24 months (M1, M6, M12, and M24) after the procedure.

Results All patients had a significant %EWL and BMI reduction at two years. Mean BMI reduction and %EWL was statistically significantly higher in the younger group at M6, M12, and M24 when compared to intermediate and senior groups (Table 1). A significant lower HOMA-IR improvement was observed at M6 in the older group when compared to both younger (p = 0.02) and intermediate (p = 0.01) groups of patients. No significant difference was found at M12 (Table 1). Mean total cholesterol and triglycerides were statistically significantly improved in the younger group when compared to both intermediate and senior patients (Table 1).

Table 1

	Time points	Young (18–29 y.o.)	Intermediate (30–49 y.o.)	Senior (≥50 y.o.)	Young vs. intermediate	Young vs. seniors	Intermediate vs. seniors
BMI (kg/m^2)	Preop.	44.8 ± 5.4	46.2 ± 7.2	46.4 ± 6	p = 0.15	p = 0.12	p = 0.84
	M6	31.5 ± 4.8	34.1 ± 6.9	36.1 ± 6.4	p = 0.0058	p < 0.0001	p < 0.0001
	M12	29.4 ± 6.1	31.4 ± 6.1	34.3 ± 6	p = 0.008	p < 0.0001	p = 0.0019
	M24	28.4 ± 5.4	31.4 ± 7.1	34.84 ± 6	p = 0.008	p < 0.0001	p = 0.0028
%EWL	M6	62.6 ± 14.4	53.2 ± 18	48 ± 15.5	p = 0.0003	p < 0.0001	p = 0.05
	M12	73.4 ± 17.1	64.8 ± 19.9	54.6 ± 15.3	p = 0.002	p < 0.0001	p = 0.0005
	M24	72.5 ± 18.9	66.8 ± 23	54.4 ± 15.4	p = 0.15	p < 0.0001	p = 0.0014
HOMA-IR	Preop.	2.49 ± 0.86	3.01 ± 1.68	3.03 ± 1.25	p = 0.33	p = 0.29	p = 0.97
	M6	1.30 ± 0.54	1.43 ± 0.82	2.83 ± 1.86	p = 0.65	p = 0.02	p = 0.01
	M12	1.01 ± 0.47	1.08 ± 0.47	1.53 ± 0.91	p = 0.71	p = 0.17	p = 0.07
Total cholesterol (g/L)	Preop.	1.91 ± 0.41	2.0 ± 0.38	1.99 ± 0.57	p = 0.17	p = 0.44	p = 0.89
	M6	1.77 ± 0.47	1.96 ± 0.41	2.06 ± 0.45	p = 0.03	p = 0.014	p = 0.24
	M12	1.75 ± 0.31	1.99 ± 0.38	2.01 ± 0.49	p = 0.01	p = 0.009	p = 0.8
	M24	1.73 ± 0.26	1.97 ± 0.36	2.06 ± 0.57	p = 0.01	p = 0.04	p = 0.39
Triglycerides (g/L)	Preop.	1.23 ± 0.74	1.38 ± 0.75	1.74 ± 0.91	p = 0.29	p = 0.009	p = 0.01
	M6	0.94 ± 0.31	1.96 ± 0.34	1.31 ± 0.55	p = 0.78	p = 0.002	p = 0.0001
	M12	0.77 ± 0.25	0.82 ± 0.3	1.12 ± 0.43	p = 0.41	p = 0.0003	p < 0.0001
	M24	0.89 ± 0.37	0.77 ± 0.3	1.23 ± 0.5	p = 0.17	p = 0.02	p < 0.0001

Conclusions An age-dependent trend towards better %EWL, BMI reduction, and lipid and glycemic profile was observed in younger patients after SG. Although there was a still acceptable 50% EWL, these findings may suggest a limited benefit of SG for senior patients.

S119

Effect of Physiologic CCK Administration in HIDA Results

James B Depew, MD (presenter), Gage Ochsner, MD FACS, Memorial Health University Medical Center, Mercer University School of Medicine

Introduction: Biliary dyskinesia, or dysfunctional gallbladder bile ejection, can be measured through the use of a cholescintigraphy (HIDA) scan. A reduced ejection fraction (EF) of <35% suggests that cholecystectomy will result in symptom relief in the setting of acalculous cholecystitis. It has been proposed that a more physiologic 30-minute infusion of CCK to stimulate gallbladder ejection is a better predictor of normal gallbladder function over the previous 3–5 minute rapid infusion protocol. Memorial University Medical Center moved to this new protocol in Sept 2006.

Methods: A retrospective study was conducted in all patients who underwent a HIDA scan with EF for any reason at our 550-bed teaching hospital over the 26-month period surrounding the new CCK protocol. Multiple independent variables were collected on each patient including demographics, abdominal ultrasound results, cholecystectomy status, pathology reports, and biliary ejection fraction. To evaluate symptom resolution, a satisfaction survey was conducted in patients who subsequently underwent cholecystectomy.

Results: A total of 793 HIDA scans were completed with 342 of those having a concomitant normal ultrasound. The diagnosis of biliary dyskinesia was significantly higher at 53% in the 3–5 minute rapid infusion protocol versus 28% in the more physiologic 30-minute protocol. A similar portion of patients underwent cholecystectomy in each group with no difference in pathologic confirmation of acalculous cholecystitis. Satisfaction survey response rate was 65%. A greater portion of patients diagnosed with biliary dyskinesia by 30-minute infusion HIDA scan reported complete resolution of their presenting RUQ symptoms after cholecystectomy.

Conclusion: The more physiologic 30-minute infusion of CCK during HIDA scan may more reliably predict both biliary dyskinesia in acalculous cholecystitis and the potential for symptom resolution following cholecystectomy in this patient population.

S120

THE FIRST NATIONWIDE EVALUATION OF ROBOTIC GENERAL SURGERY - A REGIONALIZED, SMALL, BUT SAFE START

Blair A Wormer, MD (presenter), Joel F Bradley, MD, Kristopher B Williams, MD, Amanda L Walters, MS, Vedra A Augenstein, MD, Kristian T Dacey, MHA, Brant T Heniford, MD, Carolinas Medical Center

Introduction:

The purpose of this study was to evaluate the most commonly performed robotic-assisted General Surgery (RAGS) procedures in a nationwide database and compare them to their laparoscopic counterparts.

Methods:

The Nationwide Inpatient Sample, which captures approximately 20% of all US inpatient admissions, was queried from October 2008 (the inception of the robotic ICD-9-CM code) to December 2010 for patients undergoing the most common, elective, abdominal RAGS procedures. The two most common, robotic fundoplication (RF) and robotic gastroenterostomy without gastrectomy for bypass (RG), were individually compared to those performed laparoscopically (LF and LG respectively).

Results:

During the study period, 295,155 elective, abdominal, general surgery operations were performed in total, 1680(0.6%) were RAGS. From 2009 to 2010 the incidence of RAGS nearly doubled from 536 to 1039. When evaluating primary procedure codes, the ten most commonly reported elective RAGS procedures were: 1. LG, 2. LF, 3. anterior rectal resection 4. esophagomyotomy, 5. gastric banding, 6. sigmoidectomy, 7. diaphragmatic hernia repair, 8. abdominoperineal resection, 9. loop ileostomy, 10. right hemicolectomy.

LF was performed in 11,556 (97.5%) and RF in 291 (2.5%). When comparing RF to LF, RF patients were more often Caucasian (91% v. 83%; p = 0.0097), however there was no difference in age, gender, Charlson Comorbidity Index (CCI), Length of stay (LOS), or postoperative complications which include: infection, ileus, obstruction, thromboembolism, enterotomy, or mortality. Total cost for RF was slightly more than LF ($38,974 ± 23,758 v. $37,4540 ± 50,141; p < 0.0001), and it was more often performed in zip codes with median income >$45 k (78% v. 52%; p < 0.0001), at teaching hospitals (73% v. 59%; p < 0.0001), and in urban areas (99% v. 90%; p < 0.0001). There was no difference in the proportion of medicare versus private insurance when evaluating RF and LF.

LG was performed in 41,800 (99.3%) and RG in 296 (0.7%). When comparing RG to LG there was no difference in race, age, gender, CCI, postoperative complications, or mortality; however, LOS was somewhat longer in RG (2.6 ± 2.5 days v. 2.4 ± 3.0 days; p < 0.0001). Total cost for RG was substantially more ($62,734 ± 32,480 v. $43,646 ± 50,141; p < 0.0001), and it was more often performed in zip codes with median income >$45 k (70% v. 50%; p < 0.0001), at teaching hospitals (88% v. 51%;p < 0.0001), and in urban areas (100% v. 94%;p < 0.0001). There was no difference in the proportion of medicare versus private insurance when evaluating RG and LG.

Conclusions:

This first nationwide study of robotic-assisted General Surgery operations exemplifies its low, but increasing incidence across the country. Robotics in General Surgery is regionalized to urban, teaching centers in higher income areas compared to its laparoscopic counterpart. Although the postoperative outcomes for elective robotic and laparoscopic General Surgery are similar, there is an increased cost associated with robotic cases.

S121

Factors Predicting In-Hospital Mortality in Bariatric Surgery: An Analysis from the National Inpatient Sample Database

Muhammad Asad Khan, MD (presenter), John N. Afthinos, MD FACS, Karen E. Gibbs, MD FACS, Staten Island University Hospital

Objective: Bariatric surgery is being performed in increasing numbers each year. Centers of excellence standards were set up to improve the quality and monitor post-operative morbidity and mortality. Bariatric surgery has matured into a field which maintains high standards for safety and quality. We sought to evaluate the in-hospital outcomes from a large, prospectively collected database to determine predictors of in-hospital mortality to aid in pre-operative assessment of these challenging patients.

Methods: The National Inpatient Sample database was queried for primary bariatric operations performed from 2005–2009. Revisional surgery and biliopancreatic diversion-duodenal switch procedures were excluded. Patient comorbid conditions, insurance status, ethnicity, age and gender were evaluated. In-hospital morbidity and mortality was tabulated. A multivariate logistic regression was performed to select factors which contributed to increased mortality.

Results: The weighted national estimate of bariatric procedures performed was 548,106. Laparoscopic Roux-en-Y gastric bypass was the most commonly performed procedure (60.7%). The overall in-hospital mortality was 0.1% (Table 1). Statistically significant predictors of in-hospital mortality included age $>$ 50, male gender, open procedure, COPD, obstructive sleep apnea, peripheral vascular disease and congestive heart failure (Table 2).

Table1 Bariatric procedure type and corresponding mortality rate

Procedure type	ICD-9 Code	N (%)	Mortality
Open GBP	44.31, 44.39	67340 (12.3%)	232 (0.3%)
Lap GBP	44.38	332566 (60.7%)	278 (0.1%)
Lap Gastric band	44.95	114272 (20.8%)	36 (0.0%)
Lap Gastroplasty	44.68	12627 (2.3%)	5 (0.0%)
Sleeve Gastrectomy	43.89	21301 (3.9%)	25 (0.1%)

Table 2 Multivariate logistic regression analysis for predictors of mortality

	Relative risk (95% CI)	*P*-value
Age >50	3.2 (2.5–4.0)	<.001
Male gender	2.5 (1.5–4.0)	<.001
Hypertension	04 (0.3–0.5)	<.001
Sleep apnea	2.4 (1.7–3.3)	<.001
Chronic pulmonary disease	2.3 (1.6–11.2)	<.001
Diabetes	0.6 (0.5–1.8)	<.001
Congestive heart failure	5.4 (2.6–11.2)	<.001
Smoking	1.4 (0.8–2.2)	NS
Open procedure	4.1 (3.3–5.0)	<.001