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Paper presentations

BARIATRIC SURGERY

18560

S088

19302

S009

PERFORATED MARGINAL ULCERS AFTER LAPAROSCOPIC GASTRIC BYPASS

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Introduction: A perforated marginal ulcer (PMU) following laparoscopic Roux-en-y gastric bypass (LRYGB) is a potentially serious complication, but the incidence and etiology has rarely been investigated. We therefore performed a retrospective review of all patients undergoing LRYGB at our center to determine our incidence of perforated marginal ulcer and if any causative factors could be elucidated.

Method: A prospectively kept data base of all LRYGB patients at our bariatric center was retrospectively reviewed. The complete records of patients with a PMU were individually examined for accuracy and analyzed for treatment, outcome and possible underlying causes of the marginal perforation.

Results: Between 4/99 8/07, 1% (35 of 3430) patients undergoing laparoscopic gastric bypass at our center with a median long term follow-up of 4 years developed one or more perforated marginal ulcers 3 to 70 months (median 18 months) following laparoscopic gastric bypass. Fifteen perforations were treated laparoscopically and 20 open. The mean age 37 vs. 41 years, weight of 286 vs. 287 pounds, BMI 46 vs. 47, and gender 89% vs. 83% female of all patients with or without perforation respectively were not significantly different. Two patients with perforations (6%) were taking steroids, 10 (29%) were on N-saids at the time of perforation, 18 (51%) were actively smoking, and 6 of the smokers were also taking N-saids. Eleven (31%) of patients that perforated did not have at least one of these possible risk factors, but 4 of 11 (36%) of this group had been treated post bypass for a marginal ulcer. Only 7 of 35 (20%) or 7 (0.2%) of 3430 patients perforated without any warning. There were no deaths in either group, but 3 patients re-perforated and all of these continued to smoke after their first perforation.

Conclusion: The incidence of perforation of a marginal ulcer following laparoscopic Roux-en-Y gastric bypass in this large series of patients followed over a long period was significant (>1%) and appeared to be related to smoking, N-said use or steroids in the majority of the cases. Although all LRYGB patients are at risk for perforation, only 0.2% of all patients acutely perforated without some risk factor or warning, suggesting that long term ulcer prophylaxis or treatment may be necessary to prevent this serious complication in only a select group of high risk patients.

RETRIEVABLE INFERIOR VENA CAVA FILTERS IN HIGH RISK PATIENTS UNDERGOING BARI- ATRIC SURGERY

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Introduction: Placement of retrievable inferior vena cava filters (IVCF) may be beneficial in high risk morbidly obese patients undergoing bariatric procedures. Bariatric surgery patients with a prior history of venous thromboembolism (VTE) are at high risk for postoperative recurrent deep venous thrombosis (DVT) and pulmonary embolism (PE). **Methods:** A prospective database of morbidly obese patients undergoing a bariatric procedure was studied from April 2003 to May 2007. 791 patients underwent bariatric surgery of which 30 (4%) had a prior history of VTE. These patients underwent pre-operative venous duplex and concurrent placement of a retrievable IVCF. Patient demographics and clinical outcomes were examined. **Results:** The 30 patients had a mean age of 49 ± 8 years, 12 (40%) were male with a mean BMI of 50 ± 8 kg/m². 16 (53%) underwent laparoscopic roux-en-y gastric bypass, 10 (33%) laparoscopic adjustable gastric band, and 4 (14%) open roux-en-y gastric bypass. The mean operative time including IVCF placement was 162 ± 66 minutes. Indications for IVCF placement were DVT in 20 (67%) and PE in 10 (33%) patients. All patients had successful IVCF placement along with standard peri-operative VTE prophylaxis. 29 (97%) patients had a follow up ultrasound on mean post-operative day (POD) 19 ± 25 . 6 (21%) patients had recurrent DVT confirmed by ultrasound. 27 (90%) patients underwent a follow up venogram and 4 (15%) had significant thrombus in the IVCF. Overall, retrieval was successful in 21 (70%) patients. 9 (30%) patients did not undergo retrieval, 4 had significant thrombus in the filter, 4 had an above knee DVT, and 1 due to technical reasons at the time of retrieval. 1 patient had a complication of retrieval with a DVT at the venous access site. No PE or mortality occurred. **Conclusions:** We observed a 21% incidence of recurrent DVT, and 15% incidence of thrombus in the IVCF, yet no PE occurred. IVCF retrieval was successful in 70% with 1 complication. Concurrent IVCF placement is safe, feasible, and an effective preventative measure in high risk morbidly obese patients. We recommend the use of retrievable IVCFs in conjunction with standard VTE prophylaxis in this patient population.

19325

S011

LONG-TERM IMPROVEMENT OF PULMONARY FUNCTION AFTER LAPAROSCOPIC GASTRIC BYPASS SURGERY

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Introduction: Morbidly obese patients often have impaired respiratory mechanics leading to restrictive lung disease. Weight loss after bariatric surgery has been shown to improve or resolve many obesity-related comorbidities; however, little is known about the long-term changes in pulmonary mechanics after bariatric surgery. We hypothesize that pulmonary function may improve with weight loss after laparoscopic gastric bypass.

Methods: We examined the pulmonary function of 66 consecutive morbidly obese patients before and after laparoscopic gastric bypass. Pulmonary studies, including forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), peak expiratory flow (PEF), and forced expiratory volume at mid-expiratory phase (FEV 25-75), were measured preoperatively and at 3 month intervals.

Results: There were 51 females and 15 males with a mean age of 40.6 +/- 11.3 years. The mean body mass index was 48 +/- 6.0 kg/m². The mean percentage of excess body weight loss at 12 months was 67.7 +/- 17.9%. The mean preoperative pulmonary function parameters were 2.8 +/- 0.7L for FEV1, 3.1 +/- 0.8 L for FVC, 398.2 +/- 112.6 L/min for PEF, and 3.5 +/- 1.3 L/sec for FEV 25-75. At 12 months postoperatively, FEV1 increased to 10 +/- 18 above preoperative value (p=0.04), FVC increased to 7 +/- 33% above of preoperative value (p=0.98), PEF increased to 15 +/- 33% above of preoperative value (p=0.08), and FEV 25-75 increased 35 +/- 40% above preoperative value (p=0.002).

Conclusions: Following laparoscopic gastric bypass surgery, there is a significant improvement in the respiratory mechanics of morbidly obese patients. These improvements may be more prominent in morbidly obese patient with marginal lung function.

19439

S084

EARLY US OUTCOMES AFTER LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING IN PATIENTS WITH BMI < 35

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Introduction: Many mild-to-moderately obese individuals (BMI < 35) suffer from serious diseases related to their obesity. Non-surgical therapy is ineffective in the long-term, yet surgery has never been made widely available to this population.

Methods/Procedures: Between 2002 and 2007, 53 patients with BMI < 35 underwent laparoscopic adjustable gastric banding (LAGB) under an FDA-approved study at our institution. Data on all patients were collected prospectively and entered into an electronic registry. Study parameters included: preoperative age, gender, BMI, presence of co-morbidities, percent excess weight loss (%EWL) and resolution of co-morbidities.

Results: Mean preop age was 46.9 years (16-68) and mean preop BMI was 33.1 kg/m² (28.2-35.0). 49 of the 53 patients (92%) suffered from at least one obesity-related comorbidity. Mean BMI decreased to 28.1 +/- 2.4 kg/m², 25.8 +/- 2.9 kg/m², and 25.8 +/- 3.1 kg/m² and mean %EWL was 48.3 +/- 17.6, 69.9 +/- 28.0, and 69.7 +/- 31.7 at 0.5, 1, and 2 years, respectively. The majority (75%) of co-morbidities improved or completely resolved: hypertension 100%, depression 86%, asthma 80%, hypertriglyceridemia 80%, obstructive sleep apnea 75%, hypercholesterolemia 70%, and diabetes 57%. There was 1 slip, 2 cases of band obstruction (from food), 2 cases of esophagitis and 2 port leaks. There was no mortality.

Conclusion: We are very encouraged by this series of low BMI patients operated with the LAGB. Weight loss has been excellent, complications have been acceptable, and co-morbidities have partially or wholly resolved. With further study, it is reasonable to expect the weight guidelines for bariatric surgery to be altered to include patients with BMI < 35.

19899

S008

THE PARADOX OF THE POUCH: PROMPT EMPTYING PREDICTS IMPROVED WEIGHT LOSS AFTER LAPAROSCOPIC ROUX-Y GASTRIC BYPASS

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Introduction: The utility of routine upper gastrointestinal (UGI) evaluations after laparoscopic Roux-Y gastric bypass (LRYGB) has yet to be determined, primarily being used to rule out a gastrojejunal leak. Additional information can be assessed with these studies including the rate of contrast emptying from the pouch; some patients show no or very slow emptying while others show a faster rate of emptying. No or slow emptying is likely due to anastomotic edema and/or a small initial stomal diameter. The aim of this study is to ascertain whether initial pouch emptying (or lack thereof) predicts postoperative weight loss.

Methods: Between August 2002 and July 2006, 405 LRYGB were performed by a single surgeon using a linear stapled technique. Patient demographics were entered into a longitudinal, prospective database. All patients had an UGI study on postoperative day one. At one-year follow-up, 304 patients were available for analysis. The patients were divided into 2 groups: Group A, 188 patients with normal gastric emptying, and group B, 116 patients with very slow or no emptying of contrast. Analysis of Covariance (ANCOVA) was used to compare weight loss between the two groups. The following covariates were considered in all analyses: age, gender, length of stay, and operative time. All possible interactions of variables were considered in the ANCOVA models, but there were no statistically significant interactions in the final models.

Results: There was a statistically significant difference in weight loss between the two gastric emptying groups adjusting for age, gender, and operative time (p = 0.007). Subjects with prompt gastric emptying (group A) showed more weight loss (118 lbs vs. 108 lbs) and a greater BMI loss (mean loss of 18.04 vs. mean loss of 16.59) when compared to group B patients with slow or no emptying of the gastric pouch.

Conclusion: Many factors (psychosocial, behavioral, hormonal, and anatomical) influence weight loss after LRYGB. Although we are uncertain of the mechanism, patients with normal initial pouch emptying tend to lose more weight than patients who initially exhibit slow or no emptying of the gastric pouch.

19617

S007

COMPOSITE ANALYSIS OF SURGICAL REVIEW CORPORATION BARIATRIC SURGERY CENTERS OF EXCELLENCE HOSPITALS

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Introduction: Surgery is currently the only effective long-term therapy for morbid obesity and its complications. A variety of surgical procedures can now offer durable and safe weight control as well as previously unrealized full remission of costly co-morbidities. This is a preliminary investigation of patient outcomes at Bariatric Surgery Centers of Excellence (BSCOE) Hospitals.

Methods and Procedures: Data was analyzed from 235 SRC BSCOE Hospitals receiving Full Approval status from August 2005 to May 2007. Bariatric Surgery metrics for patients treated at these hospitals (n = 81, 100) included types and volume of various bariatric surgical procedures performed at each hospital, patient demographics, payer information, and 90-day patient outcomes. The data was analyzed using both univariate and bivariate analysis.

Results: Composite aggregate data from these analyses demonstrate significant trends in terms of surgical procedure preferences (laparoscopic bypass 61%), patient (females 83%, Caucasian 60%, average age 43 years) and payer demographics (private insurance 78%), and 90-day outcomes (readmission 5%, re-operation 2.5%, mortality 0.36%).

Conclusions: The collective performance of SRC BSCOE hospitals in bariatric benchmarks of re-admissions, re-operations, and mortality are equivalent or superior to currently reported values and may establish an industry standard for optimum bariatric surgical care and patient outcomes.

19637

S078

LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS VS. LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING: 30-DAY MORBIDITY AND MORTALITY AS ASSESSED BY PROSPECTIVE, MULTI-CENTER, RISK-ADJUSTED ACS-NSQIP DATA

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Background: To date, there have been no large, multi-center U.S. outcomes comparisons between laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic adjustable gastric banding (LAGB). Beginning in 2006, unique CPT codes were available for both LRYGB and LAGB, making reliable comparisons feasible. We compare univariate and multivariable 30-day morbidity and mortality outcomes between LRYGB and LAGB from the 121 hospitals (academic = 72; community = 49) participating in the ACS-NSQIP.
 Methods: Those patients who underwent LRYGB or LAGB were identified via CPT code from the ACS-NSQIP Participant Use File a prospectively collected, validated, clinical database developed for quality improvement, not administrative use. Preoperative and intraoperative variables, as well as postoperative outcomes were compared using univariate and multivariable methods.

30-day Univariate Morbidity and Mortality (LRYGB vs. LAGB in 2006)

Out comes at 30 days	LRYGB (n=3580)	LAGB (n=1176)	p-value
Mortality	0.14% (n=5)	0.09% (n=1)	1.0
Major complication	3.32%	1.02%	<0.0001
Any complication	6.65%	2.55%	<0.0001
Return to OR (any reason)	3.6%	0.94%	<0.0001
Median Postoperative LOS (days) [IQR]	2.0 [2.0, 3.0]	1.0 [1.0, 1.0]	<0.0001

*All values are percent frequencies unless otherwise indicated. All p-values are calculated using Fisher's Exact test or Wilcoxon rank-sum scores where appropriate.

Results: After risk adjustment, this difference in major complication risk persisted (LAGB OR = 0.3; [0.167, 0.552]).

Conclusions: This risk-adjusted, prospective, multi-center data suggests that there is no difference in 30-day mortality following LRYGB vs. LAGB. Univariate and multivariable analyses showed a small but statistically significant increase in the rate of major complications within 30 days for those undergoing LRYGB. Both LRYGB and LAGB have low 30-day morbidity and mortality rates.

19642

S087

IMPROVEMENT IN GLYCEMIC CONTROL BY GASTRIC ELECTRICAL STIMULATION (TANTALUS®) IN OVERWEIGHT SUBJECTS WITH TYPE 2 DIABETES (T2DM)

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Background: The TANTALUS System (MetaCure Ltd.) is a minimally invasive implantable gastric stimulation modality that does not exhibit malabsorptive or restrictive characteristics. The device applies GCM (Gastric Contractility Modulation) signals to the stomach Antrum. The signals are delivered in synchronization to the native electrical activity of the stomach during meals. Retrospective analysis of previous studies indicated that T2DM subjects on oral medication with HbA1c between 7.5% and 9.5% are the population with most potential benefit from the treatment. The current study includes subjects enrolled prospectively within that range of HbA1c.
 Aim: to prospectively investigate the potential effect of the TANTALUS System on glyceimic control and weight in overweight subjects with T2DM.

Patients and Methods: In this European multi-center, open label study, 13 T2DM obese (6 m, 7 f, BMI: 37.1 ± 1.0 kg/m²) subjects treated with oral anti-diabetic medications but with poor glyceimic control (HbA1c 7.5-9.5%, BMI 30-45 kg/m²) were implanted laparoscopically with the TANTALUS System.

Results: Eleven subjects that have completed 3 months of treatment show a significant reduction in HbA1c from 8.0 ± 0.2% to 7.2 ± 0.2% (P < 0.05) whereas the Fasting Blood Glucose decreased from 164 ± 10 mg/dL to 130 ± 14 mg/dL (P < 0.05). The glyceimic improvement was accompanied by reduction in weight from 110.2 ± 4.5 Kg to 105.4 ± 5.8 Kg, and in waist circumference from 122.8 ± 2.8 cm to 118.0 ± 2.7 cm respectively.

Conclusion: Interim results with the TANTALUS System suggest that this stimulation regime can potentially improve glucose levels and induce weight loss in obese T2DM subjects on oral anti-diabetic therapy with poor glyceimic control. Further evaluation is required to determine whether this effect is due to induced weight loss and/or due to direct signal dependent mechanisms.

19650

S086

FEWER GASTROJEJUNOSTOMY STRICTURES AND MARGINAL ULCERS WITH ABSORBABLE SUTURE

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Background: The upsurge of gastric bypass procedures has been accompanied by an increase in anastomotic strictures and marginal ulcers. In the reported literature, the gastrojejunostomy strictures in 3-27% and ulcerates in 1-16% of cases. Several anastomotic techniques are used; however, no study has specifically addressed whether choice of reinforcing suture affects rates of stricture or ulcer. We reviewed our case series to determine if a protocol change in suture choice altered the incidence of anastomotic strictures and marginal ulcers.

Methods: We performed a retrospective review of a prospectively collected database for 291 primary Roux-en-Y gastric bypass patients (8/1/99 to 9/1/07). Nearly all patients had a 25-mm circular stapled anastomosis with an outer suture layer for reinforcement. Before 5/30/06, 231 patients had interrupted permanent suture, and after 5/30/06, 60 patients had interrupted absorbable suture. We compared overall rates of stricture, marginal ulceration and aggregate gastrojejunostomy complications between the two groups using a proportional hazards model and log-rank statistic. A p value < 0.05 was considered statistically significant.

Outcomes: We found fewer gastrojejunostomy complications in the absorbable suture group (5% than the permanent suture group (19%), with p=0.06 (table). Subgroup analysis showed that both strictures and marginal ulcers were less common in the absorbable suture group, but short follow-up times prevented statistical confirmation.

Suture Used	GJ complication	Stricture	Ulcer
Permanent	19%	6.5%	12.5%
Absorbable	5%	1.7%	3.3%
p-value	0.06	0.15	0.12

Conclusion: Use of absorbable reinforcing sutures is associated with fewer gastrojejunostomy complications. We recommend absorbable sutures for the outer layer of stapled gastrojejunal anastomoses when performing gastric bypass.

19676

S012

LAPAROSCOPIC TRUNCAL VAGOTOMY FOR WEIGHT-LOSS: A PROSPECTIVE, DUAL-CENTER SAFETY AND EFFICACY STUDY

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Objective: To evaluate the safety and efficacy of laparoscopic truncal vagotomy in morbidly obese men and women with BMI 35-45.

Methods: This is an open-label, prospective, dual-center study of 30 obese patients undergoing laparoscopic truncal vagotomy and followed every 3 months for 18 months. The primary safety variable is the overall incidence of adverse events. The primary efficacy variable is the percent excess weight loss (%EWL). Responders are defined as subjects who have lost weight, maintained over 18 months. Sections of posterior and anterior vagus trunks were resected and removed for pathologic review, and additional fibers were divided. Intraoperative gastroscopy with Congo Red testing was done to verify completeness.

Results: 30 patients (26 women) with, mean pre-operative BMI 41 kg/m² (range: 35-49), aged 41.5 years (range: 25-54) were operated since October 2005, with no operative complications. Adverse events include: dumping syndrome (n=3), wound infection (n=2), other (n=5), and diarrhea (n=6). One case of diarrhea was due to bacterial infection unrelated to the treatment. The mean follow up at 12 months is 73%. Weight loss efficacy variables are presented for available data at 12 months on 16 patients.

LapVx Study			
Time	N	%EWL	Kg Loss
12 M/All	16	16.0	7.1
12 M/Responders	14	19.6	8.9

Conclusion: These preliminary results indicate that laparoscopic truncal vagotomy is safe and may be an effective treatment for obesity.

19725

S089

UTILIZATION OF THE INTRAGASTRIC BALLOON (BIB) IN PRE-OPERATIVE PREPARATION FOR SUPER OBESE PATIENTS WITH HIGH SURGICAL RISK COMPARING WITH TWO STEPS SURGERY

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Background: Super obese patients show a high surgical risk (major complications in 30% and mortality rate of 5–12%). The present study evaluates the use of BIB as a preoperative procedure aiming an initial weight loss and reduction of surgical risk.

Methods: From November 2000 to February 2006, 66 super obese patients (mean BMI = 60.3 ± 10.1 kg/m²) were treated with the BIB for at least four months before surgical treatment: 45 male (BMI = 58.4 ± 8.0) and 11 female patients (BMI = 62.3 ± 10.7). They showed associated diseases, including systemic arterial hypertension (27 cases), diabetes mellitus (10 cases), sleep apnea (20 cases), hypercholesterolemia (10 cases) and osteoarthritis (16 cases).

Results: Patients showed mean percent excess weight loss (%EWL) of $23.4 \pm 11.0\%$, mean percent total weight loss (%TWL) of $13.6 \pm 6.5\%$, and mean BMI reduction of 8.4 ± 4.9 Kg/m². Around 80% of patients showed good results with 27% EWL with improvement in hypertension, diabetes mellitus and sleep apnea. Surgical risk was reduced from ASA III-IV (before the BIB) to ASA II (after BIB). All these patients were submitted to bariatric surgery (GB 41%, LAGB 33% or SGBP 26%). There was no mortality and only four minor complications (wound infection- 7.5 %).

Conclusions: Our results showed that the intragastric balloon is an effective technique in order to prepare super obese patients in preoperative time (79%), reducing their major complications and mortality. Effective non-surgical technique in pre-op time for patients BMI > 50. Change surgical risk ASA III - IV to ASA II (79%). No mortality and minimal risk of major complications. Reduce 79% the indications of two stage surgery. Low risk and lower cost than two stage surgery.

19757

S082

HORMONAL EVALUATION FOLLOWING THE LAPAROSCOPIC TREATMENT OF TYPE 2 DIABETES MELLITUS PATIENTS WITH BMI 20 – 34

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Introduction: A group of patients with Type 2 Diabetes (T2DM) and BMI 20-34 were submitted to the laparoscopic interposition of a segment of ileum into the proximal jejunum or into the proximal duodenum associated to a sleeve gastrectomy. The objective of this study is to evaluate the hormonal changes in the pre and postoperative period.

Methods: Hormonal evaluation was done in 58 patients operated between April 2005 and July 2006. Mean age was 51.4 years (40–66). Mean BMI was 28.2 (20–34.8). All patients had the diagnosis of T2DM for at least 3 years. Mean duration of T2DM was 9.6 years (3–22). Two techniques were performed, consisting in different combinations of Ileal interposition (II) associated to a sleeve gastrectomy (SG). The following hormones were assayed in the pre and postoperative period (mean of 16months) at the baseline and following specific food stimulation (30-60-120min): GLP-1, GIP, Insulin, Glucagon, C-peptide, Amylin, CCK, PPP, Somatostatin, PYY, Ghrelin, Adiponectin, Resistin, Leptin and IL-6.

Results: 30 patients had the II associated to a sleeve gastrectomy (II-SG) and 28 had an II with a diverted sleeve gastrectomy (II-DSG). GLP1 had an important rise following the 2 operations, especially after the II-DSG ($p < 0.001$). GIP also had an important rise, with both the II-SG and II-DSG been equally effective ($p < 0, 001$). Insulin and amylin had a significant rise at 30 min. Glucagon decreased slightly. CCK measurements were very low after the II-DSG. The PPP was also slightly altered by the II-DSG. PYY had an important increase with both operations ($p < 0.001$). Ghrelin had a significant decrease following the 2 operations ($p < 0.001$). Somatostatin and IL-6 were not affected ($p = 0.632$). Both Leptin and Resistin blood levels decreased. Adiponectin had a slight increase. Mean post-operative follow-up was 19.2 months. Both the II-SG and the II-DSG were effective in achieving an adequate glycemic control (91.2%).

Conclusions: There was a significant hormonal change following the laparoscopic ileal interposition. These alterations may explain the promising good results associated to these operations for the treatment of T2DM in a non-morbid obese population.

20130

S085

LAPAROSCOPIC ILEAL INTERPOSITION ASSOCIATED TO A DIVERTED SLEEVE GASTRECTOMY IS AN EFFECTIVE OPERATION FOR THE TREATMENT OF TYPE 2 DIABETES MELLITUS PATIENTS WITH BMI 21 29

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Introduction: The objective of this study is to evaluate the clinical results of the laparoscopic interposition of a segment of ileum into the proximal duodenum associated to a sleeve gastrectomy (II-DSG) in order to treat patients with Type 2 Diabetes Mellitus (T2DM) and BMI 21–29.

Methods: The laparoscopic procedure was performed in 69 patients. 22 were female and 47 male. Mean age was 51 years (41–63). Mean BMI was 25.7 (21.8–29.2). All patients had the diagnosis of T2DM for at least 3 years and evidence of stable treatment with oral hypoglycemic agents and/or insulin for at least 12 months. Insulin therapy was used by 43.5% of the patients. Mean duration of T2DM was 11 years (3–18). Dyslipidemia was diagnosed in 72.5% and hypertension in 66.7%. Nephropathy was characterized in 29% of the patients, retinopathy in 26.1% and neuropathy in 24.6%.

Results: Overall, 95.7% of the patients achieved an adequate glycemic control ($A1c < 7$) without anti-diabetic medication. $A1c$ below 6 was achieved by 65.2%. Mean post-operative follow-up was 21.7 months (7–42). Mean postoperative BMI was 21.8 kg/m². There was no conversion to open surgery. Median hospital stay was 3.4 days (2–58). Major postoperative complications were diagnosed in 7.3%. There was no mortality. Fasting glycemia decreased from a mean of 218 to 102mg/dl, postprandial glycemia from 305 to 141 mg/dl and Homa IR from 5.2 to 0.77. All associated comorbidities and complications related to T2DM had a significant improvement or control. Arterial hypertension was controlled in 91.3%. Macroalbuminuria was no longer observed. Microalbuminuria resolved in 85% of the patients. Hypercholesterolemia was normalized in 95% and hypertriglyceridemia in 92% of the patients.

Conclusions: The laparoscopic II-DSG was an effective operation in controlling T2DM in a non-obese (BM < 30) population. Associated diseases and related complications were also improved. A longer follow-up period is needed.

BASIC SCIENCE (CELLULAR BIO, PHYSIOLOGY)

18865

S019

19406

S021

CO2-PNEUMOPERITONEUM INDUCES RENAL APOPTOSIS IN A RAT MODEL

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Background: Kidneys harvested by laparoscopic donor nephrectomy regain normal function slightly later than laparotomy-harvested organs. Several factors affect the organs after laparoscopic recruitment, which could explain the relatively prolonged period of recovery. We investigate the role of CO2-induced pneumoperitoneum (PNP) on organ dysfunction as expressed by cell apoptosis.

Methods: CO2-PNP was established in 24 anesthetized Wistar male rats, randomly allocated into one of six groups with intraperitoneal pressure was 0 (control), 5, 8, 12, 15 or 18 mmHg. Pressure was maintained for 60 min. The rats were kept alive for the ensuing 24 hours, after which their abdominal organs were harvested. Various areas of the organs were analyzed for apoptotic cells using the TdT-mediated biotin-dUTP nick-end labeling (TUNEL) method. The cells were randomly counted in 10 eye-shots in three sections, using an ocular micrometer.

Results: Very few TUNEL-positive nuclei were detected in the liver, pancreas or spleen. Isolated TUNEL-positive nuclei were detected within the outer medulla of the control kidneys. Significantly higher numbers of TUNEL-positive nuclei were encountered in all pressurized kidneys ($P < 0.05$), and their numbers increased in parallel with increasing intraperitoneal pressure. In high intra peritoneal pressure groups, 15 and 18 mmHg, the TUNEL-positive nuclei were 1.63 ± 0.18 and 1.95 ± 0.2 , respectively, compared to 0.11 ± 0.02 in the control (0 mmHg) $p < 0.001$.

Conclusions: High pressure CO2-PNP induces apoptosis in the outer renal medulla. This phenomenon may play a role in the temporary injury of laparoscopically-harvested kidneys, and may also explain the slower regaining of their normal function in the post-transplantation period.

19025

S046

19790

S022

POLYPROPYLENE MESH (PPM) OR LIGHT WEIGHT MESH (LWM) IN INGUINAL HERNIA SURGERY (TEP)- RESULTS OF A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

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Objectives of study: Mesh application in endoscopic hernia surgery is universal. Textile, weight and pore size of mesh continue to be debated. LWMs with larger pores seem to address the concerns of host response. Aim of this study was to evaluate the advantages if any of LWMs over PPMs in totally extraperitoneal (TEP) repair of inguinal hernia. Both types of meshes were used in same host to ensure more objectivity to study.

Patients and methods: 30 consecutive candidates for bilateral (B/L) TEP were included without any exclusion criteria. A uniform perioperative protocol was followed with Paracetamol as an analgesic. Diclofenac (NSAID) was used for significant pain (SP) even after Paracetamol use. PPM and LWM were both used in same patient for TEP, one side being repaired with PPM and other with LWM. Side to be repaired with PPM and LWM was randomized. Patients were blind to randomization. Side specific, post-operative data were collected at the end of 1st, 2nd & 3rd week (W1, W2, W3) for soreness in ilioinguinal region (SIR), SP, spermatic cord induration (SCI), infraumbilical soreness (IUS) and seroma (Ser.). In case of bilaterally same symptom, predominant side of symptom was taken as an indicator of end points.

Results: 30 males with bilateral inguinal hernias, 39 years of mean age (17-74) were included and 60 meshes (30 LWM + 30 PPM) used. 36 direct and 30 indirect hernias (6 had both) were found. All the adverse end points were observed more with PPM as shown in the Table [values in () are for LWM].

EndPoint	Left	Right	SIR	SP	SCI	IUS	Seroma	
PPM(LWM)	17(16)	13(14)	30(16)	13(11)	1(0)	10(6)	0(0)	W1
			30(11)	10(7)	12(6)	26(4)	7(5)	W2
			11(5)	3(1)	14(6)	9(4)	8(5)	W3

Conclusion: LWMs are better tolerated as seen by significantly less morbidity on LWM side of repair. Larger studies should be undertaken to further evaluate it.

REAL-TIME DYNAMICS OF NITRIC OXIDE WITHIN THE ESOPHAGEAL WALL

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Objective: Current evidence suggests that the neurotransmitter Nitric Oxide (NO) plays a crucial role in the genesis of aboral propagative of esophageal peristalsis during swallowing. However, direct evidence in this regard is lacking at present. The objective of this study was to measure changes in the level of NO within the inter-muscular interstices of esophagus during normal propagative as well as abnormal esophageal peristalsis in North American opossums (*Didelphis virginiana*).

Methods: Five adult opossums of either sex were included in the study. All had normal esophageal motility as documented by water perfused esophageal manometry. A Calibrated, carbon fiber NO selective microelectrodes (ISNOP30/ISNOP100, WPI, Inc.) was placed within the smooth muscle portion of the esophageal wall and changes in NO levels were measured as pico-amperes (pA) with Apollo-4000 NO meter (WPI, Inc.). NO dynamics in response to reflexive deglutition were assessed during normal propagative peristalsis as well as abnormal esophageal contractions induced by intravenous (IV) administration of neural nitric oxide synthase inhibitor [L-NAME], and banding the gastro-esophageal junction (GEJ) for 4-weeks.

Results: During normal propagative esophageal peristalsis a mean change of $2158.8 [\pm 715.9] \text{pA}$ was recorded by the NO meter. IV administration of L-NAME and chronic banding of GEJ induced high velocity near simultaneous, achalasia like esophageal contractions. A significantly smaller change in the levels of NO was detected within esophageal wall in these situations as compared to normal propagative peristalsis ($331.9 [\pm 188.1] \text{pA}$, $p < 0.001$ and $579.0 [\pm 385.0] \text{pA}$, $p < 0.001$ respectively).

Conclusion: The results of this study indicate that NO mediated inhibitory neurotransmission plays a crucial role in programming normal propagative peristalsis. Larger studies reproducing similar results will be instrumental in providing greater insight into the etiopathogenesis and potential treatments of primary esophageal motility disorders, such as achalasia.

POTENTIAL MOLECULAR PATHWAYS INVOLVING THE RESOLUTION OF TYPE II DIABETES FOLLOWING RYGB

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Background: Following Roux-en-Y gastric bypass (RYGB), hyperglycemia dramatically improves in obese patients with Type II diabetes (T2D). For many patients, hypoglycemic agents and insulin are discontinued after RYGB. However, the exact mechanisms of this process are unknown. This unique study attempts to identify differences in gene expression profiles between pre- and post-operative T2D patients following RYGB.

Methods: Non-diabetic and T2D obese patients undergoing RYGB were included in this study. Pre- and post-operative (3-6 months) blood samples were stabilized in PaxGene tubes (PreAnalytiX) and total RNA was extracted. 100ng of the total RNA was amplified and labeled using the Ovation RNA Amplification System V2 with the Ovation Whole Blood Reagent (NuGen) before hybridizing to an Affymetrix Focus Array containing over 8500 verified genes. Microarray results were analyzed using GeneSpring and Ingenuity analyses to identify a list of genes that were significantly changed ($p < 0.05$). Real-time quantitative (QPCR) was used to verify the genes of interest from the microarray study.

Results: A list of genes related to metabolism was identified by microarray studies comparing obese T2D and non-diabetic patients. A total of 112 genes were up-regulated and 151 were down-regulated in the obese T2D versus non-diabetic patients. Ingenuity analysis identified molecular pathways involving energy metabolism such as beta-catenin like 1 (CTNBL1) and Insulin-like growth factor binding protein 4 (IGFBP4). Using QPCR analyses in post-op T2D patients, CTNBL1 and IGFBP4 were upregulated 4.6 X and 3.8 X, respectively.

Conclusions: This pilot data is one of the first studies to document that blood gene expression profiles are altered after RYGB surgery. Among the genes identified, CTNBL1 expression was increased after surgery. Although the function of CTNBL1 has not been fully elucidated, it shows homology to beta-catenin, which binds to TCF/LEF transcription factor to promote glucose metabolism. Also, the significant upregulation of IGFBP4 in T2D patients after RYGB is notable as IGFBP4 is decreased in animal models with diabetes. Thus, upregulation of these genes may help explain the resolution of T2D in obese patients after RYGB.

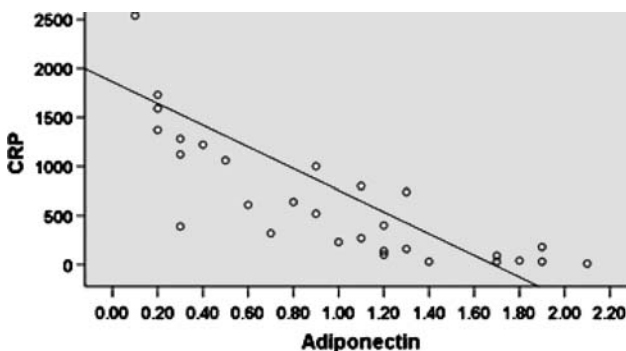
19993

S023

C-REACTIVE PROTEIN CONCENTRATIONS BEFORE AND AFTER GASTRIC BYPASS SURGERY INVERSELY CORRELATE WITH OMENTAL GENE EXPRESSION OF ADIPONECTIN

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Adipose tissue is a key regulator of C-reactive protein (CRP), an inflammatory marker linked to atherosclerosis. Adiponectin, the most abundant adipokine is also an important factor involved in the inflammatory state of obesity. The aim of the study was to assess the impact of gastric bypass surgery (GBS) on the CRP levels and its relation to adipose tissue expression of adiponectin. Methods: Omental and subcutaneous fat biopsies and plasma were obtained from 30 subjects undergoing GBS and 10 subjects after GBS (>12 months postop). Adiponectin gene expression was measured by quantitative PCR and normalized for GAPDH. CRP was measured by a high-sensitivity assay. Results: Omental adiponectin was lower and CRP higher in the group undergoing GBS than in the post-GBS (adiponectin, 0.75 ± 0.5 vs 1.41 ± 0.44 , $p=0.0004$; CRP, 1009 ± 951 vs 120 ± 114 ng/ml, $p=0.005$). As shown in the figure, multivariate analysis revealed that CRP independently correlates with omental adiponectin ($r=-0.703$, $P=0.001$) but not with subcutaneous adiponectin. Conclusions: CRP significantly decreases after GBS upholding a significant negative correlation with omental adiponectin. According to these findings omental adiponectin is a potential mechanism linking obesity with atherosclerosis.



20038

S020

INFLAMMATORY RESPONSE TO NOTES TRANS-GASTRIC SURGERY

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Study Aim: The risk of gastric spillage during transgastric surgery is a concerning potential complication of NOTES procedures. The aim of this study is to determine the risk of sepsis from gastric spillage in a rat survival model by measuring local and systemic inflammatory markers, adhesive disease, and clinical outcomes.

Methods: Under IACUC approval, mini-laparotomy with needle aspiration of either 2cc of gastric contents (study group SG) or sterile saline (control group CG) was injected into the peritoneal cavity of 60 male 250g Sprague-Dawley rats. Animals were kept alive for 14 days, and sacrificed at different time intervals to assess intra-peritoneal inflammation. Inflammatory markers (TNF α , IL-6 and IL-10) were analyzed by ELISA assay and obtained at 1, 6, and 24 hours post-operatively by obtaining plasma levels and peritoneal washings. Animals were clinically assessed for weight gain, regular bowel movements, and level of activity. At necropsy, the peritoneal cavity was examined grossly for adhesions and graded from 1 (mild) to 3 (severe) based on the severity.

Results: There were 2/60 (3%) deaths among the rats in the survival group ranging from 3–14 days. One died from peritonitis and one from unknown causes. The remaining survivors in the SG gained an average of 13 g/week post-operatively compared to the CG that gained 16 g/week ($p>0.05$). No significant difference was seen in bowel movements or level of activity between the two groups. There was a statistically significant difference in the amount of adhesions between the control and study groups, .33 vs.1.58, ($p<0.001$). The mean TNF α levels in the SG vs. CG was 88.2 pg/ml (41- 169 pg/ml) vs. undetectable ($p<0.001$). All values returned to normal at 24 hours. IL-6 and IL-10 levels peaked at a mean of 5893 pg/ml and 810 pg/ml at 6 hours in the SG vs. 6 pg/ml and 0 pg/ml in the CG ($p<0.005$) and returned to near normal levels at 24 hours. All plasma cytokines were undetectable at all time intervals.

Conclusions: The aim of our study was to determine the local and systemic impact of gastric spillage by measuring the inflammatory and clinical response in a rat model. The inflammatory response was found to be a localized event within the peritoneal cavity. While plasma cytokine levels remained normal, peritoneal washings revealed a brisk localized inflammatory response. There was a statistically significant higher rate of adhesive disease in the study group when compared with the control group; this however did not translate into a difference in apparent clinical outcome. We conclude that gastric leakage in this NOTES rodent model induces a localized inflammatory response, and mild to moderate adhesive disease. This may be important in human NOTES.

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COLORECTAL/INTESTINAL SURGERY

18537

S013

THE IMPACT OF THE LIBERAL USE OF CT IN THE WORK UP OF ACUTE APPENDICITIS

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Background: Acute appendicitis has historically been considered a clinical diagnosis, necessitating a CT scan only in the face of equivocal signs and symptoms. The purpose of this study is to determine whether or not the liberal use of CT in the work up of acute appendicitis results in a decreased negative appendectomy rate (NAR).

Methods: The medical records of 940 consecutive patients who underwent emergency appendectomy between January 2002 and December 2006 were reviewed. Data collected included patient demographics, length of stay (LOS), results of contrast enhanced CT scans, emergency department (ED) work up time, and final pathology.

Results: During the study period 940 patients (mean age 34.5 ± 16.7 years, 53% males) underwent emergency appendectomy (64% laparoscopic). Eight

hundred thirteen (86% patients, 50% males) underwent pre-operative CT scans. Final pathology was 76.1% acute appendicitis, 10% acute appendicitis with perforation, 7.7% gangrenous appendicitis, 1.2% acute appendicitis with abscess, 0.7% chronic appendicitis, and 4.3% negative for appendicitis. No difference was noted in the overall appendicitis rate by gender in the CT (Fishers exact test, $p=0.96$) or non-CT group (Fishers exact test, $p=0.75$). Similarly, no difference was noted by age (CT $p=0.14$, non-CT $p=0.26$). The NAR was lower for the CT group (3.4%) compared to the non-CT group (9.4%) ($p=0.002$). The NAR did not differ significantly by gender (Fishers exact test, $p=0.491$). Despite prolonging the ED work up time by 4.3 hours, the perforation rate did not differ between the CT (9.5%) and non-CT (12.6%) groups ($p=0.30$), nor did the LOS (3.67 vs. 3.63 days, $p=0.92$). The sensitivity, specificity, negative predictive value, and positive predictive value of CT scans was 99%, 61%, 68%, and 99%, with an overall accuracy of 98%. The positive and negative likelihood ratios were 2.52 and 0.02 respectively. The ROC for CT scans in predicting appendicitis was 79.8% (95% CI: 76.9%, 82.5%).

Conclusions: The use of CT in the work up of acute appendicitis is associated with a lower negative appendectomy rate, independent of gender and age. The additional time spent obtaining a CT does not appear to increase the risk of perforation nor increase the LOS.

18697

S016

A MULTICENTER STUDY ON 1057 CASES OF LAPAROSCOPIC SURGERY FOR RECTAL CANCER

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Background: The purpose of this study is to clarify of the safety and the feasibility of the short-term and long-term results of the laparoscopic surgery for patients with rectal cancer from the accumulated data of 28 leading hospitals in Japan.

Methods: From May 1994 to February 2006, this study group comprised 1057 patients with rectal cancer located at middle, lower rectum who underwent laparoscopic surgery. Data including morbidity and mortality was obtained and 3-year survival rates were calculated by the Kaplan-Meier method according to the location of the tumor and the UICC staging.

Results: There were 665 males and 392 females. Laparoscopic procedures consisted of 888 anterior resection, 107 abdominoperineal resection, 50 inter-sphincteric resection and 10 Hartmann. Total postoperative morbidity rate was 23.2% and 30-day mortality was not experienced. There were 83 stage 0 cancers, 495 stage I, 197 stage II, 230 stage III and 52 stage IV. Median operation time was 270 minutes (122-789 min.) and it took significantly longer time in Rb/P than Ra tumor ($p < 0.001$) and APR/ISR than AR ($p < 0.001$). Intraoperative blood loss was 90ml. Three-year disease-free survival rate was 89.4% (100% for stage 0, 94.6% for stage I 82.1% for stage II and 79.7% for stage III).

Conclusions: Our data indicate that laparoscopic surgery for rectal cancer seems good short and long term results. Further randomized trials will be necessary to confirm the value of laparoscopic surgery for rectal cancer.

18760

S098

EFFECT OF YOGA EXERCISES ON OUTCOME OF STAPLED HEMORRHOIDECTOMY: RESULTS OF A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

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Objectives of study-The aim of this study was to evaluate the effect of yoga exercises on outcome of stapled hemorrhoidectomy, a safe, popular, day care procedure for prolapsing hemorrhoids (PPH).

Methods and Procedures-Consecutive patients with indications for PPH were randomized into Yoga exercises (YE) i.e. study group and no Yoga exercise (NYE) i.e. control group.PPH was done on day care basis following a uniform perioperative "fast tract module" regimen. Yoga exercises (Mool Bandh) aimed at rectal squeeze, pull and pelvis floor were taught to YE group and continued postoperatively. Analgesic used was Paracetamol. Diclofenac (NSAID) was used only if Paracetamol failed. Data were prospectively collected at the end of 1st week (W1), 2nd week (W2) and 3rd week (W3). The end points were urinary retention (UR), pain requiring NSAID, anal irritation/burning/ pruritus (AIBP), painful defecation (PD), failure to discriminate between flatus or feces (FTD), perianal soiling (PS) at W3 and mean days to resume normal activity (RNA).

Postoperative bleeding and squamocolumnar junction seen on pathology (of resected tissue) were exclusion criteria. Analysis of prospectively controlled data is presented.

Results-72 (56 males, 16 females) patients, 45 years of mean age (17-87 years) were operated. There were two exclusions due to postoperative bleeding. UR & PS (2 & 20 cases respectively) in the control group only. In the Yoga (study) group there was no urinary retention, demand for NSAID & W3 perianal soiling. Rest of results are as shown in the table.

End point	Pain			AIBP			PD			RNA
	W1	W2	W3	W1	W2	W3	W1	W2	W3	Mean(Av.)
Control	34	21	5	22	19	12	34	20	5	6 (4-17)
Study	0	0	0	3	0	0	11	5	0	2 (1-6)

Control(NYE) n = 34; Study(YE) n = 36

Conclusion: Perioperative Yogic exercises for anorectum improve the outcome in PPH significantly & should be combined in PPH as part of treatment.

18925

S102

LAPAROSCOPIC IPAA SURGERY REDUCES ABDOMINAL AND PELVIC ADHESIONS

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Objectives: Adhesions after open abdominal operations cause > 75% of cases of small bowel obstruction. We evaluated adhesions to the anterior abdominal wall and adnexae after laparoscopic ileocecal pouch anal anastomosis (IPAA).

Methods: Patients who underwent laparoscopic proctocolectomy, IPAA and diverting loop ileostomy for Ulcerative Colitis had laparoscopic evaluation of adhesions at closure of ileostomy to assess adhesions to the anterior abdominal wall and to the adnexae. Adnexal adhesions were quantified using the AFS score. We used Chi-squared analysis to compare this result to a previous report of anterior abdominal wall adhesions after open IPAA surgery with and without Seprafilm [1].

Results: Thirty patients (19 female) were assessed. Thirteen women (68%) had no adnexal adhesions, 5 had filmy adhesions on < 1/3 of one adnexa, and 1 patient had filmy adhesions on 1/3 2/3 of one adnexa. No patient had adhesions affecting both adnexae. With respect to anterior abdominal wall adhesions, 63% of patients had no adhesions, while 37% had adhesions after laparoscopic IPAA, compared to 90% after open IPAA ($p < 0.001$) and 66% after open IPAA with Seprafilm ($p < 0.001$) [1].

Conclusions: Laparoscopic IPAA results in fewer adhesions than open operations with minimal adhesions to gynecological organs, potentially reducing the risk of associated infertility.

	Lap IPAA (30)	Open IPAA (61)	Open/Sepra (59)
Abdo Wall-Few	10	8	14
Abdo Wall-Mod	1	25	19
Abdo Wall-Sev	0	21	6
Severity of adhesions in each group			

Reference: 1. Cohen Z. et.al. Dis Colon & Rectum. 2005 Jun;48(6):1130-9

19074

S017

FEASIBILITY OF SELF-APPRAISAL IN ASSESSING OPERATIVE PERFORMANCE IN ADVANCED LAPAROSCOPIC COLORECTAL SURGERY

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Aims: Assessing surgical technical skills (TS) in a structured manner is a topical issue in the current surgical environment. To date there has been no attempt to comprehensively assess both generic and operation specific TS in live advanced laparoscopic colorectal surgery, in this study we aim to develop and validate a new tool which can assesses both generic and operation specific TS in laparoscopic colorectal surgery.

Methods: Hierarchical task analysis was constructed for generic and specific TS on three key laparoscopic colorectal operations: right hemicolectomy, sigmoid colectomy and anterior resection after expert discussions. Weighted likert scales were then constructed individually for generic and operation specific TS for each operation. The operating surgeon and the first assistant (either being the trainer or trainee) assessed each fundamental part of the operation according to the weighted likert scoring system after the operation was completed.

Results: 52 live operations were assessed, performed by 4 Consultants and 6 Trainees. Inter class correlation coefficient between the operating surgeon and first assistant was 0.86, $p = < 0.05$ for generic technical skills and 0.92, $p = < 0.05$ for the operation specific technical skills. Construct validity for both generic and operation specific TS for Consultants and Trainees were significant using ANOVA, $p = < 0.05$.

Conclusions: This new assessment tool of TS in laparoscopic colorectal surgery is reliable, has face, content, concurrent and construct validities. The tool has the possibility of being used as an instant surgical training and appraisal tool, and circumvents watching videos retrospectively, which can take many hours.

19394

S083

DOES INCREASING EXPERIENCE WITH LAPAROSCOPIC COLORECTAL SURGERY INFLUENCE THE OUTCOME OF COMPLEX CASES?

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Objectives: To define major risk factors for intraoperative complications (IOC) in laparoscopic colorectal surgery, and to assess whether surgeon experience influences the outcomes of complex cases.

Methods: Consecutive patients undergoing laparoscopic colorectal procedures from 1991-2005 were analyzed from a prospectively-collected database. All patients referred to the four surgeons involved in this study were offered a minimally invasive approach. Patient characteristics, perioperative variables, and surgeon experience data were analyzed and compared.

Results: A total of 991 consecutive laparoscopic colorectal procedures were studied. The majority of operations were performed for malignant disease (n=526, 53.1%), and most frequently consisted of segmental colonic resections (n=714, 72.0%). A total of 85 (8.6%) IOCs were encountered. Previous intraabdominal surgery (IOC 12.3% vs. 7.6%, p=0.028) and increasing weight (p=0.0047) were identified as major risk factors for IOC. A total of 126 (12.7%) cases were converted to open surgery. Risk factors for conversion were increasing age (p=0.0003) and weight (p<0.0001), history of cardiac disease (p=0.049), previous surgery (p=0.0021), malignancy (p<0.0001), and the presence of an IOC (p<0.0001). Only 40% of patients suffering an IOC required conversion to open surgery. With increasing experience from 1-30 to >120 cases, individual surgeons were found to operate on heavier patients (mean weight 66.7±15 kg vs. 72.3±20 kg, p=0.0229), and on patients who had a higher rate of previous intraabdominal surgery (9.0% vs. 31.5%, p<0.0001). Despite these risk factors, the early and late experience demonstrated no significant difference in terms of IOCs (p=0.538) and conversion to open surgery (p=0.41).

Conclusions: With increasing experience in laparoscopic colorectal surgery, surgeons are referred patients with greater risk factors for intraoperative complications and conversion. Despite this fact, the proportion of patients suffering intraoperative complications or conversion has remained stable.

19415

S018

LAPAROSCOPIC SURGERY FOR CROHN'S DISEASE. AN EXPERIENCE WITH MORE THAN 300 CASES

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Laparoscopic resection for Crohn's disease has had a slow adoption rate in gastrointestinal surgery. This is not unexpected considering the inflammatory nature of the disease process and the need for reoperative surgery.

This study is a retrospective analysis of a prospective database from one surgeon at the Mount Sinai Hospital, New York, NY.

Since 1993, 333 patients with Crohn's disease have undergone 343 laparoscopic procedures. The mean age is 37 (range 15-79). There are 183 females and 150 males. Previous surgery was present in 134 patients with 95 having had at least one prior intestinal resection (29%). Steroids or immunosuppressive medications were present in 100 patients (30%). The indication for surgery was intestinal obstruction (244), abdominal pain (53), unclear diagnosis (14), duodenal obstruction (9), abscess (11), and peritonitis (2). Enteric fistulae were present in 110 patients (32%). They mainly consisted of entero-entero (72), ileo-sigmoid (49), and entero-abdominal wall (33) fistulas. The most common procedures were primary ileocolic resection (165), secondary ileocolic resection (65), and small bowel resection (38). There were four conversions in the series (1.2%). The mean length of stay was 3.9 days in the cases completed laparoscopically. There were no mortalities. The overall complication rate was 11%. There were 18 postoperative bowel obstructions, 8 anastomotic leaks, and 4 occurrences of postoperative bleeding. 13 patients required reoperation in the postoperative period.

Laparoscopic resection is a safe and effective operation for Crohn's disease. This study describes one of the largest series in published literature.

19427

MULTICENTER STUDY OF LAPAROSCOPIC SURGERY FOR COLON CANCER IN JAPAN

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Objective: To evaluate short and long-term results of laparoscopic surgery for colon cancer, we conducted a nationwide survey and prospective randomized controlled trial (RCT) in Japan, supported by Grants for Clinical Cancer Research from the Ministry of Health, Labor and Welfare in Japan. A retrospective nationwide survey: The study group comprised 2036 patients undergoing laparoscopic surgery for colon cancer during the period 1993 to 2002 in 12 advancing laparoscopic surgical units. In 1495 patients with colon cancer, the morbidity and mortality rate was 13% and 1%. Recurrent rate was 4% and the 5-year survival rate was 96.7% for stage I, 94.8% for stage II, and 79.6% for stage III disease. A retrospective, multicenter study demonstrates that laparoscopic surgery for colon cancer is feasible in terms of short and long-term outcomes in Japan.

A randomized controlled trial: A RCT (JCOG0404) has started on November in 2004 to evaluate laparoscopic vs open surgery as the optimal treatment for T3 or deeper colon cancer. Surgeons in 27 specialized institutions will recruit 818 patients. Primary endpoint is overall survival, and secondary endpoints are disease-free survival, short clinical outcome, adverse events, conversion rate from laparoscopic to open approach and completion rate of laparoscopic surgery. To control the quality of surgeries, central review of surgical procedure by photographs is performed in all patients. Total registered cases reach to 620 now.

Conclusions: A long-term oncological outcome of laparoscopic surgery for colon cancer is to be confirmed by our on-going randomized controlled trial in Japan.

19463

S099

LAPAROSCOPIC APPROACH OF COLONIC PERFORATION DUE TO COLONOSCOPY

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Background: Iatrogenic perforation due to colonoscopy is the most serious complication of this procedure. Usually this complication requires segmental resection to be resolved. The laparoscopic approach could be an option to minimize the outcome of this complication.

Objective: The aim of this study was to assess the effectiveness of the laparoscopic approach to treat colonic perforations due to colonoscopy.

Methods: Data were collected retrospectively on all patients who underwent colonoscopy and had perforation between July 1997 and July 2007. Patients with other complications after colonoscopy as well as other colonic perforations were excluded. Patients were divided in two groups; G1 (Group 1): laparoscopic colectomy and G2 (Group 2): open colectomy. Morbidity rate and recovery parameters were evaluated between the groups.

Statistical analysis was performed using student t test and chi square test.

Results: 10233 colonoscopies were performed. 7572 (74%) were diagnostics and 2661 (26%) therapeutics. There were 16 (0.15%) iatrogenic perforations (G1=10 vs. G2=6). The mean age of the patients was 62 ± 12.1 years. There were no differences in patients demography, co-morbidities, and ASA grades between the groups. 9 patients from G1 had segmental colectomy. One patient had a diverting ileostomy associated. Patients from G1 had lower hospital stay and lower complications comparing with G2. [(G1 4.5 ± 2.06 days vs. G2 11.5 ± 8.8 days, p = 0.02) (G1: 1 vs. G2: 5, p = 0.043)].

Conclusions: laparoscopic colectomy is an effective procedure to resolve colonic perforation due to colonoscopy and might offers benefits when is compared with open approach.

19627

S014

MINIMALLY INVASIVE COLON RESECTION IS ASSOCIATED WITH INCREASED SVEGFR1 AND DECREASED SVEGFR2 PLASMA LEVELS EARLY AFTER SURGERY; THE NET IMPACT IS DECREASED BINDING OF FREE VEGF WHICH MAY ACCOUNT FOR INCREASED PLASMA VEGF LEVELS EARLY POST SURGERY

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Introduction: Plasma VEGF levels are increased after minimally invasive colorectal resection (MICR) for both benign and malignant disease. VEGF, which is critical to both wound healing and tumor growth, induces angiogenesis by binding to endothelial cell bound VEGF-Receptor 1 (VEGFR1) and VEGF-Receptor 2 (VEGFR2). Soluble VEGF-Receptor-1 (sVEGFR1) and soluble VEGF-Receptor-2 (sVEGFR2), which are not capable of signal transduction, bind VEGF in the bloodstream and decrease the levels of free VEGF in the plasma, thus, decreasing VEGF's proangiogenic effect. To better understand the etiology of the surgery-related VEGF increase it is necessary to determine surgery's effect on sVEGFR1 and sVEGFR2. The purpose of this study was to assess the plasma levels of these 2 proteins after MICR for non-malignant indications.

Methods: Blood samples were obtained preoperatively (preop) and on postoperative day (POD) 1 and 3 in patients undergoing MICR for benign indications (n=24). In 8 patients a 4th specimen was obtained between POD 7 and 13. sVEGFR1 and sVEGFR2 levels were determined via ELISA. The mean and SD were determined for each parameter and time point. The POD 7-13 specimens were bundled and considered as one time point. t-test was used for the analysis and inverse transformation was performed to transform sVEGFR1 data to normal distribution. (Significance level $p < 0.05$).

Results: The preop mean sVEGFR2 value (9562 pg/ml, +/- 2175) was much higher than the sVEGFR1 result (150 pg/ml, +/-149). In regards to sVEGFR2, the POD 1 (7297 pg/ml, +/-2250) and POD 3 (7481 pg/ml, +/- 2305) results were significantly lower than preop. In contrast, when compared to preop values, sVEGFR1 levels were significantly higher on POD 1 (226 pg/ml, +/- 149) and remained elevated on POD 3 (177 pg/ml, +/- 98, $p=0.052$). There was no difference from baseline noted for either protein at the POD 7-13 time point.

Conclusions: MICR significantly decreased sVEGFR2 levels while it increased sVEGFR1 levels on POD 1 and 3. Because of the much higher preop sVEGFR2 value, the net effect is to decrease free VEGF binding in the blood. Whereas late postop plasma VEGF elevations may be secondary to wound healing, the increase in plasma VEGF levels noted early post op may be related to the sVEGFR2 changes which are short lived.

19715

S101

LAPAROSCOPIC ASSISTED SURGERY FOR RECTAL CANCER. OUR EXPERIENCE AND RESULTS IN 430 CASES

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Introduction: Laparoscopic assisted surgery for rectal cancer is still a challenge for surgeons. Actually colorectal surgeons believe that total mesorectal excision provides favorable oncologic results for the treatment of rectal cancer and more and more believe that laparoscopic approach is a good and safe approach to do it. The present study is a feasibility study that shows that total mesorectal excision can be safely performed by laparoscopic approach with good results.

Objective: The objective of this paper is to assess the results of rectal cancer patients treated by laparoscopic techniques.

Methods: From March 1998 to July 2007 all patients with an adenocarcinoma of the rectum admitted to our unit were evaluated to be operated by laparoscopic approach.

Results: Four hundred and thirty patients (272 male and 158 female) were included with a mean age of 66.83 years. Surgical technique was: 226 low anterior resections with total mesorectal excision, 75 abdomino-perineal, 86 anterior resections, 30 Hartmann's procedure, 11 colostomy and 2 proctocolectomy. Protective loop ileostomy was performed in 144 patients (45.85% of patients with sphincter preservation). Conversion to open approach rate was 13.48% (28 because of difficult dissection, 23 adjacent organs infiltration, 2 bleeding, 3 hipercarbia and two urethral section). 34 patients presented anastomotic leakages (10, 82% of resections with anastomosis). Mean hospital stay was 7 days and the starting of the oral intake was 48 hours. The mean of lymph nodes was 13.3. In this group of patients we made a learning curve study comparing the first 50 cases and last 50 with better results in the second group in terms of surgical time, extent of resection and conversion rate.

Conclusion: Laparoscopic surgery in patients with adenocarcinoma of the rectum can be safely performed. Short term results are good and large term results are similar than conventional techniques and as long as we get into the learning curve we get shorter hospital stay and less conversion rate.

19939

S015

DOES INCISION LENGTH HAVE ANY IMPACT ON SHORT TERM BENEFITS OF LAPAROSCOPIC COLON SURGERY?

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Introduction: With the recent introduction of hand-assist devices in laparoscopic colorectal surgery, there is renewed interest in the impact of incision length. The aim of this study is to define the impact of incision length on short-term postoperative outcomes. **Methods:** Consecutive patients undergoing laparoscopic left-sided colorectal resection by 4 surgeons from 4 different academic centers from 1991 to 2005 were retrieved from a prospectively-collected database. The association between incision length and patient characteristics, diagnosis and perioperative outcomes were analyzed, using logistic regression, Spearman correlation coefficient and Wilcoxon test.

Results: 459 laparoscopic colon resection (left, sigmoid, anterior and low anterior) were retrieved. 111 patients were excluded (77 for missing data on incision length, 19 converted to open surgery, 15 with incision length 9 cm were considered open). A total of 348 cases were included in this study. Mean incision length was 5.03 ± 1.07 cm. The majority of operations were performed for malignant disease (n=176, 52%). Increasing weight is directly correlated with increasing incision length ($p=0.0002$). Mean of incision length is slightly longer in males (5.2 cm) than in females (4.85 cm, $p=0.0029$). Age, previous surgery, diagnosis (including malignancy) and days to discharge from hospital showed no significant relationship with incision length up to 9 cm. No association was observed between the incision length and intraoperative ($p=0.25$) and postoperative complications ($p=0.54$) using the logistic regression test.

Conclusion: Patients with larger extraction incision (up to 9 cm) may have the same short-term benefits of laparoscopic surgery than smaller incision group. To keep the short-term benefits of laparoscopy, surgeons should try to complete left colon surgery using minimally invasive techniques even when larger extraction incision is needed.

19947

S100

WHAT IS THE DEFINITION OF "CONVERSION" IN LAPAROSCOPIC SURGERY AMONG COLORECTAL SURGEONS? A SURVEY AMONG SAGES AND ASCRS

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Background: Various definitions are used in the literature to define conversion, rendering comparison among studies difficult. A web-based and postal survey was conducted among colorectal surgeons representing the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the American Society of Colon and Rectal Surgeons (ASCRS) regarding their definition of conversion during laparoscopic colorectal surgery and, consequently, determine the most commonly used definition. **Materials and Methods:** The multiple choice questionnaire included 3 parts: surgeon information (type, volume and time period of practice), various definitions for conversion, and 4 clinical scenarios. Surgeons were asked to check the definition(s) they considered best described conversion. **Results:** 25% responded out of 1000 surgeons; approximately half have a private based practice. 53% have more than 10 years experience while 35% have 5-10 years. 35.9% perform more than 50 cases of laparoscopic colon surgery per year; however, only 12% perform more than 25 laparoscopic rectal cases per year and 60% perform less than 10. 68.4% agreed that any incision made earlier than initially planned to complete the procedure should be considered as conversion. 81.4% felt that an incision > 5 cm is not considered a conversion; 53.4% considered an incision > 10 cm a conversion while 37% did not. Neither extracorporeal vessel ligation (73.8%), bowel resection (81.2%), anastomosis (77%), nor incision made for specimen retrieval (91.1%) was counted as conversion. Regarding clinical case scenarios, 62% regarded an incision made to facilitate phlegmon dissection after laparoscopically mobilizing the left colon up to and around the splenic flexure to be laparoscopic-assisted. 55.6% considered a 10 cm incision required for fistula take-down after completion of laparoscopic dissection as conversion. A 10 cm incision made for the rectal dissection in rectopexy and anastomosis was described as conversion in 51% but laparoscopic-assisted in 49%. Increasing a 5 cm incision to 12 cm for specimen extraction was considered laparoscopic-assisted in 49.3%. **Conclusion:** The majority of surgeons clearly consider any incision made earlier than planned as a conversion, but not extracorporeal vessel ligation or bowel resection-anastomosis. However, there are still conflicting views of conversion regarding incision length and some clinical situations, which may influence published and presented outcomes among various centers. Definitions of conversion used in practice are much more liberal than published definitions, thus explaining the low conversion rates.

COMPLICATIONS OF SURGERY

18402

S105

MESH COMPLICATIONS AFTER PROSTHETIC REINFORCEMENT OF HIATAL CLOSURE. A 29 CASE SERIES

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Background: Primary laparoscopic hiatal hernia repair is associated with up to a 42% recurrence rate. This has led to the use of mesh for crural repair, which has resulted in an improved recurrence rate (0–24%). However, mesh complications have been reported. **Methods:** We compiled three cases and our senior author contacted other experienced esophageal surgeons who provided 26 additional cases with mesh related complications. The data collected was merged into an excel 2003 spread sheet for analysis.

Results: All patients underwent laparoscopic surgery for a large hiatal hernia. Twenty six had a concomitant Nissen fundoplication and three a Toupet fundoplication Mesh types placed were polypropylene n = 12, PTFE n = 10, small intestine submucosa n = 3 and dual mesh n = 4. Primary symptoms associated with the complications were dysphagia n = 23, vomiting n = 1, regurgitation n = 2, obstipation and abdominal distention n = 1, chest pain n = 1 and weight loss n = 1. Pre-operative findings were intra-luminal mesh erosion n = 7, hiatal stenosis n = 18 and extensive adhesions n = 4. Six patients required an esophagectomy, two patients a partial gastrectomy, 4 patients did not need surgery with one patient having a stent placement in this group and the remainder had mesh removal by laparoscopy or open surgery. There was no immediate operative mortality, however, 5 patients have severe gastroparesis and two patients are dependent on tube feedings. The remainder of patients had a satisfactory outcome.

Conclusion: Further prospective studies are needed to determine the place for mesh reinforcement of the crural closure.

19657

S111

VENOUS THROMBOEMBOLIC EVENTS AND RISK STRATIFICATION: EVALUATION OF SHORT VS PROLONGED PROPHYLAXIS IN BARIATRIC PATIENTS

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Introduction: The risk of a venous thromboembolic event (VTE) after bariatric surgery remains a significant source of morbidity, mortality, and liability. A survey of ASBS members showed the incidence of DVT/PE after open bariatric surgery to be 2.63% and 0.95% respectively. Reviews of the laparoscopic literature demonstrate a risk of symptomatic VTE to be 0.8-2.4. The purpose of this study is to identify a baseline risk profile and evaluate a short hospital-based prophylaxis protocol and a longer post-hospital protocol for bariatric surgery patients.

Methods: A retrospective database was maintained and reviewed. Patients undergoing laparoscopic gastric bypass, laparoscopic gastric sleeve, and revisional procedures were included. We stratified the patients into two groups: "Low risk" patients were age < 50 and BMI < 50; "High risk" patients were age > 50 or BMI > 50. All patients received postoperative enoxaparin 30 mg every 12 hours beginning 8 hours after surgery while hospitalized. All underwent treatment with compression devices. High risk patients maintained the enoxaparin therapy for 10 days post-operatively. The incidence of DVT was assessed by complete lower extremity venous Doppler preoperatively and at 2 weeks postoperatively.

Results: 390 patients met criteria to be included in the study. The "low risk" group included 147 patients (123 female, 24 male) and had an average length of stay (LOS) of 1.15 days (1-3). This group received an average of 2.2 postoperative doses of enoxaparin. There were no VTE events seen and no significant bleeding events in the low risk group. The "high risk" group included 243 patients (180 female, 63 male) and had an average LOS of 1.32 days (1–15). 3 patients had a VTE. 2 patients had a DVT and 1 patient had a DVT and nonfatal PE. There were 2 significant bleeding complications requiring transfusion. Incidence of DVT/PE of 0.77% and 0.26% overall and 1.23% and 0.41% in the high risk group.

Discussion: VTE risk stratification in surgery patients has been addressed by both SAGES and ASBS. Current recommendation includes compression devices and pharmaceutical prophylaxis while hospitalized. We demonstrate a short course of enoxaparin while hospitalized (average 2.2 doses in our study) for low risk bariatric patients is safe and effective for DVT/PE prophylaxis. Prolonged prophylaxis after discharge in high risk bariatric patients (BMI or age greater than 50) is effective for achieving a low incidence of VTE and bleeding.

18986

S106

PERITONITIS FROM PEG TUBE INSERTION AND ENSUING COMPLICATIONS IN SURGICAL ICU PATIENTS: IDENTIFICATION OF RISK FACTORS AND CLINICAL OUTCOME

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Objective: Percutaneous Endoscopic Gastrostomy (PEG) tubes are routinely placed in Surgical Intensive Care Unit (SICU). Poor tissue healing or technical issues after tube insertion can lead to peritonitis requiring a laparotomy. Risk factors leading to this major complication are not identified.

Methods: We conducted a retrospective review of all PEG tubes inserted in SICU patients from 2003 to 2006. The procedure was performed by 2 surgical intensivists. Patients' age, sex, BMI, organ dysfunction scores, vasopressor use, fluid status, steroid use for medical reasons and nutritional status were noted. Peritonitis requiring laparotomy and mortality were among the outcomes. Multivariate logistic regression was used for data analysis (SAS v9.1).

Results: Out of 322 patients, 16 (5%) patients needed a laparotomy for peritonitis and 74 (23%) patients expired during the hospital stay. Higher BMI and serum albumin lower than 2.5 were major predictors of the need for a laparotomy (p-value 0.0005 and 0.0008 respectively). Patients with BMI > 30 and albumin < 2.5 were 25 times more likely to need laparotomy (95% CI 7.74-83.3). Mean duration between tube placement and laparotomy was 11 days. Additionally, patients requiring a laparotomy were 5 times more likely to expire during the hospitalization compared to patients not requiring a laparotomy [p-value 0.004, 95% CI 1.68-13.07]. Mean duration between laparotomy and death was 23 days. All 16 patients developed signs of sepsis and worsening abdominal examination. Dislodged tube with gastric wall not opposed to the abdominal wall was the most common finding at the time of laparotomy. There was no difference in the outcome of 2 surgeons who performed the procedure.

Conclusion: About 5% of patients undergoing PEG tube insertion in SICU require laparotomy for peritonitis and are more likely to expire from ongoing multiple medical problems. Higher BMI and lower serum albumin, by contributing to poor healing, increase the chances of needing a laparotomy.

19691

S103

EARLY REOPERATION – A QUALITY PARAMETER FOR MONITORING LAPAROSCOPIC SURGERY ?

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Background: The science of surgical quality measurement is evolving!

The need for unplanned early reoperation usually represents a major adverse event in the patient's postoperative course. Unplanned early reoperations were suggested as a possible quality indicator in general surgery. There are only a small number of prospective studies concerning this issue in general surgery, and no reports about What are the acceptable, reoperation rates, post laparoscopic surgery. The aim of this review was to assess the incidence and outcome of reoperation for laparoscopic surgery as a practical quality indicator **Methods:** retrospective review of medical records.

Study population: All patients operated between 1/1/98 17/8/2003

Inclusion criteria: Early reoperation was defined as a second surgical procedure within thirty days, required due to a complication resulting from the index operation

Results: The number of Patients meeting inclusion criteria was 335 /16071 (2.1%) of which 241/7360 (3.36%) underwent laparotomy, 47/4093 (1.12%) laparoscopy and 47/4618 (1%) other incisions. The rates of the common "classical" indications for re-exploration were all higher post laparotomy comparing to post laparoscopy (sepsis 1.37% vr 0.66%, bleeding 0.66% vr 0.2%, bowel obstruction 0.43% vr 0.07% and wound failure 0.44% vr 0.05%).

In 15/47 (31.9%) of the post laparoscopy patients, the need for re-exploration may be related directly to a complication of the laparoscopic technique. The most common indications for reoperation in this group was missed enterotomy (8/15 53%), bile leak (3/15 20%), trocar site hernia (2/15 13%), Misinterpretation of anatomy & vascular compromise of unrelated organ (2/15 13%).

In 52/288 (18%) of the post non laparoscopic group the re-exploration was Negative/Non therapeutic versus 10/47 (21%) of the laparoscopic group.

Mortality rate was 40/335 (11.9%) of reoperated patients and 3/47(6.4%) of the post laparoscopic group. The highest mortality was seen with in the patients that were reoperated due to sepsis - 19%.

Conclusions: the unplanned re-exploration rate is lower post laparoscopic surgery than post laparotomy and it's about 1%. This difference may be due to the severity of underlying diseases or the complexity of the procedures. The use of laparoscopic technique has a potential for unique "laparoscopic related" complications.

Most common factors affecting morbidity & mortality are the reason of reoperation. Reoperation rates constitute a convenient parameter for monitoring quality in surgical services

EDUCATION/OUTCOMES

18446

UTILIZATION OF LAPAROSCOPIC AND OPEN INGUINAL HERNIA REPAIR

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Background: Laparoscopic inguinal hernia repair is a safe and effective treatment for inguinal hernias, and is considered by some to be the procedure of choice for recurrent inguinal hernias. Little is known, however, about the frequency with which laparoscopic inguinal hernia repair is performed and the determinants of its utilization.

Methods: We performed a retrospective cohort study of all patients undergoing outpatient inguinal hernia repairs in Florida in 2002 and 2003, using the AHRQ State Ambulatory Surgery Database. We compared patient demographics, indication for procedure, location of procedure (hospital or ambulatory surgery center), and charges for laparoscopic and open repairs.

Results: Of 58, 172 outpatient inguinal hernia repairs, 11, 351 (19.5%) were performed laparoscopically. In the subset of 6, 221 recurrent inguinal hernias, only 1, 276 (20.5%) were performed laparoscopically. Patients undergoing a laparoscopic repair were younger (52.7 vs. 57.4 years, $p < 0.001$), more likely to be of white race (84.4% vs. 79.3%, $p < 0.001$) and more likely to have private insurance (62.0% vs. 47.2%, $p < 0.001$) compared to those undergoing open repair. Laparoscopic repairs resulted in higher charges than open repairs (\$12, 087 vs. \$7, 580, $p < 0.001$). Laparoscopic repairs were less commonly performed at ambulatory surgery centers (ASCs) than at hospitals (13.7% vs. 20.9%, $p < 0.001$), although ASCs had significantly lower charges for laparoscopic hernia repairs than did hospitals (\$6, 973 vs. \$12, 860, $p < 0.001$).

Conclusions: The laparoscopic approach is used in only a small fraction of initial and recurrent inguinal hernia repairs, and is used more commonly at hospitals than at ASCs. The use of laparoscopy for inguinal hernia repair appears to be driven by financial considerations as well as by clinical indications.

S047

19158

INTRAOPERATIVELY-ACQUIRED OBJECTIVE MEASURES TO MONITOR LAPAROSCOPIC SKILLS

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Introduction: Standard skill evaluation methods in the operating room (OR) include direct observation and checklists; both are time consuming and subject to bias. Objective assessment systems have been proposed for simulators using dexterity measures. However, motor performance in simulators can differ from that in the OR, so monitoring motor performance in the OR is necessary to supplement evaluations of performance on simulators. The purpose of this study was to evaluate the feasibility of using quantitative measures acquired in the OR to distinguish between levels of laparoscopic skill development.

Methods: We observed two sets of subjects representing two stages of training: 3 residents (4th year), and 3 experts (attending surgeons) performing 3 Laparoscopic Cholecystectomies. Electromagnetic position sensors were attached by the surgeons to a Maryland dissector and an atraumatic grasper. From the tools' positions, we extracted measures related to time, kinematics and movement transitions. Various methods such as the Kolmogorov-Smirnov (K-S) statistic and the Jensen-Shanon Divergence (JSD) were used to provide intuitive dimensionless difference measures ranging from 0 to 1. These scores were used to compare residents and expert surgeons executing two key surgical tasks: exposing Calot's Triangle and dissecting the cystic duct and artery (CD/CA).

Results: The triangle exposure task separated the two groups more clearly than the dissection task. We found significantly larger between-group than within-subject variability (ANOVA $p < 0.05$). We assessed procedure-to-procedure variability using K-S values for kinematics and time profiles and JSD values for movement transitions and found that kinematic measures most strongly differentiated between surgical levels.

Conclusions: We used time, kinematic and movement transition measures as our intraoperative performance measures. Kinematics proved to be the most effective performance measure to use to differentiate between skill levels. Moreover, the degree of discrimination depended on the type of surgical task used for comparison. We conclude that objective assessment of surgical motor behaviour is likely feasible in the OR context.

S030

18752

DOES ACCESS TO MINIMALLY INVASIVE SURGERY ACCOUNT FOR RACIAL DIFFERENCES IN SURGICAL OUTCOME

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Introduction: Minority populations consistently demonstrate poorer medical and surgical outcomes. Given that surgery is a rapidly evolving field, we hypothesized that poorer surgical outcomes by black patients are related to lack of access to minimally invasive surgery (MIS).

Methods: We used data from the Nationwide Inpatient Sample, a 20% stratified random sample of patients admitted to US hospitals. Utilizing standard ICD-9 diagnostic and procedure codes we identified all patients who underwent gastric bypass, fundoplication and appendectomy in 2004. Next, we determined use of MIS, surgical complications, and mortality as a function of race. Using logistic regression, we determined the effect of race on mortality after adjusting for patient factors, hospital characteristics and access to MIS.

Results: In 2004, a total of 88, 545 patients underwent gastric bypass, fundoplication, and appendectomy in the U.S. Patients treated with MIS had significantly reduced morbidity and mortality ($p < 0.0001$). Blacks and whites sought treatment at high volume hospitals in the same proportion; yet, compared to whites, blacks were 20% less likely to undergo MIS as the mode of surgical technique ($p < 0.0001$) and 38% more likely to die during hospitalization ($p < 0.05$). Blacks were also more likely to experience respiratory complications (4.49% vs. 3.53%; $p < 0.0004$), heart complications (0.09% vs. 0.03%; $p < 0.04$) other infections (1.94% vs. 1.30%; $p < 0.0002$), and surgical misadventures (8/10, 000 vs. 2/10, 000; $p < 0.0009$) as compared to whites, respectively. In the regression analysis, after adjusting for surgical volume, patient demographics, comorbidity level, hospital characteristics, teaching status, rurality, and access to MIS, black patients experienced persistently increased mortality, respiratory complications, heart complications, other infections, and surgical misadventures as compared to whites ($p < 0.05$).

Conclusions: Blacks are significantly less likely to have MIS and more likely to have a mortality or other complication after surgery as compared to whites. Poorer surgical outcomes experienced by black patients are not explained by lack of access to MIS.

S079

19408

VALIDATION THAT A ONE-YEAR FELLOWSHIP IN MINIMALLY INVASIVE/BARIATRIC SURGERY CAN ELIMINATE THE "LEARNING CURVE" FOR LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS (LRYGB): FELLOWS' FIRST 100 CASES IN PRACTICE REPLICATE THE QUALITY OF THEIR TRAINING INSTITUTION

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Introduction: The concept that advanced surgical training can reduce or eliminate the "learning curve" for complex procedures makes logical sense but is difficult to verify and has not been tested for LRYGB. We sought to determine if minimally invasive/bariatric surgery fellowship graduates would demonstrate complication-related outcomes (CRO) equivalent to the outcomes achieved during their training experience under the supervision of experienced bariatric surgeons.

Methods: We compared CRO for the first 100 consecutive LRYGBs performed in practice by 5 consecutive minimally invasive/bariatric fellows at new institutions (total 500 cases) to CRO for the 611 consecutive LRYGBs performed during their fellowship training experience under the supervision of 3 experienced bariatric surgeons at the host training institution.

Results: The two patient groups did not differ demographically. The 18 types of major and minor complications identified after LRYGB did not differ among the 5 fellowship graduates. The mentors' CRO were compatible with published benchmark data. As compared to the training institution data, the overall incidence of complications for the combined experience of fellowship graduates did not differ statistically from that of the mentors. The fellowship graduates' early experience included zero non-gastrojejunostomy leak (0% vs. 1.5%) and a low rate of anastomotic stricture (0.8% vs. 3.0%), incisional hernia (1% vs. 4.4%), bowel obstruction (0% vs. 3%), wound infection (0.3% vs. 3.1%) and gastrointestinal hemorrhage (0.2% vs. 1.6%). The rate of gastrojejunostomy leak (1.8% vs. 2.6%) and, most importantly, mortality (0.8% vs. 0.7%) did not differ between the two groups.

Conclusions: Fellowship graduates achieved high quality surgical outcomes from the very beginning of their post-fellowship practices which are comparable to those of their experienced mentors. These data validate the concept that advanced surgical training can eliminate the learning curve often associated with complex minimally invasive procedures, specifically LRYGB.

S025

19430

S054

WHEN SURGERY STOPS: A QUANTITATIVE VIDEO ANALYSIS OF WORKFLOW DURING LAPAROSCOPIC SURGERY

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Introduction: Interruptions in surgical workflow has been shown to lead to OR inefficiencies and patient injury; however, we lack knowledge as to what causes these interruptions and to what degree these interruption affect the procedure time (PT). Workflow is a result of teamwork, thus interruptions were analyzed based on their effect on the teamwork rather than individual performance. This project analyzed 5 cases of laparoscopic surgery to identify team activities inside the OR that are not directly related to the on-going surgery (non-surgery related activities - NSRA) and examine their impact on surgical workflow.

Methods: We have captured 25 cases of laparoscopic anti-reflux surgeries performed by an expert laparoscopic surgeon at Legacy Health System in 2006. For all 25 cases both the room view and the laparoscope view were recorded and synchronized with the audio. As a pilot study 5 of these cases have been analyzed. From these 5 cases we have identified all of the NSRA occurring in the OR. The NSRA are further categorized based on their impact on PT. The duration of the NSRA along with the PT was calculated using JVideo (analysis software).

Results: Average procedure time of these 5 cases is 120 min. The most common NSRA occurring in the OR during surgery was talking, which occurred in the OR for 22.3 \pm 14.0 min, on average (18.6% of procedure time), followed by instrument change (11.0 \pm 4.5; 9.2%), phone call/page (10.2 \pm 13.4; 8.5%), and shift/break or position change (2.4 \pm 1.2; 2%). Not all NSRA stop the workflow of the surgery, in most instances surgery continued while some of the surgical team were participating in NSRA. On average NSRA stopped surgery 4.1 min per case (3.4%). Stops in surgical workflow are mainly caused by instrument inavailability and surgeons and assistants changing positions.

Discussion: All NSRA affect the surgical performance in some way. NSRA that don't stop the workflow are still unfavorable because they can distract the surgical team and decrease team performance. NSRA that delay surgical workflow lengthen PT, which increases costs. In this project NSRA stopped surgical workflow for 4.1 min. This is likely due to the superior work of a dedicated team. We expect this number will go up when surgery is performed by a non-dedicated team on a wider range of surgical procedures. By identifying NSRA that delay surgical workflow we can implement measures to prevent the delay of surgery and increase OR efficiency.

19434

S028

A MODEL FOR LONGITUDINAL MENTORING AND TELEMENTORING OF LAPAROSCOPIC COLON SURGERY

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Objective: To demonstrate the feasibility of longitudinal mentoring and telementoring of community surgeons in laparoscopic colon surgery.

Methods: A formal mentoring protocol was established between a university centre and surgeons at a local 134 bed community hospital 60km away. The community surgeons (CS) attended a didactic course on laparoscopic colon surgery before attending surgery at the mentoring institution. Equipment at the community hospital was evaluated and upgrades recommended. Patients were identified from the CS practice and referred for approval through formal consultation with the mentor. The mentor worked with the same two CS on every case in their local hospital. Procedure outcomes were recorded using CAESaR (Canadian Advanced Endoscopic Surgery Registry) practice audit software. The mentoring endpoint was 20 cases based on ASCRS/SAGES guidelines.

Results: From March 2006 to August 2007, 40 patients underwent elective colon surgery by the CS, 20 of whom were referred and accepted for laparoscopic mentoring. The remaining 20 had open surgery. After the first nine cases the MS did not scrub and provided verbal guidance only. Beginning with case 15, procedures were telementored with the exception of a subtotal colectomy for which the MS assisted. Patients selected for laparoscopic mentoring (7F, 13M) as compared to open unmentored cases (8F, 12M) were younger (60 \pm 13yrs vs. 72 \pm 17yrs, $p=0.013$), less likely to have cancer (50% vs. 70%, $p=0.33$) and tended to require less complex resections (11 right, 7 sigmoid, 1 subtotal colectomy, 1 anterior resection vs. 5 right, 5 sigmoid, 4 subtotal, 2 transverse, 1 left colectomy, 3 anterior resections). There were no conversions. Mentored cases took longer operating time (150 \pm 43 min vs. 108 \pm 40 min, $p=0.003$) but resulted in shorter hospital stay (median 2.5 vs. 7.0 days, $p<0.001$) and trended toward lower wound complications (5% vs. 30%, $p=0.086$). Median number of lymph nodes were equivalent in cancer resections (13 vs. 12, $p=0.465$) There were no technical difficulties with telementoring. Data will be recorded for a further one year to assess adoption rate and outcomes.

Conclusions: This project demonstrates the feasibility of longitudinal mentoring and telementoring of laparoscopic colon surgery. Mentored patients were selected and had better outcomes than the concurrent group of open cases. This program may serve as a model for safe technology transfer to the community.

19531

S027

LAPAROSCOPIC NISSEN FUNDOPLICATION ASSESSMENT: TASK ANALYSIS AS MODEL FOR THE DEVELOPMENT OF A PROCEDURAL CHECKLIST

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Objective: Learning an advanced laparoscopic procedure is a complex process that requires clinical exposure, direct teaching, and deliberate practice. However, expert laparoscopic surgeons automate their knowledge making it difficult to teach all of the incremental steps. The aim of this study was to deconstruct the operative steps of a laparoscopic Nissen fundoplication (LNF) and develop a procedural checklist to be used for resident assessment.

Methods: A behavioral task analysis was conducted with five experts using the Delphi technique to identify all steps of a LNF. The Delphi survey included a video analysis of expert performance, two electronic iterative rounds and a final group interview to reach consensus. The created checklist was then used to assess the performance of 14 general surgery residents (3 R2s, 6 R3s, 4 R4s, 1 R5), all with previous clinical experience on the Foregut Surgery Service. Participants were asked to view an instructional video created prior to the development of the checklist, and complete the procedure on a porcine model. Laparoscope video recordings of resident performance were analyzed using the created procedural checklist by a blinded observer.

Results: Results of the Delphi survey produced a 65 step procedural checklist with four major components (crural dissection, crural closure, fundic mobilization and creation of fundoplication). Thirteen of fourteen participants completed the procedure; 1 pig died during the operation. The median score for all residents who completed the procedure was 31 (range 13-38). The checklist median total score for senior residents (35.5, 34-38) was significantly higher than junior residents (29.5, 13-36) ($p=0.0162$). All residents were able to demonstrate knowledge of most of the major elements of the procedure as 13 dissected the crura and created the fundoplication, 12 closed the crura and 11 mobilized the fundus. Residents frequently failed to complete (>25%) several essential steps including identification and protection of the anterior vagal nerve, complete dissection of the crura to the decussation and mobilization of the esophagus into the mediastinum.

Conclusions: The Delphi technique was successful in reaching expert consensus on the procedural tasks of a LNF and in creating a valid checklist. Application of this instrument demonstrated resident knowledge of major procedural steps as well as gaps about important details of the operation. By capturing automated knowledge in a checklist form, we can scaffold resident learning and close this gap. Additional psychometric testing is needed for implementation as a high stakes assessment of surgical performance.

19826

S029

DO HYBRID SIMULATOR-GENERATED METRICS CORRELATE WITH CONTENT VALID OUTCOME MEASURES?

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Objective: Hybrid simulators provide objective metrics for laparoscopic task performance. The aim of this study was to evaluate the correlation between hybrid simulator-generated metrics and content valid outcome measures.

Methods and Procedures: Residents underwent training with a previously validated 5-task simulation model (5-TSM). Tasks included: clip/divide vessel, excise lesion, loop appendectomy, mesh placement with tacks, and suture perforation with intracorporeal knot tying. After training residents were tested using a hybrid simulator (ProMISTM) with previously validated passing scores. Content validity was defined as the extent to which outcome measures departed from clinical reality. Content valid outcome measures (accuracy error [mm], knot slippage, leak, operating time [sec], tissue damage [mm]) were evaluated by two blinded raters. Interrater reliability (IRR) was assessed using kappa (k) coefficient. Hybrid simulator-generated metrics were path length (mm) and smoothness (jerk cm/sec³) of movements. Correlations between metrics and outcome measures were analyzed with Spearman rho coefficient. Values are given as means (standard deviation not shown). Results: Over 23 months, 20 residents underwent training with 5-TSM. For tasks 1-5, path length (mm) was 3895, 3472, 4620, 2408, 9089, respectively; smoothness (jerk cm/sec³) was 346, 455, 549, 264, 910; accuracy error (mm) was 0.45, 2.20, 0.55, 0.87, 0.20; knot slippage was 5%; there were 0 leaks; operating time (sec) was 54, 61, 135, 43, 130; tissue damage (mm) was 0, 0.28, 0, 0.8, 0. IRR was > .80 for all outcome measures except tissue damage $k = .52$. There was correlation between path length and operating time ($\rho = .537$ -.709; $P < .05$) in all tasks. There was no correlation between path length and accuracy error, knot slippage, leak, and tissue damage. There was no correlation between smoothness and all outcome measures in all tasks except for operating time ($\rho = .762$ -.958; $P < .05$). Conclusions: Although there was an expected strong correlation between hybrid simulator-generated metrics and operating time, this study showed no correlation between these metrics and content valid outcome measures such as accuracy error, knot slippage, leak, and tissue damage.

20053

SURGICAL SIMULATION IN AFRICA: THE FEASIBILITY AND IMPACT OF A THREE DAY FLS COURSE

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Introduction: Although simulation is now considered important for learning technical skills, there is very little literature assessing the use of simulation in resource restricted countries. The purpose of this study was to determine the feasibility and impact of a three day Fundamentals of Laparoscopic Surgery (FLS) course in Botswana, Africa. **Methods:** A total of 20 surgeons and trainees participated in a 3 day FLS course. A pre-test FLS score was obtained for each subject, followed by 2 days of practice with feedback. A final FLS post-test score was then obtained. Participants also watched the FLS instructional CD-ROM and took the written test on day 3. **Results:** Mean post-test scores were significantly higher than pre-test scores for each task (Table) and for the

S026

total FLS simulator score (26 ± 19 vs 57 ± 19 , $p < .001$). The mean score on the written test was 242 (116). In total, only 2 surgeons had a combined simulator and written test score required to obtain FLS certification. **Conclusion:** To our knowledge, this is the first time the FLS program has been taught in Africa. We have shown that giving the FLS course in a resource restricted country is feasible and resulted in a dramatic improvement in FLS simulator performance after 3 days. However, most surgeons still did not reach FLS passing scores, indicating that more than 3 days will be required in future courses to help surgeons obtain FLS certification.

	Pre-Test	Post-test	p-value
Peg Transfer	34 ± 29	65 ± 25	< .001
Pattern Cutting	14 ± 17	49 ± 20	< .001
Endoloop	26 ± 22	49 ± 32	< .001
Extra-corporeal	30 ± 33	68 ± 26	< .005
Intra-corporeal	27 ± 29	55 ± 28	< .005

ENDOLUMENAL/NOTES

18757

NATURAL ORIFICE TRANSESOPHAGEAL MEDI-ASTINOSCOPY AND THORACOSCOPY: A SURVIVAL SERIES IN SWINE

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Introduction: Mediastinoscopy (MX) and thoracoscopy (TX) are common procedures with painful incisions and prominent scars. A natural orifice transesophageal endoscopic surgery (NOTES) approach could reduce pain, eliminate intercostal neuralgia, provide access to the posterior mediastinal compartment or hilum, and improve cosmesis. The purpose of this study is to create a survival animal model for NOTES MX and TX.

Methods: Phase 1: nonsurvival study of NOTES MX and TX in 5 swine. Using cap endoscopic mucosal resection and blunt dissection, a 10 cm submucosal tunnel was created in the esophagus. The endoscope was passed through the tunnel and out into the mediastinum. The mediastinal compartment, pleura, lung, and esophagus were identified. A small incision was then made in the pleura and the thoracic cavity was explored. The lung, chest wall, and diaphragmatic surface were identified and pleural biopsies were obtained. Phase 2: 8-day survival study in 4 swine using the same technique. One swine underwent MX only and 3 swine underwent MX and TX. Esophageal closure was obtained via submucosal tunnel flap-valve alone (2 swine) or reinforcement with mucosal clips (2 swine). The mediastinal and thoracic cavities were examined at necropsy and resected esophageal specimens were sent for pathological examination.

Results: In all animals, mediastinal and thoracic structures were identified without difficulty and pleural biopsy was easily achieved. In one nonsurvival animal, an inadvertent lung injury caused a pneumothorax which was decompressed through a small intercostal incision. All Phase 2 animals survived for 8 days, thrived, and gained weight. At necropsy, some bruising of the lung was noted in each animal. There was no evidence of free esophageal perforation or mediastinitis. One animal (mucosal clip closure) developed a contained fluid collection in the submucosal esophageal tunnel. **Conclusions:** Transesophageal endoscopic mediastinoscopy and thoracoscopy provide excellent visualization of mediastinal and intrathoracic structures. Pleural biopsy can be easily obtained under direct visualization. The submucosal tunnel creates a flap-valve that, alone, may be sufficient for preventing esophageal leak. These procedures can be performed safely in swine with short-term survival and no evidence of clinical deterioration. However, procedural morbidity needs to be minimized and further study with a larger sample size and longer survival is warranted.

S037

18969

TRANSANAL ENDOSCOPIC MICROSURGERY (T.E.M) TREATMENT OF RECTAL CANCER: A COMPARISON OF OUTCOMES WITH AND WITHOUT NEOADJUVANT RADIATION THERAPY

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Introduction: Improved tumor downstaging and complete response rates of rectal cancer treated with neoadjuvant therapy have been observed. There has been concern that the detrimental, local effect of radiation makes this approach unsuitable for excision. We compared 2 groups of patients undergoing comparable TEM surgery, with and without neoadjuvant radiation.

Methods: All patients undergoing TEM for rectal cancer with intent to cure from 11/97 to 06/07 were prospectively entered in a database. Demographics and perioperative information were captured. The neoadjuvant group was treated with a mean dose of 5175 cGy (4000-5580 cGy) and concurrent 5FU based chemo was used preferentially. Surgery was performed at a median of 9 weeks following completion of treatment (4-16 weeks).

Results: 64 patients with rectal cancer were treated with TEM; 43 with neoadjuvant (XRT) therapy and 21 with TEM alone. Patient characteristics for the XRT group were: age 67 years (29-86), 13 women. In the non-XRT group, age was 66 years (49-89) and 9 women. The pre-operative and pathologic T stage was: XRT patients: T0: 0/15, T1: 2/5, T2: 31/18, T3: 10/5. Non-XRT patients: T0: 10/5, T1: 9/9, T2: 2/6, T3: 0/1. There were no mortalities in either group. Overall morbidity rate for the XRT was 30% and 14% for the non-XRT group, this difference was statistically different ($p < 0.005$). Wound separation (minor and major) was the most common early morbidity in both groups, 9 (21%) and 2 (9.5%) patient respectively. 6 permanent stomas were identified, 4 (9%) in the XRT group and 2 (9.5%) in the non-XRT group ($p > 0.05$). There was one patient with a positive margin in each group, 2.3% from the XRT and 4.8% for non-XRT ($p < 0.005$). Average follow up for the XRT group was 35 months, 24 months for the non-XRT. There was no local recurrence or metastasis in the non-XRT, but 2 patients (4.7%) with LR and 2 (4.7%) patients with distant metastasis in the XRT. The KM5YAS was 71% for the non-XRT and 93% for the XRT ($p < 0.005$).

Conclusion: The oncological benefit of lower positive margin rate and improved survival supports the use of neoadjuvant radiation therapy followed by tTEM. Higher morbidity in the form of wound complications were demonstrated but are not prohibitive.

S065

19085

S033

NATURAL ORIFICE TRANSLUMENAL ENDOSCOPIC DRAINAGE FOR PANCREATIC ABSCESSSES

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Introduction: Endoscopic pseudocyst drainage is well documented, but few series describe endoscopic drainage of pancreatic abscesses. Abscesses are complications of pancreatitis, presenting with sepsis and/or peritonitis. We report the feasibility and efficacy of natural orifice transluminal endoscopic surgery for pancreatic abscesses. **Methods:** We reviewed consecutively treated patients (1994–2007). Approaches alone or in combination were: (1) transmural (transgastric or transduodenal), and (2) transpapillary. Criteria for abscesses were two or more of these: fever, abdominal pain, elevated WBC, and positive fluid cultures. **Results:** Patients (n = 35) had a mean age of 49 years (19 men/16 women). Etiologies were idiopathic 37%, gallstone 32%, alcohol 20%, and divisum 11%. Presenting signs were abdominal pain 80%, positive cultures 69%, fever 57%, elevated WBC 51% and nausea/vomiting 39%. Mean follow up was 15 months with a complication rate of 5%. No one died. Approaches (left columns) and outcomes (right columns) are as follows:

Conclusion: Transluminal endoscopic surgery for pancreatic abscess is feasible and effective. It is an alternative to surgery that can now be considered a primary treatment option for pancreatic abscesses.

Transgastric	15(43%)	Endosc Success	28(80%)
Trgast/Papllry	8(22%)	Exp Laparotomy	7(20%)
Transpapillary	7(20%)	Electve Surgery	5/7
Transduodenal	4(11%)	Emergnt Surgery	2/7
Trduod/Papllry	1(3%)	External Drain	3/7

19229

S036

COLONIC STERILIZATION FOR NOTES PROCEDURES – A COMPARISON OF TWO DECONTAMINATION PROTOCOLS

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University of Missouri-Columbia

Introduction: In the 2005 White Paper, prevention of infection was named as one of the ten potential barriers to performing NOTES surgery. The aim of this study was to evaluate the effect of two different sterilization protocols on the bacterial counts in the swine colon while preparing for NOTES surgery.

Methods: After placing a proximal colon balloon, 16 swine were randomized to two different colonic sterilization protocols. Protocol 1 consisted of low colonic irrigation with 300cc of a 1:1 dilution of 10% povidone-iodine (Betadine) with sterile saline, followed by one gram of cefoxitin dissolved in 300cc of saline. Protocol 2 consisted of 2 consecutive 300cc irrigations utilizing a quaternary ammonium antimicrobial (Onamer M). Colonic cultures were taken at 3 time-points; before colonic cleansing, after decontamination protocol and after NOTES procedure completion. The Invitrogen Live/Dead bacterial viability kit was used to asses for change in bacterial load. A qualitative culture of peritoneal fluid was obtained at the end of the NOTES procedure. Colon mucosal biopsies were obtained immediately after the sterilization procedure and at the 2-week necropsy point, and were evaluated for mucosal changes. Student's T-test was used for statistical comparisons.

Results: Protocol 1 resulted in an average 80.8% decrease in live colonic bacteria, versus 83.0% in Protocol 2 (NS). After performing a NOTES colonic procedure, Group 1 had a 104.4% increase in live bacteria and Group 2 a 36.2% increase (NS). Peritoneal cultures were also obtained after trans-colon endoscopic examination. Bacteria were isolated from the peritoneal fluid of all animals and 2 or more species were isolated from 75% of the animals. There was no evidence of peritoneal infection at necropsy. Half of the mucosal specimens had mild changes immediately after sterilization but these were equally distributed between both decontamination protocols. Reactive epithelial changes and mild inflammation were only abnormalities. No changes were noted on histologic evaluation of colonic mucosa at the 2 week point, demonstrating these were temporary changes.

Conclusion: Colonic irrigation with Betadine and antibiotics are as effective at bacterial decontamination of the swine colon as a quaternary ammonium compound. The results of this study support the use of either protocol. Despite thorough decontamination, peritoneal contamination occurs. The significance of this for humans is unknown.

19397

S038

TRANSGASTRIC ENDOSCOPIC PERITONEOSCOPY DOES NOT REQUIRE DECONTAMINATION OF THE STOMACH IN HUMANS

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Introduction: Natural Orifice Transluminal Endoscopic Surgery (NOTES) is a rapidly evolving field that provides endoscopic access to the peritoneum via a natural orifice. One important requirement of this technique is the need to minimize the risk of clinically significant peritoneal contamination. We report the bacterial load and contamination of the peritoneal cavity in patients undergoing diagnostic transgastric endoscopic peritoneoscopy.

Methods: Patients participating in this trial were scheduled to undergo diagnostic laparoscopy for evaluation of presumed pancreatic cancer. Findings at diagnostic laparoscopy were compared to that of diagnostic transgastric endoscopic peritoneoscopy, using an orally placed gastroscope, blinding the endoscopist to the laparoscopic findings. No gastric decontamination was used. Diagnostic findings, operative times and clinical course were recorded. Gastric and peritoneal fluid aspirates were obtained prior to and after the gastrotomy. Each sample was sent for bacterial colony counts, culture and identification of species.

Results: Six patients have completed the protocol with an average age of 63 yrs. All patients underwent diagnostic laparoscopy followed by successful transgastric access and diagnostic peritoneoscopy. The average time for transgastric instrumentation was 28 minutes compared to 13 minutes for laparoscopy. Bacterial sampling was available in 4 of 6 patients. The average number of colony forming units (CFU) in the gastric aspirate was 181.9 CFU/ml, peritoneal aspirates prior to creation of a gastrotomy showed 25 CFU/ml, and peritoneal sampling after gastrotomy had an average of 116.9 CFU/ml. There was no cross contamination of the peritoneal cavity with species isolated from the gastric aspirate. No infectious complications or leaks developed postoperatively.

Conclusions: There was no clinically significant contamination of the abdominal cavity after transgastric endoscopic instrumentation of the peritoneal cavity in humans. Transgastric instrumentation does not contaminate the abdominal cavity but pathogens are clinically insignificant due to species or bacterial load.

19421

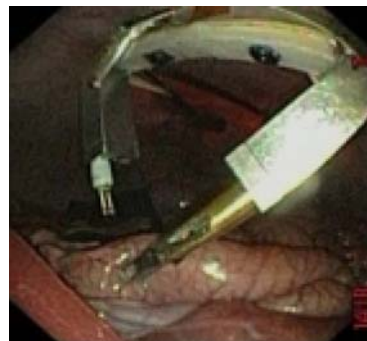
S039

NATURAL ORIFICE CHOLECYSTECTOMY USING A MINIATURE ROBOT

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Introduction: Natural Orifice Transluminal Endoscopic Surgery (NOTES) is surgically challenging. Current endoscopic tools provide an insufficient platform for visualization and manipulation. This study demonstrates the feasibility of using a miniature in vivo robot to enhance visualization and provide off-axis dexterous manipulation capabilities for NOTES.

Methods: We developed a dexterous, miniature robot with six degrees-of-freedom capable of applying significant force throughout its workspace. The robot is introduced through the esophagus and completely enters the peritoneal cavity through a transgastric insertion. The robot design consists of a central "body" and two "arms" fitted with cautery and forceps end-effectors, respectively. The arms of the robot "disconnect" allowing the robot to freely flex for entry through the esophagus. Once in the peritoneal cavity, the arms are reconnected, and the robot is attached to the abdominal wall using the interaction of magnets housed in the robot body with those in an external magnetic handle. Video feedback from the on-board cameras is provided to the surgeon throughout a procedure. **Results:** The efficacy of this robot was demonstrated in a non-survivable cholecystectomy, abdominal exploration, bowel manipulation, and cooperative intracorporeal suturing in a porcine model. Following transgastric insertion, the robot was attached to the interior abdominal wall. The robot was repositioned throughout the procedure to provide optimal orientations for visualization and tissue manipulation. The surgeon remotely controlled the actuation of the robot to assist in the procedures. **Conclusion:** This study has shown that a dexterous miniature in vivo robot can apply significant forces in arbitrary directions and improve visualization to overcome many of the limitations of using current endoscopic tools for performing NOTES.



19461

OPEN LABEL, PROSPECTIVE, RANDOMIZED CONTROLLED TRIAL OF ENDOSCOPIC DUODENAL JEJUNAL BYPASS SLEEVE VERSUS LOW CALORIE DIET FOR WEIGHT LOSS

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Background: The duodenal jejunal bypass sleeve (DJBS) has been shown to achieve a completely endoscopic duodenal exclusion without the need for stapling or anastomosis. This report consists of the first randomized controlled trial for weight loss. **Methods:** In a 12-week, open label, prospective, randomized study, patients received either a low fat diet and the DJBS or a low fat diet control (no device). Twenty-five patients were implanted with the device and 13 received the control. The two groups were demographically similar with a mean starting BMI of 42. Both groups received identical counseling at baseline only which consisted of a low calorie diet, exercise guidelines and behavior modification advice. No additional counseling occurred in either group. Measurements included starting and monthly body weight and serum blood tests. The device group also had a plain abdominal film post implant, monthly and a 4-week post explant EGD. **Results:** Twenty device (80%) patients maintained the DJBS without a significant adverse event for the 12-week duration. At 12 weeks, the mean excess weight loss was 22% and 5% for the device and control groups, respectively ($p < 0.001$). Five patients (20%) were endoscopically explanted early secondary to upper GI (UGI) bleeding ($n = 3$), anchor migration ($n = 1$) and sleeve obstruction ($n = 1$). The UGI bleeding occurred at a mean of 13.8 days post implant. EGD was performed in each of these cases with no distinct bleeding source identified. No blood transfusion was required. The migration occurred on day 47 and manifested as abdominal pain. The patient with the sleeve obstruction presented with abdominal pain and vomiting on day 30. Eight patients (40%) underwent the 4 week post explant EGD at which time mild degrees of residual duodenal inflammation was noted. **Conclusion:** The DJBS achieves noninvasive duodenal exclusion and short term weight loss efficacy. Longer term randomized controlled sham trials for weight loss and treatment of T2DM are underway.

19519

EARLY EXPERIENCE WITH TRANSGASTRIC NOTES CHOLECYSTECTOMY IN HUMANS

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Natural orifice transluminal endoscopic surgery has enjoyed an accelerated development, going from theory to clinical application in less than 4 years. Early concepts of NOTES procedures seldom included cholecystectomy as it was considered too complex and challenging to approach with current technology. An unprecedented evolution of flexible endoscopes and endoscopic tools changed this and currently cholecystectomy is the most commonly reported human case worldwide. To date, NOTES cholecystectomy has been done via a transvaginal approach in small numbers with apparently good results. For several reasons we prefer the transgastric approach, particularly for male patients. We report our early experience with hybrid transgastric NOTES performed at 2 collaborating institutions.

Methods: Four patients, (3F/1M) with symptomatic cholelithiasis by standard evaluation participated in an IRB approved NOTES study. By study protocol a minimum of 1 laparoscopic port was required to ensure procedure safety and to check the integrity of the endoluminal gastric closure. Additional ports were recommended as needed for safety and efficiency. The Transport (USGI Medical) endoscopic operating system (EOS) was used for all cases. Cases were done in the OR under general anesthesia. Gastrotomy, gallbladder dissection, per oral extraction and gastrotomy closure were performed with the flexible endoscope and endoscopic instruments. Outcomes measurements included: OR results, HRQOL, pain scoring and clinical outcomes.

Results: Mean operative time was 4.2 hours (3.5-5), numbers of laparoscopic ports (2 or 5 mm) used ranged from 1 to 3. Operative time was inversely related to the number of ports. EBL was 66 ml (5-200). There were no intraoperative complications and all gastrotomies were confirmed intact by methylene blue gastric infusion or insufflation. Mean analog pain scores were 2.9/10, 2.5/10, 0/10 respectively, in Recovery, POD 1 and POD 14. Pain was primarily laparoscopic port related. Maximal pain was in the RUQ in 2, epigastric in 1 and pharyngeal in 1. There were no late complications.

Conclusion: Initial experience with human transgastric NOTES cholecystectomy show it to be feasible and safe with current advanced endoscopic instrumentation. Patients tolerated it well and may have had less pain than with a laparoscopic gallbladder surgery. NOTES chole is a complex and demanding procedure requiring advanced endoscopic surgical skills and mastery of flexible endoscopy.

S010

19578

NOTES SIGMOID RESECTION

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Background: NOTES Colonic resection is difficult to perform because of the need for exposure, dissection, vascular control and anastomosis. The aim of the present study was to evaluate the feasibility and early results of combined transgastric-transrectal NOTES sigmoidectomy.

Materials and Methods: A two-week survival study was undertaken to evaluate the combined transgastric-transrectal approach for sigmoidectomy in 5 mini-pigs. Under general anesthesia transgastric peritoneal access was achieved. The sigmoid colon was identified by tracing the rectum proximally. A PCEEA \hat{a} was introduced transrectally. The anvil was detached from the PCEEA \hat{a} and left in the descending colon with the assistance of a blunt tip Berci needle, in the left lower quadrant. A transrectal endoluminal retractor was introduced through the anus to provide exposure. The transgastric route was used to divide the sigmoid mesocolic vessels using a round tip electrode, endoscopic clips and scissors. Once the sigmoid colon was sufficiently mobilized, a 12 mm trocar was introduced transrectally and transfixed into the posterior rectal wall. The proximal sigmoid was divided using a laparoscopic articulating linear stapler passed transrectally. The distal sigmoid stump was delivered through the anus (pull-through technique) and divided externally with a linear stapler. To complete the anastomosis, a colotomy was performed adjacent to the proximal staple line using an endoscopic needle knife passed through the transgastric endoscope. The anvil, previously left in the descending colon, was identified, retrieved and transfixed through the colotomy. The PCEEA \hat{a} was reintroduced through the anus and an end-to-end colorectal anastomosis was performed and checked with air leak testing and rectoscopy. All animals were monitored daily for signs of distress or changes in the feeding habits. Post-operative follow-up included upper and lower endoscopy, laparoscopy and necropsy 2 weeks after the initial procedure. **Results:** All sigmoid resections were performed successfully with no intraoperative complications with a mean operative time of 45 minutes (30-45). Post-operative course was uneventful. A regular diet was resumed within 24 hours of the procedure. Two week follow-up endoscopy, laparoscopy and necropsy demonstrated good caliber vascularisation and healing of the anastomosis and no intraperitoneal complications. **Conclusions:** Combined transgastric-transrectal sigmoidectomy is feasible and safe in the animal model and has the potential to become one of the next clinical application of NOTES for benign colorectal disease.

S032

S034

19600

AN ENDOSURGICAL OPERATING SYSTEM: INITIAL HUMAN EXPERIENCE IN ENDOLUMENAL AND NOTES PROCEDURES

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Background: Minimally invasive surgery is rapidly evolving with the promise of new endolumenal and translumenal surgical procedures performed with few or no external incisions. We describe our early human experience with a flexible platform technology that provides stable access and visualization, force transmission, two-handed tissue manipulation and durable tissue approximation. The EndoSurgical Operating System (EOS), (USGI Medical, San Clemente, CA), was used to perform transgastric cholecystectomy, stoma and pouch reduction after gastric bypass, anti-reflux procedures and repair of post gastric bypass gastro-gastric fistulas.

Methods: The EOS is FDA cleared and comprised of a multi-lumen operating platform that can be rigidified and a tissue grasper/approximation device used to create deep tissue approximations or folds secured with suture anchors. The TransPort provides a stable operating platform in a straight or retroflexed position within the stomach or peritoneal space. To treat post Roux-en-Y patients who failed to maintain weight loss a series of folds was placed circumferentially around the stoma to reduce the diameter and randomly into the pouch to reduce the volume. For anti-reflux procedures the TransPort was retroflexed and anchors were used to create a series of folds at the EGJ to build a mechanical reflux barrier. Anchors were also used in the stomach to close gastro-gastric fistulas. In transgastric cholecystectomy procedures the TransPort provided a stable operative field and anchors were used to close the gastrotomy. Video was recorded for each procedure.

Results: A total of 11 patients underwent surgery with the EOS. Stoma diameter and pouch volume were reduced in 4 post gastric bypass patients with weight regain by creating tissue folds using 27 anchor pairs. Patients reported early satiety and all have experienced weight loss. Two GERD patients had 3-5 tissue anchors placed at the GEJ and reported reduced reflux symptoms and follow up physiologic data is planned. Gastro-gastric fistula repair was successfully performed in 2 patients. Use of the EOS during laparoscopic assisted transgastric cholecystectomy in three patients provided a stable platform for dissection and allowed endolumenal closure of the gastric wall. No significant complications have been encountered to date.

Conclusion: Early clinical use of the EOS in a variety of procedures demonstrated the ability of the system to successfully address some of the many challenges of flexible endolumenal and translumenal surgery.

S035

19697

S063

ENDOSCOPIC ENDOLUMINAL RADIOFREQUENCY ABLATION OF BARRETT'S ESOPHAGUS: INITIAL RESULTS AND LESSONS LEARNED

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Background: Ablating Barrett's epithelium may reduce the risk of developing esophageal adenocarcinoma. This study reports the initial experience of a single surgeon using an endoscopic endoluminal device delivering radiofrequency energy (the BARRx device) in ablating Barrett's esophagus.

Methods: All patients who underwent ablation of Barrett's epithelium with the BARRx system were reviewed for length of Barrett's metaplasia, presence of high-grade dysplasia, postprocedure complication, completeness of ablation at first follow-up endoscopy (3 months after ablation), need for additional ablation, completeness of ablation at second follow-up endoscopy (6 to 12 months after ablation), and concomitant performance of a Nissen fundoplication.

Results: 47 patients underwent Barrett's ablation. A total of 59 ablations were done in these patients. The median length of the Barrett's esophagus was 3 cm (range: 1-14 cm). 8 patients (17%) had high-grade dysplasia. There were no immediate complications. 25 of 36 patients (69%) who had follow-up endoscopy had complete ablation. 11 patients with incomplete ablation had additional ablation, and 10 of these patients (91%) had complete ablation on second follow-up. One patient (Barrett's esophagus length of 12 cm) had 3 ablations, but continued to have residual metaplasia. Therefore, 97% of the total cohort had complete ablation. The median length of Barrett's esophagus in patients with initially incomplete ablation was 8 cm (range: 2-14), compared to 2 cm (range: 1-13) in the initially complete ablation patients. 7 of 8 patients with high grade dysplasia had complete ablation identified in the first follow-up endoscopy. 3 strictures occurred, all in patients with > 12 cm segments of Barrett's. 10 Nissen funduplications were done concomitantly with the ablation, without increased difficulty.

Conclusions: Complete ablation of Barrett's esophagus with radiofrequency endoluminal ablation is achievable in >95% of patients. Patients with longer segments are likely to require additional ablation. Patients with very long segments are at risk for stricture, and should be approached cautiously. Performance of a fundoplication is not hindered by concomitant ablation.

19876

S068

TRANS ORAL ENDOSCOPIC STAPLED ESOPHAGO DIVERTICULOSTOMY (TOESED) FOR ZENKER'S DIVERTICULUM

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Introduction: Zenker's diverticulum is a known cause for dysphagia and is treated usually by resection or diverticulectomy through a neck incision. In recent years an endoscopic per-oral method has been described. A cohort of patients was treated and long-term follow up was obtained.

Materials and Methods: All patients presented with the diagnosis of Zenker's diverticulum were considered as candidates for TOESED without selection. We retrospectively reviewed 55 charts of patients that underwent TOESED at our institutions between 2002 and 2007. TOESED was performed using multiple firings of a linear stapler trans orally in an endoscopic approach.

Results: 55 patients suffering from Zenker's diverticulum underwent TOESED. The mean age was 74 (48-86), and male to female ratio 3:1. Mean operative time was 25 minutes (15-45 minutes), and estimated blood loss was negligible. The mean length of hospital stay was 48 hours. Patients were fed clear liquid diet the day after surgery. Three complications (5.45%) occurred: 1 esophageal perforation that was treated conservatively, 1 severe esophageal edema causing dysphagia that was treated with temporary gastrostomy, and 1 mucosal tear of the pharynx treated by suturing and NG tube for drainage. 2 cases were aborted for technical difficulty, and treated later with open technique. All patients except for one were satisfied with the procedure. On long-term follow up there were 2 recurrences (3.6%).

Conclusion: TOESED is a feasible and safe approach to treat patients suffering from a Zenker's diverticulum. The length of hospital stay is short and complication rate is low.

19932

S024

RANDOMIZED BLINDED TRIAL COMPARING NOTES WITH LAPAROSCOPY REVEALS NO DIFFERENCE IN IMMUNOLOGIC PARAMETERS

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Background: Natural Orifice Transluminal Orifice Surgery (NOTES) is being investigated for human use as a new minimally invasive procedure. We compared NOTES with the current gold standard laparoscopy.

Hypothesis: Animals undergoing NOTES will reveal greater hemodynamic instability due to uncontrolled insufflation pressures. No difference in the immunologic impact as measured by Interleukin-1b will be realized.

Design: Randomized blinded trial using permuted block design.

Setting: Experimental surgery in a porcine survival model.

Methods: 12 swine were randomized to diagnostic peritoneoscopy with biopsy by NOTES using air insufflation or by standard CO₂ laparoscopy. Invasive monitoring of hemodynamic parameters and abdominal pressure was performed in 2.5 min intervals; results were captured electronically and entered in a database along with laboratory data by a blinded technician. Data analysis was performed by an investigator blinded to the procedure using t-test and repeated measures linear model. IACUC approval was obtained for the study.

Results: All procedures were successfully completed. One NOTES animal succumbed to hemorrhagic gastritis on day 3. Animals undergoing standard laparoscopy revealed increasing tachycardia compared to the NOTES group (baseline +22bpm vs baseline -10 bpm, $p=0.004$) and acidosis (baseline -0.1 vs baseline 0.05, $p=0.04$). Widening pulse pressure was noted in the NOTES animals compared to the laparoscopy group ($p<0.001$) over the duration of the procedure. No difference was seen in postoperative white blood cell count or hematocrit. Serum values of Interleukin-1b were compared at baseline, at the end of the procedure and 48 hours after the procedure and did not show a difference in group means ($p=0.65; 0.50$ and 0.31 respectively). No infections were noted at necropsy on day 14.

Conclusion: Hemodynamic parameters did not reveal the expected instability. The widening pulse pressure and missing tachycardia rather suggest a missing catecholamine surge or a vagal response during the NOTES procedure compared to laparoscopy. No difference in the post-operative WBC count or Interleukin-1b values was seen in the small groups. The effect of the different insufflation gases on these results remains to be investigated.

20059

S031

THE IMPACT OF PROTON PUMP INHIBITORS ON INTRA-PERITONEAL SEPSIS

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Study Aim: Proton pump inhibitors (PPI) are commonly given for the treatment of GERD and ulcer disease. In many non-operative cases of perforated ulcer disease, it is standard of care. During transgastric NOTES procedures there is an iatrogenic perforation of the gastric wall with leakage of gastric contents into the peritoneal cavity. Our study aim is to determine the effect of proton pump inhibitors and alterations in gastric pH on infection rates during transgastric surgery.

Methods: Thirty 250 g male Sprague-Dawley rats were divided to a study group N = 15 and a control group N = 15. In the study group rats were given 5mg/kg of pantoprazole SQ daily for three days before procedure and another dose one hour before. The control group received 3cc of SQ saline at similar time points. A mini-laparotomy with gastrotomy and aspiration of 2.0cc of gastric contents were injected into the peritoneal cavity of both groups of rats. Intra-gastric pH and intra-peritoneal pH was measured using a needle probe and pH meter. Rats were returned to their cages and given food and water ad libitum. White cell counts were obtained on post-operative day 1, 3, 7 and 14. At necropsy aerobic and anaerobic cultures were obtained using culture swab of the peritoneal cavity.

Results: There were no deaths in either group. The average intra-gastric pH in the study group was 5.13 vs. 3.26 ($p=0.03$) in the control group. The average intra-peritoneal pH was similar in both groups 7.09 vs. 7.19 ($p=.34$). The white blood count in the study group increased by an average of 4.5 vs. 3.5 (1000 cells/mm) in the control group. Bacterial cultures were positive in 3/15 (20%) rats in the control group and 9/15 (60%) in the group treated with PPI ($P=0.008$). Intra-abdominal abscesses were found in 2/15 (13%) rats in the control group and 5/15 (33%) in the group treated with PPI ($p=0.08$). The most common isolate in the rat cultures were E-Coli, Proteus and Staphylococcus Xylosus. There was a higher rate of E-Coli infection in the PPI group 8/9 (88%) vs. the control group 1/3 (33%).

Conclusions: Pre-treatment of a rat model for transgastric NOTES procedures with a proton pump inhibitor resulted in a higher rate of peritoneal bacterial contamination and abscess formation. The acidic environment of the stomach appears to be protective against infection when intra-peritoneal contamination occurs as a result of gastrotomy. PPIs may increase infectious complications in NOTES patients.

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18922

ERGONOMIC RISK OF ASSISTING IN MINIMALLY INVASIVE SURGERY

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Introduction: Ergonomic knowledge related to primary MIS surgeons has been well described. Similar studies making the camera assistant subject have not been undertaken. By simulating the assistant's role as a camera holder and retractor during a Nissen fundoplication, this study investigated how camera target locations and grip strategies, and fatigue affected the assistant's posture.

Methods and Procedures: Seven subjects were studied while performing a camera navigating task. A training box on an OR table simulated an adult patient in low lithotomy position. Each subject was asked to stand on two force plates at the left side of the simulated patient. A laparoscope was introduced into the training box in which four 2 cm circles as targets had been placed on the rear panel in the following locations to the assistant: (1) distal superior, (2) proximal superior, (3) distal inferior, (4) proximal inferior (TARGET). Subjects were instructed to hold the camera with their left hand and point it at a target with their task to match the target to a circle overlaid on the monitor. Simultaneously, a grasper in the right hand was used to grasp and pull one of two rubber bands on the panel. A minute signal moved the subject on to the next target. Each trial had 3 repetitions (PHASE) consisting of 4 targets. Subjects were asked to perform two separate trials, in which the camera was held from the top and then the bottom (GRIP). A 4x3x2 (TARGET x PHASE x GRIP) repeated measures design was used for statistical analysis. Weight loading ratio (WLR) was calculated from the vertical ground reaction forces (VGRF) from left force plate and total VGRF from both plates. $WLR = (\text{left VGRF}) / (\text{left VGRF} + \text{right VGRF}) * 100$.

Results: WLR significantly increased ($p < 0.005$) with proximal targets (2:80% & 4:79%) compared to distal targets (1:67.5% & 3:67.6%), a result of the distal position of the camera head (TARGET effect). Also shown was a reduced WLR (75%, 74% & 71% respectively) attributed to compensatory strategy to overcome increased fatigue in the left leg over time (PHASE effect, $p < 0.05$). The two grip strategies did not show any difference (GRIP effect, $p > 0.5$).

Conclusions: This study demonstrated that the assistant's left leg disproportionately bore 70-80% of body weight over time, thus creating a high risk ergonomic situation. Ergonomic solutions like camera handle attachments or instructions to rebalance weight should be considered to minimize fatigue and maximize postural stability. Body movement, EMG, center of pressure, and postural stability demand will provide detailed postural and fatigue parameters.

S050

19305

WORKING WITH A PRE-OPERATIVE CHECKLIST IN LAPAROSCOPIC SURGERY, AN INITIAL STUDY

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Abstract

Background: Major changes in endoscopic surgery have taken place in recent years. More and more, technical applications and complicated devices are introduced in the operation room. In previous studies, various preventable equipment related problems are reported. Potentially, this can influence the quality and safety of laparoscopic surgery. The goal of study is to find out if working with a pre-operative checklist can influence various aspects of laparoscopic procedures.

Methods: 121 consecutive procedures were closely observed and analyzed. In the first phase, the 25 participating surgeons and residents were observed during the procedures. They also filled in a questionnaire after finishing their procedure. In the second phase, they additionally filled in a pre-operative checklist. With the checklist, verification of patient data and patient positioning were performed, also instruments and hardware components were checked.

Results: When working with the checklist, two out of three time-slots were reduced. Preparation time declined from 12.4 to 9.7 minutes. Patient identification improved after introduction of the checklist. Identification was not performed in 20.3% of the cases in the first phase, this declined to 13.0% in the second phase. With a checklist, it was less often necessary to correct the patients position: 12.2% vs. in 23.2%. Instrument verification improved with the checklist from 4.8% to 14.6%. Positioning of the monitor was done more often in checklist group (34.5%), compared to the first phase group (9.3%).

Conclusion: This initial study of working with a pre-operative checklist in laparoscopic surgery showed clear benefits. It can save time and improve pre-operative preparation. Possible technical and practical errors can be detected. More research projects are necessary to demonstrate the role of checklists in laparoscopic surgery.

Key words: checklist, laparoscopy, minimal invasive surgery, advanced operation room.

S053

18991

CYBERDOME, NOVEL 3-DIMENSION HEMI-SPHERICAL DISPLAY SYSTEM, IMPROVES PROCEDURES OF LAPAROSCOPIC SURGERY

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(Background) Despite of current advances with technology associated with laparoscopic surgery, laparoscopic surgeons still need a long experience to overcome the lack of depth perception on a 2-dimensional (2D) display. Although it was reported over two decades that 3-dimensional (3D) imaging provided depth perception and might improve laparoscopic procedures, 3D systems have not been widely used because subjects sometimes felt uncomfortable due to the heavy glasses or side effect, such as headache, and recognized poor quality in 3D images. Recently, we developed the novel 3D Dome-like display (3DD) system with a hemispherical screen, CyberDome, which provides clear depth perception and high resolution with comfort and without side effect. **(Methods)** In the present study, 23 students at Kyushu University volunteered for the study. To evaluate the effect of 3DD system on depth perception and laparoscopic procedures compared with 2D system and a conventional 3D system using a plain display (3DP), we used 6 new tasks (Cognition-tasks, $n = 9$; motor-tasks; 3DD, $n = 6-9$; 2D, $n = 8-12$) and a conventional task, suturing and knot tying ($n = 13$). Execution time, errors, and flight path of forceps were analyzed. **(Results)** 3DD system significantly provided more fine depth perception and improved laparoscopic performance compared with 2D system. 3DD system also shortened the execution time and reduced number of errors in procedures of suturing and knot tying. In addition, 3DD system provided clearer depth perception than 3DP system. **(Conclusion)** The data suggest that 3DD system with CyberDome is a promising tool to provide the depth perception with high resolution to laparoscopic surgeons, leading to safety of laparoscopic surgery.

S075

19426

'REAL-TIME' MEASUREMENT OF TISSUE OXYGENATION DURING GASTROINTESTINAL STAPLING: MUCOSAL BUT NOT SEROSAL SURFACE ISCHEMIA OCCURS AND IS NOT INFLUENCED BY STAPLE SIZE

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Tension, tissue ischemia and technical error are known factors which can lead to anastomotic complications such as leak, stricture, and ulceration/bleeding. Currently surgeons evaluate tissue ischemia without benefit of any simple routine measurement technique to assess tissue viability. A new tissue surface probe (T-STAT microvascular tissue oximeter, Spectros Corporation, Portola Valley, California) provides continuous measurement of tissue hemoglobin oxygen saturation (StO₂) and may have clinical utility for intra-operative assessment of blood flow in areas of surgical anastomosis. This is a pilot study to determine local StO₂ during gut stapling using various staple sizes for the purpose of assessing the tool's ability to measure changes and the reproducibility of those changes with stapling. We sought to evaluate mucosal versus serosal measurements and to determine if the proximity to the staple line correlated with possible tissue ischemia. Measurements were made in 5 anesthetized adult swine during laparotomy. Various staple heights (Endo-GIA Autostaple, Connecticut, USA) of 2.0, 2.5 and 4.8 millimeter (mm) were used to transect small bowel (SB) and colon (C). Serosal and mucosal surface measurements were obtained at baseline and on each side (proximal and distal) of the transection using the T-Stat device at the staple line and 2 cm away from it. The baseline StO₂ within the mucosa is significantly less than the serosa for both small bowel (serosa 61.1 ± 3 versus mucosa 48 ± 5, $p < 0.05$ t test) and colon (serosa 65 ± 4 versus mucosa 40 ± 13, $p < 0.05$ t test). There was no change in serosal surface oxygenation with stapling. Mean values of mucosal SB and C StO₂ are presented in the Table with staple heights utilized ($n = 20$ measurements per viscus at each location, ANOVA * $p < 0.05$ significant versus baseline).

Staple Size	Baseline	Staple line	2 cm Away
SB/Grey(2.0 mm)	45.5	19.5	44.75
SB/Green(4.8 mm)	55.5	28.75	46.5
C/White(2.5 mm)	47	19.5	46.75
C/Green(4.8 mm)	40	18.75	43.5

There was evidence of a significant decrease in mucosal surface oxygenation in proximity to the staple line as compared to the distant (2 cm away) measurement. There was no statistically significance in StO₂ using different staple load sizes. The T-stat probe may provide a real time method for surgeons to assess even minor gut ischemia during surgical procedures.

S076

19449

S051

USING A DYNAMIC TRAINING ENVIRONMENT TO ASSESS LAPAROSCOPIC SKILL

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Current physical laparoscopic surgical simulators contain only static tasks, which do not develop the advanced hand-eye coordination skills needed to navigate the dynamic surgical environment. A dynamic minimally invasive training environment (DynaMITE) was developed to fill this need. Preliminary testing showed a potential for the device to improve the hand-eye coordination skills of even expert surgeons. To further evaluate the utility of the device as a training and skill assessment tool, a study was performed with a second-generation device. Forty-two subjects at the SAGES 2007 Learning Center participated. Their experience ranged from naïve (0-10 laparoscopic procedures performed) to highly experienced (more than 2500 procedures performed). Each subject completed a minimum of one trial each of two tasks: 1) an aim-and-point task, which required making contact with an array of five small vertical pins, and 2) an acquire-place task, which required transferring three objects (a cylinder, a triangular prism, and an asymmetric shape) from holders on one side of the platform to another. Both task targets moved at one of three speeds: static, slow, or fast. Data analysis using two-factor analysis of variance (ANOVA) showed a significant main effect in time to task completion for the factors of movement ($p=0.015$) and experience ($p=0.048$), in the aim-and-point task. On average, subjects were faster in the static and slow tasks than fast task (5.9 ± 2.9 , 5.9 ± 3.1 , 8.05 ± 2.6 s, respectively). Similarly, subjects made fewer misses in the static and slow tasks than fast task ($18.9 \pm 18.2\%$, $27.4 \pm 27.7\%$, $53.7 \pm 29.9\%$, respectively, $p=0.024$). In the acquire-place task, ANOVA showed a significant main effect in time to task completion for the factors of shape ($p=0.001$) and experience ($p=0.049$). On average, cylinders were transferred faster than triangular prism or asymmetric shapes (16.4 ± 13.2 , 65.9 ± 77.6 , 73.7 ± 90.3 s, respectively). These results suggest that DynaMITE may be useful for training more advanced hand-eye coordination skills, but remain to be validated in a more controlled testing environment.

19523

S074

A NEW FLEXIBLE ENDOSCOPIC SUTURING METHOD WITH LAPAROSCOPIC PROTECTION FOR SAFER FULL-THICKNESS ATTACHMENT TO THE GASTRO-INTESTINAL TRACT

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Background: There are some difficulties associated with placing multiple stitches or tissue anchors at flexible endoscopy in order to achieve long term attachment of devices within the gastrointestinal tract. Precision stitching of an object to the wall of the gut requires accurate penetration of the device attachment points, and knowledge that the anchor has been placed at the correct depth. Risk of injury to adjacent organs or adjacent intestine is an issue. Aim: To develop a new suturing device and method for full-thickness circumferential attachment of a food exclusion device to the wall of the cardio-esophageal junction with multiple attachment points. Devices and Methods: A flexible, hollow, curved nitinol needle was designed and tested. This device was designed to deliver large tilt T-tags and other tissue anchors to the serosal surface. A new laparoscopic assist method was devised to assure safe full-thickness delivery and to prevent inadvertent damage to surrounding tissues. Methods and devices were tested in pigs ($n=8$) and human cadavers ($n=2$). Results: Initial attempts to perform precise sutured attachment with straight needles at flexible endoscopy were relatively unsuccessful. It was difficult to cannulate the attachment points and then penetrate the stomach at desired angle. The development of a curved rotatable needle, which could be passed through a gastroscope allowed rapid and precise cannulation of the attachment points. With the laparoscopic view, the precise exit point of the needle could be identified before tissue puncture by seeing the trans-illumination from the gastroscope, indentation from the needle and palpation using laparoscopic forceps. The distance from the aorta or other structures could be identified and adjusted during suturing. A stop on the thread behind the mucosal anchor was used which allowed precise control of stitch length and avoided the need for thread tying. These devices and methods reduced the stitching time to place 8 full thickness attachment times to 20 minutes and increased precision and safety. In separate surgical attachment studies the 8 sutured attachment points were found to be holding the intragastric device in place at 5-12 weeks without device detachments. Conclusion: A new flexible endoscopic suturing device and method was used with laparoscopic assistance for safe and secure anchoring of a food exclusion device to the cardio-esophageal junction.

19773

S052

DECONSTRUCTING OPERATIVE FLOW – A FOCUS ON ANTICIPATORY MOVEMENTS

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Introduction: Efficient instrument movement is a vital part of a well-coordinated operating environment, and is a reflection of optimized ergonomic and human factor issues. In order to make assessments of these movements, objective, reproducible metrics are needed. In this study, instrument flow analysis is utilized to characterize anticipatory movements of the operative team.

Methods: Five laparoscopic Nissen fundoplication operations performed by an expert surgeon and a dedicated minimally invasive surgery team were analyzed using synchronized video feeds from two exterior cameras and the laparoscope. Instrument location was tracked for the duration of the procedure to one of 12 different locations: the 5 access ports; the 4 members of the operating team; on the top or bottom half the patient; and the instrument stand. The flow of instruments from the scrub technician to the primary surgeon was analyzed for patterns suggestive of anticipatory movements.

Results: For the five cases, there were a total of 44 instrument exchanges between the scrub technician and the primary surgeon. The average duration the technician held an instrument before handing it to the surgeon ranged from 0.68s to 42.17s. The needle driver was held for an average of 42.17s prior to handing to the surgeon, and the scissors 20.51s reflective of the technician anticipating the need for these instruments, and holding or preparing them for the surgeon. With a short average hold time of 0.68s, the curved dissector used for a specific element of the case, was not well anticipated. Other exchanges were with the liver retractor (3.11s), and standard dissector (8.26s). Regardless of anticipation, the surgeon did not have to wait long for any instruments, with an average wait time of 1.30s, and no significant correlation with anticipatory hold time by the technician.

Conclusion: Our approach to analyzing operative flow provides an objective approach to breaking down an operation and identifying effective and ineffective patterns of movement. In the environment of an expert surgeon and dedicated team, instrument transfers are highly efficient, and even unanticipated instrument movements are compensated for with little lost time. Further study will examine the inefficiencies often seen with non-dedicated teams and help delineate the factors that contribute to efficient surgical flow. Ongoing deconstruction of operative flow and establishment of metrics will continue to be central to these analyses.

MINIMALLY INVASIVE OTHER

20060

S049

THE ROLE OF MINIMALLY INVASIVE SURGERY IN THE FORWARD COMBAT HOSPITAL

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Background: Most penetrating abdominal combat wounds are of high energy, with injury to multiple viscera, and require immediate open abdominal exploration for hemorrhage control. There is interest in advanced surgical systems for use in the forward combat environment, but minimally invasive surgery (MIS) has never been utilized in such setting. The authors hand-carried an MIS capability into a major trauma center in Iraq, and report our experience incorporating MIS into forward trauma surgical care.

Methods: The Air Expeditionary Force rotation 9 recorded all patient encounters and operative reports on prospective databases, and the authors reviewed these data retrospectively.

Results: Between 19 Jan 06 and 17 May 06, 85 patients required emergent abdominal operation. Of the 67 patients requiring emergent abdominal operation due to traumatic injury, 16 previously had undergone laparotomy by a Forward Surgical Team. Of the 51 injured patients presenting initially to our center, 8 had low-energy abdominal fragment injury, and underwent diagnostic laparoscopy. In addition, 12 of the 18 patients with non-traumatic acute abdominal conditions were managed by MIS, 3 patients were treated by video assisted thoracic surgery for traumatic injury, and 6 patients required emergency therapeutic gastrointestinal endoscopy.

Conclusions: Despite the numerous barriers to providing MIS in the forward combat surgical environment, MIS has a limited role and serves as a force-multiplier, by returning injured and ill personnel rapidly to duty.

ESOPHAGEAL/GASTRIC SURGERY

18312

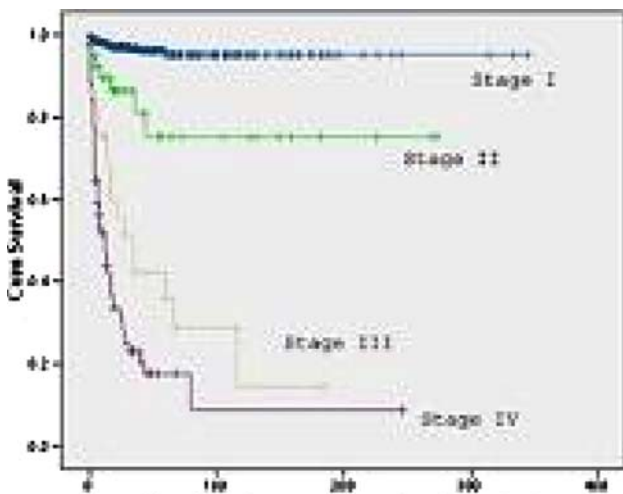
S095

ANALYSIS OF 1, 543 GASTRIC CARCINOID PATIENTS FOR PROPOSED STAGING SYSTEM

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Background: Gastric carcinoid tumors are rare and little is known about the long term prognosis of these tumors, since no staging system currently exists. The aim of this study was to create a predictive staging system to accurately estimate prognosis. Methods: A retrospective review of 15, 983 carcinoid patients from the SEER database identified 1, 543 patients with gastric carcinoid tumors from 1977 to 2004. Patients were analyzed for all clinicopathologic factors and a Tumor (T1 <3 cm or mucosa, T2 >=3 cm but <5 cm or muscularis propria, T3 >=5 cm or serosa) stage, lymph Node (N0 no nodal mets, N1 nodal disease) stage, and Metastatic (M0 no mets, M1 metastasis) stage, staging system was created according to these parameters. Data points were compared using Kaplan Meier and Cox Proportional Hazards. Results: There were 941 female, 602 male, average age was 63.5 years (23-101), average size of primary 1.7 cm (range, 0.1 to 2 cm) with 11.6% having lymph node metastasis. Survival was statistically significant between stages ($p < 0.0001$), and not significant within stages. 461 patients presented with Stage I disease, 41 with Stage II, 29 with Stage III, and 79 patients in Stage IV. 5-year survival was 96%, 61%, 24%, and 5% for Stages I-IV respectively ($p < 0.0001$). Size of primary tumor, depth of invasion, metastatic disease and age were significant on multivariate analysis. Conclusion: Our newly developed staging system accurately predicts disease prognosis in gastric carcinoids. Incorporation of gastric carcinoid into the American Joint Committee on Cancer is needed to both educate all physicians and to follow trends in prognosis.



18367

S002

RESULTS AFTER LAPAROSCOPIC HELLER-DOR OPERATION FOR ESOPHAGEAL ACHALASIA IN 100 CONSECUTIVE PATIENTS

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Background: Laparoscopic Heller-Dor operation (LHD) has been the procedure of choice for the treatment of esophageal achalasia. However since, the incidence of achalasia is low, at one in 100,000 in USA and Japan, reports on the outcome of surgical treatment for such a disease are limited. In this study, we investigated the therapeutic results after LHD for achalasia at a single university hospital.

Methods: Between August 1994 and July 2006, a total of 100 consecutive patients (52 men and 48 women, mean age 41.9 years, range 9-82) underwent LHD in this period. The therapeutic results after LHD were assessed by peri- and post-operative complications, in terms of operation time, blood loss, post-operative hospital stay and standardized questionnaire for satisfaction (SQFS) by telephone or outpatient clinic interview.

Results: According to the pre-operative esophagogram, 66 patients (66%) had spindle-type achalasia, 24 patients (24%) had flask-type, and 13 patients (13%) had sigmoid-type. The severity of esophageal dilatation was assessed as grade I in 7 patients (7%), grade II in 66 patients (66%) and grade III in 27 patients (27%). As to peri-operative complications, the lower esophageal mucosal perforation occurred in 14 of the 100 patients (14%), but all of them could be suture-obiterated laparoscopically. One patient (1%) was converted to open surgery because of the uncontrolled bleeding from the short gastric artery. The mean operative time was 169 (range 110-240) min and mean peri-operative blood loss was 22 (range 0-1300) ml. Blood transfusion was required in one patient (1%). The median post-operative hospital stay was 7 (range 3-35) days. Reflux esophagitis was seen in 5 patients (5%), which was treated successfully with a proton pump inhibitor. The other 3 patients (3%) developed either acute dilatation of the stomach (2%) or atelectasis (1%), which were successfully treated by conservative management. According to the SQSF, 77 patients rated their recovery as Excellent, 17 as Good, 4 as Fair, and 2 as Poor, so that which resulted in the successful rate of 94%. On the other hand, post-operative pneumatic dilatation was required for 5 patients (5%) for inadequate improvement of dysphagia. In addition, re-operation was required for 2 patients (2%): one patient had intrathoracic wrap, which was repaired laparoscopically, and the other patient underwent subtotal esophagectomy for a curved upper esophagus.

Conclusion: Laparoscopic Heller-Dor operation is a safe and effective surgical treatment for esophageal achalasia.

18602

S001

ANTI-REFLUX SURGERY IS NOT TOTALLY EFFECTIVE AGAINST ESOPHAGEAL ADENOCARCINOMA, DESPITE THE REGRESSION OR DISAPPEARANCE OF BARRETT'S ESOPHAGUS IN MOST CASES - A STUDY OF 80 BARRETT'S PATIENTS

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Background: Barrett's Esophagus (BE) is a complication of gastroesophageal reflux disease (GERD) and can be a pre-malignant condition. laparoscopic anti-reflux surgeries (LARS) significantly correct physiological and anatomical abnormalities in patients with GERD; nevertheless, there is no consensus about its effectiveness in preventing malignant transformation in patients with BE. The impact of LARS on those suffering from BE and in particular its effect not only on the regression of metaplasia but also on the progression of metaplasia and dysplasia toward adenocarcinoma is still not understood.

Aim: The objective of this study is to prospectively evaluate clinical, endoscopic and histopathological results after Laparoscopic Nissen Fundoplication (LapNissen) in patients suffering from BE.

Method: From January 2000 to August 2007, 315 patients suffering from GERD underwent LapNissen performed by the same surgeon. Of these 80 (25.39%) had BE. There were no conversions to open surgery and all patients were discharged within 48 hours. Follow-up using endoscopic biopsy was performed in all 80 patients. Average follow-up was 46.8 months.

Results: The control of symptoms was effective in 77 patients. Three patients remained symptomatic and used a proton pump inhibitor. BE therefore remained unaltered in these patients. Regression of BE occurred in 49 (61.25%) patients. Of these 24 (30%) showed no further signs of BE in endoscopic or histopathological examinations. In one patient, who remained asymptomatic after surgery, the degree of dysplasia increased to high-grade dysplasia and another asymptomatic patient developed adenocarcinoma. Both underwent endoscopic mucosectomy of the BE area. No-one died or suffered any significant secondary complications after surgery.

Conclusions: LapNissen is safe and effective in the control of symptoms in a significant number of patients with BE. In spite of regression occurring at a randomly high percentage level in patients operated and the control of GERD attained by most patients, the development of high-grade dysplasia and adenocarcinoma is not fully prevented by Anti Reflux Surgery. Routine endoscopic follow up with biopsy is highly recommended for all patients with BE after LARS.

18748

S091

LONG-TERM QUALITY OF LIFE AFTER LAPAROSCOPY-ASSISTED DISTAL GASTRECTOMY

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Background: Laparoscopy-assisted distal gastrectomy (LADG) needs longer operation time, but brings lesser pain, invasiveness after operation compared with open distal gastrectomy (ODG). Patients undergone LADG can recover earlier than ODG. However comparative study of long-term quality after LADG and ODG is not performed.

Patients and Method: From August 2007 to July 2006, 197 patients with early gastric cancer were operated in our hospital. 82 patients were operated on LADG, 115 patients were operated on ODG. The aim of this study was to investigate whether difference between LADG and ODG for body weight loss, symptom of esophageal reflux, diarrhea, abdominal pain after 1, 3, 6 month, and 1 year after operation.

Result: (Background) Average age of LADG was 62.6, ODG 64.9. Pre operative BMI of LADG was 22.2, OGD 23.0. Operative time of LADG was 280 minutes, ODG 276 minutes. Blood loss of LADG was 112 ml, OGD 244 ml ($P < 0.01$). The number of lymph node dissection of LADG was 46.5 OGD 44.4. The rate of sub-mucosal invasion of LADG was 35.5%, ODG 39.1%. The rate of lymph node metastasis of LADG was 4.9%, ODG 6.9%. (Long-term quality) The rate of body weight from pre-operative state after LADG was 94.5%, 93.3%, 92.8%, 92.9% (1, 3, 6 month, 1 year, same as follows), ODG 92.2%, 91.0%, 90.7%, 90.5%. The incidence of esophageal reflux after LADG was 20.7%, 18.3%, 9.8%, 3.7%, ODG 12.2%, 7.0%, 9.6%, 3.5%. The incidence of diarrhea after LADG was 13.4%, 8.5%, 6.1%, 6.1%, ODG 17.4%, 20.9%, 16.5%, 13.0%. The incidence of abdominal pain after LADG was 23.1%, 8.5%, 11.0%, 4.9%, ODG 9.6%, 5.2%, 2.6%, 0.9%.

Conclusion: There was no significant difference between the long term quality after LADG and ODG in this study.

18891

S092

PRE-OPERATIVE PREDICTORS OF THE SHORT ESOPHAGUS

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Background: Short esophagus is a common cause of failure of anti-reflux surgery. Minimally invasive intervention for short esophagus is technically difficult. Reliable predictors of short esophagus would allow appropriate referral and better outcomes.

Methods: Between January 1994 and August 2007, a total of 84 patients underwent antireflux surgery with Collis gastroplasty (Group A) at Creighton University Medical Center. On the other hand, 204 consecutive patients who underwent primary Nissen or Toupet fundoplication from September 2003 thru August 2007 were chosen as a control (Group B). Retrospective review of patient characteristics and investigations was performed. Esophageal length index (ELI) was calculated as ratio of endoscopic esophageal length (in cm) to height (in meters).

Results: Patients in group A have a higher mean age (57years) than group B (54 years) but there were no significant differences in sex, height, weight and body mass index distribution between these groups. Mean endoscopic esophageal length (EEL) as measured from incisor to esophago-gastric junction was significantly shorter in Group A (32.4) as compared to Group B (36.2) ($p < 0.0001$). Patients with pre-operatively diagnosed esophageal stricture had a 68% likelihood of having a short esophagus relative to 22% in those without (OR 7.4, $p < 0.001$). ELI of more than 19.5 had 82% specificity and 81% sensitivity of predicting short esophagus.

Conclusion(s): Patients with low esophageal length index and those with stricture are at a higher risk for having short esophagus.

19161

S005

OUTCOME OF LAPAROSCOPIC GASTRECTOMY FOR GASTRIC CANCER

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As less-invasive operations have been noted in recent years, laparoscopic gastrectomy for gastric cancer has become popular in Japan. We have performed laparoscopic gastrectomy with regional lymph node dissection on 750 cases of gastric malignancies between March 1998 and August 2007. Here we present the outcome of laparoscopic gastrectomy for gastric cancer.

Of all 750 cases, we evaluated the prognosis of 390 cases who had been followed up for over 3 years (average follow up period: 5.3 years). Distal gastrectomy was performed on 323 cases, proximal gastrectomy on 24 cases, and total gastrectomy on 43 cases, respectively. The indication of operation was established sT2N1 or less. D1 lymph node dissection for T1 cases ($n = 280$) or D2 for T2 cases ($n = 110$) was carried out according to the general rule of Japanese Gastric Cancer Association.

The final stages of the patients were as follows; stage 1A: 275, stage 1B: 51, stage2: 44, stage3A: 20. Recurrence occurred in 18 cases (T1: 4, T2: 14). The cumulative 5 year survival rate was 95.4%. The outcome in each stage was as follows; stage 1A: 100%, stage 1B: 92.2%, stage2: 86.4%, stage 3A: 60.0%. There was no significant difference between the prognosis of laparoscopic and open gastrectomy patients.

In conclusion, laparoscopic gastrectomy for gastric cancer is considered as curative as compared to the conventional open gastrectomy.

19303

A RANDOMIZED CONTROLLED TRIAL OF LAPAROSCOPIC NISSEN FUNDOPLICATION (LNF) VERSUS PROTON PUMP INHIBITORS FOR TREATMENT OF PATIENTS WITH CHRONIC GASTRO-ESOPHAGEAL REFLUX DISEASE (GERD)

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Objective: In patients with GERD who were stable and symptomatically controlled on long-term medical therapy we performed an RCT to compare ongoing optimized medical therapy with LNF.

Methods: 201 patients were eligible for randomization, 104 gave informed consent (age mean 42.9, sd11; male 55 female 49) and 2 withdrew from the study immediately after randomization. Patients randomized to medical therapy received optimized treatment with PPI using a standardized management protocol based on best evidence and published guidelines. Surgical patients underwent LNF by four surgeons using previously published technique. Patients underwent symptom evaluation using the GERD symptom score (GSS), a published and validated instrument and the Global Rating Scale (GRS) for overall symptom control. Patients had 24 hour pH testing at baseline and after 3 years. Medical patients were evaluated on PPI, surgical patients off PPI.

Results: 94 patients were available for 3 year follow up. Both groups improved significantly with regard to pH (medical $p=0.0200$, surgical $p=0.0246$) and GSS (both groups $p<0.0001$). The overall GRS at 3 years was unchanged compared to baseline in the medical patients ($p=0.7287$) but improved in the surgical patients ($p=0.0072$). When the changes in medical and surgical patients were compared there were no significant differences between the groups for pH or GSS at 3 year ($p=0.7274$, $p=0.2295$) but the surgical patients had a significantly improved GRS ($p=0.0029$). Of 51 patients who had surgery, 3 had a redo LNF and 6 were on PPIs at 3 years (17.6% failure). In the medical group, 8 out of 50 patients required a LNF before the 3 year follow-up (16% failure).

Conclusions: In patients whose GERD symptoms were stable and controlled on PPI, both continuing PPI and LNF are effective therapies with similar failure rate, but patients undergoing LNF had better overall symptom control.

S081

19471

ASSESSMENT OF THE CLINICAL UTILITY OF ROUTINE BARIUM ESOPHAGRAM AFTER LAPAROSCOPIC ANTERIOR ESOPHAGEAL MYOTOMY FOR ACHALASIA

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Introduction: The purpose of this study is to evaluate the clinical utility of routine barium esophagram (BAS) after laparoscopic anterior esophageal myotomy for achalasia.

Methods: Records of 260 consecutive patients (pts) undergoing laparoscopic anterior esophageal myotomy for achalasia from 5/96-8/07 were reviewed from a prospective, IRB-approved database. All radiographic reports and perioperative records were reviewed. Data are given as mean \pm SD. Statistical significance ($p<0.05$) was determined using a two-tailed t-test and Chi Square.

Results: There were no conversions to an open procedure. Partial fundoplication was performed in 254 (97.7%) patients. Thirteen (5.0%) pts suffered an intraoperative mucosal perforation [esophageal (5), gastric (8)] during the myotomy, 7 pts had an esophageal diverticulectomy and 4 pts did not undergo a postoperative BAS and were excluded from analysis. Routine protocol BAS was therefore performed in 236 pts at a mean of 1.0 ± 0.3 days postoperative. BAS was interpreted as normal flow of contrast after esophageal myotomy in 145 (61.4%) pts. There were no false negative studies in this group and diet was initiated without incident at a mean of 1.0 ± 0.2 days, time to goal diet was 1.3 ± 0.7 days and mean time to discharge was 1.5 ± 1.0 days postoperative. Ninety-one (38.6%) pts had an abnormal BAS (contrast retention or pooling, delayed emptying). Initiation of a diet was delayed in only 6 (6.6%) pts. Two (0.9%) BAS were interpreted as an esophageal leak. Both were determined to be false positives after one pt underwent negative exploratory laparoscopy and one was observed clinically. Of the remaining 4 pts with a diet delay, two were true positive postoperative BAS, one pt with a residual stenosis requiring early esophageal dilatation and one pt who underwent laparoscopic re-exploration on POD #4 for incarcerated omentum in the hiatus. In the group with abnormal BAS, diet was initiated at a mean of 1.1 ± 0.3 days, time to goal diet 1.4 ± 0.7 days and mean time to discharge was 1.8 ± 1.9 days postoperative. The mean time to initiate diet, reach goal diet and discharge was not significantly different ($p=0.14$) between the normal and abnormal BAS groups. The sensitivity and specificity of an abnormal routine BAS after laparoscopic esophageal myotomy was 100% and 62.0% and the positive and negative predictive values were 2.2% and 100%, respectively.

Conclusions: Because of the poor positive predictive value, routine BAS after laparoscopic anterior esophageal myotomy should be utilized selectively in the immediate postoperative period after an uncomplicated procedure.

S096

19346

ESOPHAGEAL MANOMETRIC CHARACTERISTICS AND OUTCOMES FOR LAPAROSCOPIC ESOPHAGEAL DIVERTICULECTOMY, MYOTOMY AND PARTIAL FUNDOPLICATION FOR EPIPHRENIC DIVERTICULA

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Introduction: The purpose of this study is to characterize the esophageal motor and lower esophageal sphincter (LES) abnormalities associated with epiphrenic esophageal diverticula and analyze outcomes for laparoscopic esophageal diverticulectomy, myotomy and partial fundoplication.

Methods: Endoscopic, radiographic, manometric and perioperative records for patients undergoing laparoscopic esophageal diverticulectomy, anterior esophageal myotomy and partial fundoplication from 8/99-9/06 were reviewed from an IRB-approved outcomes database. Data are given as mean \pm SD.

Results: An esophageal body motor disorder and/or LES abnormalities were present in 11 patients with epiphrenic diverticula; 3 patients were characterized as achalasia, 1 had vigorous achalasia, 2 had diffuse esophageal spasm and 5 had a nonspecific motor disorder. Presenting symptoms included chest pain (4/13), dysphagia (13/13), and regurgitation (7/13). Three patients had previous Botox injections and 3 patients had esophageal dilations. Laparoscopic epiphrenic esophageal diverticulectomy with an anterior esophageal myotomy was completed in 13 patients (M:F, 3:10) with a mean age of 67.6 ± 4.2 years, BMI of 28.1 ± 1.9 kg/m² and ASA 2.2 ± 0.1 . Partial fundoplication was performed in 12/13 patients (Dor, n=2; Toupet, n=10). Four patients had a Type I and 1 patient had a Type III hiatal hernia requiring repair. Mean operative time was 210 ± 15.1 minutes and mean LOS was 2.8 ± 0.4 days. Two Grade II or higher complications occurred including one patient who was readmitted on postoperative day 4 with a leak requiring a thoracotomy, esophageal repair and gastrostomy/jejunostomy tubes. After a mean follow-up of 13.6 ± 3.0 months (range, 3-36), 2 patients complain of mild solid food dysphagia and 1 patient requires a PPI for GERD symptoms.

Conclusions: The majority of patients with epiphrenic esophageal diverticula have esophageal body motor disorders and/or LES abnormalities. Laparoscopic esophageal diverticulectomy and anterior esophageal myotomy with partial fundoplication is an appropriate technique with acceptable short-term outcomes in symptomatic patients.

S003

19477

LAPAROSCOPIC VERSUS OPEN GASTRECTOMY FOR ADENOCARCINOMA: A PROSPECTIVE COMPARATIVE ANALYSIS

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Background: The role of laparoscopic gastrectomy in the treatment of gastric adenocarcinoma.

Aim: To compare open and laparoscopic gastrectomy for adenocarcinoma.

Methods: Between January 2000 and December 2006, we prospectively enrolled all patients operated for gastric adenocarcinoma. Data were later analyzed according to the type of procedure (open versus laparoscopic). Parameters included: operative incidents, conversion, transfusion, duration, harvested lymph nodes, resection margins, operative mortality and morbidity, 1- 2- and 3-year recurrence and survival analysis.

Results: 51 patients operated laparoscopically (group A) were compared to 79 patients who had open procedures (group B). Conversion rate was 6%. Blood loss was less important in group A (150 ml versus, 400 ml; $p<0.05$). Operative duration was longer in group B (260 min versus 200 min;

$p<0.05$). Resection margins were positive in 3% of cases (group A) and 7.6% in group B ($p>0.05$), respectively. The number of harvested lymph nodes was more important in group A (14 versus 26;

$p<0.05$). Operative mortality rate was 0% in group A and 2% in group B ($p>0.05$), respectively. Post-operative morbidity rates were comparable (12% versus 16%) in group A and B, respectively. Mean length of hospital stay according to the French system was shorter in group A (8 days versus 11 days) as compared to group B ($p<0.05$). One, two and 3-year survival and recurrence rates were comparable in both groups.

Conclusion: Laparoscopic gastrectomy is a feasible and safe technique; In selected patients and experienced hands, results are at least comparable to those of open gastrectomies.

S094

19825

S090

LAPAROSCOPIC MANAGEMENT OF ACUTE PARAESOPHAGEAL HERNIA

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Objective: Acute paraesophageal hernia is a surgical emergency presenting with chest pain, abdominal pain, dysphagia, nausea and vomiting, retching or significant anemia. This can be due to gastric volvulus, incarceration, strangulation, severe bleeding or perforation. Traditionally this is treated with an open surgery. The purpose of this study is to evaluate the outcome of laparoscopic approach for these cases.

Methods: A retrospective chart review was performed for patients operated on for paraesophageal hernia at the Peter Lougheed Centre for 2004-2007. Patients admitted with acute symptoms requiring emergency surgery were selected for the study.

Results: Thirteen patients (11 women and 2 men) with a mean age of 71.5 years (50-91 years) were identified. Twelve patients underwent successful laparoscopic repair including reduction of the hernia content, excision of the sac, crural closure and fundoplication (anterior or Nissen). One patient was converted to open repair due to ischemic gastric perforation and peritoneal contamination. The mean operating time was 208 minutes (132-305 minutes), blood loss was minimal, and the mean postoperative hospital stay was 5.4 days (1-14 days). There were no significant perioperative complications. All patients were tolerating regular diet on short-term follow up.

Conclusions: Laparoscopic repair of acute paraesophageal hernia is safe and feasible with low morbidity and mortality. It affords all the benefits of minimally invasive surgery in a group of patients that are often elderly and suffer from multiple medical problems. Based on our experience we advocate the laparoscopic technique to repair acute paraesophageal hernias in patients with no obvious perforation.

20075

S004

VIDEO ASSISTED THORACOSCOPIC ESOPHAGCTOMY FOR CARCINOMA ESOPHAGUS

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Introduction: Thoracoscopic esophagectomy is emerging as an alternative to conventional open esophagectomy. It is perceived to have advantages of reduced surgical trauma and hence lesser postoperative morbidity. This paper presents outcome of patients undergoing thoracoscopic esophagectomy and compares it to patients undergoing open surgery in the same time period in the thoracic surgical service of Tata Memorial Hospital, India.

Methods and Patients: This is a retrospective analysis of a prospective database of 107 patients with carcinoma esophagus and cardia who underwent thoracoscopic esophagectomy between January 2004 and August 2007. Thoracic operative time and blood loss, total blood transfused, ventilatory days, total hospital days, pulmonary complications, major morbidity, anastomotic leak, hospital mortality, circumferential resection margin, number of lymph nodes harvested, and incidence of relapse were evaluated. These parameters were compared with that of 236 patients undergoing standard open surgery performed during the same time period.

Results: Thoracoscopic esophagectomy was attempted in 132 patients and performed successfully in 107 patients (19% conversion rate). Lung adhesions and advanced disease were the most common reasons for conversion. The two groups of patients were similar with respect to pre operative variables. The mean thoracic operative time was two hours for both groups; mean thoracic blood loss was 300 ml for both groups; mean blood transfused was 330 ml, (348 ml for open surgery) mean ventilator days were 1.6 days (1.8 for open surgery), and total hospital stay was 15 days. for both groups. The frequency of pulmonary complications was 22% (27% for open surgery), major morbidity from any cause was 23% (25% for open surgery), anastomotic leak rate was 6% (7% for open surgery) and hospital mortality was 5% for both groups. A median number of 30 lymph nodes harvested (31 for open surgery) and the frequency of microscopic positive circumferential resectional margin was 30% (27% for open surgery). With mean follow up period of 7.5 months the relapse rate was 23% (16% for open surgery). The difference in the outcome measures between the two groups was statistically not significant.

Conclusions: Thoracoscopic esophagectomy compares well with open surgery with respect to safety and short term outcome measures; however it fails to confirm the perceived advantage of thoracoscopic surgery with respect to reduced morbidity and early recovery.

19901

S093

COMPARISON OF ONCOLOGICAL OUTCOMES AFTER LAPAROSCOPIC TRANSHIATAL ESOPHAGECTOMY AND OPEN ESOPHAGECTOMY FOR PT1 ESOPHAGEAL ADENOCARCINOMA

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Introduction: This study compared pathological characteristics and patterns of disease recurrence for patients with pT1 esophageal adenocarcinoma treated with either laparoscopic transhiatal esophagectomy or open esophagectomy (Ivor Lewis or transhiatal).

Methods: Case notes were reviewed for consecutive patients, who had esophagectomy with pT1 adenocarcinoma at final pathological staging, during January 2000–December 2006. No patient had neo-adjuvant treatment.

Results: There were 44 patients, comprising 37 men (84%), median age 64 years (range, 35–80). 24 patients had an open Ivor Lewis operation, 4 had an open transhiatal operation and 16 had a laparoscopic transhiatal operation. Pre-operative, endoscopic ultrasound staging was T0 (2 patients, 5%), T1 (10, 23%) or T2 (32, 72%). Median lymph node yield was 19 (10-51) after an Ivor Lewis operation, 16 (3-28) after an open transhiatal operation and 15 (4-41) after a laparoscopic transhiatal operation. There was no R1 resection. There were two in-hospital deaths (5%), both of whom had an open operation. All patients in the laparoscopic group had N0 disease; none received adjuvant treatment. Two patients (7%) in the open group had N1 disease, of whom one patient received adjuvant chemotherapy. Alive patients had median follow-up of 36 months (5-87). One patient (6%) in the laparoscopic group had recurrent disease at 22 months after operation. This patient had N0 but poorly differentiated disease and died at 24 months. Two patients (7%) in the open group developed recurrence, at 6 or 8 months and died at 7 or 14 months, respectively. Both patients had poorly differentiated tumors. The patient who developed recurrence at 8 months had N1 disease; the second patient with N1 disease is alive and well at 14 months. Estimated survival (Kaplan-Meier) at 1 year or 3 years was 100% or 88%, respectively, for the laparoscopic group and 96% or 92% for the open group.

Conclusions: Oncological outcomes after laparoscopic esophagectomy or open esophagectomy for pT1 esophageal adenocarcinoma are similar.

FLEXIBLE ENDOSCOPY

19693

S066

19698

S006

PERFORMANCE MEASURES OF SURGEON-ENDOSCOPISTS IN A VETERANS AFFAIRS MEDICAL CENTER: APPROPRIATENESS OF SURGICAL RESIDENT COLONOSCOPY TRAINING

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Objective: Colonoscopy training is recognized to be important for surgical resident training. This study aimed to determine if surgeon-endoscopists meet quality indicators in the performance of colonoscopy in a Veteran's Medical Center.

Methods: Retrospective review of prospective standardized computer endoscopic reporting database (ProVationMDR). All colonoscopies performed by two attending surgeons (one general and one colorectal) between January 1, 2004 and July 31, 2007 were included in the study. Exclusion criteria included flexible sigmoidoscopies and incomplete reporting. Quality indicators used included the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) criteria for colorectal cancer screening and the American Society for Gastrointestinal Endoscopy (ASGE) quality indicators for colonoscopy.

Results: 568 patients' data were analyzed. Average patient's age was 63 y/o (range 27–89 y/o); 96% were male. Ninety-seven percent of colonoscopies were performed in accordance to established criteria. The most common indications for colonoscopy were: surveillance 205 (36%) for either a history of polyps in 87 (15%), or postsurgical 118 (21%); screening 157 (28%); rectal bleeding 18%; pain 19 (4%); anemia 15 (3%). Postcancer resection surveillance colonoscopies were performed within recommended guidelines criteria in 98% of the cases. Cecal intubation rate was 97% (versus ASGE quality target of 95%). Adenoma detection rate (ADR) was 25% overall (versus ASGE ADR of equal or greater than 25% among men, and 15% among women over the age of 50). Complications requiring intervention occurred in 2 patients (< 1%).

Conclusion: 1. Surgeon-performed colonoscopies meet standard quality criteria for indications and performance measures as established by SAGES and ASGE. 2. Surgeon-performed colonoscopies in a VA Medical Center may provide an excellent venue for surgical residents to attain colonoscopy competency.

ENDOSCOPIC THERAPY FOR ESOPHAGEAL PERFORATION OR ANASTOMOTIC LEAKAGE WITH A SELF EXPANDABLE METALLIC STENT

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Introduction: Leakage of the esophagus is associated with a high mortality rate and needs to be treated as soon as possible. Therapeutic options are either surgical or conservative. We evaluated the treatment of esophageal leaks with self expandable metallic stents (SEMS).

Methods: Between 2002 and 2005, we included 24 consecutive patients for iatrogenic esophageal perforation (n=11), intrathoracic anastomotic leakage after esophagectomy (n=10), and spontaneous tumor perforation (n=3) in our study. All patients were treated with endoscopic placement of a covered SEMS. Stent removal was performed 4 to 6 weeks after implantation. To exclude continuous esophageal leakage, radiologic examination was performed after stent implantation and removal.

Results: In all patients, a stent could successfully be placed and post-interventional x-ray demonstrated full coverage of the leakage. After 4 to 6 weeks, complete closure of the esophageal leak could be achieved in 22 patients (92%). One patient died after stent implantation due to myocardial infarction. The second patient with spontaneous tumor perforation received neoadjuvant therapy and underwent esophagectomy with gastric pull-up. Stent migration was not seen.

Conclusions: Implantation of covered self expandable metallic stents in patients with esophageal leakage is a successful alternative for operative treatment and can lower the morbidity rate.

ENDOLUMINAL/NOTES

19311

S061

LAPAROSCOPIC – ASSISTED ENDOLUMINAL SURGERY: A STEPPING STONE TO NOTES

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Background: As Natural Orifice Transluminal Endoscopic Surgery (NOTES) approaches on the horizon, surgeons will need to develop the fundamental skills and spatial orientation needed to perform in this new perspective. The Natural Orifice Surgery Consortium for Assessment and Research (NOSCAR) has established several fundamental challenges to the safe introduction of NOTES. Our institutional experience with laparoscopic assisted endoluminal surgery is reviewed to display the techniques and efficacy of procedures that may provide a safe transition to NOTES.

Methods: A retrospective review of all laparoscopic assisted endoluminal surgeries from 1991 to 2007 was performed. All procedures involved

establishment of pneumoperitoneum, placement of endoluminal balloon trochar ports under laparoscopic and endoscopic visualization, intraluminal insufflation, coordinated resection of intraluminal pathology using both the endoscope and laparoscopic instruments, and closure of the intraluminal port sites with intracorporeal suturing.

Results: A total of 177 procedures were performed from 1991 to 2007 using these techniques. These procedures varied and included laparoscopic monitored colon polypectomy, resection of gastric polyps, intraluminal cystgastrostomy, gastric ulcer resection, foreign body removal, and extraction of colon specimen through the vagina. The average age was 55 years (range 38-75), length of operation 95 minutes (range 60-137), hospital stay 3.5 days and 1 complication (2.8%).

Conclusions: Our institutional experience with these procedures successfully displays a safe and effective approach to a wide range of intraluminal pathology. While patients benefit from a shorter hospital stay, less post-operative pain, improved cosmesis and less morbidity, the laparoscopic surgeon can perform these operations using current instruments and equipment to safely transition into the emerging field of NOTES.

FLEXIBLE ENDOSCOPY

19942

ENDOSCOPIC SCLEROTHERAPY INDUCES ADDITIONAL WEIGHT LOSS INITIAL ROUX-EN-Y GASTRIC BYPASS

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Background: Weight gain (WG) following initial weight loss (WL) success or inadequate initial WL (IWL) from Roux-en-Y gastric bypass (RNYGB) is a problem for many patients. Often, this may be due to dilation of the gastrojejunostomy (GJ). Effective endoscopic management would avoid the morbidity of surgical revision. We hypothesized that endoscopic sclerotherapy (ES) of the GJ can achieve additional weight loss.

Methods: Patients with long-term WG or IWL were endoscopically evaluated for dilated GJ. ES was performed by circumferential injection of sodium morrhuate around the dilated GJ. WL was analyzed on a per procedure and per patient basis (to determine effectiveness of multiple procedures). Statistical analysis was performed via Wilcoxon tests.

Results: 14 patients underwent 20 ES. Follow-up ranged from 1 to 12 months. One patient was not available for follow-up. Examining WL on a per procedure basis, 8/19 did not yield weight loss. In the remaining 11, weight loss averaged 9.5 pounds (3.8% of total weight) per procedure ($p < 0.001$). For all 19 procedures, weight loss averaged 3.2 pounds per procedure ($p > 0.05$). Examining weight loss on a per patient basis, 6/13 patients did not have net weight loss. The remaining 7 patients had an average WL of 12.2 pounds (4.7% of total weight) per patient ($p < 0.016$). For all 13 patients, net weight loss averaged 4.3 pounds per patient ($p > 0.05$). Only one of four patients undergoing multiple procedures lost greater than one pound.

Conclusion: ES does yield WL in approximately half of the patients. Multiple ES do not seem to improve outcomes. ES may be a useful as first line therapy for patients with WG/IWL and dilated GJ.

S069

20136

AN INFLATABLE DEVICE FOR ESOPHAGEAL ESD USING CELL SHEET ENGINEERINGTakeshi Ohki MD, Masayuki Yamato PhD, Masanori Maeda, Daisuke Murakami, Teruo Okano PhD, Masakazu Yamamoto PhD
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Introduction: Large endoscopic submucosal dissection (ESD) of superficial esophageal cancers often requires subsequent of balloon dilation operations to prevent post-operative esophageal constriction. We therefore have previously developed a novel method to transplant oral mucosal epithelial cell sheets using cell sheet engineering to promote wound healing after ESD (Gut, 1704-1720, 2006). Although we have demonstrated the successful transplantation of two cell sheets, it has remained difficult to transplant cell sheets to the entire surface of esophageal ulcerative wound site using our previous. We therefore develop a novel device for the endoscopic delivery and transplantation of cell sheets. Methods: Oral mucosal epithelial cell sheets (24 mm × 24mm) from beagle dogs were harvested by simply reducing the temperature 2 weeks after seeding oral mucosal epithelial cells on temperature-responsive dishes. Using a novel inflatable device a carrier of the engineered tissues, four individual cell sheets were then simultaneously transplanted to an artificial circumferential esophageal ulceration of a deceased pig (n = 5). Results: An inflatable balloon was attached to the exterior of standard EEMR-tube with an outer cylindrical cover. For transplantation, the device was carefully moved to the ulcer site by endoscopy. Ten minutes after transplantation we macroscopically confirmed complete circumferential transplantation of oral mucosal cell sheets. Iodine staining indicated that the all of the cell sheets were successfully attached to the esophageal ulcer. Histological results also confirmed that the epithelial cell sheets were attached to the remnant submucosal layers. Conclusions: Our results show that this novel balloon device completely enables to the simultaneous, controlled transplantation of several tissue engineered cell sheets by endoscopy. This ability to simply cover circumferential esophageal ulcerations with a single procedure creates new a potential treatment in endoscopic treatment of Barrett's esophagus with high grade dysplasia, using ESD in conjunction with cell sheet engineering.

S067

20078

SEVERE COMPLICATIONS AFTER DOUBLE BALLOON ENTEROSCOPYGary Weissenfluh MD, John Morton MD
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Introduction: Double balloon enteroscopy (DBE) is a relatively new endoscopic technique to diagnose and treat small bowel disease. While it is becoming widely used, there are relatively few data regarding potential complications.

Methods: We reviewed all DBE cases at an academic medical center from 2006–2007. 39 DBEs were identified and three patients had severe complications (7.7%) secondary to their DBE procedures. All DBEs were performed by a single gastroenterologist in their first year of performing DBE.

Results: The first patient had a DBE for evaluation of Crohn's disease after years of partial small bowel obstructions and chronic abdominal pain. This procedure resulted in an emergent exploratory laparotomy for two small bowel perforations. The second patient had a DBE performed for chronic anemia and capsule endoscopy evidence of arteriovenous malformations in the small bowel. The original DBE was non-diagnostic and was not able to advance the scope presumably secondary to adhesions. This patient was taken to the operating room and a laparoscopic assisted DBE study was performed. However, the patient later underwent urgent exploratory laparotomy for small bowel perforation. The third patient underwent double-balloon dilation for pyloric channel stenosis and gastric outlet obstruction. During the procedure, gastroenterologist visualized possible intraperitoneal. Patient subsequently underwent an exploratory laparotomy, gastrectomy, and gastrojejunostomy with Roux-en-Y reconstruction.

Literature review reveals limited studies and case reports for DBE complications despite its widespread use since first being described in 2001. The largest case series to date reports a much lower severe complication rate (0.6%) than our case series (7.7%). The diagnostic and therapeutic yields also vary widely. Specifically, the complication rate of DBE in patients for whom difficulty was encountered due to adhesion or stricture has not been studied.

Conclusions: Double balloon enteroscopy may be a valuable diagnostic and therapeutic tool in the right patients and with the right hands. Further studies of DBE in the setting of difficult advancement and more clearly defined procedural training should be explored.

S062

20143

THE ROLE OF NARROW BAND IMAGING (NBI) DURING FOLLOW-UP AFTER ENDOSCOPIC POLYPECTOMYMiroslaw Szura PhD, Aleksander Zajac PhD, Jan Kulig PhD
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Narrow-band imaging is one of the latest technological achievements of the digital endoscopy. The technique is using interference filter to light surfaces in narrow bands of red, green, and blue colour that visualizes the differences in mucosa colouring and enhances contrast between the mucosa surface and submucosa vascular network. The NBI makes easier differentiating between pathologic lesions from normal mucosa.

The study evaluates the possibility of using NBI for monitoring of the patients after endoscopic polypectomy of the colon.

Material and Method: The study was conducted in 50 patients after endoscopic polypectomies for colonic adenomas with high-grade dysplasia. Control NBI endoscopy was performed 3 months after polypectomy using HDTV Olympus equipment series 180. During the study the attempts were made to localize polypectomy site, and the polypectomy scar was evaluated in the traditional light and using narrow band light. The material was taken for histopathological examination. The quality of obtained images was evaluated using a score system.

Results: NBI failed to localize endoscopic polypectomy site in 19 patients, in 24 localized polypectomy scar and in the remaining 7 remaining or recurrent polyp. NBI illumination detected remaining adenoma in 6 patients with the localized polypectomy scar. Histopathological examination revealed low-grade adenoma in 6 patients with the remaining polyp and in 5 with polypectomy scar, as well as inflammatory reaction in the remaining cases.

Conclusions: A new technique of NBI enhances the visibility of lesions in mucosa, and the preliminary results are encouraging for the assessment of the endoscopic treatment accuracy.

S064

HEPATOBIILIARY/PANCREATIC SURGERY

18767

S116

TREATMENT OF GALLBLADDER DISEASE DURING OPERATIONS IRAQI FREEDOM AND ENDURING FREEDOM

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Introduction: We examined the outcome after treatment for gallbladder disease in deployed military service members and the impact of instituting a clinical pathway to expedite return to duty (RTD).

Methods and Procedures: A retrospective chart review of 97 medically evacuated patients with gallbladder disease was analyzed. These patients were evacuated from the field to Landstuhl Regional Medical Center (LRMC), Germany, between March 2003 and November 2004. In October 2003, a clinical pathway was established to aid in returning these deployed patients back to their combat units. These service members were compared to 90 local patients who underwent the same surgery during the study period. **Results:** Prior to the implementation of the clinical pathway, 29 patients were treated at LRMC. Of those, 15 (52%) returned to their deployed units. After the clinical pathway was established, 57 of 68 patients (84%) returned to duty. The Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) service members had delayed presentations for definitive treatment. When compared to the local patient group, OIF/OEF surgical cases were more often male (78% vs. 32%), younger (31 vs. 35), associated with longer operative times (89 min vs. 52 min), higher conversion rates to open (7.2% vs. 2.2%) and higher major complication rate (6.2% vs. 0%). Gender, operative times, conversion rate and complication rate were significantly different between the two groups. No significant differences were noted in age or final pathologic diagnosis. **Conclusion:** Gallbladder surgery can be performed in a delayed manner in the deployed service member although with a significantly higher morbidity as compared to the local population. These findings suggest that changes in the immediate treatment and transportation of these service members should occur at the theater level. The use of a clinical pathway facilitates the rapid RTD for soldiers diagnosed with gallbladder disease.

18863

S117

COMPARATIVE ANALYSIS ON CLINICAL OUTCOMES BETWEEN LAPAROSCOPIC DISTAL PANCREATECTOMY AND OPEN DISTAL PANCREATECTOMY : SINGLE CENTER, SINGLE OPERATOR, SAME PERIOD EXPERIENCE

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Purpose: Laparoscopic pancreatic surgery on distal lesion is in development state now. However benefit of laparoscopic distal pancreatectomy over the open surgery is not well known yet. We compared the clinical data of the patients underwent laparoscopic distal pancreatectomy (LDP group) with the patients underwent open surgery (ODP group) on the base of same operator, same period retrospectively. Type of operation was selected by wish of patients. **Result:** We performed 100 cases of laparoscopic surgery for the pancreatic disease including 90 cases of distal pancreatectomy with or without spleen-preserving, 5 cases of enucleation, and 5 cases of pylorus preserving pancreaticoduodenectomy from Mar. 2005 to Aug. 2007 by single operator. Demographic features, such as age, sex, body mass index, underlying disease, previous operation history, type of disease didn't show significant differences between two groups. Rate of spleen preservation was significantly higher in LDP group (40 % versus 5.7 %). Median operation time was 208 mins in LDP group and 190mins in ODP group ($P > 0.05$). Blood loss, RBC transfusion, use of pain killer, hospital cost did not show significant difference between two groups. LDP group had a median length of 10 days of hospital stay, and started the soft diet at 3 days after operation, compared with 16 days, and 4.5 days for the open patients respectively ($P < 0.05$). Overall postoperative complication rate was 20.3% in the LDP group, compared with 22.9% in the open group. ($P > 0.05$). Pancreatic fistula rate was 8.4% in LDP group and 14.4% in ODP group ($P > 0.05$). There was no mortality in both groups. **Conclusion:** Considering the benefits of laparoscopic surgery like big cosmetic advantage, short hospital stay and rapid getting back to normal work, laparoscopic pancreatectomy with or without spleen-preserving should be considered in benign or low potential malignant lesion of the distal pancreas, even prospective randomized study still be needed.

19002

S112

THE USE OF A MULTIPLE INSTRUMENT GUIDE TO FACILITATE LCBDE; REPORT ON 119 CASES

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Objective: To analyze a large LCBDE experience in a community hospital and determine the efficacy of using a new device, the Multi-channel Instrument Guide (MIG) to achieve safe, practical and effective LCBDE techniques that are applicable to virtually all cases of choledocholithiasis.

Methods: All cases of choledocholithiasis that presented to our surgical team were analyzed. An algorithm progressing from trans-cystic duct LCBDE to choledochotomy techniques was employed. Balloon catheters, stone baskets, and laser lithotripters were used under video choledochoscopy guidance. The MIG was used to protect and manipulate the choledochoscope without the need for grasping forceps.

Results: 119 cases of choledocholithiasis were analyzed. 21 cases were resolved using glucagon, flushing and catheter techniques that did not require use of the choledochoscope and MIG. 98 cases were more complex. Overall, 55 of the cases were resolved using trans-cystic duct techniques. 64 cases were resolved using choledochotomy techniques. Experience lead to procedural refinements and by the second half of the study the success rate for trans-cystic duct techniques had increased from 31% to 65%. Laser lithotripsy was used in 15 patients (12%). 12 patients had a pre-op ERCP (unsuccessful at clearing all stones), and of these 7 patients had a history of previous cholecystectomy. Overall the successful stone clearance rate for LCBDE was 97%. One patient was converted to open Roux-en-Y choledochojunostomy.

Conclusion: The 2.8 mm choledochoscope introduced into either the cystic duct or choledochotomy using the MIG is a highly effective combination for any complex LCBDE procedure. LCBDE is not a single procedure, but rather a family of related endoscopic techniques with the objective of clearing the bile ducts of stones. In trans-cystic duct LCBDE using the MIG, the adjustable tip angle and the stiffness of the MIG were advantageous in introducing the choledochoscope. The MIG was effective in protecting the choledochoscope and allowing its manipulation without the need for grasping forceps. In choledochotomy LCBDE the MIG is again used to manipulate and protect the choledochoscope. The two additional working channels are used for enhanced irrigation to distend the bile duct and to deploy balloon catheters and larger size stone baskets, thus offering procedural enhancements. Video guidance within the biliary tree is indispensable in the use of stone baskets, balloon catheters, and laser lithotripters. It is essential in confirming final clearance of the bile ducts and in evaluating the ampulla. LCBDE using the MIG and 2.8 mm choledochoscope is an effective, organized, safe and practical procedure that can be accomplished in a community hospital

19202

S113

THE IMMEDIATE RE- RESECTION OF T1 INCIDENTAL GALLBLADDER CARCINOMA- INDICATION OR OVER TREATMENT

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Introduction: The indication for an immediate re-resection (IRR) in T1b incidental gallbladder carcinoma (IGBC) is debated in the literature, and different recommendations are often drawn based on data collected from only small groups. But the management of IGBC is difficult, because there are no established guidelines.

An IRR is recommended in cases of T2 tumours and more advanced stages according to many authors and the effective guidelines in of Germany. For a T1 tumour a simple cholecystectomy is enough. The IRR includes a liver resection and a loco regional lymphadenectomy. In which T- stage such a re- resection should be undertaken is debated in the international literature.

Some authors recommend a re resection in case of T1b- stage and improve the 5 year survival from 60 to 100%, because the rate of positive lymph nodes is up to 16% and the lymphatic, venous and perineural infiltration is up to 50% according to the literature.

Others recommend a reoperation only when the margins are positive or when there is subserosal invasion > 2 mm.

The question is, if T1b tumours do profit from a re- resection or if this operation is only an additional lethality, the same question has to be discussed for T3 and T4 tumours.

Material and method: To obtain data we use the German- Registry of incidental gallbladder carcinoma, which is institution of the German Society of Surgery. Within a period of 3 months we are actualizing the data.

Results: 550 cases of incidental gallbladder carcinomas are registered.

In 79 patients with T1- tumour there was no IRR. In 31 patients with T1- tumour there was an IRR. According to Kaplan- Meier graph for T1- tumours, there is a significant prognostic advantage for T1- tumours with an IRR.

In 138 patients with T2- tumours there was no IRR. In 117 patients with T2- tumour there was an IRR. According to Kaplan- Meier for T2- tumours there is a significant prognostic advantage for T2- tumours with IRR.

The Kaplan- Meier graphs for T3 and T4- tumours indicate no survival benefit after IRR.

Discussion: There is a significant survival benefit for the T2 tumours and T1b- tumours after an IRR (log- rank $< 0, 05$). The analysis shows no advantage for T1a and T3/4 carcinomas after IRR. An IRR should be highly recommended for patients with IGBC in the T1b stage. An extended resection is also necessary in order to exactly determine the nodal status, to make an exact definite staging for these patients, and to separate nodal negative patients (Stage Ia, IIb) from those with positive lymph-nodes.

19348

S115

PRIMARY AND OVERALL SUCCESS RATE AND CLINICAL OUTCOMES FOR LAPAROSCOPIC, ENDOSCOPIC AND OPEN PANCREATIC CYSTGASTROSTOMY FOR PANCREATIC PSEUDOCYSTS

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Introduction: The purpose of this study is to evaluate the primary and overall success rate for laparoscopic, endoscopic and open pancreatic cystgastrostomy for pancreatic pseudocysts.

Methods: Records of 83 patients (M:F, 46:37) undergoing laparoscopic (LAP; n=16), endoscopic (ENDO; n=45) and open (OPEN; n=22) pancreatic cystgastrostomy from 3/99-8/07 were analyzed on an intention-to-treat basis from an IRB-approved outcomes database. Data are given as mean \pm SD. Statistical significance ($p < 0.05$) was determined using t-test and Fisher's exact test.

Results: Mean patient age was 50.8 \pm 2.4 years, mean BMI was 28.1 \pm 1.4 kg/m², mean percent gallstone pancreatitis was 53.3% and mean pancreatic pseudocyst size was 9.5 \pm 0.6 cm. There were no significant differences ($p < 0.05$) in the mean patient age (years), gender, BMI (kg/m²), etiology of pancreatitis (% gallstone) and size (cm) of pancreatic pseudocyst between groups. The incidence of Grade II or higher complications within 30 days of the primary (index) procedure occurred in 31.5%, 15.6%, and 22.7% patients undergoing LAP, ENDO and OPEN pancreatic cystgastrostomy, respectively ($p = ns$). Follow up evaluation of 75 (90.4%) patients was carried out at a mean interval of 9.5 months (range, 1-40). The primary success and overall success rate defined as pancreatic pseudocyst resolution was 87.5%/93.8%, 35.5%/84.6% and 81.2%/90.9% for LAP, ENDO and OPEN pancreatic cystgastrostomy, respectively. Primary success rate was significantly higher ($p < 0.01$) for LAP and OPEN compared to ENDO pancreatic cystgastrostomy, but overall success was equivalent ($p = ns$). Primary endoscopic failures were salvaged by OPEN pancreatic cystgastrostomy (n=13), percutaneous drainage (n=3) and repeat ENDO drainage (n=6).

Conclusions: LAP and OPEN pancreatic cystgastrostomy both have a higher primary success rate than endoscopic internal drainage although OPEN pancreatic cystgastrostomy and repeat endoscopic pancreatic cystgastrostomy provides overall success in selected patients.

19530

S114

LAPAROSCOPIC LIVER RESECTION INCLUDING THE LESION LOCATED IN POSTERIOR AND SUPERIOR PART

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Background: Despite the increasing experience of laparoscopic and hepatic surgery, laparoscopic liver resection is still limited to lesions localized on the antero-lateral segments of the liver. The aim of this study is to evaluate the feasibility of laparoscopic liver resection for tumors located in the postero-superior segments of the liver (Segments I, VII, VIII, and the superior part of IV), and to compare operative outcomes with the antero-lateral segments of the liver (Segments II, III, V, VI, and the inferior part of IV). **Methods:** Out of 120 consecutive laparoscopic liver resections from September 2003 to July 2007, we analyzed the clinical data of 77 patients who underwent laparoscopic liver resection for tumors. Five (6.5%) conversions occurred. Patients were classified into two groups according to tumor location: group AL (antero-lateral segments; n=50) and group PS (postero-superior segments, n=22). **Results:** There was no mortality, reoperation, or life threatening complications. The predominant type of resection was a minor liver resection in group AL, and a major liver resection in group PS ($P < 0.001$). The mean operative time in group PS (346 min) was longer than that in group AL (222 min; $P < 0.001$). However, there was no difference in the conversion rate ($P = 0.099$), mean blood loss ($P = 0.061$), the rate of intraoperative transfusion ($P = 0.098$), the rate of complications ($P = 0.293$), mean tumor-free margin ($P = 0.557$), and mean hospital stay ($P = 0.183$) between the two groups. **Conclusion:** Laparoscopic liver resection for tumors located in PS is more difficult than in AL, but is still feasible and leads to comparable outcome.

HERNIA SURGERY

19476

S045

LAPAROSCOPIC COMPLETELY EXTRAPERITONEAL REPAIR OF INGUINAL HERNIA IN CHILDREN; A SINGLE INSTITUTE EXPERIENCES WITH 1, 257 REPAIRS IN COMPARISON WITH CUT-DOWN HERNIORRHAPHY

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Aim of the study: Conventional open herniorrhaphy in children has been reported to have 2~3% recurrence and 10~20% postoperative contralateral hernia rates. We developed a unique technique to achieve completely extraperitoneal ligation of patent processus vaginalis (PPV) without any skip areas, sparing the spermatic cord and vessels under laparoscopic control. Our technique should be theoretically superior to open repair in terms of high ligation of the PPV and routine intervention to the contralateral side. The purpose of this report is to introduce our technique and its results in comparing with the conventional cut-down herniorrhaphy.

Methods: A consecutive series of 1, 585 children with inguinal hernia or hydrocele, experienced during 1996 to 2006, were analyzed. In laparoscopic PPV closure (LPC), a 2-0 suture, placed in the lower half of the internal inguinal ring through a 16-G sheath needle advanced extraperitoneally across the cord and vessels, was retrieved through the upper half of the ring by a specially devised needle, and tied up achieving completely extraperitoneal ligation of the ring. Either cut-down herniorrhaphy with or without diagnostic laparoscopy (C-D) or LPC was selected according to parental preference under informed consent.

Main results: Parents gave a more preference to LPC (LPC in 1, 257 children, C-D in 308 and miscellaneous in 20). Age ranges were equal to both group LPC and CD (median, 3y). Sex distribution showed female predominance in group LPC (44% vs 27%) for postoperative cosmetic superiority. Mean operation times were equal to both group in unilateral repair (28 \pm 9 m for LPC vs 29 \pm 17 for C-D), and shorter for LPC in bilateral repair (38 \pm 14 vs 47 \pm 20). Postoperative hernia recurrence was less in LPC (0.1% vs 0.5% of total PPVs). Contralateral hernia developed less in LPC (0.8% vs 1.3% of unilateral PPV closure). Postoperative direct hernia occurred in one patient of group C-D (0.3%). Group C-D had injuries to reproductive systems during the operation in two patients (0.7%). **Conclusion:** Our technique has succeeded to reduce the rates of postoperative hernia recurrence and contralateral hernia and the risk of injuries to reproductive systems.

19748

S041

TRANSABDOMINAL PREPERITONEAL (TAPP) VS LICHTENSTEIN PRIMARY HERNIA REPAIR: LONG-TERM RESULTS

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Background: The surgical preference for inguinal hernia repair is still under debate and discussed controversial. Short- and long-term results are based on data of different surgical trials with diverse results. In this retrospective study the long-term results of the transabdominal preperitoneal (TAPP) hernia repair and the Lichtenstein technique were compared.

Method: Between 2000 and 2005, the TAPP or the Lichtenstein primary inguinal hernia repair was performed in patients that were examined and analyzed retrospectively. The TAPP repair was performed at a single centre and the Lichtenstein approach at another centre. Patients data, the clinical course, complications and the recurrence rate were recorded. Quality of life was analyzed using the GIQLI and the SF-36 questionnaire.

Results: A total of 286 patients were retrospectively analyzed after the TAPP (Group I) or Lichtenstein (Group II) primary hernia repair. Group I were 196 patients with a mean age of 42.5 years (range, 14-74 years) and Group II were 90 patients with a mean age of 63.4 years (range, 25-93 years). According to the ASA classification most patients in Group I were ASA I and in Group II ASA II. Mean hospitalization for Group I patients was 3.2 days (range, 2-9 days) and for Group II 3.4 days (range, 1-8 days). None of the patients had intra-operatively complications or an organ injury. Complication rate was 4.1% for Group I and 10.0% for Group II. Recurrence rate for the TAPP group was 11.1% and the Lichtenstein repair group 6.5%. Mean general score of the GIQLI questionnaire in Group I was superior to the normal population, but lower in Group II. For the SF-36, higher scores were obtained in both groups for the items vitality, body pain and general health compared to the normal population.

Conclusions: The Lichtenstein procedure was more effective regarding the recurrence rate. The TAPP repair was superior to the Lichtenstein technique concerning the complication rate and the quality of life.

19822

S040

TREATMENT OF FEMORAL HERNIAS BY A SINGLE SURGEON: A SYSTEMATIC APPROACH

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Introduction: The high rate of coincident or missed femoral hernias while or after mesh herniorrhaphy suggest is systematic search. We present our findings and results using the laparoscopic preperitoneal approach (TEP).

Methods: Between April 2001 and February 2007, patients undergoing inguinal hernia repair were entered into a prospective database. The nature of their hernias in regards to detection of inguinal and/or femoral hernias, the type of repair, and postoperative complications were noted.

Results: 1025 hernias were repaired in 764 patients. 74 femoral hernias were discovered and repaired in 70 pts (9.2%). Femoral hernias were found unilaterally on the right in 35 patients, on the left in 31 patients and bilaterally in 4 patients. As expected, women were more likely to have a femoral hernia (50 patients, 25% of 203 females total) than men (20 patients, 4% of 562 men total, $p < 0.001$). Only 16 (23%) patients with femoral hernias displayed typical symptoms of thigh pain. Femoral hernias were found unilaterally on the right in 35 patients, on the left in 31 patients, and bilaterally in 4 patients. Femoral hernias were found in association with other inguinal hernias (direct or indirect) in 62 out of 74 cases (84%). All but two patients underwent laparoscopic total extraperitoneal repairs (TEP); these two underwent a laparoscopic abdominal approach (TAPP). Two patients were discovered to have obturator hernias.

Conclusion: The utility of the laparoscopic approach allows for routine detection and repair of femoral and obturator hernias. This case series showing the low preoperative detection of femoral hernias and the high incidence of additional ipsilateral hernias illustrate that femoral hernias will continue to go largely undetected unless a systematic preperitoneal approach is utilized.

19886

S044

MORBIDLY OBESE PATIENTS DO NOT HAVE INCREASED INCIDENCE OF EARLY RECURRENCE AFTER LAPAROSCOPIC VENTRAL HERNIA REPAIR

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Introduction: Previous studies have raised concern that morbid obesity is associated with a markedly increased risk of recurrence after repair of ventral hernias. This study compared the incidence of early post-operative recurrence after laparoscopic ventral hernia repair in morbidly obese patients and non-morbidly obese patients.

Methods: Case notes were reviewed for consecutive patients who underwent laparoscopic ventral hernia repair between December 2002 and August 2007. Body mass index (BMI) ≥ 35 kg/m² was considered morbid obesity (since ventral hernia constituted at least one comorbidity).

Results: There were 166 patients, comprising 85 men (51%), median age 55 years (range, 24–92). The hernia was incisional in 102 patients (68%). The BMI (kg/m²) distribution was: < 25 , 17%; 25–30, 29%; 30–35, 30%; 35–40, 11%; 40–45, 9% and ≥ 45 , 4%. In total, 126 patients (76%) had BMI < 35 . Nine patients had previous bariatric surgery and 4 patients underwent synchronous laparoscopic gastric bypass. For patients with BMI < 35 versus BMI ≥ 35 , recurrent hernias after previous open repair (23 patients, 18% vs. 12, 30%, $P = 0.10$) and median defect diameter (3 cm [0.5–30] vs. 5 cm [1–18]; $P = 0.30$) were not significantly different. The median follow-up period was 15 months (1–54) for patients with BMI < 35 and 20 months (1–57) for BMI ≥ 35 . Recurrence after laparoscopic ventral hernia repair was noted in 16 patients (13%) with BMI < 35 versus 2 patients (5%) with BMI ≥ 35 ($P = 0.20$). As compared to patients with no recurrence, recurrent hernias were significantly associated with larger median defect diameter (3 cm [0.5–30] vs. 10 cm [2–20], respectively; $P < 0.01$), smaller mesh: defect area ratio (22 [2–375] vs. 10 [3–56]; $P < 0.01$) and any postoperative infection (7 patients, 5% vs. 4, 22%; $P = 0.02$); previous open hernia repair (32 patients, 22% vs. 3, 17%; $P = 0.80$) and BMI (30.4 [15–63] vs. 30.0 [18–39]; $P = 0.60$) did not correlate with recurrence.

Conclusion: The incidence of early post-operative recurrence after laparoscopic ventral hernia repair was not significantly different in morbidly obese patients (BMI ≥ 35) as compared to those with BMI < 35 .

19839

S042

THE INCIDENCE OF OCCULT FASCIAL DEFECTS DISCOVERED IN LAPAROSCOPIC VENTRAL HERNIA REPAIRS IN 374 PATIENTS

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Objective: One aspect unique to the laparoscopic ventral hernia repair (LVHR) is the visualization and repair of occult fascial defects not recognized during open repairs. This recognition of occult fascial defects leads to wider mesh coverage of the areas that would likely go undetected (and un-repaired) at the time of open surgery. This study reviews the incidence of such occult fascial defects. This study analyzes a single surgeon's experience at a single institution and decreases variability of operative technique and postoperative management inherent in other multi-surgeon studies.

Methods and Procedures: The short term outcomes of LVHR were analyzed by retrospectively reviewing the records of all patients who underwent this procedure by a single surgeon in a single institution from January 2000 to August 2007. The data from 374 patients was reviewed including patient demographics, history of ventral hernia repairs, the number of occult fascial defects, operative details, and postoperative outcomes.

Results: The study was comprised of 374 patients (179 men and 195 women; mean age 51 years) who underwent LVHR with mesh over a 7-year period. 7 patients were converted to an open procedure. Average ASA class was 1.8. 26.5% of patients had a previous ventral hernia repair. The average fascial defect size was 46.75 cm². Occult fascial defects were found in 57% of the patients. Average operative time was 54 minutes and the patients average length of stay was 1.45 days. There was a 7% complication rate including 2 enterotomies, 1 postoperative bowel obstruction, 5 post op ileus, 1 fistula and 15 patients with seromas. 92% were seen in follow-up at median 11 days postoperatively. Patients reported narcotic use on average of 4.3 days. 91% of patients reported marked pain improvement and 92% were back to full activity at follow-up. There were no deaths in this series.

Conclusions: There was a 57% incidence of occult fascial defects detected and repaired in 374 LVHR. This single surgeon experience showed less operative time, shorter length of stay, and fewer complications than reported in previous multi-surgeon, single institution studies. LVHR offers the advantage of recognizing and repairing occult fascial defects not detected in open repairs with minimal complications. In addition, the laparoscopic repair allows for the well-known advantages of wider mesh coverage, less tissue destruction, earlier recovery, fewer postoperative complications and decreased recurrence rates.

19997

S048

MECHANISMS OF VENTRAL HERNIA RECURRENCE FOLLOWING LAPAROSCOPIC REPAIR

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Objective: To determine mechanisms of ventral hernia recurrence following laparoscopic repair.

Background: Laparoscopic ventral hernia repair techniques have demonstrated low recurrence rates in recent years. Mechanisms of recurrence following open repair are well-documented, but there is less data defining how laparoscopically-repaired hernias recur.

Methods: We performed a retrospective analysis of 25 patients who had previously undergone at least one laparoscopic hernia repair, and who subsequently required repair for recurrence. Mechanisms of recurrence were determined at the time of surgery, and documented in the operative note for 23 of the patients, while two were determined later through video analysis.

Results: Sixty percent ($n = 15$) of recurrences demonstrated mesh retraction or contraction, exposing the previous defect. On several occurrences, these retractions caused ripping of the mesh at transfascial suture sites, causing defects within the mesh. Four (16%) recurrences were located at the periphery of the previously placed mesh. One primary mesh failure was noted. In this instance, mesh was torn through the center, with intact retention devices along edges of the mesh. Failed retention devices were noted in two patients. Two patients had loss of domain. In one case infected mesh was noted, and in another, an inflammatory reaction to mesh was seen laparoscopically. Eighty-eight percent were female, with a mean age of 48.9 years ($SD \pm 10.2$) and an average BMI of 38.2 ($SD \pm 6.7$). Patients averaged three previous hernia repairs, with an average of 1.5 ($SD \pm 1$) previous laparoscopic repairs. Thirty-six percent required extensive (greater than one hour) lysis of adhesions. Median defect size was 207 cm² (Range 16–750), while median mesh size was 624 cm² (Range 225–1768).

Conclusion: The documented mechanism of recurrence after lap ventral hernia repair appeared to be mesh contraction and/or migration in 60% of this patient series. Other mechanisms of recurrence appeared to be failure of fixation and inadequate mesh coverage.

20009

S043

TRANS-GASTRIC VENTRAL ABDOMINAL WALL PLACEMENT OF A BIOLOGIC MESH

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University of Missouri-Columbia

Introduction: We proposed a feasibility study to determine if biologic mesh may be safely placed in the abdomen in a transgastric fashion, as a precursor to attempting transgastric ventral hernia repair.

Methods: Six swine underwent upper endoscopy after decontamination of the stomach with povidone-iodine (Betadine). Under endoscopic guidance the gastric wall was perforated. A plastic overtube was introduced into the abdominal cavity over the endoscope. A 13 × 15cm Surgisis Gold mesh with 4 pre-placed corner sutures was delivered down the overtube. Transfascial suture passers and endoscopic graspers were used to externalize the sutures and add 4 additional fixation sutures. The gastrotomy was closed transabdominally using the suture passer. The pigs were sacrificed at 2 weeks.

Results: One anesthesia death occurred at operation. One pig was sacrificed early due to sepsis and the small bowel was found to be

eroded into a mesh fixation suture with resultant gross peritonitis. This infection may have been secondary to a suture-passer bowel injury. Although the mesh was still intact, it was not as well incorporated into the abdominal wall as in the other pigs. Bacteria were cultured from 3/5 mesh specimens. Multiple intra-abdominal bacteria were found in the peritoneum remotely from the mesh in the same 3/5 animals. Mesh appeared intact in 4/5 animals; one pig had multiple scattered intraperitoneal abscesses and delamination of the mesh around an infected fluid collection. Other mesh findings included one intralaminar hematoma and one intralaminar seroma. Variable adhesions to mesh were present, from none to extensive. Histologic evaluations demonstrated inflammatory cells progressing into the mesh material, the first stage of Surgisis mesh incorporation. Median mesh size was 115.5 cm² (Range 95.7–166.3 cm²) and median contraction was 40.8% (Range 14.7–50.9). **Conclusion:** Totally endoscopic trans-gastric delivery and fixation of mesh on the anterior abdominal wall is feasible and Surgisis mesh remained intact despite bacterial contamination of the peritoneum. The most difficult portions of the procedure involved manipulating the gastric overtube and this most likely led to bacterial seeding of the peritoneal cavity. Significant challenges still remain in designing ideal systems for mesh delivery that exclude gastric spillage. A mesh that is tolerant of bacterial exposure is necessitated in this procedure.

MINIMALLY INVASIVE OTHER

18554

S107

THE EFFECTS OF LAPAROSCOPIC CHOLECYSTECTOMY, HYSTERECTOMY, AND APPENDECTOMY ON NOSOCOMIAL INFECTION RISKS

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Background: This paper presents precise estimates of nosocomial infection risks associated with laparoscopic as compared to open surgery in three procedures: cholecystectomy, appendectomy, and hysterectomy.

Methods: A retrospective analysis was performed on 11, 662 admissions from 22 hospitals that have a nosocomial infection monitoring system. The Nosocomial Infection Marker (NIM, patent-pending) was used to identify nosocomial infections during hospitalization and post-discharge. The dataset was analyzed by source of infection: urinary tract, wounds, respiratory tract, bloodstream, and others. Single and multivariable logistic regression analyses were performed to control for the following potentially confounding variables: gender, age, type of insurance, complexity of admission on presentation, admission through the emergency department, and hospital case mix index.

Results: Analyses were based on 399 NIMs in 337 patients. Laparoscopic cholecystectomy and hysterectomy each reduced the overall odds of acquiring nosocomial infections by more than 50% ($p < 0.01$). Laparoscopic cholecystectomy and hysterectomy also resulted in statistically significantly fewer readmissions with nosocomial infections ($p < 0.01$). Excluding appendectomy, the odds ratio for laparoscopic vs. open NIM-associated readmission was 0.346 ($p < 0.01$). Laparoscopic appendectomy did not significantly change the odds of acquiring nosocomial infections.

Conclusion: As compared to open surgery, laparoscopic cholecystectomy and hysterectomy are associated with statistically significantly lower risks for nosocomial infections. For appendectomy, when comparing open versus laparoscopic approaches, no differences in the rate of nosocomial infections were detected.

18701

LAPAROSCOPIC SURGERY UNDER SPINAL ANAESTHESIA

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Abstract

Introduction: Laparoscopic abdominal surgery is conventionally done under general anesthesia. Spinal anesthesia is usually preferred in patients where general anesthesia is contraindicated. We present our experience of using spinal anesthesia as the first choice for laparoscopic surgery over a period of over 10 years with the contention that it is a better alternative to anesthesia.

Methods & Procedure: Spinal anesthesia was used in 4645 patients, over the last 11 years. 2992 underwent laparoscopic cholecystectomy and the rest, other laparoscopic surgeries. There was no modification in technique and the intraabdominal pressure was kept at 8–10 mm of Hg. Sedation was given if required and conversion to general anesthesia was done in patients not responding to sedation or with failure of spinal anesthesia. Results were compared with those of 421 patients undergoing lap surgery under GA.

Results- 24(0.01%) patients required conversion to general anesthesia. Hypotension requiring support was recorded in 846(18.21%) patients and 571(12.29%) patients experienced neck and/or shoulder pain. Postoperatively 2.09%(97) patients had vomiting as compared to 29.22%(123 patients) in patients administered general anesthesia. 35.59%(1672) patients required injectable diclofenac for their abdominal pain within 2 hours postoperatively and oral analgesic was required in 2936 (63.21%) patients within the first 24 hours. While 90.02% patients operated under GA required injectable analgesics in the immediate post operative period. Postural headache persisting for average 2.6 days was seen in 255(5.4%) patients postoperatively. Average time to discharge was 2.3 days. Kernofsky's performance status showed a 98.6% satisfaction level in patients.

Conclusions: Laparoscopic surgery done under spinal anesthesia has a number of advantages over general anesthesia.

S110

19147

SINGLE PORT ACCESS (SPA) SURGERY – INITIAL EXPERIENCE OF A NOVEL MINIMAL ACCESS APPROACH APPLIED ACROSS SURGICAL SPECIALTIES

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We have developed a minimal access surgical technique in which the entire procedure can be performed through a single incision within the umbilicus. This Single Port Access (SPA) surgical technique developed in May 2007 has been utilized for a number of general surgical procedures including cholecystectomy, gastric surgery, omental surgery and hernia surgery. Utilizing High Dexterity instrumentation (RealHand Novare Surgical, Inc), handheld articulation allows us to place the working ports and instruments within the same skin incision used for the 5mm camera. Given the seven degrees of freedom with which the 5 mm RealHand instrumentation articulates, we are able to perform dissection through one incision in the umbilicus and apply the same principles of dissection utilized by the corresponding standard multiple port procedures. Adaptation of this new technique across surgical specialties is one factor in determining its usefulness.

We presented the SPA technique to surgeons in gynecologic oncology (SAK), gynecology (GH) and urology (JAC) to assess its adaptability across specialties. Each surgeon then performed their specialty related SPA procedures. Three cholecystectomies, one oophorectomy, four bilateral oophorectomies, one laparoscopic vaginal hysterectomy and three nephrectomies were successfully accomplished with the SPA technique in patients. All procedures were performed through a single umbilical incision using one or two 5 mm High Dexterity Instruments, a 5 mm laparoscope, and one rigid instrument, either a grasper or tissue sealing device. We reviewed the initial experience with the first of these procedures performed by each specialty, including our own (PGC).

All procedures were successfully completed using the SPA technique in average times of 60 minutes (cholecystectomy), 45 minutes (oophorectomy), 90 minutes (LAVH) and 126 minutes (nephrectomy). All incisions were placed in the umbilicus and measured an average of 16 mm (cholecystectomy), 16 mm (oophorectomy and hysterectomy) and 32 mm (nephrectomy). Patient recovery and discharge were comparable to standard laparoscopic surgery and there were no complications.

An important component of any new procedure is its applicability to other surgical disciplines. Application of the SPA surgery technique across these fields within three months of its development demonstrates that this new technique can rapidly be applied to several subspecialties with success.

S073

19238

ACCURACY AND ROLE OF SURGEON-PERFORMED INTRAOPERATIVE ULTRASOUND IN MINIMALLY INVASIVE OPEN PARATHYROIDECTOMY

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Objective: Assessment of the accuracy and the role of surgeon-performed ultrasound in comparison to expert radiology-performed ultrasound, sestamibi scanning and histologic findings.

Patients and Methods: From January 2006 to December 2007 we prospectively evaluated forty two consecutive patients undergoing parathyroidectomy for primary hyperparathyroidism. One surgeon who was unaware of the preoperative imaging studies did all ultrasound examinations just prior to skin incision. The correlations between surgeon-performed ultrasound, radiology-expert ultrasound, sestamibi scanning and histologic findings were assessed.

Results: There were thirty eight females (mean age: 55.9 yrs, range: 13–83) and four males (mean age: 41 yrs, range: 42–77) with biochemical evidence of primary hyperparathyroidism. Single gland disease (SGD) was histologically confirmed in thirty six cases (85.7%) and multigland disease (MGD) in six cases (14.3%). Concordant preop U/S and sestamibi findings were found in thirty four cases in SGD patients: surgeon performed U/S and expert radiology U/S were equally correct in all of these cases. In the rest two discordant cases in SGD patients, radiologist U/S was wrong in both cases, whereas sestamibi and surgeon U/S had no false results. Multigland disease had been predicted by negative findings in preop U/S and sestamibi in four patients and by finding more than one enlarged parathyroid glands in two patients. Surgeon U/S gave one false result in the former subgroup of MGD patients with negative findings in preop studies, although correctly identified multiple gland enlargements in the latter subgroup.

Conclusions: This study shows that surgeon-performed ultrasound compares favourably and even exceeds radiology U/S. Since this positive predictive result applies especially in SGD, intraoperative U/S had been added in the standards of care of patients with primary hyperparathyroidism in our institution.

S059

19194

ENDOSCOPIC THYROIDECTOMY BY THE AXILLARY APPROACH

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Aim: Minimally invasive surgery is widely employed for the treatment of thyroid diseases. We have performed pure endoscopic thyroidectomy by the axillary approach from 1999. In this study, we evaluate the efficacy of this surgical procedure.

Patients and Methods: The indications for this procedure included the presence of a follicular nodule or adenomatous goiter with a maximum diameter of less than 6 cm as observed during a preoperative ultrasonography examination and small low-risk papillary thyroid carcinomas. Our procedure is pure endoscopic thyroidectomy with carbon dioxide insufflation from an axillary portion. This procedure was performed in 122 cases including 7 papillary thyroid carcinomas.

Results: Conversion was necessary in three cases (difficult dissection in two cases and large nodule size in one case). Thyroid partial resection was successfully accomplished in 21 cases, thyroid lobectomy in 93 cases and subtotal thyroidectomy in 5 cases. A subtotal thyroidectomy was performed for cases of Graves' disease. Unilateral central neck lymph node dissection was completed in 5 cases without any complications. Major vessel bleeding such as superior or inferior thyroid artery during surgery was 2 cases, however, these complications were able to be controlled in endoscopic procedure and completed the endoscopic procedure. The operative time and the amount of bleeding were statistically significantly reduced, as the surgeon gained experience with the technique. The mean operative time for a thyroid lobectomy in the last year was 155 minutes. Postoperative complications included 3 transient recurrent nerve palsies, and 1 postoperative arm pain. The cosmetic result was excellent and almost all patients are satisfied with the results.

Conclusion: The indications for pure endoscopic thyroidectomy are still limited. Nonetheless, in selected patients, it seems a valid option for thyroidectomy and even preferable to conventional surgery because of its significant advantages, especially in terms of cosmetic result.

S055

19256

LAPAROSCOPIC VERSUS OPEN APPROACH FOR IMPLANTATION OF THE PERITONEAL CATHETER DURING VENTRICULOPERITONEAL SHUNT PLACEMENT

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Background: Ventriculoperitoneal shunt (VPS) is the mainstay of therapy for hydrocephalus. The aim of this study is to compare the outcomes of laparoscopic (LVPS) versus open (OVPS) ventriculoperitoneal shunts.

Methods: All patients undergoing VPS at a tertiary care center between January 2004 and September 2007 were included. Univariate analysis was used for clinical characteristics. Wilcoxon Rank Sum, Kruskal Wallis and Chi-Square tests of proportions were used to make comparisons between LVPS and OVPS groups and subgroups. All data is presented as mean \pm SEM.

Results: 562 consecutive patients underwent 616 VPS (259 LVPS, 333 OVPS, 24 other). Mean age (52 ± 1.0 yrs) and ASA (3) were similar in LVPS & OVPS groups. BMI (28.9 ± 0.5 kg/m² vs 27.1 ± 0.42 kg/m², $p=0.004$), EBL (24.4 ± 1.66 ml vs 37.5 ± 2.86 ml, $p=0.0007$), and OR time (41.5 ± 1.2 min vs 56.9 ± 1.4 min, $p < 0.0001$) were statistically different between the LVPS & OVPS groups, respectively. Indications for VPS were similar between groups with the most common being post-subarachnoid hemorrhage and normal pressure hydrocephalus. Between LVPS and OVPS, perioperative 11.2% vs 10.5% [OR = 0.93, CI = (0.55–1.57)] and long-term 10.8% vs 11.7% [OR = 1.09, CI = (0.65–1.83)] complication rates and odds ratio were similar, respectively. The LVPS group had a higher rate of previous abdominal operations 64.9% vs 58.6%. There was no statistical difference between rates of revision for LVPS (17.7%) vs OVPS (18.9%), $p=0.72$. A total of 467 initial VPS were performed, 203 LVPS and 264 OVPS. In this subgroup EBL (25.4 ± 1.9 ml vs 37.9 ± 3.4 , $p=0.016$) and OR time (40.1 ± 1.3 min vs 55.6 ± 1.5 min, $p < 0.0001$) were significantly different when comparing LVPS vs OVPS, respectively. The odds ratio of perioperative and long-term complications were similar between these subgroups.

Conclusions: This is the largest series of LVPS reported to date with comparisons between LVPS and OVPS. Both techniques have comparable perioperative and long term outcomes. A significant difference exists between operative times and EBL favoring laparoscopy. The laparoscopic approach for VPS is a safe, effective, and readily reproducible alternative to the traditional open approach.

S109

19478

S077

TRUE SINGLE-PORT LAPAROSCOPIC APPENDECTOMY: FIRST EXPERIENCE WITH THE "PUPPETEER TECHNIQUE"

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Introduction: Our novel "puppeteer technique" using an intraabdominal pulley system enabled us to perform the first true single-port appendectomy. In this report, we describe our first experience with this innovative technique which allows us to remove the appendix safely and successfully through one single incision.

Methods: Five consecutive patients were assigned prospectively to undergo a true single-port laparoscopic appendectomy at our institution from July through September of 2007. An 11-mm infraumbilical port for a 10-mm rigid endoscope with a 5-mm working channel was used. Retraction of the appendix was achieved in the following way.

First, a "pulley" was created by mounting a loop tied as an air knot to the anterior abdominal wall, just cephalad and lateral to the base of the appendix. The loop was subsequently used as an axle.

Next, a string (Surgitie™) was placed around the appendix. The string was then thread through the previously created loop and pulled through the 11-mm port to rest outside the abdominal cavity. This enabled the surgeon to pull on the string extracorporeally like a "puppeteer", which resulted in a lateral and anterior movement of the appendix to the abdominal wall exposing the base of the appendix.

In a final step, the appendix and mesoappendix were dissected and the base ligated with a Surgitie™. The appendix was then divided and removed from the abdomen in an EndoCatch™ bag.

Results: All five true single-port appendectomies were completed without difficulty. The mean operative time was 87 minutes. All patients were discharged on postoperative day 1. No immediate or late postoperative complications were encountered.

Conclusion: Our "puppeteer technique" is a safe, novel and innovative technique which allowed us to perform the first true single-port laparoscopic appendectomy. It advances minimally invasive surgery to a new level with decreased invasiveness and better cosmesis.

20050

S080

LAPAROSCOPIC DIAPHRAGM MOTOR POINT PACING: COMPLETE WORLDWIDE EXPERIENCE OF ALL IMPLANTED PATIENTS

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Background: Diaphragm movement is essential for adequate ventilation and when the diaphragm is adversely affected patients face life long positive pressure mechanical ventilation or death. This report summarizes the complete world wide multi-center experience with the diaphragm pacing stimulation (DPS) system to maintain and provide diaphragm function for ventilation.

Methods: In prospective FDA trials, patients underwent laparoscopic diaphragm motor point mapping to identify the area where maximum diaphragm contraction occurs when the implanted electrode is stimulated. The adverse events and operative experience were recorded and analyzed.

Results: From March of 2000 to September of 2007, a total of 88 patients (44 patients in 2007 alone) were implanted with the DPS system at 5 sites for the following indications: spinal cord injury (SCI) (48), Amyotrophic Lateral Sclerosis (ALS) (38), and transverse myelitis (2). Patient age ranged from 18-74 and time from SCI to implantation ranging from 3 months to 27 years. In 87 patients the diaphragm motor point was mapped with successful implantation of electrodes with the only failure the second patient due to a false positive phrenic nerve study. There was no peri-operative mortality even in ALS patients with forced vital capacity (FVC) below 50% predicted. The most common tracked adverse event (42% of SCI patients) was a capno-thorax where the CO2 tracked to the pleural space from electrode implantation in the thinned deconditioned diaphragm. Average time in the operating room was less than 120 minutes with no differences between sites. There was no cardiac involvement from diaphragm pacing even when analyzed in 10 of the patients who had pre-existing cardiac pacemakers. No infections occurred even with simultaneous gastrostomy tube placements for ALS patients with bulbar symptoms and dysphasia. Average hospital stay was less than 24 hours. In the SCI patients 96% were able to use the DPS system to provide ventilation and in the ALS studies patients have been able to delay the need for mechanical ventilation up to 20 months.

Conclusion: This multi-center experience has shown that laparoscopic diaphragm motor point mapping, electrode implantation and pacing can be safely performed. The ability to move the diaphragm for ventilation or maintain diaphragm function has significant patient benefit and is the basis for continued multi-center trials for additional indications.

19907

S108

DEVELOPMENT OF MINIMALLY INVASIVE SURGERY IN INFANTS LESS THAN 5 KG: THE FIRST DECADE'S EXPERIENCE

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Introduction: Pediatric minimally invasive surgery (MIS) has undergone significant development over the last 10 years but the role in complex neonatal and infant surgery is still being evaluated. Technical advances and new procedures have allowed the evolution of MIS in even the smallest neonates. This report documents our experience in MIS in infants under 5 kg.

Methods: A retrospective database review was performed including dates from September, 1993 to September, 2007. All children weighing 5 kg or less that underwent a laparoscopic or thoracoscopic procedure were included.

Results: A total of 639 and 43 different procedures were performed in children under 5 kg. The most common were Nissen fundoplication (310 cases, avg OR time: 43 min, avg time to full feeds 2 days), pyloromyotomy (104 cases, avg OR time 12.5 min, avg hosp days < 1), PDA ligation (26 cases, avg OR time: 31min, avg hospital days: < 1), TEF repair (22 cases, avg OR time: 83min, avg time to full feeds: 7.8 days), duodenoduodenostomy (20 cases, avg OR time: 76min, avg time to full feeds: 8.6 days), colonic pull-through for Hirschsprung's Disease (18 cases, avg OR time: 109.6, avg time to full feeds 3 days), colonic pull-through for imperforate anus (10 cases, avg OR time: 103, avg hospital days: 2), lung resection (12 cases, avg OR time: 66.8, avg hospital days 1.75), congenital diaphragmatic hernia repair (10 cases, avg OR time: 62.5, avg time to full feeds: 4.75). There were no surgery related deaths. The conversion rate to open was 1.2%. The intraoperative complication rate was 0.9%.

Conclusion: The development of new techniques, instruments, and surgical skill sets has made MIS in neonates and small infants safe and affective for complex surgical diseases. The same advantages of lower morbidity, and shorter hospital stays as seen in larger patient's is present in patients < 5 kg Further development and study is warranted.

20106

S060

OUR EXPERIENCE IN LAPAROSCOPIC APPROACH FOR LARGE ADRENAL TUMORS

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Laparoscopic adrenalectomy has become in last decade "gold standard" for treating of adrenal tumors with diameters smaller than 6 cm. In addition, one should note that larger tumors or potentially malignant tumors, once considered contraindications to a laparoscopic approach, can now be removed laparoscopically, with virtually no complication. In many surgical centers a tumor size > 6 cm is used as an indication for adrenalectomy.

Herein, the authors performed adrenalectomy over the past 5 years for 100 patients with adrenal pathology including incidentalomas, adenomas, Cushing disease, Cushing syndrome, Conn syndrome, pheochromocytomas and also neoplasia. Specifically, 32 patients (23 females and 9 males) between ages of 20 and 69 (median age of 46, 43 years) had tumors larger than 6 cm diameter. 4 of these cases underwent bilateral adrenalectomy by laparoscopic approach whereas in 10 cases the surgeons preferred conversion to an open approach. Among the reasons for the conversion: bleeding, tumor size over 10 cm, cardiac arrhythmias, local invasion (inferior vena cava, liver, diaphragm), unclear landmarks, etc. The operating times were anywhere from 25 min to 270 min (median time 114, 02 min) including patients with bilateral approach. Worth mentioning is also the fact that for the first cases the authors/surgeons first used monopolar dissector and then the LigaSure Atlas. Mortality among the studied cases was zero and as postoperative complication only a bleeding from spleen (after bilateral adrenalectomy convert to open procedure because of unclear landmarks in a case of Cushing disease) can be mentioned. This spleen bleeding required reintervention for splenectomy and then pancreatic reaction (treated conservatively in the end). Patients were discharged anywhere between 1 and 50 days (the complicated case) postoperative (median 6 days).

In conclusion, the authors recommend that regardless of the nature and size of the tumor, surgeons should not delay conversion to open approach anytime there are signs of invasion or when the dissection has become difficult. Surgeon experience is a critical factor as well mainly because laparoscopic adrenalectomy is a quite difficult procedure and requires a more experienced surgeon when tumors are larger than 6-8 cm.

ROBOTICS

19365

ROBOTIC GASTRIC CANCER SURGERY USING DA VINCI SYSTEM: CLINICAL RESULTS & LESSONS LEARNED FROM 2-YEAR EXPERIENCE

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Background: For gastric cancer, robotic surgery is still in its early years. This study is performed to evaluate the technical feasibility, effect, and safety of robot-assisted gastrectomy (RAG) with lymphadenectomy using da Vinci system
Methods: From July 2005 to April 2007, 80 RAG with lymphadenectomy were performed for patients with preoperative diagnosis of EGC. The clinicopathologic features and surgical outcomes were analyzed.

Results: There were 40 males and 40 females with a mean age of 53 years (range = 20~89 years). None of the patients needed open conversion. D1 + beta or more extended lymphadenectomy was performed. Distal subtotal gastrectomy was performed for 55 patients and total gastrectomy was performed for 25 patients. Among 55 distal subtotal gastrectomies, gastroduodenostomy was performed in 47 patients while gastrojejunostomy was in 8. Mean operation time was 226 minutes. There was no operative mortality while there were two conservatively treated wound complications and 1 postoperative leakage. The restoration of bowel sound was noted on 2.9 postoperative days, soft diet was started form 4.1 postoperative days and the mean duration of hospital stay was 6.4 days.

There were 37 mucosal, 33 submucosal, 3 muscular, 3 subserosal, and 4 serosal lesions. None of the specimen showed microscopic tumor involvement in the resection line. The mean number of retrieved lymph nodes was 37 (range = 7~83). Lymph node metastases were noted in ten patients with one mucosal, five submucosal, one subserosal, and three serosal cancers.

Conclusions: From our experience of robotic gastrectomy, robotic surgery can be applied safely and effectively for the patients with early gastric cancer. Robotic gastrectomy showed quite similar early postoperative outcomes to that of conventional laparoscopic gastrectomy. However, a prospective randomized study comparing the short-term and long-term surgical outcomes between robotic and laparoscopic gastrectomy is needed.

S072

20102

ROBOTIC PANCREATIC SURGERY: A SINGLE INSTITUTION EXPERIENCE

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The overall activity of robotic pancreatic surgery at Misericordia Hospital in Grosseto has been reviewed. From October 2000 to March 2007, has been performed 68 robotic pancreatic resections: 35 pancreatoduodenectomies (PD) (25 Whipple, 10 Longmire procedures), 28 distal pancreatectomies (DP) (13 spleen-preserving), 3 middle segment pancreatectomies and 2 insulinoma enucleations.

The etiology of 35 PD were: 11 ductal cancer, 9 ampullary carcinoma, 3 duodenal cancer, 7 mucinous cystadenoma, 4 chronic pancreatitis, 1 cystic dysplasia.

The mean operative time of robotic PD was 398 min. (range 240-480) and the average of intraoperative blood losses was 120 ml (range 50-300). No intraoperative transfusion needed. The conversion rate was 25.7% (9/35).

The overall morbidity rate was 31.4%. The mortality rate was 5.7% (2/35) (1 Boerhave's syndrome, 1 colonic infarction).

The etiology of 28 DP were: 5 ductal cancer, 4 endocrine tumors, 2 cystadenocarcinoma, 11 mucinous cystadenoma, 1 insulinoma, 5 other pathologies. In 13/28 a spleen preserving DP was planned and successfully performed.

The mean op. time was 233 min. (range 120-390). The conversion rate was 3.5% (1/28). The average of blood loss was 80 ml (range 50-120). One case required an intraoperative blood transfusion. The overall morbidity rate was 14.2% (4/28: 4 low output pancreatic fistulas). The mortality rate was 0%.

A ductal cancer was diagnosed in 16/68 patients (11 PD and 5 DP). The TNM staging for PD was: T3N0M0 in 5, T3N1M0 in 3, T2N1M0 in 2 and T3N1M1 in 1; in the 5 cases of DP was: T3N1M0 in 3 and T3N0M0 in 2.

The overall mean survival rate for PD was 16.4 months.

3 patients (27.3%) are disease free with a median follow-up of 27.4 months. The overall mean survival rate of the 5 pts who underwent a DP was 17 months, and 3 patients (60%) are disease free with a median follow-up of 21.5 months. The most interesting data concern the reduction of intraoperative blood losses and the high percentage of spleen preservation in DP.

The cancer free survival seems to compare favourably with that of open surgery.

19871

S070

IMPACT OF IQ, COMPUTER-GAMING SKILLS, GENERAL DEXTERITY AND LAPAROSCOPIC EXPERIENCE ON THE PERFORMANCE WITH THE DA VINCI® SURGICAL SYSTEM

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Background: Due to improved ergonomics and dexterity, robotic surgery is supposed to be very easy to perform for all individuals and no special premises should be necessary. We have tested the above hypothesis by measuring IQ-elements, computer-gaming-skills, general dexterity with chop sticks and evaluating laparoscopic experience in correlation to the performance with the da Vinci robot® in a pelvi-trainer.

Methods and Design: 34 individuals were tested for robotic dexterity, IQ-elements, computer-gaming and general dexterity. Group 1 included 18 surgically inexperienced probands. Group 2 included 16 trained surgeons. Each individual performed different tasks with the da Vinci® Surgical System. Times and errors were taken. An IQ test (Elements: logical thinking, 3-D-imagination, technical understanding) was accomplished by each proband. Computer skills were tested with a simple computer-game (Hand-eye-coordination) and general dexterity was evaluated by the use of chop sticks.

Results: We found no correlation between logical thinking, 3-D-imagination and robotic skills. A significant correlation between robotic skills and technical understanding was observed ($p < 0, 05$). Both computer-gaming and general dexterity showed a slight coherency to the performance with the da Vinci® robot ($p > 0, 05$). Trained surgeons showed significantly superior performance with the da Vinci Surgical System in comparison to the inexperienced individuals ($p < 0, 05$).

Conclusion: The data support the conclusion that there are no significant correlations between robotic performance and logical thinking, 3-D-understanding, computer-gaming and general dexterity. However, a correlation between robotic skills and technical understanding was found. Furthermore, surgical experience seems to have a positive influence on the performance with the da Vinci® Surgical System.

SOLID ORGAN REMOVAL

18727

S058

LAPAROSCOPIC SPLENECTOMY FOR SPLENO-MEGALY: LONG TERM FOLLOW UP OF 61 PATIENTSSricharan Chalikonda MD, Stacy Brethauer MD, R.Matthew Walsh MD, Steve Rosenblatt MD
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Background: Numerous studies have demonstrated the feasibility of laparoscopic splenectomy (LS) for splenomegaly. There is little published data on the efficacy of LS for the treatment of splenomegaly associated cytopenias. The aim of this study is to determine long-term outcomes following LS for splenomegaly.

Methods: Retrospective review of patients undergoing LS between 8/95 and 5/05. Splenomegaly was defined by CT criteria of craniocaudal length > 17 cm. Preoperative diagnoses included lymphoma in 13 patients (20%), leukemia in 15 (23%), autoimmune hemolytic anemia in 3 (5%) and other hematologic disorders in 8 (12%). Twenty-six patients (40%) had no definitive diagnosis prior to splenectomy. Patients with ITP were excluded. Patient demographics, operative indications, operative morbidity and mortality, pathology, pre- and postoperative hematological indices were collected. Follow-up data was collected from patient records and telephone interviews.

Results: 311 patients underwent LS during the study period. 65 patients underwent LS for splenomegaly. The mean age of the study group is 59. 62% were male. There were no operative mortalities. 7 patients (11%) were converted from LS to open. There were 9 (14%) major complications including 4 re-operations (3 for bleeding), 3 portal vein thromboses, 1 intrabdominal abscess and 1 postoperative hemorrhage managed non-operatively. 32 patients underwent LS primarily for diagnostic purposes. 9 patients had an existing hematological diagnosis and LS was performed to evaluate splenic involvement. LS confirmed a diagnosis in 19 (59%) patients including 11 lymphomas (34%). Thirty-three patients underwent LS primarily for treatment of either symptoms (11) or cytopenias (22). LS effectively treated mass symptoms in all patients. Among all patients 33 (51%) had associated cytopenias. At median f/u of 20 months (1-86) 15 (45%) patients had no recurrence of cytopenias, 15 (45%) patients required further treatment and 3 were lost to follow up. One responder (7%) died of lymphoma 3 months after surgery without recurrence of cytopenia. The 15 non-responders had progression of disease requiring chemotherapy and transfusions and 9 (60%) died a median of 6 months after splenectomy.

Conclusion: LS is effective for alleviation of mass related symptoms of splenomegaly and is a valuable diagnostic tool. It is less effective as isolated treatment of cytopenias related to hematological malignancies.

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S056

LAPAROSCOPIC VERSUS OPEN LIVE DONOR NEPHRECTOMY: OUTCOMES ANALYSIS IN 276 CONSECUTIVE PATIENTSCharles J Dolce MD, Daniel Griffin, B T Heniford MD, Kent W Kercher MD
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Purpose: Minimally invasive surgical techniques have become the preferred method for live donor nephrectomy (DN) in many centers. We compare the experience with laparoscopic and open DN within a single institution.

Methods: Data on 276 consecutive live DN were entered prospectively (lap) or retrospectively (open) into a surgical outcomes database between 1998 and 2007. Demographic, intraoperative, and postoperative data were compared. All open DN were performed prior to the initiation of a minimally invasive training program in August 2000. Data were analyzed by T-test and Chi-Square test. A p-value < 0.05 was considered significant.

Results: 276 patients underwent live donor nephrectomy (209 Hand-assist laparoscopy (HAL), 18 totally laparoscopic (TL), 49 open). Patient age, gender, race, and weight were equal for all groups. Laparoscopic DN was associated with a shorter operative time (177 vs 193 minutes, p < 0.013), less blood loss (71.1 vs 185 ml, p < 0.0001), and shorter hospital stay (3.6 vs 5.3 days, p < 0.0001) than open DN. Warm ischemia time was less for HAL versus totally laparoscopic DN (59.9 seconds vs 90.0, p < 0.0001). When compared with open DN, laparoscopic patients had fewer complications (11.0 vs 22.5%, p < 0.03), fewer wound infections (2.5 vs 14.3%, p < 0.004), less wound paresthesias (0.88 vs 12.5%, p < 0.0009), and fewer complaints of incisional pain lasting longer than 6 weeks (1.77 vs 30.6%, p < 0.0001). There was no difference with incisional hernia formation (2.7 vs 2.1%, p < 0.82). There were no conversions or re-operations and only one (0.4%) blood transfusion in the laparoscopic group. There was one re-operation (2%) and one (2%) blood transfusion in the open group.

Conclusions: Minimally-invasive techniques for donor nephrectomy offer considerable advantages over the traditional open flank approach. In a single-institution experience, laparoscopic DN results in less blood loss, reduced operative time, and shorter hospital stay than open DN. Hand-assisted DN has the potential to decrease warm ischemia time for renal allograft. Donors managed laparoscopically had fewer complications and significantly less wound-related morbidity than those undergoing open donor nephrectomy.

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UNRECOGNIZED ADRENAL INSUFFICIENCY IN PATIENTS UNDERGOING LAPAROSCOPIC ADRENALECTOMYGerman F Barbosa MD, Jamie Mitchell MD, Eren Berber MD, Mira Milas MD
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Introduction: There is scant data in the literature about unrecognized adrenal insufficiency (AI) in patients undergoing laparoscopic adrenalectomy (LapA). We hypothesized that postoperative day (POD) 1 AM cortisol levels could identify these patients after LapA. The aim of this study is to determine the incidence of AI after LapA and identify clinical predictors.

Methods: One hundred and three patients underwent LapA at the Cleveland Clinic between June 2000 and August 2007. Patients with Cushing's syndrome, bilateral disease or conditions associated with bilateral disease were excluded leaving 71 patients for the analysis. All patients had preoperative serum and 24-hour urine cortisol analyses performed. AM cortisol levels were drawn on POD 1 in 40 patients (16 nonfunctional adenomas, 13 pheochromocytomas, 3 aldosteronomas, 2 testosterone secreting adenomas, 3 other benign lesions, 2 metastasis and 1 adrenocortical cancer). None of these patients received preoperative steroids. Data were analyzed using one-way ANOVA, t-test and Chi-square.

Results: The mean POD 1 AM cortisol levels were 11.9 ± 1.8 ug/dL for pheochromocytomas, 10.3 ± 1.6 ug/dL for nonfunctional adenoma, 6.9 ± 3.2 ug/dL for aldosteronoma, 6.9 ± 6.9 ug/dL for malignant tumors, and 4.1 ± 3.6 ug/dL for other benign lesions. There were 3 groups of patients identified based on POD 1 AM cortisol levels: sufficient (> 10ug/dL; n=21), low normal (3.4 - 10ug/dL; n=9) and insufficient (< 3.4ug/dL; n=10). There were no differences between these 3 groups regarding age or gender. However, patients with pheochromocytoma, non-functional cortical tumors and metastases, were less likely to have POD 1 AI (p=0.02). Preoperative serum and 24-hour urine cortisol values did not predict the subsequent presence of AI in these patients. Mean tumor size was found to differ in patients with AI (5.9 ± 1.0 cm), as compared to patients with low normal cortisol (3.7 ± 1.0 cm) and patients with normal cortisol level (3.6 ± 0.7) (p=0.03). Patients found to have AI postoperatively were placed on a steroid taper regimen upon discharge from the hospital.

Conclusions: Adrenal insufficiency is a grossly under-diagnosed entity in patients with non-cushing's adrenocortical tumors undergoing LapA. To our knowledge, this is the first study to look at the relevance of postoperative cortisol levels to detect AI after LapA. Postoperative day 1 serum AM cortisol analysis can identify these patients with otherwise normal preoperative work up.

THORACOSCOPY

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THORACOSCOPIC TREATMENT OF SPONTANEOUS PNEUMOTHORAX

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Objective: Prospective study to evaluate thoracoscopic treatment of spontaneous pneumothorax by bulla resection with pleurectomy or with pleura coagulation.

Patients: From 1991 to 2007, 255 patients were included in this study. Indications were persistent bubbling (45.3%), recurrence (42.9%), opposite side pleurectomy (11.4%), opposite side pneumothorax (5.5%), haemopneumothorax (2.3%), bands (3.2%), huge bulla (2.7%), double sided pneumothorax (0.8%) & complete or compressive pneumothorax (34.3%).

Technique: Operation is carried out through anterobasal, posterobasal and axillar trocars. Parenchyma is explored with deflated and inflated lung. Dystrophy, bulla & band are removed with endostapler. Limits of apical pleura are drawn with a coagulating hook, respecting intercostal nerves, sympathetic nerve, brachial plexus and internal thoracic vessels. Pleura is removed or coagulated into these limits.

Results: Conversion to thoracotomy (2.7%) was secondary to major dystrophy, adhesions or technical problems. To create pleurodesis,

pleurectomy was undertaken (1991 to 2004) in 74.9% of the cases, and pleura coagulation (2002 to 2007) in 25.1% of the cases. In the pleurectomy group, intra operative complications occurred in 4.3% of the cases (intercostal vessel bleeding, endostapler problem). Postoperative complications occurred in 16.2% of the cases. Reoperation (10.8% of the cases) included chest drainage (5.4%) thoracoscopy (3.2%) and thoracotomy (2.7%). During an average follow-up of 26 months, recurrence (3.8% of the cases) needed bed rest (2.2%) chest drainage (0.5%) and thoracoscopy (1.1%). In the coagulation group, intra operative complications occurred in 8.1% of the cases (intercostals vessel bleeding, stapling line bleeding). Postoperative complications occurred in 12.9% of the cases. Chest drainage was necessary in 1 case. During an average follow-up of 12 months, recurrence (4.9% of the cases) needed bed rest (1.6%), chest drainage (3.2%) and thoracoscopy (1.6%).

Conclusion: Thoracoscopic treatment of spontaneous pneumothorax was effective in 97.3% of the cases. Postoperative complication and reoperation were more frequent after pleurectomy because of postoperative bleeding. Recurrence rate was similar in the two groups.