

ABSTRACTS

of presentations to the Annual
Meetings of the

Canadian Society
of Colon and Rectal
Surgeons

Canadian Association
of General Surgeons

Canadian Association
of Thoracic Surgeons

RÉSUMÉS

des communications présentées
aux congrès annuels de la

Société canadienne
des chirurgiens du côlon et
du rectum

Association canadienne des
chirurgiens généraux

Association canadienne des
chirurgiens thoraciques

CANADIAN SURGERY FORUM

Toronto, Ont.

September 6-9, 2007

FORUM CANADIEN DE CHIRURGIE

Toronto, Ont.

du 6 au 9 septembre 2007

Canadian Surgery Forum 2007 Forum canadien de chirurgie 2007

Canadian Society of Colon and Rectal Surgeons Société canadienne des chirurgiens du côlon et du rectum

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COLORECTAL CANCER (CRC) IN ELDERLY PATIENTS — PRESENTATION, TREATMENT AND OUTCOMES. *K.M. Devon, O. Vergara, J.C. Victor, C.J. Swallow, Z. Cohen, R. Gryfe, H.M. MacRae, R.S. McLeod.* Dr. Zane Cohen Digestive Diseases Research Unit, Samuel Lunenfeld Research Institute, Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Elderly patients are a growing subset of the population who are underrepresented in clinical trials and often present and are treated differently than their younger counterparts with colorectal cancer (CRC). Thus the objective of this study was to characterize the presentation, care and outcomes of CRC in individuals over 75 years of age compared with those aged 50–74.

All patients over age 50 who had surgery for CRC between 1997 and 2006 were identified through the Mount Sinai Hospital CRC database. Eight hundred and ninety-five patients had surgery (55.6% male, 44.4% female). There were 623 patients aged 50–74 (mean 62.6) and 272 patients 75 and over (mean 81.5).

	50–74 yr	75+ yr	<i>p</i> value
% Stage IV	18.6	12.1	0.001
% Identified by screening	13.7	7.3	0.008
% Colon	55.1	65.8	0.003
% Emergency procedures	6.6	6.6	0.989
% With no complications	71.9	61.9	0.011
Median hospital stay, days post-op	8.0	10.0	0.005
Stage III chemotherapy	91.3	43.5	0.001
5-yr overall survival, %	68.7	57.3	0.036
5-yr CRC-related survival, %	74.0	74.7	0.277

CRC = colorectal cancer.

Older patients selected for CRC surgery are more likely to have colon cancers and lower stage cancers. Although they have more complications and longer hospital stays, their long-term CRC related outcomes are similar to younger patients. Despite these good outcomes they are less likely to have cancers identified by screening and are less likely to receive adjuvant chemotherapy.

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IMPACT OF SHORT COURSE RADIOTHERAPY AND LOW ANTERIOR RESECTION ON BOWEL FUNCTION AND QUALITY OF LIFE IN PRIMARY RECTAL CANCER. *A. Murata, P.T. Phang.* Division of General Surgery, University of British Columbia, Vancouver, BC.

We evaluate the effects of short course preoperative radiotherapy on bowel function and quality of life in patients who have undergone low anterior resection for rectal cancer.

Forty-six patients underwent curative low anterior resection and either short course preoperative radiation (*n* = 30) or no radiation (*n* = 16). Quality of life and bowel function were assessed using European Organization of Research and Treatment of Cancer quality of life questionnaires, Fecal Incontinence Quality of Life Scale, and the Memorial Sloan-Kettering Cancer Center Bowel Function Instrument. Survey response was 79.1%. Average anastomotic height was 5 cm in both groups.

Patients who received radiation had a greater number of daily bowel movements (3–4 v. 2–3 in the no radiation group), increased prevalence of diarrhea (62.5% v. 20%) and loose stools (88.2% v. 60%), higher rates of using a pad (62.5% v. 60%), and increased need to alter activities because of bowel dysfunction (58.3% v. 10%). The radiation group had higher rates of accidental bowel leakage including gas (83.3% v. 70%), mucus (45.8% v. 20%), liquid stool (50% v. 30%), and solid stool (41.7% v. 30%). Fecal incontinence caused significantly more problems in lifestyle, coping/behaviour, depression/self-perception, and embarrassment categories for the radiation group. Patients who did not receive radiation had higher global health and quality of life scores.

Bowel dysfunction after short course radiation and low anterior resection is considerable, inadequately discussed and often untreated. Fecal incontinence has a significant effect on quality of life, producing embarrassment and limiting daily activities.

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SENTINEL LYMPH NODE MAPPING IN COLON CANCER. *K. Jones, N. Merritt, P. Belliveau, D. Hurlbut.* Departments of Surgery and Pathology, Kingston General Hospital, Queen's University, Kingston, Ont.

A prospective study to evaluate the feasibility and accuracy of in vivo sentinel lymph node (SLN) mapping at Kingston General Hospital was undertaken. Forty-nine patients undergoing

laparotomy for resection of stage I–III colon cancer over a 2-year period were enrolled.

At the time of resection, peritumoural in vivo subserosal lymphazurin injection was performed and SLNs were identified by the surgeon and/or study pathologist. Non-SLNs and SLNs were all examined by single hematoxylin and eosin-stained section. SLNs negative on single section were micro-sectioned, and if this evaluation was also negative, cytokeratin immunohistochemistry was performed. Rate of SLN detection, sensitivity and rate of upstaging were then determined.

SLNs were identified for 92% of patients. All were within previously planned resection margins. There were 2 false-negative SLNs giving a sensitivity of 90%. Twenty-eight percent of patients with negative non-SLNs had positive SLNs, and 14% of patients overall were upstaged due to SLN evaluation.

We conclude that SLN mapping of colonic tumours at Kingston General Hospital is feasible and accurate and upstages a significant minority of patients.

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LAPAROSCOPIC COLECTOMIES: DOES OPERATIVE TIME MATTER? *A. Scheer, E. Sabri, H. Mooloo, E.C. Poulin, J. Mamazza, R. Boushey.* Department of General Surgery, Ottawa Hospital, Ottawa, Ont.

The objective of this study was to determine if the perioperative benefits associated with laparoscopic colectomy are maintained as operative time increases.

A retrospective review of a prospectively collected database was performed. Since their operative time distributions were different, patients were divided into 3 groups: laparoscopic right colectomy or ileocecal resection (RC), sigmoid resection (SC), and total abdominal colectomy (TAC). Converted cases and those without a recorded operative time were excluded. Outcomes assessed included intraoperative (IOC) and postoperative (POC) complications, days to regular diet (DAT), length of stay (LOS) and 30-day mortality. ANOVA, Kruskal–Wallis, Pearson correlation, Spearman correlation coefficient, *t* tests and logistic regression were used for analysis. A *p* value of < 0.05 was considered significant.

Six hundred and sixteen cases were identified. One hundred and twenty-nine were excluded, leaving 487 patients (281 RC, 210 SC, 46 TAC). In both RC and SC groups logistic regression demonstrated no significant change in IOC and POC, days to DAT and LOS with increasing operative time. In the TAC group, a significant relationship between OR time and POC ($p = 0.045$), days to DAT ($p = 0.019$) and hospital stay ($p = 0.029$) was found. Patients with operative times > 270 minutes were more likely to have POC (53.33% v. 12.9%, $p < 0.01$), longer ileus (median days to DAT 5 v. 3, $p < 0.01$), and longer LOS (7 v. 5, $p < 0.05$). This increased risk remained significant after adjusting for weight and diagnosis. Thirty-day mortality was 3%, 0.5% and 4% in RC, SC and TAC groups, respectively.

Increasing operative time did not appear to adversely affect perioperative outcomes in the RC or SC groups. In the TAC group, increasing operative time was associated with increased postoperative complications, days to DAT and LOS. TAC patients with procedures lasting more than 270 minutes seem to benefit less from a laparoscopic approach.

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COLORECTAL CANCER IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE — A POPULATION-BASED STUDY OF THE PROGNOSTIC SIGNIFICANCE OF MICROSATELLITE INSTABILITY. *C.J. Brown, H. Zhang, S. Gallinger, R. Gryfe, R.S. McLeod.* University of British Columbia, Vancouver, BC, University of Toronto, Toronto, Ont.

Crohn's disease (CD) and ulcerative colitis (UC) are both risk factors for colorectal cancer (CRC). The objective of this study was to compare the prevalence and impact of tumour microsatellite instability on the survival of patients with inflammatory bowel disease (IBD) who develop colorectal cancer with patients who do not have IBD.

The Cooperative Family Registries for Colorectal Cancer Studies (CFRCCS) is a multinational, multicentre collaboration that has prospectively collected clinical, genetic, surgical, pathologic and follow-up data on patients with CRC from 1997–2000. The CFRCCS has complete follow-up on 4516 population-based patients diagnosed with CRC. We identified 2 groups of patients with CRC for comparative analysis: 152 patients with self-reported diagnosis of either UC or CD (IBD) and 4364 patients who were non-colitic controls (NCC). IBD patients were similar to NCC patients in gender, TNM stage, tumour differentiation, tumour histology and anatomic site of cancer. However, IBD patients were younger than NCC patients (55.4 v. 58.5 yr, $p = 0.0001$).

Microsatellite instability (MSI) in tumours is defined as high ($\geq 30\%$ of markers tested), low (10%–30%) or stable ($< 10\%$). Tumours in patients in the IBD group had similar prevalence of MSI-high when compared with NCC (24/152 v. 549/4364, $p = 0.52$). A Cox proportional hazard model was used to determine the influence of IBD status on survival; this demonstrated no significant impact of IBD on survival (hazard ratio 1.041, $p = 0.83$). Furthermore, patients with IBD who had MSI-high tumours showed a similar trend toward better survival demonstrated in NCC patients.

In conclusion, patients with IBD and CRC appear to have a similar prevalence of microsatellite instability as patients without the diagnosis of IBD. Furthermore, the relationship between MSI-high status and improved survival is similar in patients with IBD and NCC.

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VALIDATION OF THE CROHN DISEASE ACTIVITY INDEX AS A SINGLE MEASURE OF POSTOPERATIVE DISEASE RECURRENCE. *T.D. Walters, A.H. Steinhart, C. Bernstein, W. Tremaine, B.G. Wolff, S. Ross, R. Parkes, M. McKenzie, R.S. McLeod.* University of Toronto, Toronto, Ont., University of Manitoba, Winnipeg, Man., Mayo Clinic, Rochester, NY, University of Calgary, Calgary, Alta., Samuel Lunenfeld Research Institute, Mount Sinai Hospital, Toronto, Ont.

The Crohn Disease Activity Index (CDAI) is the standard for assessing outcome in medical trials. Its value in assessing postoperative recurrence is unknown. Taking advantage of an international randomized controlled trial (RCT) investigating postoperative disease recurrence, we examined the association between a combined clinical/endoscopic assessment of disease activity and the CDAI to determine whether the CDAI is suit-

able for assessing postoperative outcome.

Eighty-eight patients from 16 surgical units in an RCT comparing 2 surgical techniques underwent clinical and colonoscopic evaluation 12 months post ileocolic resection. Endoscopic appearance was assessed using the Rutgeerts score (i0-i4). Symptomatic disease recurrence was defined by the composite of symptom severity warranting therapy and an endoscopic score \geq i2. Outcomes were adjudicated by a 3-person committee. Comparisons with CDAI were made using both non-parametric methods and the Receiver Operator Curve (ROC).

Thirty-five (40%) patients had evidence of recurrent disease (23% symptomatic, 17% endoscopic only) by 12 months. Median CDAI for symptomatic recurrence was 215, compared with 70 for asymptomatic subjects ($p < 0.001$). The area under the ROC for symptomatic disease and CDAI was 0.80 (95% confidence interval [CI] 0.67–0.93, $p < 0.001$). Recurrence was best predicted by a CDAI of \geq 148 (sensitivity 70%, specificity 85%, positive predictive value [PPV] 58% and negative predictive value [NPV] 91%).

This study confirms that a CDAI of 150 is the best cutpoint for assessing disease activity. CDAI is useful in assessing outcome in postoperative RCTs. However, given a PPV $<$ 60%, it does not replace combined clinical/endoscopic evaluation as a single outcome measure of postoperative disease recurrence.

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SURGICAL MANAGEMENT OF ULCERATIVE COLITIS: A COMPARISON OF CANADIAN AND AMERICAN COLORECTAL SURGEONS. *D. Richardson, S. deMontbrun, P.B. McIntyre, P.M. Johnson.* Department of Surgery, Dalhousie University, Halifax, NS.

Ileal pouch anal anastomosis (IPAA) is the procedure of choice for most patients with ulcerative colitis (UC) who require surgery. This reconstruction may involve 1 to 3 operations. The purpose of this study was to compare the practice patterns of Canadian and American colorectal surgeons with regards to the surgical management of UC. A questionnaire was mailed to all practising fellows of the American Society of Colon and Rectal Surgeons (ASCRS) in Canada and the United States. Surgeons were asked to describe their typical practice for a number of clinical scenarios.

Questionnaires were mailed to 37 Canadian and 876 American ASCRS fellows with response rates of 81% and 62%, respectively. Of those who responded, 90% of Canadian and

81% of American surgeons perform IPAA for UC. In the setting of a patient who has had a prior colectomy, who is not taking steroids and a tension-free IPAA is possible, 56% of Canadian surgeons would perform IPAA alone and 44% would perform IPAA with a loop ileostomy. In contrast, only 26% of American surgeons would perform IPAA alone and 74% would perform IPAA with a loop ileostomy. This difference is statistically significant ($p < 0.01$). In the setting of a patient who has not had previous surgery, who is taking prednisone 40 mg/day and a tension-free IPAA is possible, 48% of Canadian surgeons would perform a subtotal colectomy with an end ileostomy and defer IPAA and 52% would perform a proctocolectomy, IPAA and loop ileostomy. This is significantly different compared with the practice of American surgeons of whom 14% would perform a subtotal colectomy with end ileostomy, 83% would perform a proctocolectomy, IPAA and loop ileostomy and 3% would perform a proctocolectomy, IPAA and no ileostomy ($p < 0.001$).

There are significant differences in the surgical management of UC between Canadian and American colorectal surgeons.

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IMPROVED RESULTS WITH THE ACTICON ARTIFICIAL BOWEL SPHINCTER (ABS) WITH APPLICATION OF PRACTICE CONSENSUS GUIDELINES — A SINGLE INSTITUTION EXPERIENCE. *J. Shum, P.H.D. Colquhoun, B.M. Taylor.* London Health Sciences Centre, University of Western Ontario, London, Ont.

In the 10 years since the introduction of the artificial bowel sphincter (ABS) into clinical use in Canada, the world experience still reports infection and explantation rates of 25% to 35%. In our series of 25 patients undergoing ABS implantation for fecal incontinence since 1998, 4 (16%) patients have developed either infection or erosion of the device requiring removal, but only 2 of these patients (8%) had actual primary infection as the underlying cause. Twenty of the 25 patients currently have a functioning ABS at an average of 2 months to 8.5 years after implantation, with much improved quality of life. None have required conversion to defunctioning colostomy. Nine patients (32%) have required revision of one or all components of the ABS device for complications such as anal outlet obstruction and system fluid leak. We believe that with meticulous attention to detail at implantation, the ABS is an excellent alternative to colostomy in patients with end-stage neurogenic fecal incontinence.

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CAGS BASIC SCIENCE AWARD: THE RISK OF GAS EMBOLISM DURING LAPAROSCOPIC LIVER RESECTION IS RELATED TO PARENCHYMAL TRANSECTION TECHNIQUE. *G.N. Polykronopoulos, L.S. Feldman, A.L. McCluney, J. Buihieu, J. Martinie, P. Metrakos, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University, Montréal, Que.

The risk of gas embolism during laparoscopic liver resection has been previously shown. However, whether parenchymal transection technique affects the risk of gas embolism has not been previously studied. The purpose of this study was to evaluate whether staple transection of the liver reduced the risk of gas embolism compared with thermal energy techniques in a porcine model.

Fifteen female pigs underwent laparoscopic left lateral hepatectomy. For transection technique, pigs were randomized into 3 groups: ultrasonic coagulation shears (UCS) ($n = 5$), electrothermal bipolar vessel sealer (EBVS) ($n = 5$), or endostapler ($n = 5$). CO₂ pneumoperitoneum was established at 12 mm Hg, and a transesophageal echo (TEE) probe was positioned to detect gas emboli. A reviewer blinded to the transection technique measured the frequency, duration and grade of gas emboli events. Grade of gas emboli ranged from 0 (no emboli) to 4 (total vessel opacification with emboli). Blood loss was measured with a laparoscopic suction device, and operative time was measured from the start of liver marking for transection to the completion of resection. Proper TEE sampling was confirmed at the end of each case. Data are presented as median interquartile range (IQR) and were compared using the Kruskal-Wallis test. A p value of < 0.05 was considered statistically significant.

Proper TEE sampling was confirmed in 14/15 pigs. Gas emboli occurred in 5/5 cases with the UCS, 4/4 cases with the EBVS, and in 4/5 cases with the Endostapler. However, there was a significant difference between groups for grade of gas emboli, operative time, and blood loss favouring the Endostapler (Table).

Gas emboli occurred during laparoscopic left lateral hepatectomy with all transection techniques used in this study. However, the endostapler device was associated with the lowest grade and duration of gas emboli events, as well as the shortest operative time and least operative blood loss.

	UCS	EBVS	Endostapler	p value
Grade of gas emboli	4 (2.5-4)	3 (2.25-3.75)	1 (0.5-2.5)	0.040
Frequency of gas emboli events	3 (2-9)	4.5 (1.75-5.75)	3 (1-5.5)	0.491
Duration of gas emboli events, s	388 (149-659)	163.5 (81.5-439)	11 (1-196)	0.110
Operative time, min	25 (22-48)	52 (33.5-71.5)	22 (19.5-24)	0.018
Operative blood loss, mL	120 (100-150)	70 (32.5-100)	50 (27.5-85)	0.021
UCS = Ultrasonic coagulation shears; EBVS = electrothermal bipolar vessel sealer.				

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LAPAROSCOPIC VERTICAL SLEEVE GASTRECTOMY: INITIAL EXPERIENCE AS A STAND ALONE BARIATRIC OPERATION. *P.M. Chiasson, S.E. Burpee, R. Corrigan, P. Manson.* Southern Arizona Center for Minimally Invasive Surgery, Northwest Medical Center, Tucson, Ariz., USA.

Minimally Invasive Bariatric Surgery continues to evolve with the introduction of both new techniques and technology. This report discusses our initial experience in the performance of the laparoscopic vertical sleeve gastrectomy (LVSG) for the management of morbid obesity as a stand alone procedure. Using data taken from our prospective IRB-approved database, the results of 41 LVSGs and 85 laparoscopic gastric bypass (LGBP) procedures performed between October 1, 2005 and November 1, 2006 were analyzed. Demographic, postoperative, and 6-month weight loss data were compared for each group using χ^2 , Fisher's exact test, and Student's t test where appropriate. Both groups were similar in age, gender, weight, and comorbidities. Intraoperatively, the LVSG procedures were shorter (91.1 v. 141.5 min, $p < 0.05$). There were no conversions to open surgery or differences in the number of intraoperative complications for either group. Postoperatively, the groups had similar complication rates. Nonetheless, the LVSG group had a shorter length of stay in a hospital (2.0 v. 2.7 d, $p < 0.05$). Weight loss at 3 and 6 months was comparable between the LVSG and LGBP groups. LVSG appears to be a safe treatment option that takes less time to perform, and results in a decreased length of stay with similar short-term weight loss to LGBP.

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CAGS CLINICAL RESEARCH AWARD: DOES THE EXTRACTION SITE LOCATION IN LAPAROSCOPIC COLORECTAL SURGERY IMPACT ON INCISIONAL HERNIA RATES? *A. Omiccioli, R. Singh, S.G. Hegge, C.A. McKinley.* Centre for Minimal Access Surgery, North Bay General Hospital, North Bay, Ont.

Incisional hernias are a common postoperative complication in abdominal surgery. Major risk factors for their development include wound infection, obesity and age. The objective of this study was to evaluate the impact extraction site location has on incisional hernia rates in laparoscopic colorectal surgery (LCS).

A prospective study of 208 consecutive patients who underwent laparoscopic colorectal surgery between March 2002 and July 2006 was performed. In order to be included in the study, patients were required to have had an extraction site on the abdominal wall. Patients were excluded if they were lost to follow-up or converted to open. In the remaining 166 patients, mean follow-up was 1.7 (standard deviation [SD] 1.2) years. Extraction site incisions were classified into 2 groups: midline or off-midline. Midline wounds involved sharp division of the linea alba and were closed with a single layer of # 1 Vicryl® (ETHICON Inc.). Off-midline incisions involved sharp division of the anterior and posterior sheaths with blunt spreading of the muscular layers and were closed in 2 layers with #1 Vicryl® (ETHICON Inc.). Risk factors including wound infection, body mass index (BMI), age and diabetes, and mean follow-up were evaluated in both the midline and off-midline groups.

The incisional hernia rate for the entire series was 7.8%. Incisional hernia rates for the midline (74 patients) and off-midline (92 patients) groups were 17.6% and 0%, respectively (statistically significant, $p = 0.0002$). There was no statistically significant difference in age, follow-up time, BMI and wound infection rate between the 2 groups.

In our series, the midline extraction site resulted in a significantly higher incisional hernia rate than the off-midline extraction sites. We therefore recommend using an off-midline blunt muscle splitting extraction site when performing LCS.

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LAPAROSCOPIC APPENDECTOMY IN PREGNANT PATIENTS: A REVIEW OF 40 CASES. *P. Lemieux, P. Rhéaume, I. Lévesque, E. Bujold, G. Brochu.* Surgery Department, CHUQ (St-François d'Assise and CHUL pavilions), Université Laval, Québec, Que.

Laparoscopic surgery in pregnancy remains debated, especially in a patient with appendicitis.

This a retrospective review of 40 cases of suspected appendicitis treated by the laparoscopic approach in our institution over the last 10 years. The main goal was to evaluate the safety of the procedure by looking at immediate complications and outcome of pregnancy. Secondary end point was trying to find clinical markers to predict worst outcome in patients. The data was retrieved by chart reviews. Outcome of pregnancy was evaluated by chart reviews or by contacting the patients.

Fourteen patients were in the first trimester, 20 in the second and 6 in the third. Three patients had minor complica-

tions (wound infection, cystitis and ileus). Only 2 patients had major complications (intraabdominal abscess and uterine perforation). The immediate preterm labour rate (month following surgery) was 0. The overall preterm labour rate (< 37 weeks) was 19.4%. The early preterm labour rate (< 35 weeks) was 9.7%. The mean delivery time was at 38 weeks (median 39). No differences were found in the preterm labour rates between trimesters of pregnancy ($p > 0.05$), complications or operative time ($p > 0.05$). The mean operative time was 49 minutes (median 55 min).

This is the second largest series of laparoscopic appendectomy in pregnancy in the literature. Immediate complication rates and preterm labour rates compare advantageously to series of open appendectomies. Our data are comparable to other laparoscopic series. With proper precautions, the laparoscopic is as safe as the open approach, with several advantages. It has a diagnostic advantage in ambiguous cases and is more versatile if the appendix is displaced by the gravid uterus.

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DOES PREOPERATIVE WEIGHT LOSS PREDICT SUCCESS FOLLOWING SURGERY FOR MORBID OBESITY? *B.A. Mrad, C. Johnson Stoklossa, D.W. Birch.* Department of Surgery, University of Alberta, Centre for the Advancement of Minimally Invasive Surgery (CAMIS), Royal Alexandra Hospital, Edmonton, Alta.

Surgical treatment for weight loss in morbidly obese adults is the most efficacious treatment option available. However, not all patients achieve long-term success following surgery. Non-compliance with lifestyle recommendations is believed to contribute to failure. Our clinical experience suggests that preoperative weight loss may be a reasonable surrogate for compliance. In this study we analyze preoperative weight loss as a predictor of postoperative success in patients following surgery for morbid obesity.

Data was obtained from a retrospective chart review of 562 patients that presented for assessment at a multidisciplinary obesity clinic (February 1, 2003 to February 1, 2007). Patients were excluded from analysis if they have not undergone surgery (remain in preoperative assessment or discharged from clinic), were lost to follow-up or had postoperative follow-up less than 6 months duration. The primary outcome is the correlation of percent excess weight loss at 1 and 2 years postoperatively with preoperative weight change.

One hundred and forty-six patients met the inclusion criteria (23 male and 123 female). Mean age is 39.5 years (18–63 yr) and mean body mass index (BMI) 52.6 kg/m² (34.4–95.3 kg/m²). Comorbid disease included diabetes 15.7%, hypertension 30.8%, mental illness 38.4%, and musculoskeletal disease 56.8%. Procedures performed include 16 vertical band gastroplasty (VGB), 43 open Roux-en-Y (RYGB), 52 laparoscopic RYGB and 35 laparoscopic adjustable gastric band (LAGB). The duration of preoperative assessment ranged from 100 to 737 days (mean 275.5 d). Preoperative weight change (defined as a 2% or greater change from initial body weight) was observed in 32 patients (21.7%) who gained weight and 57 patients (38.8%) who lost weight while 58 patients (39.5%) maintained their weight.

In this study, we aim to clarify the importance of preopera-

tive weight loss as a predictor of success in patients following surgery for morbid obesity. Our clinical experience suggests that preoperative weight loss may be a key determinate for assessing compliance and guiding decisions regarding surgical intervention for morbid obesity.

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CAGS BASIC SCIENCE AWARD: HYPERLEPTINEMIA INCREASES POLYMORPHONUCLEAR NEUTROPHIL ADHERENCE IN A MURINE CREMASTER MODEL. *J. Chen, N.V. Christou.* Section of Bariatric Surgery, Division of General Surgery, McGill University, Montréal, Que.

Recent evidence of increased bacterial infections in severely obese patients suggests increased leptin, a proinflammatory adipokine secreted by adipocytes, may adversely affect immunocompetence in morbid obesity.

Male CD1 mice were divided to 3 treatment groups. Group I received once daily ip injections of PBS, group II – 1 mg/g leptin and group III – 5 mg/g leptin for 7 days. These mice were then processed for cremasteric muscle intravital microscopy to determine leptin's effects on polymorphonuclear neutrophil (PMN)-endothelial cell interactions, a measure of innate immune function. Data \pm (SEM) follow:

	PBS	Low leptin (1 μ g/g)	High leptin (5 μ g/g)
Number	19	21	15
PMN rolling	190.6 \pm 22.6	212.7 \pm 21.5	220.9 \pm 25.5
PMN rolling velocity, mm/s	25.7 \pm 2.2	29.8 \pm 2.1	26 \pm 2.5
PMN preadherence	0.3 \pm 0.2	0.3 \pm 0.1	0.8 \pm 0.2*
PMN adherence	0.1 \pm 0.3	0.1 \pm 0.3	1.1 \pm 0.3*
TNF- α , pg/mL	5.5 \pm 17.0	26.3 \pm 14.8	41.9 \pm 15.8

PMN adherence and preadherence were found to be significantly increased in the high leptin group (* $p < 0.05$; ANOVA). This observation could not be correlated with static serum TNF- α levels, which trended higher in the high dose leptin group but were not statistically different.

Our study demonstrates leptin per se increases neutrophil adhesion in the absence of excess adipose tissue. Excessive adhesion could adversely affect neutrophil trafficking by limiting their ability to exit the circulation at the postcapillary venules and appropriately home into targets of bacterial invasion. This could parallel the situation in morbid obesity where high concentrations of leptin are observed.

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DIKKOPF-1 (DKK1) AND PROSTATE-DERIVED ETS TRANSCRIPTION FACTOR (PDEF) ARE NEW CANDIDATE TUMOUR ANTIGENS FOR BREAST CANCER IMMUNOTHERAPY. *S. Turcotte, M-A Forget, D. Beauseigle, R. Lapointe.* Immuno-oncology Laboratory, Institut du cancer de Montréal, Centre hospitalier de l'Université de Montréal, CHUM Research Center and Department of Surgery, Université de Montréal, Montréal, Que.

New immunotherapeutic strategies, relying on lymphocyte cy-

totoxic action, specifically directed against tumour antigens (TA), have shown increasing efficacy in the treatment of some disseminated cancers. Our aim is to characterize new breast cancer TA.

Screening of cDNA libraries has prompted us to investigate if Dikkopf-1 (DKK1) and prostate-derived Ets transcription factor (PDEF) could be characterized as TA. The transcriptional expression of both genes was evaluated by real-time RT-PCR in breast cancer clinical samples and in normal tissue RNA panels. The immunogenicity of HLA-A*0201-restricted DKK1 and PDEF peptides was evaluated by ex-vivo stimulation and recognition assays of lymphocytes taken from the blood of HLA-A*0201 patients operated on for breast cancer, as well as from healthy donors. The peptides' affinity for HLA-A*0201 was further quantified by a flow cytometric competitive binding assay.

We report that DKK1 is found in 29% (21/73) and PDEF in 75% (64/86) of the clinical samples tested. DKK1 is preferentially expressed in hormone receptor-negative tumours ($p = 0.005$) and among women reporting familial cases of breast cancer ($p = 0.02$). PDEF is expressed in a different phenotype of tumours, that being hormone receptor-positive ($p < 0.001$). PDEF also appears to be an independent risk factor for axillary node metastasis (multivariate model, $p = 0.002$). Neither DKK1 nor PDEF are expressed in vital normal tissues. Among the 15 peptides tested for DKK1 and PDEF, the ones that show the greatest immunogenicity have been identified for further validation.

Considering that DKK1 and PDEF are expressed in a large proportion of aggressive breast cancers, that they are absent from vital normal tissues, and that some of their HLA-A*0201 restricted peptides are potentially recognized by cytotoxic T lymphocytes, both DKK1 and PDEF qualify as candidate TA. Their potential use as prognostic markers is also being prospectively evaluated.

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GRAFT LOSS TO CHOLESTATIC DISEASE FOLLOWING LIVER TRANSPLANTATION FOR PRIMARY SCLEROSING CHOLANGITIS. *P.M. Garzon, S.A. Shab, A.C. Wei, N. Girgrah, G.A. Levy, P. Wong, L.B. Lilly, D.R. Grant, M.S. Cattral, I. McGilvary, P.D. Greig.* Multi-Organ Transplant Unit, University Health Network, University of Toronto, Toronto, Ont.

Although orthotopic liver transplantation (OLT) for end-stage primary sclerosing cholangitis (PSC) provides excellent patient and allograft survival, postoperative cholestatic disease (CD), defined as either chronic rejection or recurrent PSC, has been reported to occur from 5%–35% of grafts. The objectives of this study were to determine the incidence and morbidity of CD following OLT for PSC.

From 1985 to 2006, 127 consecutive PSC patients who underwent OLT were evaluated. Patients were divided into groups based on the presence of cholestatic disease after OLT. The diagnosis of CD was based on biliary imaging and/or histology which were prompted by elevated liver biochemistry tests. Patients with early biliary strictures, anastomotic strictures, hepatic artery thrombosis, or cholangiocarcinoma were excluded.

A total of 141 grafts were transplanted in 125 patients with

PSC. CD occurred in 45 grafts and its incidence at 5, 10 and 15 years was 23%, 42% and 60%, respectively. Median follow-up was 67 months (range 0–207 mo) for the entire cohort. The CD and non-CD groups had similar baseline and transplant characteristics. However, the first episode of acute rejection tended to occur earlier in CD grafts (3 [standard deviation {SD} 5] mo v. 13 [SD 29] mo, $p = 0.09$). Graft survival at 5, 10 and 15 years of the CD group appeared to be reduced compared with the non-CD group: 79%, 58% and 0% versus 76%, 67%, and 40%, respectively ($p = 0.18$). The overall incidence of graft loss secondary to end-stage CD was 11% (15/141) in the entire cohort. In the CD group, the incidence of graft loss secondary to CD was high (30%) leading to 11 re-OLT and 4 patient deaths. Patient survival was not affected by the occurrence of CD at 5, 10, and 15 years (84%, 77% and 53% v. 83%, 76% and 49%, respectively, $p = 0.65$).

Long-term outcome following OLT for PSC is good; however, the prevalence of CD is common and increases with time. Furthermore, in grafts that develop CD, graft loss is important (30%) but may not affect long-term patient survival.

17

TLR4 TRANSLOCATION FOLLOWING OXIDATIVE STRESS IN MOUSE MACROPHAGES REQUIRES SPHINGOLIPID METABOLISM THROUGH THE ASM PATHWAY. P.S. Tawadros, Z. Wang, S. Birch, K. Szaszi, A. Kapus, O.D. Rotstein. St. Michael's Hospital, University of Toronto, Toronto, Ont.

Multiorgan failure is a major cause of late mortality following trauma. Oxidative stress generated during shock/resuscitation contributes to tissue injury by priming the immune system for an exaggerated response to subsequent inflammatory stimuli such as lipopolysaccharide (LPS), the so-called “two hit hypothesis.” The mechanisms of oxidant-induced cell priming, however, remain poorly elucidated. Our group has previously reported a role in this priming process for translocation of the LPS receptor TLR4 to the plasma membrane (*J Exp Med* 2006). Recent studies, including our own, have suggested that the membrane sphingolipid product ceramide is generated in response to oxidant stress, and is an important molecule in inflammatory cell signaling. Taken together, we hypothesized that lipid metabolites such as ceramide may play a role in oxidant-induced TLR4 translocation.

Alveolar macrophages from 2 wild-type and 2 acid sphingomyelinase (ASM) knockout mice were retrieved by bronchoalveolar lavage and exposed, ex vivo, to 200 uM hydrogen peroxide for 60 minutes. The cells were exposed to a FITC-conjugated antibody against TLR4/MD2 and analyzed by fluorescence microscopy. In a separate similar experiment, TLR4 translocation was assessed by flow cytometry.

A qualitative review of the immunofluorescence results revealed that the control macrophages from both the wild-type and ASM-deficient groups had a typical diffuse cytoplasmic pattern of TLR4 staining. After 60 minutes of peroxide exposure, a majority of wild-type macrophages exhibited the pattern of TLR4 peripheralization we have previously described, while the ASM-deficient macrophages did not. This data was corroborated quantitatively by flow cytometry, suggesting a potential role for sphingolipid metabolism through the ASM pathway in oxidant-induced TLR4 translocation.

Oxidant-induced priming of macrophages by TLR4 translocation to the cell surface is inhibited in ASM deficient cells. This novel finding may direct future therapies in modulating oxidant-induced cellular priming.

18

CHILD PEDESTRIAN INJURY IN A LOW INCOME COUNTRY: A COST EFFECTIVE SOLUTION TO A PUBLIC HEALTH PRIORITY. A. Mihailovic, C. Nansamba, P. Coyte, A. Howar, D. Urbach. Departments of Surgery and Health Policy Management and Evaluation, University of Toronto, Toronto, Ont., Injury Control Center – Uganda, Kampala, Uganda.

Described is the methodology used to quantify the incidence of injuries in a district of Kampala, Uganda as well as the implementation and evaluation of a pedestrian injury prevention program in response to identified injury priorities. Initial baseline data on injuries in children was collected through prospective hospital based registries, a community survey of 2200 homes and teacher reports. Combined these showed pedestrian injury as the leading cause of severe injury and death in this group. A program of enhanced visibility using reflective arm bands combined with road traffic education was trialed in this cohort of children. The program consisted of 3 components: (1) distribution of reflective arm bands; (2) educational brochures; and (3) school road safety lessons. Rates of child injury and the acceptability of the program were reported weekly by 250 teachers and in total, 11640 children were included. A community advisory committee contributed to the program design and distribution. Ten weeks after the intervention, 28 fewer children had been struck by vehicles while walking compared with the year before (χ^2 value of 24.53 [$p < 0.0001$]). The relative risk reduction of being struck was 93% after the intervention. Fifty-five percent of children continued to wear their reflectors routinely. The total cost of this program was US\$3500 or US\$129 per child prevented from serious injury or death. Trauma and injury are costly to treat and often account for the majority of health care resource spending in the developing world. Simple, cost-effective solutions to public health priorities in the developing world should be sought and implemented wherever possible. Engagement of the local community is imperative to subsequent ownership of these programs and assurance of cultural sensitivity.

19

INTRAOPERATIVE DECISION MAKING IN LOCALLY-ADVANCED COLORECTAL CANCER: A POPULATION-BASED ANALYSIS. A. Govindarajan, V. Cranford, D. Wirtzfeld, S. Gallinger, C.H.L. Law, A.J. Smith, A.R. Gagliardi. Division of General Surgery, Toronto Sunnybrook Regional Cancer Centre, Toronto, Ont., Department of Surgery, Memorial University of Newfoundland, St. John's, Nfld.

This population-based study was conducted to determine the proportion of patients undergoing multivisceral resection (MVR) for locally advanced colorectal cancer (LACRC) in Ontario and to elucidate factors that influence intraoperative decision making in these patients.

All patients aged 20–74 years in the Ontario Familial Col-

orectal Cancer Registry who underwent surgical resection for primary, non-metastatic LACRC from July 1997 through June 2000 were included in the study. Data were extracted from operative notes and pathology reports. Patient and provider factors were compared between patients who received MVR and those that did not. Qualitative analysis was performed on operative notes using a predetermined analytic framework of non-technical surgical skills, to determine cognitive factors associated with intraoperative decisions.

Overall, 37 patients were included in the study. En bloc MVR was performed in 46.0% of patients and standard colorectal resection was performed in 32.4% of patients. In 21.6% of patients, some, but not all organ structures were resected en bloc. MVR was significantly more likely to be performed at academic centres (64.7% v. 16.7%, $p = 0.035$), and was inversely correlated with physician years in practice (9.3 yr of practice in MVR group v. 19.0 yr in standard resection group, $p = 0.02$). Surgeons who performed en bloc MVR appeared to differ from surgeons who did not with respect to mental readiness (preparation or information before surgery), risk assessment (evaluation of appropriate course of action, including intraoperative consultation), and decision making (clinical judgment guided by knowledge of the need for en bloc resection and negative margins, and by the avoidance of judgment as to whether adhesions were inflammatory or malignant).

MVR is performed in the minority of patients with LACRC. Intraoperative decision making processes differ between surgeons who performed MVR and those who did not. Appropriate knowledge translation strategies may increase the use of MVR in this population.

20

REVIEW: DOES THE EXISTING EVIDENCE SUPPORT CURRENT TECHNICAL SURGICAL EDUCATIONAL STRATEGIES? *F. Hagggar, H. Moloo, J. Grimshaw, E.C. Poulin, J. Mamazza, R.P. Boushey.* University of Ottawa, Ottawa Hospital, Ottawa, Ont.

To determine the effectiveness of educational interventions in improving technical surgical skills in operative procedures.

We systematically searched, without any language bias, the Cochrane Central Register of Controlled Trials (2006, volume 3), MEDLINE (1966–2006), HealthSTAR (1975–2006) EMBASE (1980–2006), ERIC (1993–2006), other databases and the references list of related reviews and articles. From these we identified studies of skills training methods where educational strategies, such as telementoring, feedback, didactic sessions and surgical simulations were used to determine their effects on improving the technical skills of surgical trainees. The methodological quality of studies was assessed using criteria appropriate for each study type. Data were synthesized through a narrative review.

From an initial 4251 abstracts, 1557 addressed surgical skills training. Review of full text identified 21 studies (20 RCTs/1 CBAs) comparing different surgical training models with either a traditional preceptor-based model, other training models or no training. The majority (12/21) of interventions used video box trainers and targeted laparoscopic skills (16/21). The quality of reporting and methodology were generally poor by today's standard; only 6/21 studies

specifically assessed actual intraoperative performance, 9/21 demonstrated adequate baseline group comparability, 3/31 reported the method of randomization. The sample sizes were generally very small and only 1/21 reported sample size calculations. The studies often lacked appropriate statistical methods. No economic evaluations comparing surgical educational strategies with standard training or other educational interventions were identified.

This report has served to highlight a shortage of high-quality information regarding the efficacy of technical surgical skills training for surgeons and surgical trainees. It is difficult on the basis of the limited significant studies and poor methodological quality to determine whether any of the training can reliably produce significant impacts on any of the reported outcomes.

21

SURGICAL SITE INFECTIONS FOLLOWING COLORECTAL SURGERY IN DIABETICS: IS POSTOPERATIVE HYPERGLYCEMIA A FACTOR? *T. McConnell, P. Johnson, G. Porter.* Division of General Surgery, Queen Elizabeth II Health Sciences Centre, Dalhousie University, Halifax, NS.

Postoperative hyperglycemia is strongly associated with complications following cardiac surgery in patients with diabetes mellitus (DM), but has never been examined in colorectal surgery patients. This study aimed to describe postoperative glycemic control in patients with DM undergoing colorectal resection, and examine its association with surgical site infections (SSI) and anastomotic leaks (AL).

All patients with preoperatively documented DM who underwent non-urgent colorectal resection between April 2001 and May 2006 at our institution were reviewed. SSI were defined by Centers for Disease Control criteria and anastomotic leaks were defined by objective clinical/radiographic criteria.

From a study cohort of 149 patients, 85 (57%) were male and the mean age was 68.6 years. Overall, 36 (24%) patients had poor postoperative glycemic control (defined as a 48-hr postoperative mean capillary glucose (MCG) ≥ 11.1 mmol/L). Patients with a 48-hour MCG ≥ 11.1 mmol/L developed significantly more SSI than those with a 48-hour MCG ≤ 11.0 mmol/L (25.0% v. 10.6%; $p = 0.03$). This association was most marked in patients with a body mass index (BMI) ≥ 30 kg/m² (37.5% v. 12.2%; $p = 0.02$). Multivariate analysis by logistic regression, incorporating potential demographic and clinical risk factors for SSI, showed that 48-hour MCG ≥ 11.1 mmol/L was independently associated with SSI (odds ratio [OR] 3.8, $p = 0.01$). No significant differences in AL rates were identified between patients with 48-hour MCG ≤ 11.0 mmol/L compared with those with 48-hour MCG ≥ 11.1 mmol/L (6.2% v. 8.3%; $p = 0.7$).

There appears to be an association between 48-hour postoperative glycemic control and SSI following colorectal resection in patients with DM. Prospective studies are required to examine therapeutic strategies to improve glycemic control following colorectal resection.

22

IMPACT OF SURGEON AND HOSPITAL FACTORS ON THE SUR-

GICAL TREATMENT OF LOCALLY ADVANCED COLON CANCER: A POPULATION-BASED STUDY. *A. Govindarajan, A. Kiss, L. Rabeneck, A.J. Smith, D. Hodgson, C.H.L. Law.* Department of General Surgery, Institute for Clinical Evaluative Sciences, Toronto Sunnybrook Regional Cancer Centre, Department of Radiation Oncology, Princess Margaret Hospital, Toronto, Ont.

Despite current guidelines, only approximately one-third of patients in the United States with locally advanced colorectal cancer (LACRC) are treated with multivisceral resection (MVR). In this population-based study, we evaluated surgeon and hospital factors associated with the use of MVR.

Patients ≥ 66 years of age who were diagnosed with non-metastatic, locally advanced colon cancer from 1991–2002 were identified from the Surveillance, Epidemiology and End Results-Medicare database. Hierarchical multivariable models were used to examine the independent effect of surgeon and hospital factors (case volumes, specialization) on the type of surgery performed (MVR v. standard resection) and on overall survival.

Overall, 2935 patients met study criteria, with MVR being performed in 31% of patients. In adjusted analysis, hospital volume was significantly associated with MVR, with hospitals in the highest volume quartile being 33% more likely to perform MVR than hospitals in the lowest volume quartile. In contrast, surgeons in the lowest volume quartile were 25% more likely than surgeons in the highest volume quartile to perform MVR. Patients treated at a designated cancer centre were significantly more likely to receive MVR than patients treated at non-cancer hospitals (odds ratio [OR] 2.14, $p = 0.038$). Analysis of individual providers found that 40% of surgeons and 25% of hospitals did not perform MVR on any of their LACRC patients. Treatment at a high-volume hospital or at a cancer centre were also associated with significantly improved overall survival.

Patients with LACRC were more likely to receive MVR when treated at a high-volume hospital or at a cancer centre, whereas treatment by a high-volume surgeon was paradoxically associated with decreased performance of MVR. A substantial fraction of surgeons did not perform MVR on any of their LACRC patients suggesting that beliefs of individual surgeons may be most relevant in the type of treatment patients receive.

23

A COMMON REFERRAL SYSTEM FOR GENERAL SURGERY — IMPACT ON WAITING TIMES AND ACCEPTABILITY AMONG REFERRING PHYSICIANS. *C. White, M.C. Taylor.* Department of Surgery, University of Manitoba, Winnipeg, Man.

Within an academic group of 6 general surgeons, the length of time patients waited for consultation varied from a mean of 20 to 125 days, with an overall mean of 82 days. It was proposed that a new system allowing referring physicians the option of referring patients to the group of surgeons would reduce waiting times for consultations. Letters were sent to 389 referring physicians advising them of how to access the new system. After the system had been in place for 6 months, a questionnaire was sent to each referring physician to assess the acceptability

of the common system. In the first 10 months of the new optional common referral system, 562 patients were referred to it. These patients waited a mean of 41.5 days from the date of referral to the date seen by the surgeon. The mean wait to see specific surgeons was 84 days. The satisfaction survey was returned by 43% of referring physicians after 3 mailings. On the 5-point Likert scale, with a score of 5 indicating strong agreement, respondents indicated the new system provided simpler access to specialists (mean score 4.05) and an equivalent quality of care (4.02). When asked whether they preferred their patients to see a consultant they knew or to the first available, the mean score for the known consultant option was 2.95 compared with 4.01 for the first available. There was strong agreement with the statement that more health care services should be available through common referral systems (4.12). The common referral system has reduced the waiting time to see a general surgeon, and is popular with referring physicians.

24

THE ROLE OF ILEOCECAL VALVE AND BACTERIA IN POSTOPERATIVE CROHN'S RECURRENCE. *A.M. Borowiec, R.N. Fedorak.* Departments of General Surgery and Gastroenterology, University of Alberta, Edmonton, Alta.

The role of ileocecal valve and colonic bacteria in postoperative Crohn's disease recurrence at the anastomosis and the neo-terminal ileum was investigated using a mouse model.

Wild type (WT) mice (129/SvEv) and genetically modified mice (IL-10) lacking interleukin-10 and known to develop Crohn's like disease (129/SvEv IL-10) underwent either an operation bypassing the ileocecal valve or a sham operation (ileal transection and anastomosis) or no operation. The animals were sacrificed at 6 weeks after the procedure and a 2-cm segment of ileum proximal to the ileocecal junction or anastomosis was collected for histological assessment of inflammation.

The WT mice were larger than IL-10 mice at the onset (21.5 v. 17.1 g) and at the end of the study (27.6 v. 23.5 g), however both groups gained approximately 6 g during the 6-week study period. The mortality rates for the IL-10 and WT mice that underwent ileocecal elimination were 40% and 20%, respectively. All deaths were due to anastomotic leak between postoperative day 3 and 5. There were no deaths among the control and sham operated groups. Preliminary histology analysis showed no inflammation of the distal 2 cm of ileum in all groups.

Reflux of bacteria-rich colonic contents into the ileum of genetically modified mice prone to develop colitis did not result in ileal inflammation at 6 weeks postsurgery. The examination of bowel wall injury using light microscopy may not be a sensitive enough method for detecting bowel wall injury and a longer postoperative exposure to colonic contents may be required before ileitis develops.

25

EARLY EXPERIENCE IN THE USE OF SURGISIS® BIOLOGICAL PROSTHETIC MESH FOR REPAIR OF ABDOMINAL WALL DEFECTS IN CONTAMINATED FIELDS. *G.N. Polybronopoulos, L.S. Feldman, P.A. Kaneva, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University Health Centre, Montréal, Que.

The repair of an abdominal wall defect in a contaminated field presents a difficult problem for the surgeon. While non-absorbable prosthetic mesh may result in chronic infection, absorbable mesh results in inevitable recurrence. The use of a biological prosthetic mesh derived from porcine small intestine submucosa (Surgisis®) has been proposed as a solution to this difficult problem. We studied early outcomes following the use of Surgisis® mesh for abdominal wall defect closure in a contaminated field.

Consecutive patients undergoing Surgisis® repair of the abdominal wall in a contaminated field between February 2004 and May 2006 were identified from a prospective operating room database. Patients were examined for recurrent hernias and charts were reviewed. Outcomes included perioperative morbidity, hernia recurrence, mesh or wound infection, and reoperation.

Nineteen patients were studied. The most frequent indications for the use of Surgisis® included abdominal wall closure following removal of infected mesh (7) and ventral hernia repair with bowel injury (6). Postoperative complications occurred in 18 patients (95%). Surgical site infections occurred in 16 patients (84%). Other complications included fistula in 5 (26%), seroma in 5 (26%), bowel obstruction in 3 (16%), ileus in 1 (5%), and hematoma in 1 (5%). There was 1 early reoperation to drain an abdominal wall abscess. With mean follow-up of 12 months (range 3–22 mo), incisional hernia was documented in 13/19 patients (68%). There were 21 meshes used in the 19 patients; at a cost of Can\$2450 per mesh, this amounts to a mesh cost of Can\$8575 per hernia prevented at 1 year.

Wound infection and postoperative hernia recurrence remain a significant problem when Surgisis® mesh is used in a contaminated field. Careful consideration should be given to the cost and benefit of this approach.

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IS EARLY CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS SAFE AND COST-EFFECTIVE? *M. Keshoofy, A. Gutauskas, R. Fairfull Smith. Department of General Surgery, Ottawa Hospital, Ottawa, Ont.*

Early laparoscopy cholecystectomy has been shown to be safe. However, difficulty with operating room access has resulted in a trend to initial nonoperative management of acute cholecystitis. In order to assess the cost-effectiveness of this approach we conducted a retrospective review.

Two hundred and forty-two Ottawa Hospital admissions for acute cholecystitis between January 1, 2004 and December 31, 2004 were reviewed. Patients who presented within 72 hours of the onset of their symptoms and were eligible for surgery or medical management were reviewed.

A total of 85 patients with acute cholecystitis were started on medical treatment in the emergency department. Forty-four (52%) of these patients were deemed unresponsive to the medical treatment, and 41 were scheduled for emergency laparoscopic cholecystectomy on day 1 to 9 of admission. Only 2 of these patients were converted to open procedure because of severe inflammation. This was not significantly different with those who had an elective operation after successful medical treatment of acute attack (1 out of 24). Length of operation in the first admission was mean 111 (standard deviation

[SD] 35.5) minutes, with a median of 105 minutes; the operative time strongly correlated with number of preop inpatient hospital days ($r = 0.439$, $p = 0.003$). Postoperative stay also correlated significantly with length of preoperative stay ($r = 0.497$, $p = 0.001$). Thirty-six point six percent of patients treated medically and discharged were readmitted with a second attack; 50% of whom were admitted within 10 days from discharge. Total length of hospital stay for 104 admissions was 426 days. A total of \$452 000 was spent on 283 days of preoperative stay. Based on a predicted postop stay model, if the patients were operated on in their first day of admission a total of \$398 400 could potentially be saved.

Early laparoscopic cholecystectomy for acute cholecystitis is comparable to elective cholecystectomy with regard to complications and conversion rates. It is therefore safe and more cost efficient to offer surgery to patients with acute cholecystitis as soon as possible after admission.

27

EXPERIENCE WITH 1227 OPEN AND LAPAROSCOPIC RY GASTRIC BYPASSES (RYGBP) FOR THE TREATMENT OF MORBID OBESITY. *N.V. Christou. Section of Bariatric Surgery, Division of General Surgery, McGill University, Montréal, Que.*

We compared 1227 open and laparoscopic RY gastric bypasses (RYGBP) to test the hypothesis that converting our bariatric surgery program from an open to a minimally invasive approach did not adversely affect the clinical outcomes. From October 30, 1995 to February 1, 2002 all RYGBP were performed using a standard midline incision. On February 8, 2002 we performed our first laparoscopic RYGBP and continue to do so today. All patient data were prospectively collected and entered into an outcomes database. This database was queried for the present study. Data and standard deviation (SD) of the 2 cohorts are shown.

	Open RYGBP	Lap RYGBP	<i>p</i> value
Number	564	663	—
Men/Women	164/499	123/441	NS
Start BMI, kg/m ²	52.5 ± 9.1	51.3 ± 9.3	NS
Age	39.7 ± 10.5	39.6 ± 9.8	NS
Death	3 (0.5%)	4 (0.6%)	NS
Anastomotic leaks	21 (3.7%)	24 (3.6%)	NS
Gastrojejunostomy (GJ) stenosis	22 (3.9%)	33 (4.0%)	NS
Gastro-gastric (GG) fistula	16 (2.8%)	5 (0.8%)	0.01
Wound infection	111 (19.7%)	2 (0.3%)	0.00001
Incisional hernia	224 (39.1%)	5 (0.8%)	0.0001
% EWL at 1 year	64.0 ± 18.9	66.7 ± 18.1	NS
% EWL at 3 years	77.5 ± 20.1	80.5 ± 19.7	NS
% EWL at 5 years	74.1 ± 21.1	74.3 ± 23.4	NS
OR time (skin-skin)	66 ± 12 min	77 ± 9 min	0.05
Length of stay (LOS)	3.6 ± 1.0 d	2.0 ± 0.5 d	0.05
EWL = excess weight loss.			

There were no significant differences in M/F, sex, age and starting body mass index (BMI) in the 2 cohorts. Mortality,

anastomotic leaks and GJ stenosis were similar, whereas GG fistulas, wound infections and incisional hernias were significant lower in the laparoscopic RYGBP cohort. The excess weight loss (EWL) was equivalent at 1-, 3- and 5-year follow-up periods.

Switching from open to minimally invasive approach to RYGBP had no significant impact on severe complications and weight loss, reduced the incidence of GG fistulas, wound infections and incisional hernias. The slightly longer operating time was negated by the shorter LOS.

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Withdrawn.

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SOCIOECONOMIC AND HEALTH STATUS QUESTIONNAIRE FOR BARIATRIC SURGERY PATIENTS. *S. Al-Sabah, M. Ladouceur, N.V. Christou.* Section of Bariatric Surgery, Division of General Surgery, McGill University Health Centre, Montréal, Que.

Obesity impacts on the psychosocial, physical, and economic wellbeing of all Canadians. Measuring socioeconomic and health wellbeing post bariatric surgery may guide decision makers with service provision, health care expenditures and public health policy.

A questionnaire concerning demographics, socioeconomic status, education, and extent of satisfaction with weight loss was given to patients presenting at the bariatric clinic following their weight loss surgery, after minimum follow-up of 6 months and maximum follow-up of 19.6 years. Statistical analysis was performed using Student's *t* test, χ^2 and analysis of variance.

The questionnaire was completed by 392 patients, of which 78.8% are women. The mean age was 41.9 years. Mean start body mass index (BMI) 52.5, and the mean BMI at follow-up was 32.4. Before their surgery, most patients were married/common law (56.6%) with family income below \$50 000 (66.3%) and 28% below \$20 000. After surgery, most patients (84.7%) felt better, more able to participate in physical activities (81.1%), more willing to be involved socially (70.9%), more able to work (65%) and more interested in intimacy (60.7%). Eighty-two point nine percent are satisfied with their weight loss but 66.3% wanted to lose more weight. Compared with before surgery, 68.7% had decrease in appetite. Only 3.8% required hospitalization for dehydration/malnutrition after the surgery. More people were satisfied with their weight loss when the questionnaire was administered closer to their surgery, but the satisfaction diminished with time and associated with weight regain.

Not only is obesity a risk factor for a variety of potentially life-threatening illnesses, it also has a devastating impact on health-related quality of life and socioeconomic status. Bariatric surgery leads to a profoundly positive impact on socioeconomic and physical and overall health status, and these benefits are directly proportional to weight loss.

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PROGNOSTIC FACTORS IN ESOPHAGEAL CANCER — NUMBER

OF METASTATIC LYMPH NODES AND EXTRACAPSULAR LYMPH NODE INVASION. *S.K. Thompson, A.R. Ruszkiewicz, G.G. Jamieson, B.P.L. Wijnhoven, P.A. Game, P.G. Devitt, and D.I. Watson.* Department of Surgery, Royal Adelaide Hospital, Adelaide, SA, Australia.

Prognostic factors such as the number of metastatic lymph nodes and the presence of extracapsular lymph node invasion may improve the current TNM staging system for esophageal cancer, and therefore optimize patient treatment.

All patients who underwent surgical resection for esophageal cancer were identified in a prospectively-maintained database. Patients without invasive adenocarcinoma or squamous cell cancer were excluded. Pathology slides were reviewed by a single pathologist. Survival data was calculated using Kaplan–Meier curves, and prognostic factors were examined using the log rank test.

Two hundred and thirty-five surgical specimens met inclusion criteria, and 95 specimens have been reviewed so far. The 5-year overall survival rate was 43% (median 31.4 mo). The following prognostic factors were examined:

Improved survival ($p < 0.05$)	No effect on survival
Less than 3 positive lymph nodes	Mid v. lower esophagus
Absence of extracapsular LN invasion	Complete response to radiotherapy
Negative circumferential margin	Intramucosal v. submucosal tumour invasion
Absence of vascular invasion	
Absence of perineural invasion	

Subdividing pN-stage into 1–2 positive nodes and > 2 positive nodes showed significant differences in 5-year survival between both groups: 41% versus 6.0%, respectively ($p = 0.0003$). Similarly, including absence and presence of extracapsular lymph node invasion into our pathology review showed significant differences in 5-year survival: 40% versus 7.8%, respectively ($p < 0.01$).

The number and characteristics of metastatic invasion of lymph nodes should be included in current esophageal cancer staging systems. Clinicians will then have more accurate prognostic information, and treatment can be better tailored to patients' needs.

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ACCESS TO MULTIDISCIPLINARY ASSESSMENT IN CANCER CARE: SOME PRELIMINARY DATA FROM BRITISH COLUMBIA. *B. Poole, T.G. Ehlen, N.L. Davis.* Department of Surgical Oncology, BC Cancer Agency, Faculty of Medicine, University of British Columbia, Vancouver, BC.

A study was conducted by the BC Cancer Agency and the Vancouver General Hospital to explore referral to multidisciplinary assessment for oncology surgical patients. While surgery remains the primary treatment for many solid tumours, neoadjuvant therapies have increasingly been shown to enhance outcomes. Multidisciplinary assessment in the form of tumour conferences improves adherence to evidence-based

guidelines. Surgeons therefore act as gatekeepers to multidisciplinary assessment.

Multidisciplinary care was defined for the purposes of this study as referral to the cancer agency and attendance at a new patient visit. All surgical cases flagged as oncology cases for a 3-month period were linked to the BC Cancer Registry and BC Cancer Information System. Percentage of cases referred to the Cancer Agency was calculated. This was stratified by surgical specialty, existence of a defined provincial program and timing of the referral.

Four hundred and sixty-seven of the 637 linked cases (73.3%) cases were referred to the BC Cancer Agency. Of those referred, 278 (59.5%) were seen at the agency in advance of their surgery. One hundred and thirty-nine (29.8%) were seen after their surgery. The remaining 50 cases (10.7%) were seen but the time frame of their visit could not reasonably have been associated with the episode of care involving the surgery.

A statistical significant difference was found between specialties with well defined provincial programs and other surgical specialties.

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RARE FOURTH BRANCHIAL CLEFT SINUS PRESENTED WITH THYROID ABSCESS — CASE REPORT. *F. Tuma, T. Smith. Department of Head and Neck Surgery, St. Clare's Mercy Hospital, St. John's, Nfld.*

This is a report of a case of thyroid abscess secondary to fourth branchial cleft sinus connecting right pyriform sinus to the thyroid gland.

A 20-year-old male presented to the ER with tender swelling on the right neck side. Initial assessment and work-up including WBC, TSH, Free T4, anti Thyroglobuline Abs, neck x-ray, and ESR was suggestive of subacute thyroiditis. He was, therefore, admitted and treated with Ancef and Decadron on which he felt better after 2 days and is discharged home.

Two days later, he presented to the ER again with worse pain, swelling, and tenderness in the thyroid region. CT scan showed thyroid abscess. Ultrasound-guided aspiration of thick, purulent, foul smelling fluid was done. Contrast swallow showed fistulous communication at thyroid level with pyriform sinus. Pharyngolaryngoscopy showed pus in right pyriform sinus. He was, therefore, kept NPO, and NGT feeding started. The antibiotic was changed from Cefazoline to Cefotaxim and Flagyl after the culture result showed mixed aerobic and anaerobic bacteria.

Five days later, CT was repeated and showed marked decrease in abscess size. Another trial of ultrasound-guided aspiration came with no pus. Tri-endoscopy with microendoscopy visualized the fistula opening in the right pyriform sinus. Tisseel was injected at that opening of the sinus.

Over the following few days, patient's condition was much better, therefore; he was discharged home on Kefzol and Flagyl. A month later, he had another tri-endoscopy and microendoscopy which again showed the fistula opening in the right pyriform sinus, therefore; Tisseel injected again. Otherwise, he has no signs of abscess recurrence.

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MANAGEMENT OF LAPAROSCOPIC COLORECTAL ANASTOMOTIC LEAKS. *M. Hamoud, A. Elfeitori, R. Boushey, E. Poulin, J. Mamazza. Department of Surgery, Ottawa Hospital, University of Ottawa, Ottawa, Ont.*

Leakage is the most serious early complication of any colorectal anastomosis; the aim of this study was to prospectively assess to present our experience in the management of colorectal leak in 1000 consecutive patients who underwent laparoscopic colorectal operations. Forty-one (4.1%) patients with clinical anastomotic leaked patients undergoing laparoscopic colorectal surgery over 6 years were studied.

Prospectively collected computerized data from January 1999 to November 2005 were analyzed. There were (47%) women and (53%) men with a mean age of 63 years. Six hundred and eight operations were performed for cancer indications and 392 for benign.

The main indications were malignant disorders such as rectosigmoid carcinoma.

A total of 1000 patients developed 41 leak complications, 26 of which (63%) required a surgical intervention by fecal diversion and 15 leaked anastomosis resolved with conservative management using percutaneous drainage. The leak occurred in 14/344 patients submitted to right hemicolectomy (4%), in 1/41 patients after left hemicolectomy in 24/553 patients after sigmoidectomy and anterior resection of the rectum (4.3%) and in 4/62 patients (6.45%) after total colectomy. The leak rate was similar by surgical site, except increased leak rate with ileorectal anastomosis. Anastomotic leaks were more common in men ($n = 28$) 70% than in women and most frequent in antero-resection ($n = 15$). Ten of 26 procedures were performed laparoscopically creating diverting stoma without any complications. Average blood loss of 1000 patients was 210 mL with a transfusion rate of 2.7%. The blood loss of the leaked patient was 386.8 mL, transfusion rates 4.9% ($n = 12$).

The patients were divided into 3 groups. Leak rate was (6%) in the 1999–2001 group, (3.9%) in the second 2 years and (3.1%) in the last 2 years (3.1%). Thirty percent of total colectomies were done in the first 2 year were leaked.

Primary management of clinical anastomotic leak remains intestinal diversion and laparoscopy appears to be an adequate technique to treat this complication in this patient population.

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EXTRATHORACIC MANIFESTATIONS OF ASBESTOS EXPOSURE. *J.R. MacKenzie, W. Teel, A. Reinhardt, J. Schieman, J. Brophy. Occupational Health Clinic for Ontario Workers, Sarnia, Ont.*

A retrospective study of 868 male workers exposed to asbestos and who had evidence of pleural plaques or pleural thickening on chest x-ray appeared with or were examined for the prevalence of extrathoracic cancers.

The table indicates the results.

Patients who have had heavy exposure to asbestos and/or pleural plaques on chest x-ray or CT scans should also be aggressively examined for other extrathoracic neoplasms, especially those of the colorectal variety. A longitudinal prospective study should be performed on a cohort of asbestos-exposed

Disease	Total number	Asbestos exposure	Other exposure
Thoracic disease	446	442	44
Mesothelioma	69	69	—
Asbestosis	208	208	—
Lung cancer	189	145	44
GI cancers	159	119	40
Stomach	23	16	7
Esophageal	17	10	7
Colon	100	81	19
Rectal	19	12	7
Head/neck cancers	32	26	6

and nonexposed workers to determine the true relationship between asbestos and the extrathoracic tumours that are manifested by this group.

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IDENTIFICATION OF INTRAOPERATIVE FACTORS PREDICTIVE OF RECURRENCE AFTER LAPAROSCOPIC PARAESOPHAGEAL HERNIA REPAIR. *K.E. Hsu, L.E. Ferri, L.S. Feldman, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University, Montréal, Que.

Laparoscopic paraesophageal hernia repair (LPEHR) with mesh has a lower recurrence rate (0%–9%) compared with primary crural reapproximation (22%–30%). It is unclear whether all LPEHRs require mesh or whether subgroups can be identified that are likely to recur without mesh reinforcement. The purpose of this study was to identify intraoperatively factors that are significantly associated with PEH recurrence.

Seventy-nine LPEHRs were performed between 1997–2006, of which 45 were identified in a video library. Twenty-nine were excluded because they depicted redo operations, mesh LPEHR, had insufficient follow-up, or were of too poor quality for review. Of the remaining 16 videos, 5 depicted repairs that recurred based on a > 3 month follow-up contrast study or gastroscopy. A 15-item tool (8 global rating Likert scales and 7 checklist domains) assessing characteristics believed to be associated with recurrence was created. Three blinded surgeons with experience in LPEHR then viewed and independently rated the videos using these scales. For each item, median interquartile range (IQR) scores for the 3 reviewers were compared for recurrent versus nonrecurrent repairs using Mann–Whitney *U* test or Fisher’s exact test. Agreement between reviewers was determined with intraclass correlation (ICC).

Initial assessment of PEH size ($p = 0.9$), anterior–posterior ($p = 1.0$) or coronal hiatal diameter ($p = 0.2$), amount of peritoneal stripping of crura ($p = 0.14$), number of crural stitches used ($p = 0.8$) and pexy of the fundoplication ($p = 0.6$) were not significantly associated with PEH recurrence. Scores indicating poorer crural muscle quality ($p < 0.01$), insufficient esophageal length ($p = 0.05$), tension after crural closure ($p < 0.01$), and surgeon dissatisfaction with crural closure ($p = 0.02$) and with the repair overall ($p = 0.01$) were significantly associated with PEH recurrence, while less complete hernia sac dissection/removal ($p = 0.08$) and length of subdiaphrag-

matic esophagus ($p = 0.1$) approached statistical significance. The median (IQR) total of these differentiating scores was 21 (17–24) in recurrent hernias and 13 (12–15) in nonrecurrent hernias ($p < 0.01$). A cut-off total score of 20 correctly classified all of the non-recurrent and 4 of 5 recurrent hernias. There was very good correlation of total score between the 3 raters (ICC 0.78–0.89, $p < 0.01$).

Recognition of factors intraoperatively that are predictive of poor outcome after primary crural approximation may aide surgeons in selectively placing mesh during LPEHR.

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EXPERIENCED SURGEONS CAN DO MORE THAN ONE THING AT A TIME: EFFECT OF DISTRACTION ON PERFORMANCE OF A SIMPLE LAPAROSCOPIC AND COGNITIVE TASK IN EXPERIENCED AND NOVICE SURGEONS. *K.E. Hsu, F.Y. Man, R.A. Gizicki, L.S. Feldman, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University Health Centre, Department of Surgery, McGill University, Montréal, Que.

While operating, surgeons are required to make cognitive decisions and are often interrupted to attend to questions from other members of the health care team. Technical automatization may be achieved by experienced surgeons such that these distractions have little effect on performance of either the surgical or cognitive task. This study assessed the effect of adding a distracting cognitive task on performance of a basic laparoscopic skill in novice and experienced surgeons.

Thirty-one novice (medical students, PGY 1–2) and 9 experienced (PGY 4–5/fellow/attending) laparoscopic surgeons practised the FLS laparoscopic peg transfer task until their scores stabilized; the mean normalized score after 5 repetitions was then recorded. Subjects were also tested on the number of mathematical addition questions they could answer in 1 minute. This was repeated 5 times with the mean number of questions attempted and accuracy (% correct) recorded. The laparoscopic and addition tasks were then performed concurrently 5 times. Data are presented as mean and standard deviation (SD) and were analyzed using Student’s *t* test. A *p* value of < 0.05 was considered statistically significant.

After practice to stable peg transfer performance, baseline peg transfer score was higher in the experienced group (98 [SD 6] v. 87 [SD 12], $p < 0.01$). There were no baseline differences between the groups in the number of math questions attempted in 1 minute (10 [SD 2] v. 9 [SD 2], $p = 0.55$), or number of correct answers (9 [SD 3] v. 8 [SD 3], $p = 0.36$). In comparing baseline versus dual-task performance, experienced surgeons had no decline in peg transfer score (98 [SD 6] v. 97 [SD 6], $p = 0.48$) number of questions attempted in 1 minute (10 [SD 2] v. 9 [SD 3], $p = 0.32$), or number of correct answers (9 [SD 3] v. 8 [SD 3], $p = 0.46$). In contrast, dual-tasking in novices was associated with a decrease in the number of questions attempted (9 [SD 2] v. 8 [SD 2], $p < 0.01$) and the number of correct answers (8 [SD 3] v. 7 [SD 2], $p = 0.02$), with no change in peg transfer score (87 [SD 12] v. 88 [SD 8] $p = 0.38$) compared with baseline.

Distraction significantly decreased a novice’s ability to process cognitively-based math problems, while there was no effect on experienced subjects. This occurred despite the fact

that the novice group had practised to high-level peg transfer scores at baseline. This suggests that experienced surgeons have achieved a level of automatization of the peg transfer basic surgical skill, so that the cognitive distraction did not affect performance of either task. Experienced surgeons were able to equally attend to both tasks while the novices attended to the surgical task at the expense of some aspects of performance of the cognitive task.

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THE IMPACT OF HOSPITAL VOLUME ON THE RATE OF COMPLICATIONS OF LAPAROSCOPIC CHOLECYSTECTOMY. *M.C. Taylor, S. Bruce.* Manitoba Centre for Health Policy and the Department of Surgery, University of Manitoba, Winnipeg, Man.

There is evidence of a volume-outcome relationship with many low-volume, high-intensity surgical procedures. It is less clear whether this applies to procedures of lower complexity. The Manitoba Centre for Health Policy carried out a study primarily designed to develop patient safety indicators using their repository of linked administrative databases. Specific administrative files were from hospital discharge abstracts data, physicians' claims and the vital statistics registry.

Laparoscopic cholecystectomy (LC) was identified as a high-volume procedure that was carried out in almost every regional health authority in Manitoba. Using relevant ICD-9 CM codes, all patients in Manitoba undergoing laparoscopic cholecystectomy between 1999 and 2004 were identified. Patients who underwent subsequent biliary surgery were identified from surgeon billing claims to Manitoba Health. The complications were assigned to the hospital in which the cholecystectomy had been done, regardless of where the subsequent surgery was carried out.

During the study period, 14379 cholecystectomies were performed. Thirteen thousand, two hundred and nineteen (92%) of these were laparoscopic procedures, which are the focus of this analysis. The overall rate of subsequent biliary reconstruction after LC for the entire province was 0.2%. Those hospitals that carried out over 1000 LCs had a rate of subsequent biliary reconstruction of 0.13%, compared with 0.25% for those hospitals that carried out between 500 and 1000, and 0.5% for those hospitals that carried out less than 500. The difference in rate of subsequent biliary surgery was statistically significant ($p < 0.01$).

This data suggests that there is a volume-outcome relationship for high-volume, low-intensity surgery. It appears that hospitals performing fewer than 100 laparoscopic cholecystectomies per year may have a high rate of serious biliary injury.

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IS LAPAROSCOPIC VENTRAL HERNIA REPAIR THE NEXT STANDARD OF CARE? BETTER BE SAFE THAN SORRY. A CRITICAL REVIEW OF 70 CONSECUTIVE CASES. *A. Burtally, G. Brochu, J.P. Gagné.* Québec Centre for Minimally Invasive Surgery, Centre Hospitalier Universitaire de Québec, Québec, Que.

This study is a critical assessment of the perioperative outcomes of laparoscopic ventral hernia repair (LVHR) since its introduction in our institution.

This is a retrospective study of 70 consecutive cases of LVHR performed by 2 laparoscopic surgeons in an Academic Health Science Centre between January 2001 and March 2007. Data included patients' demographics, body mass index (BMI), ASA classification, hernia size, types and sizes of meshes, operative time, length of stay, conversion and complication rates.

Of the 70 patients, 32 were men. Median age was 59 (26–91). Median BMI was 31 (22–54). Fourteen patients had recurrent hernias, while 10 presented with incarceration. ASA classifications were: class 1, 22%; class 2, 69%; class 3, 9%. Median hernia size was 109 cm². Most hernias (41) were repaired with Composix E/X™ (Bard Canada, Mississauga, Canada) meshes. Median operative time was 140 minutes (50–720). Median hospital stay was 4 days (1–210 d). Conversion rate was 12%. Reasons for conversion were: adhesions (5), hemodynamic instability (1), bladder involvement (1) and colon incarceration (1). In that subgroup of 8 patients, operative time was 215 minutes and hospital stay, 6 days. Complications occurred in 11 patients (15%). There was 1 death. There were 2 enterotomies, 1 of which was recognized 1 week postoperatively, resulting in peritonitis, stoma creation and a prolonged hospital stay.

Although LVHR provides excellent immediate results, the occurrence of 1 major complication jeopardizes the overall results of this study and should prompt surgeons to apply caution regarding enterotomies. A low conversion threshold, at least initially, might be the best way to avoid such catastrophic events.

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INFLUENCE OF LAPAROSCOPY ON HIRING PRACTICES IN CANADIAN SURGICAL DEPARTMENTS. *G. Martel, E.C. Poulin, J. Mamazza, R.P. Boushey.* Minimally Invasive Surgery Group, Division of General Surgery, Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The objective of this study was to determine whether the increasing importance of minimally invasive surgery (MIS) influences hiring practices within Canadian academic surgical departments.

A questionnaire was mailed to surgery department chairs and general surgery division heads at the 16 Canadian academic institutions. Nonresponders were identified and contacted directly. Data pertaining to MIS were collected, including demographics, perceptions of MIS and recruitment data. At the time this survey was completed, 2 surgery department chair positions were vacant.

Overall, there was an 87% response rate ($n = 26/30$), with representation from 94% of departments ($n = 15/16$). Among those surveyed, 88% intend to increase the importance of MIS at their institution within 5 years; 87% intend to achieve this objective through new hirings. Networking (73%) and retention of recent graduates (89%) were cited most frequently as recruitment strategies. Strengthening the division, research and education were considered important or extremely important by > 90% of respondents with respect to recruitment goals, while strengthening MIS was considered important or extremely important by 50%. Within 5 years, surgical departments intend to hire a median of 4 general surgeons, of which

49% will have formal MIS training. In comparison, over the last 10 years, only 26% of new recruits had formal MIS training. Over 90% of respondents considered formal MIS fellowship, MIS fellowship plus a second fellowship, and proctorship to be adequate training for performing advanced MIS, whereas residency, weekend/week-long courses, and self-teaching were considered inadequate. Lack of operative time and costs/resources issues were considered most limiting in hiring new MIS surgeons.

MIS is growing in importance within academic surgical departments, but remains an intermediate recruitment priority. It does not appear to substitute for traditional hiring goals. Formal MIS training appears important in recruiting new surgeons, while traditional training methods are considered inadequate.

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ANAPLASTIC THYROID CARCINOMA EXHIBITS INTRATUMORAL MOLECULAR HOMOGENEITY. *S. Deen, O. Griffith, H. Masoudi, S.M. Wiseman.* Department of Surgery, St. Paul's Hospital, University of British Columbia, Vancouver, BC.

Anaplastic thyroid cancer is a rare, lethal endocrine malignancy. The objective of this work was to determine if molecular heterogeneity exists between different intratumoral histologic subtype foci of anaplastic thyroid carcinoma.

A tissue microarray composed of 12 anaplastic thyroid carcinoma samples from 6 patients (2 discrete histologic subtype foci each) were evaluated for expression of 51 different molecular markers. Significant associations between marker staining and focus (primary v. secondary) or subtype (epithelioid, giant cell, or spindled) were determined using a Fisher's exact test. Marker scores were grouped as either "negative" (score = 0) or "positive" (score \geq 1). The samples and markers were clustered using a hierarchical clustering algorithm and heatmaps generated. Correlation between marker staining for the 2 foci was also assessed for each patient using a Spearman correlation. All tests were 2-tailed and considered significant at $\alpha = 0.05$. Statistics were performed with SPSS software (SPSS Inc., version 13).

No significant associations were found between intratumoural focus or subtype and marker expression. However, significant correlations were observed between overall staining patterns for paired foci from the same patient. This suggests that the different tumours showed consistent or homogeneous staining. The Spearman correlations ranged from 0.514 to 0.937 when comparing the 2 foci for each of the 6 patients. All *p* values were less than 0.004 and considered significant. On the heatmap, the 2 foci from the same patient consistently clustered together suggesting intratumoral molecular homogeneity when comparing the intratumoral foci.

Few studies have evaluated molecular marker expression patterns of different histologic subtypes of anaplastic thyroid cancer. Despite being phenotypically heterogeneous, our findings suggest that anaplastic thyroid carcinoma exhibits intratumoral molecular homogeneity. This is supported by the statistically significant correlations observed between overall staining patterns for paired foci from the same patient. These results support the utilization of anti-cancer agents that target the molecular characteristics of this fatal thyroid malignancy.

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CALCIPHYLAXIS: QUESTIONING THE NEED FOR HIGH CALCIUM PHOSPHATE PRODUCT AS AN INDICATION FOR PARATHYROIDECTOMY. *H. Cox, J.L. Pasiëka.* Department of Surgery, University of Calgary, Calgary, Alta.

Calciophylaxis is a rare and often fatal condition with controversial management. The purpose of this study was to review the outcomes from parathyroidectomy (PTx), by assessing the resolution of the lesions and the short- and long-term mortality rates. In addition we assessed whether location or biochemical markers were predictive of a poor outcome.

A retrospective chart review from all patients with the diagnosis of calciophylaxis who underwent PTx from 1991–2006.

During this period, 826 PTx were performed; 147 PTx were in patients with renal disease of which 16 (11%) had calciophylaxis. There were 9 females with a median age of 54 years (range 21–81). Eleven patients were on hemodialysis, 4 on peritoneal dialysis and 1 patient had viable transplant. All patients had progressive, painful ulcerating skin lesions with 50% having radiologic evidence of calcinosis. Five patients (31%) presented with truncal calciophylaxis. Preoperatively the median calcium was 2.4 mmol/L (2.06–2.63), phosphate 1.78 mmol/L (0.64–3.02) and parathyroid hormone (PTH) was 636 ng/L (124–1681). Only 5 patients had Ca X P (calcium phosphate product) $>$ 5 with an overall mean of 4.5 ranging from 1.57–6.7. All patients underwent total PTx and thymectomy with only 2 patients early in the series having autotransplantation. There were no operative mortalities. Two patients died from sepsis secondary to calciophylaxis, while an additional 5 patients despite resolution of the calciophylaxis died within 6 months (6-mo mortality rate of 32%). Nine patients lived beyond 1 year of PTx. Six patients (38%) remain alive with a mean follow-up of 21.4 months (range 2–96 mo).

Truncal calciophylaxis is not uniformly fatal. Furthermore, PTH level and Ca X P were not predictive of mortality. Total PTx without autotransplantation resulted in several long-term survivors from this often fatal disease.

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RECURRENT HEARTBURN AFTER FUNDOPLICATION IN PATIENTS WITH A NEGATIVE 24-HOUR pH ASSESSMENT: RECURRENT REFLUX OR "IRRITABLE ESOPHAGUS"? *Z.E. Parr, S.K. Thompson, G.G. Jamieson, J.C. Myers, P.A. Game, P.G. Devitt.* Departments of Surgery, Foothills Hospital, Calgary, Alta., Royal Adelaide Hospital, Adelaide, SA, Australia.

A small cohort of patients present after antireflux surgery complaining of recurrent heartburn. Over two-thirds of these patients will have a negative 24-hour pH study. Our objective is to determine whether these patients have a functional disorder. We are therefore first confirming that there is no recurrent reflux and then investigating whether they have altered inflammatory cytokine levels and symptomatic relief from a herbal medicine, Iberogast®. A series of questionnaires will be used to determine the presence or absence of various functional disorders. Patient recruitment is ongoing and this report documents the reproducibility of 24-hour pH testing in the patient group.

A prospective analysis has been carried out on a cohort of patients (identified from the Royal Adelaide Hospital Esophageal Function database) who have undergone a fundoplication and pH testing for recurrent heartburn. There are 2 groups of patients, groups A and B. Group A – patients with recurrent heartburn and a negative 24-hour pH test. Group B (control group) – patients with recurrent heartburn and a positive 24-hour pH test (treated with medication/surgery; asymptomatic). To confirm absence of recurrent reflux, group A patients were first asked to complete a second postoperative 24-hour pH test.

One hundred and fifty-seven patients were identified from our database who met our inclusion criteria and we could locate 137 patients. Fifty-eight of 103 (56%) group A patients have agreed to participate. Forty-nine of these patients underwent a repeat pH study, and 47/49 (96%) had a negative result. Symptom-reflux correlation was highly significant ($p < 0.001$).

Reproducibility of 24-hour pH testing in patients with recurrent symptoms of heartburn and a negative 24-hour pH study is excellent (96%) and seems better than the 70%–80%, which is the usually quoted figure for this test. Therefore, a second pH test to confirm initial results will be unnecessary in most patients.

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INFRARED THERMOGRAPHIC IMAGING IN THE ASSESSMENT OF PAIN FOLLOWING VENTRAL AND INGUINAL HERNIA REPAIR. *M. Bélanger, G. Brochu.* Service de chirurgie générale, CHUL-CHUQ, Québec, Que.

The surgery of the abdominal hernia is often associated with either acute pain as in laparoscopic hernia repair or subchronic or chronic pain in the case inguinal hernia repair. The causes are hard to define and it is often controversial subject. We think that infrared thermal imaging may help to understand those clinical problems.

After various hernia procedures with different meshes an infrared thermographic imaging of the abdomen wall and the inguinal region of the patient was recorded. The recording was done with an infrared Thermographic camera Thermovision® 400 (AGEMA, Sweden). Two thermographs were recorded. The first was at room temperature (20°C) and the second one in the warning phase after cooling the skin of the patient by spraying isopropyl alcohol and letting it evaporate. When thermal asymmetry was noted, the difference was measured. The pattern of thermal activity was correlated to the area of the mesh used.

After laparoscopic ventral hernia repair severe acute and subchronic pain can be observed. Some authors have advocated that the pain is related to the transparietal sutures; others advocate that the pain can be due to the prosthesis itself. The thermograph demonstrates a pattern of intense hot spots as well a diffuse warmer area which corresponds to the mesh itself. The pattern is less intense if a lighter mesh is used. This supports the fact that the pain is not due only to the sutures but to the inflammatory response of the abdominal wall due to the implantation of a large piece of prosthesis in close contact with the peritoneum. In the case of inguinal hernia repair (Lichtenstein procedure) a lighter mesh induced less thermal change to the inguinal region. In the case of bilateral repair

with different meshes, difference in the temperature is observed but not very intense (less than 2°C); a small asymmetry can be observed between heavy-weight polypropylene and light-weight polypropylene. The pain post inguinal hernia repair is not specific to a technique nor a prosthesis. In the case of nerve entrapment, either ilioinguinal or iliohypogastric, a thermal asymmetry up to 6°C can be observed and improves with either neurectomy or cryotherapy. On the other hand in 1 postoperative asymptomatic patient a minimal thermal asymmetry is noted.

Infrared thermographs can be useful in the assessment of the postoperative pain following hernia surgery. Infrared thermography support the fact that the postoperative pain following ventral hernia repair particularly by laparoscopy is due to the transparietal suture and the inflammatory response to the mesh. Infrared thermography supports the clinical finding that lightweight mesh causes less discomfort and pain. This seems to be the first communication using infrared thermographs to study the pain post herniorrhaphy.

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MINIMALLY INVASIVE SURGICAL TRENDS IN CANADIAN COLORECTAL SURGERY: THE MISTIC SURVEY. *H. Molo, F. Haggar, J. Grimshaw, D. Coyle, I.D. Graham, E. Sabri, E.C. Poulin, J. Mamazza, F. Balaa, H. Stern, R.P. Boushey.* Department of Surgery, Ottawa Hospital, Department of Epidemiology, University of Ottawa, Ottawa, Ont.

To examine the patterns of practice and access Canadian general surgeons' opinions with regards to laparoscopic colorectal surgery. In addition, limiting factors and strategies for adoption were identified.

A 28-item questionnaire was sent to all members of the Royal College of Physicians and Surgeons of Canada ($n = 1266$). Descriptive and correlative information was derived using χ^2 , Wilcoxon rank sum, Student's t test, and multivariate logistic regression.

The return rate was 54.8%. Sixty-seven percent (462/694) (95% confidence interval [CI] 63.0%–70.2%) of respondents performed colorectal surgery. Of these, 53.6% perform laparoscopic colorectal surgery (group 1) with 46.4% only offering open colorectal surgery (group 2). Multivariate logistic regression identified 4 factors related to performing laparoscopic colorectal surgery: fewer years of practice ($p < 0.0001$), male gender ($p = 0.0023$), practising in a more populous province ($p = 0.0009$), and minimally invasive surgery (MIS) fellowship training ($p = 0.004$). Lack of adequate operating time and formal training were the main reasons for group 2 not offering laparoscopic colon resections. Most surgeons (67.2%) feel that site visits from a MIS surgeon represent the most effective training method for acquiring advanced laparoscopic skills.

A large percentage of general surgeons are offering laparoscopic colorectal resections. Recent graduation, male gender, practice location and minimally invasive surgery training appear to be significant predictors for offering a laparoscopic approach. Lack of operative time and formal MIS training are the main barriers to adoption. Site visits by trained laparoscopic surgeons is the preferred method of acquiring advanced skills.

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LAPAROSCOPIC RESECTION FOR COLON CANCER: DO ALL PATIENTS BENEFIT? *H. Mooloo, E. Sabri, E. Wassif, F. Hagggar, E.C. Poulin, J. Mamazza, R.P. Boushey.* Ottawa Hospital, Ottawa, Ont.

To examine perioperative and long-term survival in patients undergoing laparoscopic resection (LR) who would have been excluded from the COST and COLOR trials.

A prospective database of consecutive laparoscopic resections performed for colon cancer was reviewed. Patients were divided into “inclusion” (IG) and “exclusion” (EG) groups based on criteria from the COST and COLOR trials. Baseline and perioperative data were analyzed using *t* tests, Wilcoxon rank sum, χ^2 and Fisher’s exact test. Kaplan–Meier curves followed by adjustment for TNM stage and age using a Cox proportional hazards model was performed to compare survival.

The IG had 221 patients with 166 in the EG; median age and gender distribution were similar. The EG had a higher conversion rate (23% v. 11.3%; $p = 0.0023$). There was no difference in intraoperative complications (9.0% EG v. 8.6% IG; $p = 0.80$), operative time (180 min EG v. 172 min IG; $p = 0.24$) or postoperative complication rates (33.7% EG v. 26.0% IG; $p = 0.13$). No difference was detected in perioperative mortality rates, length of stay or days to DAT. No difference in 2- or 5-year survival was detected.

No differences were found between “inclusion” and “exclusion” groups with respect to intraoperative or postoperative complications, length of stay and perioperative mortality. There was no difference detected in 2- or 5-year survival. It appears that all patients with colon cancer benefit from a laparoscopic approach.

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OUTCOME OF LAPAROSCOPIC SPLENECTOMY WITH PREOPERATIVE SPLENIC ARTERY EMBOLIZATION FOR MASSIVE SPLENOMEGALY. *A. Reso, D. Estifanos, N. Church, P. Mitchell.* Division of General Surgery, Peter Lougheed Centre, Calgary, Alta.

The objective of this study was to determine the outcome of patients who underwent laparoscopic splenectomy (LS) with preoperative splenic artery embolization (SAE) for massive splenomegaly.

A retrospective chart review was carried out on patients with massive splenomegaly who underwent LS with preoperative SAE in the period 2004–2006. Patients were identified through the database of a larger ongoing study on laparoscopic splenectomies. Preoperative CT scans were reviewed to confirm patients with spleen length 20 cm or longer (pole to pole), and in these patients a detailed review of charts was completed.

A total of 19 patients were identified. There were 11 females and 8 males, with a mean age of 51 years (19–77 yr). Median time from embolization to surgery was 3 hours. Nine patients underwent laparoscopic-assisted splenectomy and 10 hand-assisted laparoscopic splenectomy. There was no conversion to open laparotomy. Mean operative time was 133 minutes. Median hospital stay was 6 days. The mean spleen length

was 23 cm (20–35 cm) with an average weight of 1642 g. Mean blood loss was 250 mL and blood transfusion rate was 21% (4/19). One patient required laparotomy for bleeding 24 hours after completion of LS. Five patients (26%) developed splenic vein thrombosis and 3 (15%) had associated portal vein thrombosis.

LS following preoperative SAE is a feasible and safe procedure in massive splenomegaly with a low conversion rate.

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GASTRIC OUTLET OBSTRUCTION SECONDARY TO BILIARY CALCULI: 3 CASES OF BOUVERET’S SYNDROME. *C. O’Neill, P. Colquhoun, C.M. Schlachta, R. Etemad-Rezai, S. Jayaraman, R. Passi.* Division of General Surgery and Department of Diagnostic Radiology and Nuclear Medicine, Schulich School of Medicine and Dentistry, London, Ont.

Bouveret’s syndrome is a rare complication of cholelithiasis in which gallstones migrate into the duodenum via a cholecystoduodenal fistula and become impacted, producing gastric outlet obstruction. The objective of the current study is to present a series of 3 cases of Bouveret’s syndrome, which describes and evaluates the various approaches to the management of this condition. The results of this study demonstrate that open surgery is superior to endoscopic management and the surgical procedure of choice is described.

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UMBILICAL HERNIA REPAIR IN A DAY SURGERY UNIT USING LOCAL ANESTHESIA: ADDRESSING WAIT TIME INITIATIVES. *A.S. Hodder, D.E. Pace.* Division of General Surgery, Memorial University, St. John’s, Nfld.

Prosthetic repair for umbilical hernias under local anesthesia has received limited review. This study assessed the effectiveness of prosthetic umbilical hernia repair and the feasibility of performing the procedure under local anesthetic in a day surgery unit to address wait time initiatives.

A retrospective review of 82 patients who underwent elective suture ($n = 34$) and mesh ($n = 48$) repair of an umbilical hernia was conducted. Procedures were performed on an outpatient basis under local ($n = 57$) or general ($n = 25$) anesthesia in either a designated day surgery unit ($n = 49$) or main operative suite ($n = 33$).

Early complications such as hematoma, seroma and wound infection were similar in the suture and mesh repair groups. Six recurrences were identified: 4 (12%) in the suture repair group and 2 (4%) in the mesh repair group at a median follow-up of 44 and 19 months, respectively. Procedures performed under local anesthesia had similar mean surgical times (25 v. 31 min; $p = 0.050$) but significantly shorter operating room times (42 v. 58 min; $p = 0.000$) than those done under general anesthesia. Using a designated day surgery unit rather than a main operative suite significantly reduced surgery wait times (8.7 v. 31.2 wk; $p = 0.001$).

Mesh repair of umbilical hernia is a safe and effective procedure. Its performance under local anesthesia in a day surgery unit has potential for improving surgical resource allocation and shortening OR wait times.

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COLORECTAL CANCER: A SURVEY OF CURRENT PRACTICE PATTERNS OF GENERAL SURGEONS IN ATLANTIC CANADA. *T.K. Chuah, D. Wirtzfeld, T.Y.T. Lee, W. Pollett.* *Discipline of Surgery, Health Sciences Centre, Memorial University, St. John's, Nfld.*

To determine the current practice patterns of general surgeons in Atlantic Canada (Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland) in the investigation and treatment of primary colorectal cancer in relation to surgeon-specific variables.

The survey measured screening preferences, preoperative assessment, use of neoadjuvant and adjuvant therapy, surgical therapy for colorectal cancer, and surgeon demographics. All general surgeons (183) in Atlantic Canada were invited to participate in the survey. Response rate was 98 (54%) after 2 mail-outs. Eighty-two responses were analyzed using χ^2 analysis.

Seventy-three percent of respondents were male, 60% were over 40 years of age, 81% were FRCS certified, 7% had colorectal or surgical oncology fellowship training and 36% had a university appointment. Surgeons with greater number of years in practice (> 20) chose preop liver ultrasound more often ($p = 0.03$). Endorectal ultrasound was performed routinely by 22% of surgeons, while 68% would ideally order it routinely. Use of neoadjuvant therapy by surgeons who perform more rectal cancer cases ($> 10/\text{yr}$) was significantly increased in T3 rectal tumours ($p = 0.04$) and fixed rectal tumours ($p = 0.01$) versus those with less rectal cancer cases per year. Belief in total mesorectal excision is significantly higher in surgeons with less than 21 years of practice ($p < 0.001$) and those with additional training in TME ($p < 0.001$). Surgeons with university appointments recommended adjuvant chemotherapy for colon cancer significantly more often ($p < 0.05$).

Significant variability in the management of colorectal cancer exists according to surgeon-specific variables. Implications on colorectal cancer patient outcome due to this variability are unknown.

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SYNTHETIC MESH EROSIONS — A RARE COMPLICATION OF PARAESOPHAGEAL HERNIA REPAIR. *D. Trottier, G. May, H. Moloo, F. Hagggar, R. Boushey, E. Poulin, J. Mamazza.* *Department of Surgery, University of Ottawa, Ottawa, Department of Gastroenterology, St. Michael's Hospital, Toronto, Ont.*

The purpose of this report is to describe potential complications when synthetic mesh is applied to reinforce the hiatus after paraesophageal hernia repair and to explore the different therapeutic options employed in its management.

A retrospective observational analysis of 2 cases involving synthetic mesh erosion into the stomach and esophagus was performed. A literature search of MEDLINE, PubMed and Google Scholar was also performed to retrieve records of similar cases or case series.

Both cases reviewed occurred after paraesophageal hernia repair with synthetic mesh. The first case involves a 77-year-old patient who presented with dysphagia 1 year postoperatively, which was initially successfully managed with dilata-

tions. He subsequently developed worsening dysphagia with mesh erosion into the stomach as well as an esophagogastric fistula requiring stent placement, as he was a high risk surgical candidate. Unfortunately the stent had to be removed secondary to migration and he continues to receive conservative therapy for his symptoms in the form of ongoing dilations. The second case involves a 40-year-old patient who developed a gastrocutaneous fistula secondary to mesh erosion into the stomach. A variety of conservative measures failed, ultimately resulting in reoperation with removal of mesh and esophagogastrectomy. Two case reports addressing this particular complication were found in the literature but neither discussed the different methods available to treat the problem.

Synthetic mesh erosion is a potential complication when repairing the esophageal hiatus. Although sporadically mentioned in studies addressing hiatal repair, only 2 cases are reported in the literature. Conservative measures and surgical management are both therapeutic options and should be tailored to the individual patient.

51

CROHN'S DISEASE AND ADENOCARCINOMA: SINGLE INSTITUTION EXPERIENCE. *R. Singh, O. Boutross-Tadross, B. Deif, R. Elias, W.J. Stephen.* *Departments of Surgery and Pathology, McMaster University, Hamilton, Ont.*

Historically, ulcerative colitis (UC) has been linked to being a risk factor for the development of colorectal cancer (CRC). Our objective was to review a single institution's experience with adenocarcinoma and Crohn's disease (CD) of both small and large bowel.

A retrospective review of pathology reports from 1992–2005 of all patients with CD who had surgical resections was undertaken. Those patients who had evidence of adenocarcinoma coinciding with their CD were further reviewed and compared with the existing literature.

Four hundred and forty-eight resections were undertaken in 354 patients. Male to female ratio was 1:1. Average age for resection was 34.0 (standard deviation [SD] 15.4) years. Mean number of resections/year was 32.0 (SD 9.7). Seven patients were found to have adenocarcinoma coinciding with their CD (5 females, 2 males). The site of the adenocarcinoma was large bowel ($n = 4$), small bowel ($n = 2$) and rectum ($n = 1$). Indications for surgery included a preoperative diagnosis of cancer (4), Crohn's disease (2) and large bowel obstruction (1).

CD is recognized as a risk factor for the development of adenocarcinoma of both the large and small bowel, although this implication is based on mostly case reports and series. Our experience clearly shows it is a rare association with an overall incidence of approximately 2% (small bowel 0.6%; large bowel 1.1%; rectum 0.3%). We found similar patient demographics as stated in the literature except for the female predominance, the preoperative knowledge of dysplasia or cancer in 4 of the 7 patients (all large bowel) and the relatively early stage of small bowel adenocarcinoma despite the occult nature of these tumours.

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COLORECTAL CANCER SCREENING: A REVIEW OF A COLONOSCOPY-BASED SCREENING PROGRAM IN NORTHEAST-

ERN ONTARIO. *A. Omiccioli, R. Singh, S.G. Hegge, C.A. McKinley.* The Center for Minimal Access Surgery, North Bay General Hospital, North Bay, Ont.

Colorectal cancer (CRC) is the second leading cause of death from cancer in Canada. In northeastern Ontario the risk of developing CRC in males and females is 78.5/100000 and 64/100000, respectively, which are among the highest in the country. The goal of this study was to evaluate the results of a screening colonoscopy program in northeastern Ontario.

Between January 2004 and March 2006, a prospective study was performed on 462 consecutive patients who were referred by their family doctor for screening colonoscopy. Indications to perform colonoscopy were: positive fecal occult blood test (OB⁺) with no family history of CRC (53 patients), age greater than 50 (age > 50) with no family history of CRC (213 patients) and positive family history of CRC in a first degree relative (FH⁺) (196 patients). Clinically significant findings were defined as adenomatous polyps or CRC.

In the OB⁺ group there were clinically significant findings in 32.1% of patients (16 patients with adenomatous polyps, 4 with high grade dysplasia) and 3 patients with CRC). In the age > 50 group there were clinically significant findings in 15.5% of patients (31 patients with adenomatous polyps [5 with high grade dysplasia] and 2 patients with CRC). Finally, in the FH⁺ group there were clinically significant findings in 15.3% of patients (30 patients with adenomatous polyps).

The current recommendations strongly suggest screening colonoscopy be offered to any patient with a FH of CRC in a first degree relative. Given that, in our series, the clinical yield of screening colonoscopy in age > 50 patients is similar to clinical yield of patients with a FH, we believe that screening colonoscopy should be offered to all patients of age > 50 in northeastern Ontario. OB stool testing remains a valuable interim screening tool.

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CAN COMMUNITY SURGEONS PERFORM LAPAROSCOPIC COLORECTAL SURGERY WITH OUTCOMES EQUIVALENT TO TERTIARY CARE CENTRES? *R. Singh, A. Omiccioli, S.G. Hegge, C.A. McKinley.* The Centre for Minimal Access Surgery, North Bay General Hospital, North Bay, Ont.

Laparoscopic colorectal Surgery (LCS) has been well studied in tertiary care centres and provides improved short-term outcomes and comparable long-term outcomes to the conventional open approach. In this follow-up study, we present both short and longer-term outcomes for 250 patients who underwent LCS by 2 surgeons in a community setting.

This is a retrospective review of prospective data on 250 consecutive patients who underwent a LCS at the North Bay District Hospital (a 200-bed community hospital). All cases were performed by 2 community surgeons with no formal training in LCS.

Between October 2000 and October 2006, 250 consecutive patients (130 women and 120 men, mean age of 64.4 ± 13.7 yr) underwent LCS for benign (*n* = 129) and malignant (*n* = 121) disease. Median operating time was 215.0 minutes (58.0–475.0) and the conversion rate was 7.6%. The intraoperative complication rate was 2.8%. There were 20 (8.0%) major

postoperative complications and 42 (16.8%) minor postoperative complications. There was no intra-operative mortality, and 6 30-day mortalities occurred secondary to ischemic bowel, stroke, 3 myocardial infarctions and pneumonia. The median length of stay was 4.0 days (2.0–55.0). Disease-free survival for stages I–IV colorectal cancer (CRC) was 100%, 97.2%, 71.4%, and 10% with follow-up time of 36.9, 29.3, 27.9, and 21.1 months, respectively. The mean number of resected lymph nodes was 11.5 ± 8.6.

LCS can be performed without formal training in a community hospital setting with both short and longer term outcomes equivalent to tertiary care centres.

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THE IMPACT OF RESIDENT EDUCATION ON OPERATING TIMES IN A COMMUNITY TEACHING HOSPITAL. *S. Sampath, B.E. Segal, J.J. Carter, N.H. Nguyen, M. Frimer, G. Houston, S.W. Bloom.* Department of Surgery, Richmond Hospital, Richmond, BC.

The purpose of this study is to quantify the impact of resident training on operating room times for elective surgery in a community hospital.

A retrospective comparison of operating times with and without resident involvement was conducted for 3 common elective operations. A chart review of elective laparoscopic cholecystectomy, inguinal hernia repair and breast biopsy was completed for cases done between January 2002 and December 2006 at our institution. Unscheduled and emergent operations were not evaluated because operative times for these cases are inherently variable and difficult to objectively compare.

Operating times with residents involved in the surgery were longer for all 3 types of elective operations. A total of 420 laparoscopic cholecystectomies (288 without residents and 132 with residents), 424 inguinal hernia repairs (317 without residents and 107 with residents) and 374 breast biopsies (289 without residents and 84 with residents) were recorded. Operating times were 24% longer for laparoscopic cholecystectomies with residents (67 v. 54 min), 18% longer for inguinal hernia repairs with residents (51 v. 43 min) and 32% longer for breast biopsies with residents (37 v. 28 min).

There is an increase in operating times for elective surgeries when residents are involved in the operation. The increase in operating time translates to decreased operating room productivity for community surgeons who are involved in training surgical residents. The findings of this preliminary study provide support for financial compensation and additional operating room time for these surgeons. We plan to follow up this study with a prospective look at other operations and disciplines.

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SURGICAL RESECTION OF METACHRONOUS ADRENAL METASTASIS FROM NON SMALL CELL LUNG CANCER: A REVIEW OF 9 CASES. *P. Lemieux, C. Couture, S. Simard, S. Lebel.* Surgery and Pathology Departments, Hôpital Laval, Université Laval, Québec, Que.

Over the last decade, there have been numerous reports of long-term survival after surgical resection of adrenal metastasis from non small cell lung cancer (NSCLC). However, in the

subgroup of metachronous metastasis, survival is reported in a more inconsistent fashion.

The present study is a retrospective review of 9 cases of metachronous disease done in our institution. The main goal was to corroborate results in the literature showing long-term survival. The secondary end point was to try to find prognostic factors for the patients.

Data was collected through chart reviews and contacting patients by phone. All pathology specimens, both the primary and metastatic tumours, were reviewed.

The mean disease-free interval (DFI) was 12 months. Mean and median survivals were 53.7 and 53 months, respectively. Mean and median disease-free survivals were 44.7 and 15 months, respectively. Five out of 9 patients are long-term survivors with 4 of them being disease free at the last follow-up. A higher DFI and the absence of vascular invasion in the metastatic tumour seemed to be good prognostic factors. However, no statistical significance could be found ($p > 0.05$), perhaps due to the small number of patients.

In conclusion, resection of solitary metachronous adrenal metastasis is no longer a debate and should be offered to low-risk patients. Long-term survival and remission are obtainable and not anecdotal.

56

DOES THE INCISION LENGTH HAVE ANY IMPACT ON THE SHORT-TERM BENEFITS OF LAPAROSCOPIC SURGERY. *A. El fitori, E. Sabri, E. Wassif, J. Mamazza, E. Poulin, R. Boushey.* Department of Surgery, Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The short-term benefits of laparoscopic surgery are well known for over a decade now. With more complex colonic surgery a longer incision than usual may be needed for a variety of reasons. Does the length of the incision affect the short-term outcomes of laparoscopy?

A retrospective review of 462 consecutive left-sided laparoscopic colon resections performed by 4 surgeons between April 1991 and May 2005. Ninety-nine patients were excluded (80 missing incision length and 19 converted). The effects of possible risk factors for incision length, namely, gender, weight (kg), previous abdominal surgery and incision location were studied. Surgical outcomes such as intraoperative complications, postoperative complications, days to DAT, days to DC and days to RNA were also studied.

There were significant relationships between incision length and weight (kg) ($p = 0.0019$), male gender ($p = 0.017$) and surgeon ($p < 0.0001$). The incision length was significantly different in different incision locations ($p < 0.0001$). A weak positive correlation between days to RNA and incision length ($\rho = 0.18$, $p = 0.015$) also existed. Factors such as previous surgery, age, and malignancy did not have a significant relation with incision length.

Patients with more complex colonic surgery still have the short-term benefit of laparoscopic surgery even with larger incisions.

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RESULTS OF A READERSHIP SURVEY OF THE CANADIAN JOURNAL OF SURGERY IN ITS FIFTIETH ANNIVERSARY YEAR.

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The *Canadian Journal of Surgery (CJS)* is circulated to 2900, including surgical specialists as well as to hospitals and educational institutions throughout Canada. The journal celebrates 50 years of publication in 2007. We report results of a readership survey completed in 2006 with the aim of improving the journal for Canadian surgeons.

A questionnaire was directed via email to resident and surgical members of 6 sponsoring societies of the journal. An email was sent to 1765 recipients, a reminder in 1 week, and then the survey was closed 1 week later yielding 172 responses.

Seventy-seven percent of respondents were surgeons in full-time practice, 60% practised in academic health sciences centres, while 20% practised in the community. Readers were from metropolitan centres (> 1 million) in 41%, urban centres (< 1 million) in 52% and 8% rural. Readership by specialty comprised 41% from orthopaedic surgery, 40% from general surgery and remainder from subspecialties. Nine percent were resident trainees.

All sections of *CJS* were deemed relevant to over 70% of readers except for book reviews and correspondence. The percentages of respondents who expressed interest by section were: Evidence-Based Surgery (67); Original Research (51); Reviews (49); Editorials (44); Case Reports (44); Trauma & Critical Care (52); Quill on Scalpel (42). Corresponding percentages indicating that the sections were of value were 68%, 46%, 44%, 38%, 44%, 52% and 34%, respectively.

Feedback indicated that *CJS* advantaged publication and dissemination of Canadian-focused research and opinion, while retaining international visibility and peer-review research to be available freely online. This survey suggests that *CJS* contributes to effective continuing medical education of Canadian surgical specialists by disseminating relevant clinical and basic research observations. Interest and value of journal contents was deemed high for evidence-based surgery and modest for other components.

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THE IMPACT OF COMPUTED TOMOGRAPHY SCANNING OF THE ABDOMEN ON CLINICAL OUTCOMES IN PATIENTS WITH ACUTE RIGHT LOWER QUADRANT PAIN — A SYSTEMATIC REVIEW OF THE LITERATURE. *S.A. Krajewski, J.A. Brown, P.T. Phang, M.J. Raval, C.J. Brown.* Departments of Surgery and Radiology, St. Paul's Hospital, University of British Columbia, Vancouver, BC.

Abdominal CT scans have been shown to be both sensitive and specific in the diagnosis of acute appendicitis. However, the impact of abdominal CT scans on clinical outcomes remains unclear. The purpose of this study is to evaluate the impact of abdominal CT scanning on clinical outcomes in adult patients presenting with acute right lower quadrant (RLQ) pain.

A systematic review of the literature (MEDLINE, EMBASE and Cochrane databases) was conducted to identify studies that assessed the impact of CT scans on appendicitis out-

comes. Of 560 potentially relevant articles published between January 1988 and March 2007, 33 retrospective and prospective studies met our inclusion criteria: studies of adult patients with acute RLQ pain, comparison of abdominal CT scan with clinical evaluation alone, outcomes including negative appendectomy, perforation, and/or time from emergency department assessment to surgery.

Negative appendectomy rates were evaluated in 28/33 (85%) studies; 15 of these studies showed a significant decrease in negative appendectomy rates with the increased use of CT scans and the remaining studies showed no significant difference. Appendiceal perforation rates were evaluated in 14/33 (42%) of the studies. Only 3 studies demonstrated a significant increase in perforation rates with the increased use of CT scan. Time to the operating room (OR) was evaluated in 7/33 (21%) studies; 4 of these studies demonstrated a significant increase in the time to OR with the increased use of CT scans.

The use of abdominal CT scans in the evaluation of patients presenting with acute RLQ pain is associated with a significantly lower negative appendectomy rate. However, there is some evidence to suggest that CT scans are associated with higher appendiceal perforation rates and delays to surgery.

59

POPULATION-BASED INTERVENTIONS FOR PANCREAS CANCER SURGERY LIKELY CONTRIBUTED TO IMPROVEMENTS IN RATES OF OPERATIVE MORTALITY: OBSERVATIONAL STUDY IN ONTARIO AND QUEBEC FOR YEARS 1994 TO 2004. *M. Simunovic, D. Major, F. Qui, T. To, N. Baxter, D. Urbach.* McMaster University, Hamilton, Ont., Institut national de santé publique du Québec, Québec, Que., Institute for Clinical Evaluative Sciences, Hospital for Sick Children, University of Toronto, Toronto, Ont.

In Ontario, in the year 1999, 2 interventions related to pancreas cancer surgery were the production of a standards of care report, and the audit and feedback to surgeons of their results. Intervention goals included regionalizing care to hospitals with a high volume of procedures and lowering operative mortality rates. Similar interventions did not occur in Quebec. For pancreas cancer surgery in Ontario and Quebec we measured time trends in regionalization to high-volume hospitals and operative mortality rates by hospital procedure volume and overall.

We used Ontario and Quebec hospital administrative databases. For individual years we defined high-volume hospitals as performing > 10 pancreas resections annually (the definition of the Ontario standards of care report), and operative mortality as in-hospital death. Prior to viewing results, we selected years 1994–1997 and 2001–2004 for assessment of operative mortality rates.

Over the years 1994 to 2004 there were 1895 and 1396 pancreas cancer resections in Ontario and Quebec, respectively. For Ontario and Quebec, respectively, in years 1994–1997 the percentage of patients treated in high-volume hospitals was 35% and 37%, while in years 2001–2004 the percentage rose to 65% and 68%. In Quebec for these same respective time periods, the rate of operative mortality in high-volume hospitals was 7.0% and 7.8%, in low-volume hospitals

was 8.7% and 13.0% and for the province was 8.1% and 9.5%. In Ontario for these same respective time periods, the rate of operative mortality in high-volume hospitals was 11.1% and 3.8%, in low-volume hospitals was 9.2% and 7.0%, and for the province was 9.9% and 4.9%.

Regionalization to high-volume hospitals was similar in Quebec and Ontario. Operative mortality dropped in Ontario mostly due to improvements in results in high-volume centres, and rose slightly in Quebec mostly due to worsening results in low-volume centres. In Ontario, population-based interventions for pancreas cancer surgery in the year 1999 likely contributed to improved rates of operative mortality.

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ULCERATION AND DEPTH OF INVASION: ARE THERE ENOUGH SIMILARITIES WITH MELANOMA TO INCORPORATE THESE FEATURES INTO THE STAGING OF MERKEL CELL CANCERS? *A. McGuire, R. George.* Departments of Surgery and Oncology, Queen's University, Kingston, Ont.

Merkel cell cancer (MCC) is a rare form of cutaneous neuroendocrine neoplasm with only a few published series exceeding 12 cases. While associated with a poor prognosis, there is limited information on staging these cancers and no data on the prognostic significance of ulceration. (Ulceration is a known poor prognostic indicator in melanoma, which is of neuro-ectodermal origin).

This is a case control study comparing prognostic and etiologic features of melanoma and MCC. Comparisons include patient skin types, age, sun exposure and regional and systemic failure, prognostic significance of ulceration and depth of invasion. Statistical analysis included Student's *t* test, χ^2 and Fisher's exact test.

Final analysis included 232 melanoma and 14 MCC cases. Like melanoma, MCC was most common on sun exposed areas and in type I, II and III skin. The relationship with sun exposure was even stronger for the MCC cases than the melanomas ($p = 0.026$). Both showed a propensity for full thickness skin invasion (greater in MCC with $p = 0.0002$), and both had nodal and systemic failures. Like melanoma, in MCC ulceration of the primary was significantly associated with metastatic disease ($p = 0.03$). Depth of invasion approached but did not achieve statistical significance. This may be a power issue with the low number of MCC cases.

This is the first report to suggest the prognostic significance of ulceration in primary MCCs. These results need to be confirmed in a larger study and suggest that ulceration may be an important feature to be incorporated into the staging of MCC as it has been for melanoma.

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DYNAMIC SKIN EXPANSION: PREOPERATIVE APPLICATION OF A NEW DEVICE. *R. Berg, R. George, H. Hristov.* Departments of Surgery and Oncology, Queen's University, Kingston, Ont.

Two years ago we reported the use of preoperatively applied adhesive anchors to expand the skin surrounding areas of planned wide excision for malignancy. These anchors had been designed to facilitate secondary closure of open wounds.

As a result of that experience, we now report on our first cases using a new device designed to better address the preoperative setting.

The new design incorporates a non-adhesive elastomer into the mid-portion of an otherwise adhesive dressing. Application provides continuous traction in the axis of placement. Pre and postoperative photography document each lesion, planned excision and end results. Preoperative application is a minimum of 48 hours before planned excision. Patients are followed for flap viability, success of primary closure, infection rate, as well as a subjective (photographic) assessment of outcome.

Nine cases have been completed and represent areas associated with poor skin mobility and hypertrophic scarring. Three required resection in previously irradiated fields. Locations included shoulder, skin, ankle, scapula, radiated upper arm, radiated mid back and radiated chest wall. All cases were closed primarily without grafting. One patient had minimal flap necrosis along her suture line managed with dressing care alone, and 1 patient had a portion of her wound opened for cellulitis/abscess. Each case is documented with photos.

Dynamic preoperative expansion facilitates primary skin closure of wide excision in difficult anatomic locations. The new device has proved safe and effective in our initial series.

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IMPROVING THE DIAGNOSIS OF SOFT TISSUE MASSES: PAIN PREDICTS NERVE SHEATH ORIGIN WHILE GROWTH VELOCITY SUGGESTS MALIGNANCY. UPDATE OF A PROSPECTIVE DATABASE.
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Soft tissue masses commonly present to primary care physicians. This study examines the clinical features of a soft tissue mass that predicts significant lesions.

This is an updated analysis of our soft tissue database with 246 consecutive adult patients referred for assessment of a non-nodal mass. Patient demographics, tumour characteristics, time to presentation and histological features are all recorded. Analysis is with Microsoft Excel and Palisade Stat Tools.

One hundred and six lesions had a malignant diagnosis. The most common benign diagnosis was a lipoma. The most common malignant diagnoses were lipo- and leiomyosarcomas. Pain as a presenting feature was highly correlated with the diagnosis of a nerve sheath tumour ($p = 0.0001$, odds ratio [OR] 33.7, confidence interval [CI] 4.6–692) however; pain at presentation could not predict malignancy. In multivariate analysis, predictions of malignancy remain size greater than 5 cm ($p = 0.005$) and patient perception of recent growth ($p = 0.0001$). A new lesion in older individuals also suggested malignancy ($p = 0.001$).

While lesion size predicts malignancy it is a late feature. Early detection of significant lesions may be enhanced by focusing on pain (suggesting peripheral nerve sheath origin) and recent growth, which is correlated with a malignant diagnosis.

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LAPAROSCOPIC GASTRECTOMY FOR BENIGN AND MALIGNANT DISEASE: A COMMUNITY HOSPITAL EXPERIENCE.

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This study reviewed our 3-year experience with the implementation of laparoscopic gastrectomy at a community hospital.

A retrospective chart review identified all patients that underwent laparoscopic gastrectomy at our centre between January 2004 and March 2007. Patient demographics, tumour characteristics, length of stay, operative time, and short-term outcomes (postoperative complications and death) were examined.

A total of 57 patients were identified and 31 (54%) were male. Median age was 68 years (range 31–90 yr). Forty-two (74%) and 7 (12%) patients presented with adenocarcinoma and gastrointestinal stromal tumour (GIST), respectively. Median operative time was 167 minutes (range 23–387 min). Conversion to open laparotomy was necessary in 12 cases (21%). Median length of stay was 6 days (range 0–48 d). There were 6 postoperative deaths, and 8 major complications, which included: myocardial infarction, pulmonary embolism, duodenal stump leak, bleeding, dehiscence, and obstruction. R0 resection was achieved in 38 of 50 (76%) malignant cases. Median number of lymph nodes that were pathologically evaluated was 10 (range 1–24).

To our knowledge, this is the largest series of laparoscopic gastrectomy cases performed in Canada. Laparoscopic gastrectomy can be performed in a community hospital setting with operative times and length of stay that are comparable to open cases. Our short-term outcomes are comparable with existing studies.

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UTILITY OF A POPULATION-BASED CANCER AUDIT: PATIENTS WITH BREAST CANCER IN CENTRAL SOUTH ONTARIO.
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We performed an audit of breast cancer patients who reside in central south Ontario. The study evaluated the staging ability of oncologists at the Juravinski Cancer Centre (JCC), and evaluated stage and treatment patterns for patients.

We used the Ontario Cancer Registry to identify a population-based random sample of 277 patients diagnosed with invasive breast cancer in calendar year 2004. Trained reviewers abstracted data from all hospital and JCC charts, including patient demographics, tumour stage, and all diagnostic test and treatment variables. Reliability testing demonstrated high consistency among abstractors, (Krippendorff $\alpha = 0.84$).

JCC oncologists and study abstractors were able to stage 81% and 99% of cases, respectively, and in 7% of cases the staging by JCC oncologists was inaccurate ($\kappa = 0.90$). The mean age of the study population was 61.4 years. Most patients ($n = 264$, 95.3%) were treated with surgery across 15 individual hospitals. Range of breast cancer surgery performed per hospital ranged from 1–65 cases. Sixty-two patients (22%) had no axillary surgery, and only 21 (8%) had a sentinel lymph

node biopsy. When performed, the median number of axillary lymph nodes resected was 9.0. Sixty-four percent ($n = 170$) of patients underwent breast-conserving surgery, and of these 90% received postoperative radiation therapy. When excluding stage I and IV patients, only 45% received chemotherapy. For all patients with estrogen receptor (ER) positive tumours, only 61% ($n = 106$) received hormonal therapy.

Staging completeness and accuracy is superior when performed by trained abstractors versus oncologists. Treatment patterns in this audit demonstrate concerning and low rates of utilization for sentinel lymph node biopsy, chemotherapy and hormone therapy, and acceptable rates of utilization for radiation therapy following breast-conserving surgery. Population-based audits are a powerful tool to assess stage and treatment patterns for patients with cancer.

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HANDS-FREE, MULTIPLE MONITOR, POINTER AIDS INSTRUCTION IN LAPAROSCOPIC SURGERY. I. Apriasz, S. Mohan, G. Mccreery, R. Patel, C.M. Schlachta. Canadian Surgical Technologies and Advanced Robotics (CSTAR), Lawson Health Research Institute, Schulich School of Medicine and Dentistry, London, Ont.

During advanced laparoscopic procedures the instructor often has both hands occupied. The objective of this study was to determine the efficiency of a hands-free, multimonitor pointer in a simulated laparoscopy teaching environment.

Twenty arbitrary instruction points were selected on a picture of a partially dissected cholecystectomy and revealed to the instructor alone. For each of 11 trainees, points were randomly divided into 2 even groups with the instructor providing guidance with verbal instruction only (VERBAL) and with a hands-free pointer that appeared on both the instructor's and trainees' monitors (POINTER). The total time for the trainees to correctly locate 10 points with a laparoscopic instrument on the image placed in a trainer box was recorded.

Randomization led to equal distribution of points between the study groups ($\chi^2 = 9.686$, $df = 18$, $p = 0.942$). No learning effect occurred over the course of the study with no significant correlation between the trainee number and task time in the VERBAL group ($r = 0.329$, $p = 0.324$) or the POINTER group ($r = -0.113$, $p = 0.740$). Total task time was significantly shorter with POINTER than with VERBAL guidance (65 [standard deviation {SD} 10] v. 140 [SD 27] s, $p < 0.001$). The mean time to locate each point by VERBAL guidance ranged from 9.6 to 18.6 seconds and 5.5 to 7.6 seconds with the POINTER. The mean of mean times was shorter with the POINTER than with VERBAL guidance (6.4 [SD 0.6] v. 13.8 [SD 2.8] s, $p < 0.001$). Dividing trainees into prior (5) and no prior (6) laparoscopic operative experience, there was no difference in task completion time with the POINTER (60 [SD 10] v. 70 [SD 8], $p = 0.111$), however, the prior experience group took longer for task completion with VERBAL guidance (161 [SD 26] v. 123 [SD 12] s, $p = 0.10$).

Use of a hands-free, multimonitor pointer significantly improved performance on a simple locating task in a simulated laparoscopy environment. Experienced surgeons were harder to guide with verbal instruction alone.

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FEASIBILITY OF LONGITUDINAL MENTORING IN LAPAROSCOPIC COLON SURGERY: A PILOT PROGRAM. C.M. Schlachta, A.K. Sorsdahl, K.L. Lefebvre, M.L. McCune. Canadian Surgical Technologies and Advanced Robotics (CSTAR), Lawson Health Research Institute, Schulich School of Medicine and Dentistry, London, Ont., Stratford General Hospital, Stratford, Ont.

The objective of this report is to demonstrate the feasibility of longitudinal mentoring of community surgeons in laparoscopic colon surgery.

A formal mentoring protocol was established between CSTAR and 3 surgeons at a local 134-bed community hospital. The community surgeons (CS) attended a didactic course on laparoscopic colon surgery before witnessing live surgery at the mentoring institution. Equipment at the community hospital was evaluated and necessary upgrades recommend. Patients were identified from the CS practice and referred for approval through formal consultation with the mentor. The mentor worked with 2 CS on every case in their local hospital. Procedure outcomes were record using CAESaR practice audit software.

From March 2006 to March 2007, 35 patients underwent colon surgery by the CS of which 13 were referred and accepted for laparoscopic mentoring. Patients consisted of 6 females and 7 males with an average age of 61 ± 12 years. Six right and 6 sigmoid colectomies with 1 anterior resection were performed. Indication was cancer or polyp in 11 cases with 1 benign stricture and 1 rectal prolapse. After the first 9 cases the MS did not scrub and provided verbal guidance only. There were no conversions. Average operating time was 142 ± 33 minutes. Median number of lymph nodes was 12. Median length of stay was 3.0 days. Minor complications only occurred; 1 intraoperative, 2 early and 1 late postoperative. There were no readmissions. It is anticipated that the full 20 cases will be mentored within an 18-month period. Data will be recorded for a further 1 year to assess adoption rate and outcomes.

This project demonstrates the feasibility of longitudinal mentoring in laparoscopic colon surgery. This program may yet serve as a model for safe technology transfer to the community.

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PRACTICE PATTERNS AND CAREER SATISFACTION OF CANADIAN FEMALE GENERAL SURGEONS. P.C. Hebbard, D.A. Wirtzfeld. Department of Surgery, Memorial University of Newfoundland, St. John's, Nfld.

We surveyed all Canadian female general surgeons to ascertain the practice patterns of this population and to measure levels of personal and professional satisfaction.

The response rate to the survey was 60%. Over 90% of respondents work in traditional full-time, clinical practices and most work similar hours to their male colleagues. While it is currently rare to find women in part-time or shared practices, 38% of respondents stated that they were interested in such a practice and 26% responded that they planned to be in part-time practice in 10 years. Respondents described the necessary

factors for a transition into a nontraditional practice. Job satisfaction was high, measuring 3.8 out of 5 (with 5 being highly satisfied), and 80% would still pick a career in general surgery if they had the opportunity to have any career. Satisfaction with personal relationships and parenting roles were less highly rated.

We conclude that female general surgeons have active, rewarding and satisfying careers. Due in part to greater social and family commitments, a growing number of female surgeons would like to work less hours and in group practices. We anticipate that this will have a significant impact on the surgical workforce in the next decade. Mechanisms to adapt to these changes, while still meeting our communities' surgical needs, will be postulated.

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TREATMENT OF SEVERE GASTROESOPHAGEAL REFLUX AFTER BARIATRIC SURGERY. *Q.H.P. Huynh, L.V. Klein, J.A. Hagen.* The Minimally Invasive Surgery Program, Humber River Regional Hospital, Department of Surgery, University of Toronto, Toronto, Ont.

A retrospective review of 8 consecutive patients with severe gastroesophageal reflux after vertical banded gastroplasty or mini-gastric bypass surgery treated successfully with conversion to laparoscopic or open Roux-en-Y gastric bypass or laparoscopic reversal of vertical banded gastroplasty with gastro-gastrostomy. All patients had resolution of reflux symptoms. Patients converted to Roux-en-Y gastric bypass continue to lose weight. Treatment of severe gastroesophageal reflux after bariatric surgery with conversion to a Roux-en-Y gastric bypass or reversal of vertical banded gastroplasty is safe and effective. Six of these procedures were performed laparoscopically. With increasing experience, we found that reversal or conversion could be performed laparoscopically with improved short-term outcomes and high patient satisfaction.

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SIMULATION IN LAPAROSCOPIC SURGERY: A CONCURRENT VALIDITY STUDY FOR MISTELS. *G. Xeroulis, A. Dubrowski, K. Leslie.* Department of Surgery, Division of General Surgery, University of Western Ontario, London, Ont.

The aim of this study was to assess whether a correlation exists between the expert-rated assessments of the MISTELS tasks and computer-based assessment of motion efficiency using the Imperial College Surgical Assessment Device (ICSAD)

We recruited 26 volunteer subjects who were stratified into 3 experience groups: juniors (PGY 1–3) ($n = 13$), seniors (PGY 4,5) ($n = 7$) and staff surgeons ($n = 6$). All subjects performed 4 MISTELS tasks: peg transfer, pattern cut, endoloop and extra corporeal suturing. Performance was assessed by both standard MISTELS expert rating and motion analysis using ICSAD. Group differences were analyzed using the Kruskal–Wallis test and Spearman coefficient analyses were employed to compare MISTELS and ICSAD scores.

MISTELS scores discriminated effectively between experience groups for all tasks ($p < 0.05$). Motion efficiency scores discriminated between experience groups for tasks 1, 3, 4 for number of movements ($p < 0.05$), tasks 1, 4 for total distance

($p < 0.05$) and tasks 1, 2, 3, 4 for total time ($p < 0.005$). There was a significant correlation between total MISTELS scores and the motion efficiency metrics of total distance, number of movements and total time (Spearman coefficient 0.65 $p < 0.001$, 0.59 $p < 0.001$ and 0.87 $p < 0.001$, respectively).

The high correlation between MISTELS standard scoring and motion efficiency metrics helps to establish the concurrent validity of ICSAD for this method of training fundamental laparoscopic skills. The use of ICSAD for the objective assessment of MISTELS tasks may in the future offer an adjunctive method of evaluation. ICSAD metrics are potentially less labour intensive due to the instant and fully automated computerized scoring that it provides.

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DETERMINANTS OF ACCESS TO CARE AFTER PEDIATRIC INJURY IN A LOW INCOME COUNTRY: USING THE ANDERSEN MODEL TO PREDICT HEALTH SERVICES USAGE IN UGANDA. *A. Mihailovic, A. Howard, A. Willan, P. Coyte, D. Urbach.* Departments of Surgery and Health Policy, Management and Evaluation, University of Toronto, Hospital for Sick Children, Toronto, Ont.

A case-control design was used on data collected both prospectively from a health care facility as well as cross sectionally from a community in Kampala, Uganda. Data collection consisted of 2 parts: a prospective cohort of all children presenting to the casualty unit of Mulago Hospital in Kampala over a 12-month period with a diagnosis of injury, and second, a community survey of 2500 households randomly selected from children enrolled in 40 local primary schools through a double-cluster sample design. Injuries in children were included if they resulted in death, permanent disability or of they occurred in the past 12 months and were severe enough to require a day from normal activities. Items in the questionnaire were guided by the Andersen model of health services utilization and included both child and household level variables pertaining to demographic, socioeconomic and descriptions of the injury and culprit event. Outcomes were divided into children who received formal health care within 24 hours, those who received formal health care after 24 hours and those that never received care. A total of 480 injuries were captured in the hospital study and 282 in the community. Most injuries were due to road traffic, burns and falls. Almost 50% of all injuries took longer than 24 hours to receive care. A hierarchical multivariate regression analysis using SAS software was performed to take into account both levels of variables in the model. Results confirmed that the variables predictive of access in this setting differed dramatically from those in high income settings. This information is vital to guide spending directed at bridging health inequalities and health service provision in the developing world. Results speak to the often misunderstood circumstances contributing to injury burden in these circumstances and the complexities of addressing this enormous problem.

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AN ANALYSIS OF THE DEMOGRAPHIC CHARACTERISTICS OF MORBIDLY OBESE CANADIANS PRESENTING FOR TREATMENT IN A MULTIDISCIPLINARY OBESITY MANAGEMENT CLINIC.

G. Sawisky, C. Johnson Stoklossa, D.W. Birch. Department of Surgery, University of Alberta, Centre for the Advancement of Minimally Invasive Surgery (CAMIS), Royal Alexandra Hospital, Edmonton, Alta.

Surgical treatment for weight loss in morbidly obese adults is the most efficacious treatment option available. As a result, the number of Canadians undergoing surgery for morbid obesity continues to increase. It is unknown if the demographic characteristics and socioeconomic status of Canadian patients who present for management will impact on the clinical outcomes of surgery for morbid obesity. In this study we analyze appropriate demographic indices of patients presenting for assessment at a multidisciplinary obesity clinic and compare these data to the literature.

Data will be collected from a retrospective chart review of patients who presented for assessment at a multidisciplinary obesity clinic. Data includes: patient age, gender, ethnicity, body mass index (BMI), comorbid disease (diabetes, hypertension, musculoskeletal disease, and mental health), marital status, education, employment, disability and social assistance.

The socioeconomic status and demographic features of morbidly obese Canadians may differ from patients included in clinical outcome studies from other countries. The data from this study will begin to define the type of patient presenting for management of morbid obesity in a Canadian health care environment.

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DOES MENTAL HEALTH ILLNESS AFFECT THE ASSESMENT AND OUTCOME OF BARIATRIC SURGERY? B.H. Dickie, C. Johnson Stoklossa, D. Davey, D.W. Birch. Department of Surgery, University of Alberta, Centre for the Advancement of Minimally Invasive Surgery (CAMIS), Royal Alexandra Hospital, Edmonton, Alta.

Recent literature quotes rates of up to 50% of patients seeking bariatric surgery have a diagnosis of a psychiatric illness. There is minimal data to support whether these patients should undergo surgery or if they do any different than patients without mental health issues. Our clinical experience suggests careful selection of these patients can lead to successful outcomes. We have reviewed the female patients assessed and treated in our bariatric clinic who have had bariatric surgery and a psychiatric illness.

A retrospective review of the female patients from our bariatric clinic patient database was completed from patients assessed and treated from October 2002–July 2006.

Three hundred and eighty-six new female patient consults were evaluated in a multidisciplinary clinic. One hundred and fifty-seven (40.7%) patients had reported a mental health (MH) issue: 20 self reported, 114 treated by a mental health professional and 61 on psychiatric medications. The breakdown of diagnoses are as follows: 134 depression, 3 postpartum depression, 24 anxiety disorder, 3 ADHD, 14 eating disorders, 8 bipolar, 5 obsessive compulsive, 9 borderline personality, 1 schizophrenic and 31 had other diagnoses. Of these patients, 77 patients have undergone bariatric surgery (49% — same as non-MH patients) and 4 patients are undergoing medical screening for possible surgical management. Only 1

patient did not qualify for surgery because of her MH illness. Mean body mass index (BMI) preoperatively was 53.52 (49.86 in non-MH patients). Following surgery, 9 MH patients were lost to follow-up (11.6%) (v. 4 (3.5%) in non MH patients) even with intense intervention to locate these patients.

Overall, both MH and non-MH patients have comparable outcomes in weight loss. Patients with mental health disease are more difficult to assess and follow. But if screened appropriately and with intense follow-up arranged can have successful outcomes with bariatric surgery.

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ADVANCED LAPAROSCOPIC TRAINING AND OUTCOMES IN LAPAROSCOPIC CHOLECYSTECTOMY. L. Bobacek, D.E. Pace. Department of Surgery, Memorial University, St. John's, Nfld.

Advanced laparoscopic training is becoming a valuable asset for surgeons as more procedures are carried out in a minimally invasive fashion. The purpose of this study was to determine if laparoscopic fellowship training affects outcomes in patients undergoing laparoscopic cholecystectomy.

The data were obtained from a retrospective review of 110 patients who underwent laparoscopic cholecystectomy on an urgent basis from 2003 to 2005. Outcomes of 31 cases performed by a surgeon with advanced laparoscopic training were compared with 79 cases performed by surgeons without such training.

The 2 groups were similar in patient demographics and time to OR. Outcome measures included conversion rates, postoperative length of stay, and complications. There was a significant difference in conversion rates (3.2% v. 16.5%, $p = 0.05$) and postoperative length of stay (1.77 v. 2.82 d, $p < 0.01$) between the 2 groups, but no difference in rate of postoperative complications. There was no significant difference in conversion rates among the surgeons without advanced training ($p > 0.5$).

Based on the results of this study, laparoscopic cholecystectomy is associated with improved outcomes when performed by a surgeon with fellowship training in laparoscopic surgery.

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MESENTERIC ANGIOGRAPHY FOR THE LOCALIZATION AND TREATMENT OF ACUTE LOWER GASTROINTESTINAL BLEEDING. P.J. Karanickolas, P.H. Colquhoun, E. Dahlke, G.H. Guyatt. Department of Surgery, University of Western Ontario, London, Ont., Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont.

There is limited evidence regarding the effectiveness and complications of mesenteric angiography in the diagnosis and management of acute lower gastrointestinal bleeding (ALGIB). Our objective was to determine the complications and outcomes of mesenteric angiography in patients with ALGIB, and to identify predictors of a positive result at angiography.

We identified and reviewed the records of all patients who underwent mesenteric angiography for ALGIB at our institution during a 10-year period. We compared potential predictors of positive versus negative angiograms.

Of 47 mesenteric angiograms in 35 patients, 22 (47%, 95% confidence interval [CI] 33%–61%) revealed a source of bleeding, most commonly the colon. Three patients (6.4%, 95% CI 0%–18%) developed groin hematomas, and 1 of these patients also experienced a myocardial infarction during the procedure. None of the potential predictors were significantly associated with a positive result at angiography, although the confidence intervals were wide. Twenty patients (57%, 95% CI 41%–74%) continued to bleed following the angiogram, and 18 of the patients (51%, 95% CI 35%–68%) were discharged without a definitive diagnosis.

With diagnostic success of approximately 50%, mesenteric angiography may play an important part in the diagnosis and management of patients with ALGIB, but 1 or more large, prospective, multicentre studies are needed to more clearly define its role.

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PERIOPERATIVE FLUID MANAGEMENT IN COLORECTAL SURGERY PATIENTS — HAS OUR CLINICAL PRACTICE CHANGED TO REFLECT THE EVIDENCE? M.S. Butler, C.J. de Gara. Department of General Surgery, Royal Alexandra Hospital and University of Alberta Hospital, Edmonton, Alta.

The purpose of this study was to evaluate if surgeons and anesthesiologists have incorporated the recent evidence surrounding fluid administration during the perioperative period in patients undergoing elective colorectal surgery (by using less perioperative fluid in 2006 than in 2004).

We performed a retrospective chart review study on 80 patients who underwent elective colorectal surgery during similar time periods in 2004 and 2006. Data was gathered on intraoperative and postoperative fluid administration and urine output as well as other factors.

We found that the median fluid administered to patients undergoing major colorectal surgery intraoperatively in 2004 was 4287 mL (1200–8500) compared with 3238 mL (1000–7100) in 2006 ($p = 0.0015$). Postoperatively, median fluid administered in the first 72 hours was 9153 mL (5275–13575) in 2004 versus 8024 mL (4870–12330) in 2006 ($p = 0.013$). Other variables including age, ASA classification, operative time, operative blood loss and postoperative urine output were not statistically significantly different between 2004 and 2006.

Overall surgeons and anesthesiologists in our institution have adopted the recent evidence surrounding careful fluid management in colorectal surgery patients and reduced the total

volume of fluid administered to these patients in the perioperative period (first 72 hr) by 1.9 L over 2 years.

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A COMPARISON OF ORAL EXAMINATION VERSUS SCRIPT-CONCORDANCE TEST FOR THE ASSESSMENT OF CLINICAL REASONING IN GENERAL SURGERY. M. Boutros, B. Zabalotny, B. Charlin, S. Meterissian. Centre for Medical Education and the Division of General Surgery, McGill University, Centre for Medical Education, Université de Montréal, Montréal, Que.

Clinical reasoning is a critical component of surgical training that remains difficult to assess. We have devised and validated a script-concordance test (SCT) for the assessment of intraoperative decision making. However, the gold standard for assessing clinical reasoning in surgery is still the oral examination (OE). The purpose of this study was to contrast the SCT and OE as assessment tools for clinical reasoning among general surgery residents.

We administered a 62-question SCT to 35 general surgery (GS) residents (22 junior, 13 senior) and a case-based OE to 33 GS residents (21 junior, 11 senior). The SCT had good internal reliability (Cronbach $\alpha = 0.85$) and addressed the major content areas of general surgery. The OE was comprised of 5 cases, each with an anchored scoring grid.

The mean senior resident (SR) scores for OE and SCT respectively were 90.7% and 71.0%; as compared to the mean junior resident (JR) scores of 81.5% and 61.5%. Although SR scored higher than JR on both exams, only the SCT showed a significant difference in scores ($p = 0.01$). SCT scores were equally clustered for JR and SR with indices of variability 0.18 and 0.13, respectively, while the OE had significant differences in variability between JR and SR (indices 0.19 and 0.07, respectively). OE scores correlated with SCT scores for JR ($r = 0.43$, $p = 0.05$); however, senior resident OE scores, negatively correlated ($r = -0.46$, $p = 0.02$) with SCT scores.

The SCT distinguished residents according to year of training better than the OE with uniform variability of scores at each resident level. JR scores on the SCT correlated well with OE scores. Interestingly, SR scores on the OE negatively correlated with SCT scores. It is possible that although we tried to standardize the OE with an anchored scoring grid, we could not make it as objective as the SCT. The SCT may be better than the OE due to: its ease of administration, its high internal reliability, its standardized scoring grid and its ability to differentiate between junior and senior residents.

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EMPYEMA: AN INCREASING CONCERN IN CANADA. *C. Finley, J. Clifton, M. Fitzgerald, J. Yee.* Vancouver General Hospital and the University of British Columbia, Vancouver, BC.

Empyema is a suppurative infection of the pleural space. Without prompt treatment it can result in significant hospital stays, increasingly invasive treatments and substantial morbidity and mortality.

The primary objective of this study is to evaluate if there has been an increasing incidence of empyema in Canada. Secondly, we investigate if this increase is disproportionately affecting any age group.

The Discharge Abstract Database (DAD) of CIHI was used to evaluate national empyema data.

There were 11 294 patients identified with empyema over the 9 years of this study, 31% of whom were women. The mean length of stay (LOS) was stable throughout the study at 21.82 (standard deviation [SD] 33.88) days with a median LOS of 14 days. Of patients who were discharged, 63.4% went home. The crude incidence rate ratio (IRR) from 1995 to 2003 for medical empyema increased significantly, 1.30 (95% confidence interval [CI] 1.20–1.41) ($p < 0.001$), as did empyema of unknown cause, 1.29 (95% CI 1.08–1.54) ($p = 0.005$), while surgical empyema did not appear to increase, 1.17 (95% CI 0.97–1.43) ($p = 0.114$).

Poisson regression showed an increase in the indirect age standardized IRR for medical empyema by 1.025 (95% CI 1.018–1.032) ($p < 0.001$). The IRR for patients age < 19 from 1995 to 2003 was 2.20 (95% CI 1.56–3.10), while in those older than 19 it was 1.23 (95% CI 1.14–1.34).

This study demonstrates the increasing rate of empyema in Canada and shows a changing pattern of disease. The disproportionate rate change in the pediatric population suggests a high-risk group that needs to be addressed. In the adult population, while cause is unknown, it is necessary to continually educate front-line physicians to confront both the increased burden of this disease, caused by an aging population, as well as the underlying increasing rate of empyemas in this country.

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IMPROVED LOCAL CONTROL AND PALLIATION OF DYSPHAGIA WITH NEOADJUVANT CHEMORADIOTHERAPY AND ESOPHAGECTOMY FOR LOCALLY ADVANCED ESOPHAGEAL CANCER. *S. Quadri, J. Knox, R. Wong, W. Xu, J. Hornby, S. Keshavjee, G. Darling.* Toronto General Hospital, Princess Margaret Hospital, Toronto, Ont.

The objectives of this study were to determine the efficacy of neoadjuvant (NA) chemoradiotherapy on complete resection (R0) rate at esophagectomy in patients with locally advanced esophageal cancer (LAEC). We sought to correlate R0 resections with local recurrences (LR). Patients' subjective impressions of dysphagia and ability to tolerate oral intake were also measured using a validated index.

A phase-2 trial of NA chemoradiotherapy followed by esophagectomy was conducted. Fifty-two patients with LAEC underwent treatment with irinotecan (65 mg/m²) and cisplatin (30 mg/m²) concurrently with external beam radiotherapy (50 Gy/25 fractions), followed by esophagectomy and 2-field lymph node dissection. R0 rates were tracked, as were rates of LR and distant metastases. Symptoms of dysphagia and ability to eat were assessed using the Functional Assessment of Cancer Therapy-Esophageal (FACT-E).

Forty-one out of 43 patients had an R0 esophagectomy (95%), while 2 patients had an incomplete resection (R1) following NA treatment. After a median follow-up of 21 months (4–47 mo), 3 patients had local recurrences (7%). As expected, LR was related to the completeness of resection — both patients who had R1 resections had local failures, as did 1 other patient.

NA treatment dramatically improved dysphagia scores: 72% had relief of dysphagia after NA treatment. The median swallowing and eating indices rose after NA treatment. This effect was durable after esophagectomy — after an initial decline in the immediate postoperative period, both indices improved over 24 months.

NA treatment followed by esophagectomy is effective in increasing R0 resection rates and thereby improving local control. Our LR rate was 7% as compared with 20%–40% local failure rates reported in other series. Improved local control is reflected in patients' dysphagia and eating indices over 24 months follow-up. Given the overall poor prognosis of most patients with LAEC, reduction of LR and palliation of dysphagia are important goals that are achieved with curative intent trimodality therapy.

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CAN THE OCCURRENCE OF SPONTANEOUS PNEUMOTHORACES BE PREDICTED BASED ON THE WEATHER? *C. Schieman, C. Tiruta, M. Blitz, A. Graham, G. Gelfand, S. McFadden, S. Grondin.* Division of Thoracic Surgery, University of Calgary, Calgary, Alta.

Previous studies have linked the onset of spontaneous pneumothorax (SP) to changes in air pressure and temperature.

During a Chinook event, changes in weather conditions such as wind speed, wind direction, temperature and relative humidity are reported. We hypothesize that the meteorological changes associated with Chinook events influence the occurrence of SP within the Calgary Health Region.

We performed a retrospective chart review of all adult cases of SP in the Calgary Health Region from 2001 to 2005. Patients with secondary pneumothoraces, including those with significant underlying lung disease, were excluded. Detailed hourly meteorological data were obtained from Environment Canada. Chinook weather events were defined according to the accepted definition. Rates of SP were compared between Chinook and non-Chinook days during the Chinook season (October through March). The rate of SP was also correlated independently with specific meteorological parameters such as temperature, humidity, wind speed, and atmospheric pressure for the entire study duration.

The study period included a total of 1643 days, with 911 days occurring during the Chinook season. There were 220 SP events for 149 patients during the 5-year study period. Of the 220 SP events, 124 SP occurred during the Chinook season with 47 occurring on Chinook days ($p = 0.8$). During the study period, mean temperature and mean relative humidity were not significantly different on days with SP versus days without SP ($p = 0.8$, $p = 0.9$, respectively). There was a significant difference between mean wind speed and mean atmospheric pressure on days with SP versus days without SP ($p = 0.0009$, $p = 0.03$, respectively).

Within the Calgary Health Region, a relationship between rates of SP and Chinook weather events was not observed. The occurrence of SP was, however, associated with changes in wind speed and atmospheric pressure.

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RESULTS OF TRIMODALITY THERAPY FOR MALIGNANT PLEURAL MESOTHELIOMA. *M. de Perrot, M. Anraku, R. Feld, A. Bezjak, R. Burkes, H. Roberts, J. Cho, A. Visbal, N. Leighl, S. Keshavjee, M. Johnston.* Toronto General Hospital, Princess Margaret Hospital, University of Toronto, Toronto, Ont.

The objective is to examine the results of trimodality therapy for malignant pleural mesothelioma (MPM).

All patients with MPM were prospectively evaluated for trimodality therapy since 01/2001 in our institution. Trimodality protocol consisted of induction chemotherapy, followed by extrapleural pneumonectomy (EPP) and postoperative hemithoracic radiation therapy (RT).

A total of 60 patients were suitable candidates for trimodality therapy between January 2001 and January 2007. Histology was epitheloid ($n = 42$), mixed ($n = 17$), or sarcomatoid ($n = 1$). Induction chemotherapy was administered to 56 patients. Chemotherapy regimens included vinorelbine/cisplatin ($n = 26$), pemetrexed/cisplatin ($n = 26$) and gemcitabine/cisplatin ($n = 4$). EPP was performed in 47 patients; 13 patients did not undergo EPP because of tumour progression during chemotherapy ($n = 2$), extensive chest wall involvement at surgery ($n = 6$), or involvement of mediastinal nodes at mediastinoscopy ($n = 5$). Three patients (6%) died within 30 days of surgery. Pathological stage was II ($n = 6$), III ($n = 35$) and IV

($n = 6$). Adjuvant RT was administered to 36 patients and is ongoing in 5 patients; 6 patients did not receive adjuvant RT because of fatigue ($n = 5$) or previous RT ($n = 1$), and 4 patients did not complete RT up to 54 Gy. Overall survival for the 23 patients who completed the trimodality therapy was 37% at 3 years with a median survival of 15 months. Eleven of the 23 patients had recurrence after a median of 8 months (range 2–13 mo). Among patients undergoing EPP, disease-free survival was longer in patients undergoing adjuvant high dose hemithoracic RT ($p = 0.07$), in epithelial tumours ($p = 0.03$), and in early stage ($p = 0.07$). Overall survival was influenced by histology ($p = 0.007$) and stage ($p = 0.05$), but not by adjuvant high dose hemithoracic RT ($p = 0.5$). The type of chemotherapy had no impact on disease-free and overall survival.

In conclusion, trimodality therapy is feasible in selected patients with MPM. Adjuvant hemithoracic RT can improve disease-free survival and achieve good local control.

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EXTREME AGE ALTERS PATTERNS OF LUNG METASTASES. *P.J. Villeneuve, R.S. Sundaresan, D.A. Gray.* Centre for Cancer Therapeutics, Ottawa Health Research Institute, Division of Thoracic Surgery, University of Ottawa, Ottawa, Ont.

Lung cancer is the leading cause of cancer death in Canada; the incidence accelerates with age and peaks in seventh decade. Significant genetic alteration has been noted in the aging mouse lung, yet the net impact of aging-related genetic alterations of lung tissue is unclear. A pulmonary metastasis model has been used to assess aggregate age effects on the lung tissue environment, with attention to distribution of tumour deposits, kinetics of tumour growth and survival.

Young (6 mo) and aged (30 mo) mice were used for all experiments. Syngeneic mouse colon cancer (CT26, 1e5 cells/dose) were injected intravenously to induce pulmonary metastases. Lung tissues were analyzed to quantify pattern, extent and average size of tumour deposits. Pulmonary blood flow studies were performed using fluorescent microspheres. Disease progression using luciferase-expressing tumour cells was monitored by in-vivo imaging. Markers of endothelial (CD31) and immune (CD4/CD8) compartments were assessed by flow cytometry.

Aged mouse lungs developed significantly more tumours, with the average tumour size being smaller than in younger mice. Tumour growth as assessed by tissue luminescence was more rapid and of greater magnitude in young mice at early time points. Median survival was significantly worse in aged mice. No differences in pulmonary blood flow, endothelial proliferation or lymphocyte profiles were noted between the 2 age cohorts.

Lung tissue microenvironments, as assessed by a pulmonary metastasis model, are significantly different in young and old mice and alter both survival and disease course. Further identification of specific molecular determinants responsible for the observed aging effect is in progress.

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MUCOSA OF THE REMAINING ESOPHAGUS AFTER ESOPHAGECTOMY. *G. Rakovich, C. Brigand, L. Gaboury,*

J. Martin, P. Ferraro, A. Duranceau. Service de chirurgie thoracique, Service anatomo-pathologique, Centre hospitalier de l'Université de Montréal, Montréal, Que., Service chirurgie digestive, CHU Strasbourg, Strasbourg, France.

Esophagectomy with gastric replacement is a model of pathologic esophageal reflux. The purpose of this study is to evaluate the remaining esophagus after esophagectomy and gastric replacement by comparing the level of the reconstruction and the presence of mucosal damage as assessed by endoscopy and pathologic examination.

Seventy-six consecutive patients were evaluated endoscopically after esophagectomy and gastric replacement. The reconstruction was accomplished either by way of an intrathoracic anastomosis or an extrathoracic left cervical anastomosis. Endoscopic evaluation of the esophagus was based on the MUSE classification (Metaplasia, Ulcer, Stenosis, Erosion) whereby each type of mucosal damage is visually quantified (0, 1, 2). Systematic biopsies of the supra-anastomotic region were obtained in order to evaluate the type and degree of mucosal damage pathologically. Statistical analysis was accomplished using the χ^2 test.

	Thoracic anastomosis ^{N36}	Left cervical anastomosis ^{N41}	<i>p</i> value
Endoscopy			
Muse 0	7	21	< 0.017
Muse 1	16	10	
Muse 2 or more	12	10	
Pathology			
No abnormality	3	13	< 0.008
Esophagitis	28	21	
Metaplasia absent	8	23	
Metaplasia present	23	11	0.001

- (1) Gastric replacement after esophagectomy leads to a high incidence of esophagitis in the remaining proximal esophagus.
- (2) Mucosal damage as assessed by endoscopy is less severe in cases of left cervical anastomosis than right intrathoracic anastomosis.
- (3) Pathologic esophagitis is more severe after intrathoracic anastomosis than after cervical anastomosis.

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ENDOSCOPIC THERAPY VERSUS ESOPHAGECTOMY FOR BARRETT'S ESOPHAGUS WITH HIGH-GRADE DYSPLASIA OR INTRAMUCOSAL CARCINOMA. *D. Low, J. Huang, N. Cantone, D. Schembre. Departments of Thoracic Surgery and Gastroenterology, Virginia Mason Medical Center, Seattle, Wash., USA*

There is currently little published data comparing efficacy, risks and costs of endoscopic therapy and esophageal resections for the treatment of Barrett's esophagus (BE) with high-grade dysplasia (HGD) or intramucosal cancer (IMC).

Prospectively-collected data on all patients with Barrett's HGD or IMC treated either endoscopically (photodynamic therapy [PDT], endoscopic mucosal resection [EMR] or argon plasma coagulation [APC]) or surgically [esophagec-

tomy]) with curative intent at 1 institution from May 1998–November 2005 were reviewed. Patients diagnosed with invasive cancer during initial staging and those with less than 6 months follow-up were excluded. Total hospital and outpatient charges were compared.

Sixty-one patients who underwent endoscopic therapy (2 APC alone, 18 EMR/APC, 21 PDT/APC, and 20 EMR/PDT/APC) and 32 who underwent esophagectomy (4 transhiatal, 10 Ivor–Lewis, 18 left thoracoabdominal) met the inclusion criteria. Median follow-up time was 20 months for endotherapy and 48 months for surgical patients. Median age for endotherapy was 70 and 64 for surgery ($p < 0.01$). Average ASA classification was 2.6 and 2.5, respectively ($p = NS$). Thirty-day mortality occurred in 1 endotherapy group patient (2%) and none in the surgical group ($p = NS$). No death from esophageal cancer occurred in either group. Cancer developed in 7% of endotherapy patients. No distant cancers developed in the surgical cohort ($p < 0.05$) despite identifying previously unrecognized invasive cancer in 8 (25%). Major complications (death, bleeding, pain requiring hospitalization) and minor complication (photosensitivity, stricture) occurred in 8% and 33% of the endotherapy patients, respectively. Twelve point five percent of surgical patients experienced major complications (anastomotic or chyle leaks, pulmonary embolus [PE]), and 63% minor complications (postoperative strictures, wound infection, dysrhythmias), $p < 0.01$. Median cost to date was \$40 079 for endotherapy and \$66 060 for esophagectomy ($p < 0.01$).

Both endotherapy and esophagectomy can effectively treat high-grade dysplasia and IMC associated with BE. Endotherapy is associated with higher risk of tumour progression. Esophagectomy is associated with higher initial costs and more frequent complications, but can be done with very low mortality rates, is typically curative for HGD and IMC, and may effectively treat previously unidentified early invasive cancer.

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A ROBOT-ASSISTED MINIMALLY INVASIVE TECHNIQUE FOR LUNG BRACHYTHERAPY. *S. Mohan, A.L. Trejos, H. Bassan, A.W. Lin, R.V. Patel, R.A. Malthaner. Canadian Surgical Technologies and Advanced Robotics (CSTAR), University of Western Ontario, London, Ont.*

The purpose of this project was to evaluate the performance of electromagnetic navigation and robotic assistance in minimally invasive interstitial lung brachytherapy. The specific objectives were to determine whether the additions of the electromagnetic guidance system and a modified robotic brachytherapy seed injector result in differences in performance measured by parameters such as task completion time, trauma (measured by number of attempts), and seed placement accuracy.

The in-vitro experimental test-bed included a video-assisted thoracoscopic surgery (VATS) box, a modified AESOP™ surgical robotic arm, a seed injector, an ultrasound system, and a custom designed navigation system (InterNAV2.0™) with electromagnetic tracking. Brachytherapy seeds were aimed at a metal ball target (1.6 mm diameter) embedded in an agar cube. The performance parameters were compared for manual, VATS and robot-assisted minimally invasive (RAMI) procedures.

The RAMI procedure significantly improved the targeting accuracy and reduced the task completion time and the number of attempts needed for seed placement as compared with the VATS technique. The RAMI procedure was also found to have improved accuracy and reduced number of attempts when compared with the manual technique (n = number of trials; * = $p < 0.05$).

	Manual ($n = 78$)	VATS ($n = 83$)	RAMI ($n = 80$)
Time, s	29	104	40.5*
range	7-150	26-665	22-112
No. of attempts	2	4	1*
range	1-9	1-18	1-3
Mean error, mm	2.7	2.5	0.9*
range	0.4-6.0	0-7.0	0-3.0

The RAMI approach offers improvements over ultrasound guided VATS and manual techniques when placing seeds in interstitial lung brachytherapy. Further, this approach reduces the invasiveness of the procedure, improves ergonomic conditions for the clinician, and reduces radiation exposure.

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THE EVOLUTION OF THORACIC SURGICAL LITERATURE. *M. Blitz, A.J. Graham, G. Gelfand, S.D. McFadden, S.C. Grondin.* Division of Thoracic Surgery, Department of Surgery, University of Calgary, Calgary, Alta.

The levels of evidence of original research and meta-analyses published in the top 3 thoracic surgery subspecialty journals identified using impact factor (ISI 2004) were determined for the years 2006, 2002 and 1998. The quality of the research was then compared between these time periods within the individual journals to determine what improvements, if any had occurred.

Online and hand-searches of the table of contents of the *Journal for Thoracic and Cardiovascular Surgery*, the *Annals of Thoracic Surgery* and, the *European Journal of Cardiothoracic Surgery* were performed to identify all publications pertaining to thoracic surgery. The individual abstracts and their corresponding manuscripts were then evaluated and classified by 2 independent observers using the levels of evidence from the Oxford Centre for Evidence-Based Medicine. Finally, for each individual journal, the distribution of the levels of evidence for the manuscripts published during the specified year was compared with the other 2 years under investigation.

Even though there are more manuscripts categorized as level 1 evidence (randomized and controlled trials and systematic reviews of randomized and controlled trials) in the 2006 publication year, the overall trend toward the publication of manuscripts deemed to be of higher levels of evidence is poor.

More emphasis needs to be placed on the completion of systematic reviews as well as the design, implementation and ultimately publication of randomized and controlled trials so that thoracic surgical literature can maintain its standing within the evidence-based milieu of the general medical literature.

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VARIABLES AFFECTING A PATIENT'S PERCEPTION OF READINESS FOR DISCHARGE VERSUS LENGTH OF HOSPITAL STAY FOLLOWING LOBECTOMY: A RANDOMIZED CONTROLLED STUDY. *J. Kondra, J. Clifton, G. Suarez, B. Ross, K. Evans, R.J. Finley, J. Yee.* Department of Thoracic Surgery, Vancouver General Hospital, University of British Columbia, Vancouver, BC.

We prospectively examined the impact of clinical variables and structured ambulation encouragement on a patient's perception of their readiness for discharge versus their actual length of hospital stay (LOS) after lobectomy.

Patients undergoing a lobectomy (January to October 2006) were randomized to 1 of 3 intervention groups differing in encouragement of ambulation: Group 0 received a standard preoperative discussion; Group 1 received the preoperative discussion with an additional booklet to outline and record daily ambulation goals; and Group 2 received the former in addition to daily visitation and monitoring from the study coordinator. The patient's pain and anxiety levels were tested using the Short Form McGill Pain Index and the Short Form State Trait Anxiety Scale. Social (family/friends) visitation was recorded using a bedside sign-in sheet. Each patient was asked to rate their readiness for discharge using a visual analog scale (0% = "Not at all ready," 100% = "Definitely ready"). Surgical and demographic data was collected from hospital and clinical charts.

Forty-eight patients (27 F, 21 M, mean age 63 [standard deviation {SD} 10] yr) participated in the study. The average LOS was 9.1 (SD 4.9) days. Twenty (41.7%) participants experienced complications (15 major, 5 minor). Multivariate linear regression indicated that the patient's perceived readiness for discharge was predicted by the intervention group ($p = 0.019$), visitation rates ($p = 0.027$) and anxiety at discharge ($p = 0.016$). Further analysis indicated that Group 0 participants tended to be less ready for discharge than those in Group 1 or 2 ($p = 0.054$). The same linear regression indicated that LOS was solely predicted by complications ($p < 0.001$), where participants who experienced any complication had a longer LOS.

These results suggest that social variables (i.e., personal attention from the study coordinator and visitation) had a greater affect on the patient's perceived readiness for discharge, while medical variables had a greater affect on LOS.

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THORACOSCOPIC SYMPATHETIC CLIPPING FOR HYPERHIDROSIS — LONG-TERM RESULTS AND REVERSIBILITY. *H. Sugimura, E.H. Spratt, C.G. Compeau, Y. Shargall.* Division of Thoracic Surgery, Department of Surgery, University of Toronto, St. Joseph's Health Centre, Toronto, Ont.

Treatment success, satisfaction, and degree of compensatory sweating (CS) were prospectively evaluated in 727 consecutive patients undergoing thoracoscopic sympathetic clipping (TSC) for hyperhidrosis. Reversibility of adverse effects was assessed in patients subsequently undergoing removal of surgical clips. Follow-up was complete in 666 patients. The median age was 27 years and 383 were male. The level of TSC was T2 in 399,

T2+3 in 55, and T3+4 in 273 patients. Postoperative hyperhidrosis was significantly less in the T3+4 group when compared with the T2 group ($p < 0.05$). Excellent satisfaction was seen in 288 (74%) of the T2, 33 (62%) of the T2+3, and in 184 (85%) of the T3+4 group. Postoperative satisfaction was significantly higher in the T3+4 group when compared with the T2 or T2+3 groups ($p < 0.05$). Severe CS was seen in 49 (15%) of the T2, 13 (31%) of the T2+3, and in 17 (8%) of the T3+4 groups. CS was significantly less in the T3+4 group when compared with the T2 or T2+3 groups ($p < 0.05$). Thirty-four (4.7%) patients underwent reversal after a median of 11.0 months. The level of TSC was T2 in 21, T2+3 in 8, and T3+4 in 5 patients. There was a trend toward fewer reversals in the T3+4 group when compared with the combined T2 and T2+3 group ($p = 0.05$). Fifteen patients reported substantial decrease in their CS after reversal. Thirteen patients reported good control of hyperhidrosis after reversal. There was no difference in the change in CS or hyperhidrosis after reversal between the 3 groups. When compared with TSC at T2 or T2+3 levels, TSC at the T3+4 level was associated with higher satisfaction, less CS, and a trend toward fewer subsequent reversals. Subjective reversibility of adverse effects after TSC was seen in approximately half of the patients who underwent reversal.

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PREOPERATIVE EGFR INHIBITOR IN CLINICAL STAGE I NSCLC. *H. Lara-Guerra, N. Leigh, A. Salvarrey, A. Sakurada, N. Paul, S. Boerner, W. Geddie, G. Pond, F.A. Shepherd, M.S. Tsao, T.K. Waddell.* Departments of Thoracic Surgery, Medical Oncology, Laboratory Medicine, Diagnostic Imaging, University Health Network, University of Toronto, Toronto, Ont.

The purpose of this study is to assess the impact of preopera-

tive epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor (gefitinib) on EGFR intracellular signaling, the response and toxicity rates, and the correlation with response in early stage non small cell lung cancer (NSCLC).

Stage I NSCLC patients received gefitinib for 28 days before surgical resection in a single arm open label study. Tumor response was evaluated by response evaluation criteria in solid tumors (RECIST). Mutation analysis of EGFR exons 19 and 21 were performed. EGFR, its phospho-isoforms and intracellular signaling pathways were analyzed by immunohistochemistry.

Thirty-four patients have completed treatment. Sixty-five percent of cases were adenocarcinomas, 21% squamous cell, 12% pure BAC, and 3% large cell carcinoma. Twelve percent were non-smokers. Five patients had serious adverse events within 30 days postsurgery (2 pulmonary infections, 2 prolonged air leaks, 1 pulmonary embolism). Four (12%) patients had exon 19 deletions and 2 (6%) had exon 21 point mutations. Two of the first group had partial response while 2 had stable disease; from the latter group, 1 had partial response and 1 had stable disease. The overall response rate was 11.7% in the sample. By univariate analyses, fibrosis in surgically resected specimens was associated with EGFR mutation status ($p = 0.002$) and exon 19 deletions ($p = 0.008$). EGFR mutation status ($p = 0.016$) was associated with RECIST response. In multivariate analysis, presence of mutation was associated with a reduction in tumour diameter, (mm $F = 14.82$, $p = 0.001$; % $F = 22.54$, $p < 0.001$), response by RECIST ($p = 0.016$), and fibrosis ($p = 0.004$). Preliminary analysis of EGFR phosphorylation suggests nonresponders are not experiencing complete EGFR inhibition.

Gefitinib can be administered safely preoperatively in early NSCLC. Comparison of pre- and post-therapy tumour samples may allow additional understanding of EGFR TKI resistance and facilitate patient selection.

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