

ABSTRACTS

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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

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1

DIETARY FIBRE FOR THE PREVENTION OF COLORECTAL ADENOMAS OR CARCINOMAS. T.K. Asano, R.S. McLeod. Mount Sinai Hospital, Toronto, Ont.

We conducted a systematic review and meta-analysis to assess the effect of dietary fibre on the incidence or recurrence of colorectal adenomas, the incidence of colorectal carcinomas (CRCs) and the development of adverse events.

We identified randomized controlled trials (RCTs) up to October 2001. All subjects had no previous history of CRC, a documented "clean colon" at baseline and repeated visualization of the colon/rectum after at least 2 years. Dietary fibre was the intervention. The primary outcomes were the number of subjects with: (a) at least 1 adenoma, (b) more than 1 adenoma, (c) at least 1 adenoma greater than or equal to 1 cm or (d) a new diagnosis of CRC. The secondary outcome was the number of adverse events. Two reviewers independently extracted data and assessed trial quality. The outcomes were reported as relative risks (RR) with 95% confidence intervals (CIs) and the number needed to treat/harm if statistically significant. The data were combined with the fixed effects model if it was clinically and statistically reasonable.

Five studies with 4349 subjects met the inclusion criteria. The interventions were wheat bran fibre, ispaghula husk or a comprehensive dietary intervention. When the data were combined there was no difference between the intervention and control groups for the number of subjects with at least 1 adenoma (RR 1.04 [95% CI 0.95, 1.13]). As well, the combined results for the number of subjects with more than 1 adenoma (RR 1.02 [95% CI 0.89, 1.17]) or at least 1 adenoma 1 cm or greater (RR 0.94 [95% CI 0.77, 1.15]) were not statistically significant. Other outcomes and subanalyses were not statistically or clinically significant.

There is currently no evidence from RCTs to suggest that increased dietary fibre intake will reduce the incidence or recurrence of adenomatous polyps within a 2- to 4-year period.

2

COLORECTAL LIVER METASTASES: THE INFLUENCE OF ADJUVANT CHEMOTHERAPY ON SURVIVAL AFTER RESECTION. M. Blitz, C. Butts,

N. Kneteman, D. Bigam. Department of Surgery, University of Alberta Hospital and Department of Medical Oncology, Cross Cancer Institute, Edmonton, Alta.

We attempt to determine the benefit of adjuvant chemotherapy after resection of colorectal liver metastases as determined by overall survival and disease-free survival. Secondary analysis is made based on type of chemotherapy: 5-FU versus 5-FU plus CPT-11, all administered peripherally via intravenous infusion.

All colorectal liver metastectomies performed at the University of Alberta Hospital by 2 surgeons were included. Data were collected in regards to patient demographics, primary tumour characteristics and treatment, metastases and subsequent therapy, adjuvant therapy, and overall and disease-free survival.

Preliminary results suggest that adjuvant chemotherapy after resection of hepatic colorectal metastases was not associated with an increase in survival as demonstrated by analysis of the survival functions created using the method of Kaplan and Meier (analyzed using the log-rank test, $p = 0.76$).

Our preliminary results do not demonstrate a benefit from the addition of chemotherapy after the resection of colorectal liver metastases. Unfortunately, these results are based on a small number of cases and on retrospective data. A prospective and randomized clinical trial is necessary to accurately define the role of adjuvant chemotherapy and more specifically the type of chemotherapy in patients with resectable colorectal liver metastases.

[Updated results will be presented.]

3

SURGICAL BLOOD USE IN A CANADIAN HOSPITAL — DID KREVER HAVE AN EFFECT? J.F.M. Oosthuizen, P.T. Phang, D. Gouthro. Department of Surgery and Department of Laboratory Medicine, St. Paul's Hospital, University of British Columbia, Vancouver, BC

We sought to determine whether our blood transfusion practice had changed following the 1997 publication of the Krever Commission Report on the Blood System in Canada.

Perioperative use of blood was obtained from blood bank records for 4 elective operations performed in St. Paul's Hos-

pital (SPH): coronary artery bypass grafting (CABG), abdominal aortic aneurysmectomy (AAA), total hip replacement (THR) and colectomy (COL). We compared 1996 and 2000 transfusion practices with regard to percentage of patients transfused and percentage of patients having autologous blood transfusion.

Blood transfusion did not change significantly from 1996 to 2000 for CABG (63% v. 63%), AAA (85% v. 72%) or COL (38% v. 33%). There was a trend toward decreased transfusion for THR (34% v. 19%, $p = 0.09$). Autologous blood use decreased from 3.0% in 1996 to 0.20% in 2000 ($p = 0.0001$).

We conclude that blood transfusion practice at our hospital has not changed for most major elective surgical procedures following the Krever Report. However, use of autologous blood has decreased significantly.

4 OUTCOME OF ILEORECTAL ANASTOMOSIS FOR CROHN'S COLITIS (CC). A. Ravid, M. Liu, B.I. O'Connor, H.M. MacRae, Z. Cohen, R.S. McLeod. Inflammatory Bowel Disease (IBD) Research Unit, Division of General Surgery and Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Objective: To assess outcome and quality of life (QL) of patients who had subtotal colectomy with ileorectal anastomosis (IRA) for Crohn's colitis (CC). **Methods:** Clinical and demographic information was collected from an IBD database and review of charts. A questionnaire was mailed to all patients with CC who had IRA performed. QL was assessed with the SF-36 and the Inflammatory Bowel Disease Questionnaire (IBDQ) or IBDQ modified to stoma patients. **Results:** There were 61 patients, 26 males and 35 females. Mean age at IRA was 33 years (14–63 yr), and mean follow up was 11 years (0.58–27.9 yr). The indications for colectomy were failure of medical treatment in 31 (51%), bowel obstruction in 16 (26%), acute colitis in 3 (5%), colonic perforation in 4 (7%; of which 2 were post-colonoscopy perforations), abdominal abscess in 1 (1.5%), massive hemorrhage in 1 patient (1.5%) and coloduodenal fistula in 1 patient (1.5%). The indication was unknown in 4 patients (7%). Twenty-five patients (41%) had terminal ileal involvement. Fifty-eight patients had rectal sparing, and only 3 (5%) had mild rectal involvement. Six patients had perianal disease. Forty-four IRAs (72%) were performed at colectomy, and 17 (28%) subsequently. There was no perioperative mortality. There were 5 (8%) anastomotic leaks, 2 wound infections, 1 dehiscence and 5 bowel obstructions (all resolved nonoperatively). Thirteen patients had anastomotic resection and reanastomosis. One patient developed rectal cancer 8 years after IRA. Twenty-six patients retained a functioning IRA, 26 underwent abdominoperineal resection (mean 80 mo after IRA) and 2 have a diverting ileostomy. Seven (11%) are lost to follow-up. Patients with a functioning IRA have mean 6 bowel movements/day (2–13) and 0.9/night (0–4). Most patients have excellent day and night continence: 11 (50%) are completely continent and 8 (36%) have seepage only during the day. Urgency is always present in 4 (18%) and sometimes in 13 (59%). There were no significant differences in the IBDQ results between IRA patients and those with ileostomies. With the SF-36, patients who had an

ileostomy had superior results to those who retained a functioning IRA in the general health perception domain ($p = 0.017$). **Conclusions:** IRA is a good option for patients with CC and rectal sparing, with approximately 50% of patients retaining the rectum at 10-year follow-up. However, should it fail, QL is equally good in patients with an ileostomy.

5 IS EPIDURAL ANALGESIA AND ANESTHESIA SAFE TO BE USED IN LOW COLORECTAL ANASTOMOSIS? O. Al-Obeed, J. Penning, H.S. Stern. Department of Anaesthesia and Department of Surgery, Ottawa Hospital, University of Ottawa, Ottawa, Ont.

To determine the safety of rectal anastomoses performed under epidural anesthesia.

A retrospective analysis was undertaken of a consecutive series of anterior resections (ARs), low anterior resections (LARs) and ileoanal pouch procedures (IPAA) performed by a single surgeon (H.S.) between January 1995 and November 1999. Leaks, operating room time, analgesia and length of stay were compared in the epidural group versus historical and nonepidural controls.

Of 163 intentions to treat with IPAA and LAR, 84 (51.5%) were IPPA; 16 (9.8%) AR; 46 (28.2%) LAR. Thirteen patients had no anastomosis (e.g., Hartmann). Twenty-seven patients had loop ileostomies. There was no difference in leak rate: 1.2% and 1% for patients with epidural analgesia with and without loop ileostomies respectively versus 4.6% and 5.55% for patients who had intravenous PCA with and without loop ileostomy respectively ($p < 0.347$). Non-leak complications were 22.7%. Average hospital stay was 9.70 versus 10.4 days for patients who had epidural and intravenous PCA analgesia respectively.

Epidural analgesia and anesthesia confer no increased risk for leaks in rectal anastomosis.

6 INTEROBSERVER AND INTRA-OBSERVER BIAS VARIABILITY IN GRADING OF ANAL DYSPLASIA. P. Colquhoun, J. Nogueras, B. Dipasquale, J. Petras, S. Wexner, S. Woodhouse. Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, Fla.

Natural history of progression from anal intraepithelial neoplasia (AIN) to invasive carcinoma remains unproven. The risk of progression is believed to be linked to severity of dysplasia. Important therapeutic decisions are thus based upon the severity of AIN. Consistency and reliability in the interpretation of AIN are unproven.

One hundred and ninety-one anal biopsy specimens were identified for review of dysplasia (6-point grade system from normal to invasive cancer), evidence of human papilloma virus infection and quality of histology (QOH) by 3 pathologists. Review of 191, 128 and 102 slides by pathologists 1, 2 and 3 respectively have been undertaken to date.

Preliminary results reveal poor to moderate agreement on grading of dysplasia (Kappa score: 0.092–0.461) (Table 1), human papilloma virus status (Kappa score: 0.218–0.383) and QOH (Kappa score: 0.012–0.207). Complete agreement between the original pathology and the 3 pathologists was ob-

Table 1

AIN	Original	Path 1	Path 2	Path 3
Original	xxx	0.419	0.277	0.092
Path 1	0.419	xxx	0.307	0.461
Path 2	0.277	0.307	xxx	0.449
Path 3	0.092	0.461	0.449	xxx

served in only 18/102 cases. Analysis of 86 slides previously read by 1 of the pathologists reveals only moderate agreement with a Kappa score of 0.473. Increase in agreement was observed by reclassifying the results into low-grade (human papilloma virus changes and AIN I) and high-grade dysplasia (AIN II and III) (Table 2).

Table 2

Dysplasia	Original	Path 1	Path 2	Path 3
Original	xxx	0.598	0.333	0.397
Path 1	0.598	xxx	0.537	0.562
Path 2	0.333	0.537	xxx	0.600
Path 3	0.397	0.562	0.600	xxx

Significant interobserver and intraobserver biases exist in the interpretation of AIN. These inconsistencies may explain the uncertainty of the natural progression of AIN and the varied results of surgery reported for AIN in the literature. Improved consistency may be achieved using a simplified grading system for anal dysplasia.

7

METALLIC STENT ENDOPROSTHESIS FOR LARGE-BOWEL OBSTRUCTION: A RETROSPECTIVE REVIEW. M.J. Raval, J.A. Heine, G.R. May, S. Bass. Department of Surgery and Department of Medicine, University of Calgary, Calgary, Alta.

The goal of this study was to evaluate the use of a self-expanding metallic stent endoprosthesis (SEMSE) in large-bowel obstruction (LBO).

A retrospective chart review from April 2000 to March 2002 identified 14 patients (10 male, 4 female; ages 53–88 yr) who presented with LBO and were referred for placement of a SEMSE. The obstruction was due to malignancy in all 14 patients (13 colorectal, 1 prostate primary) and was complete in 4 patients. The sites of obstruction were rectum (1), rectosigmoid colon (5), sigmoid colon (5), descending colon (1), splenic flexure (1) and ileocolic anastomosis from a prior right hemicolectomy (1). Eleven patients were stented for palliation of metastatic disease, while 3 patients with localized disease underwent stenting with the intent of decompression and preoperative bowel preparation followed by single-stage resection. One of these 3 ultimately refused surgery.

Initial stent deployment and relief of obstruction was successful in all 14 patients. Twelve patients were advanced to full diet within 2 days. Two patients were never advanced to full diet: 1 had proximal obstruction secondary to carcinomatosis and the other had a prolonged ileus prior to laparotomy and resection.

Complications included stent migration and subsequent laparotomy with resection (2), constipation (3, all resolved) and

transient bleeding (1, no transfusion required). There were no attributable mortalities or perforations secondary to stenting.

Of 14 patients, 5 ultimately underwent resection. The remaining 9 patients were followed for 2 to 25 weeks (median 12 wk), until the time of death ($n = 8$) or termination of this study. All 9 of these patients experienced relief of obstruction with no attributable complications until the time of death.

SEMSE is an effective treatment for patients with LBO, either as palliation in the setting of metastatic disease or as a bridge to surgical resection.

8

CROHN'S DISEASE AND INDETERMINATE COLITIS AND THE ILEAL POUCH ANAL ANASTOMOSIS: OUTCOMES AND PATTERNS OF FAILURE. C.J. Brown, A.R. MacLean, T. Asano, Z. Cohen, H.M. MacRae, B.I. O'Connor, R.S. McLeod. Inflammatory Bowel Disease (IBD) Centre, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

The objective of this study was to determine the outcome of patients with Crohn's disease (CD) and indeterminate colitis (IC) having an ileal pouch anal anastomosis (IPAA). Between 1982 and 2001, 1270 patients underwent an IPAA at the Mount Sinai Hospital: 1135 with ulcerative colitis (UC), 36 with CD, 21 with IC and 78 for other diagnoses. Perioperative data were collected prospectively. Functional outcomes were assessed with a 35-question survey mailed to all patients with a functioning pouch of at least 6 months duration.

Pouch complications were significantly more common in patients with CD (64%) and IC (43%) compared with patients with UC (22%). Similarly, 56% of patients with CD compared with 10% of patients with IC and 5.6% with UC had their pouch excised or defunctioned. The mean time from IPAA to pouch failure was 40 ± 17 months in the CD group. Risk factors for failure included female gender (60% v. 19%, $p < 0.02$), younger age at pouch construction (27.5 ± 5.0 v. 34.6 ± 4.4 yr, $p < 0.04$), hand sewn IAA (75% v. 38%, $p < 0.05$), pathological diagnosis of UC on the colon/rectal specimen (85% v. 38%, $p < 0.01$) and shorter disease duration prior to IPAA (4.0 ± 1.6 v. 10.7 ± 4.5 yr, $p < 0.01$). The functional results in patients with CD with a successful pouch were not significantly different from those with IC or UC.

Although complication rates may be higher in patients with IC compared with UC, the success rate is similar. More than half of patients with CD will require pouch excision or diversion. Patients with long-standing CD are more likely to have a successful outcome and may be considered for IPAA. However, the long-term results confirm a high failure rate in CD whereas IPAA is an acceptable alternative for patients with IC.

9

THE LACK OF INFLUENCE OF PUBLICATION OF COLORECTAL CANCER SCREENING CLINICAL PRACTICE GUIDELINES IN CANADA. T.K. Asano, D. Toma, H.S. Stern, R.S. McLeod. Mount Sinai Hospital, Toronto, and the Ottawa Hospital, Ottawa, Ont.

The Canadian Task Force on Preventive Health Care (CTF-PHC) recently published revised clinical practice guidelines

(CPGs) that recommend routine colorectal cancer (CRC) screening.

We sought to assess the CPGs' influence on primary care physicians' screening beliefs and clinical practice.

A national survey of 160 quasi-randomly sampled primary care physicians prior to (May 2001) and 1 year after publication (March 2002) of the CPGs. Subjects were included only if they responded to both surveys. Univariate and bivariate analyses using paired McNemar's χ^2 tests were conducted.

The response to both surveys was 45%. There was an increase from 42% at baseline to 54% in 2002 of physicians who routinely recommended CRC screening to their patients ($p = 0.1$). For the individuals that reported to have changed their practice, there was no association with awareness of the revised CPGs. The 55% baseline reported awareness of CRC screening CPGs in general did not change significantly ($p = 0.2$). Of the subjects who do not recommend routine screening, 46% reported that "inconclusive evidence" played a role in their decision and this belief did not change after the publication of the revised CPGs ($p = 1.0$). Only 23% of respondents were aware and 17% had read the summary or full text of the revised CPGs.

Despite the published level I evidence of reduced CRC incidence and cancer mortality from routine CRC screening, the belief that the evidence is inconclusive remains a significant barrier for Canadian primary care physicians. Physicians are unfamiliar with the revised CTFPHC guidelines for colorectal cancer screening. Multifaceted educational strategies are required in order to implement the guidelines.

10 DIFFERENCES IN OPERATIVE APPROACH TO RECTAL CANCER: A COMPARISON OF UNIVER- SITY AND COMMUNITY CENTRES. K. Irshad, G.A. Ghitulescu, P.H. Gordon. Division of Colorectal Surgery, Sir Mortimer B. Davis-Jewish General Hospital, McGill University, Montreal, Que.

The goal of this retrospective study is to compare rates of low anterior resection with diversion (LAR Div) and without diversion (LAR), abdominoperineal resection (APR) and local resection (LR), between community and university hospital centres in the province of Quebec.

The Medical Discharge Summary Database (MED-ECHO) was used to gather information on all patients undergoing surgical treatment for rectal cancer between 1993 and 2000. The type of operation, institution at which it was performed and comorbidities for each patient were obtained. Rates of the 4 operative approaches were compared in university versus community hospitals using the χ^2 test.

	N	APR	LAR	LAR Div	LR	OR for 1° anastomosis
University	1340	27.3%	51.3%	6.5%	14.9%	1.27 (1.10-1.48)*
Community	2661	34.0%	51.2%	5.0%	9.8%	1.00
<i>p</i> value		< 0.001	0.48	0.027	< 0.0001	
OR = odds ratio. * 95% confidence interval						

Using logistic regression to control for age, sex and comorbidities, the odds of undergoing a primary anastomosis is 27%

higher if the operation is performed at a university centre ($p = 0.02$). We were unable to control for the level of the rectal cancer.

In the province of Quebec, the rate of APR is significantly lower in university centres when compared to community hospitals. The issue of equivalency of oncologic outcomes and quality of life needs to be addressed.

11 OUTCOME OF INFLAMMATORY BOWEL DISEASE IN PATIENTS UNDERGOING LIVER TRANSPLAN- TATION FOR PRIMARY SCLEROSING CHOLANGI- TIS. A.R. MacLean, L. Lilly, Z. Cohen, B. O'Connor, R.S. McLeod. Department of Surgery, University of Toronto, Toronto, Ont.

The purpose of this study was to determine the outcome of patients with inflammatory bowel disease (IBD) who underwent liver transplantation for primary sclerosing cholangitis (PSC).

All patients who underwent liver transplantation for PSC at our institution were identified. A review of patients' hospital and office charts was carried out, and all patients were then contacted and a detailed survey was administered by telephone.

Sixty-nine patients were identified. There were 53 males (76.8%) and 16 females, with a mean age of 45.3 years (± 13.3 yr). Fifty-two (75.4%) of the 69 patients have documented IBD; 40 have ulcerative colitis (76.9%), 11 have Crohn's colitis, and 1 has indeterminate colitis. Thirty-one patients (60%) were diagnosed with IBD prior to PSC, with a mean interval to diagnosis of PSC being 10.8 years (± 10.3 yr). Seven patients had both diagnoses made at roughly the same time, and 14 patients initially diagnosed with PSC were subsequently found to have IBD, with a mean interval of 5.2 years (± 4.4 yr); 5 of those patients (35.7%) were only diagnosed with IBD following their liver transplant. The mean time from diagnosis of PSC to liver transplantation was 6.1 years (± 4.9 yr). Since their transplant, 30.8% of patients rated their colitis as worse, 38.5% felt it was unchanged and 30.8% felt that their colitis was better controlled. Eight of the 52 patients (15.4%) with IBD denied having any knowledge of an increased risk of colorectal neoplasia. Three patients have required colectomy for colorectal neoplasia following liver transplantation, at a mean of 4.7 years following transplantation. Of the patients with IBD, 42 (80.1%) have had at least 1 post-transplant surveillance colonoscopy. Five of the remaining 10 patients had had a colectomy, leaving only 5 patients (9.6%) who have not been surveyed. However, only 32 (61.5%) of the patients with IBD have been on a surveillance regimen that would roughly conform to current screening recommendations.

Liver transplantation for PSC in patients with IBD is becoming more common. The activity of IBD following transplantation is highly variable. Patients should be educated about their increased risk of colorectal neoplasia and should probably be on a formal surveillance program. Colorectal cancer is an uncommon but important event in patients with IBD following liver transplantation for PSC.

12 HEALTH-RELATED QUALITY OF LIFE IN CROHN'S

COLITIS PATIENTS FOLLOWING COLECTOMY. A. Ravid, B.I. O'Connor, M. Liu, H.M. MacRae, Z. Cohen, R.S. McLeod. IBD Research Unit, Division of General Surgery and Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Objective: The aim was to compare health-related quality of life (HRQL) with ileorectal anastomosis (IRA) to patients with total proctocolectomy (TPC). **Methods:** A questionnaire was mailed to all patients with Crohn's colitis (CC) who had IRA or TPC performed. Information related to further operations, medical therapy and functional results was collected. HRQL was assessed with the Medical Outcomes Study 36-item Short Form (SF-36) and the Inflammatory Bowel Disease Questionnaire (IBDQ) or IBDQ modified to stoma patients. Other clinical information was obtained from the Hospital Inflammatory Bowel Disease database. **Results:** Of 155 patients, 99 (64%)

responded. There were 37 males and 62 females, mean age 44.5 years. Seventy-seven (group 1) had TPC and 22 (group 2) had an IRA. Mean time from last operative procedure was 65 ± 53 . IBDQ scores were similar in both groups. There were no significant differences in physical functioning, role physical, role emotional, bodily pain, vitality, social functioning and mental health domains of the SF-36 between the 2 groups. In the general health perceptions domain, which evaluates personal health, group 1 had significantly better scores than group 2 (mean 53 v. 44, $p = 0.03$). When group 1 was subdivided to those who had an IRA in the past (group 1a) and those who never had an IRA (group 1b), the physical functioning domain, which assesses limitations in physical activities, was significantly higher in group 1b (83 v. 65, $p = 0.08$). The general health domain was higher in group 1a (51 v. 61, $p = 0.02$). **Conclusions:** HRQL is good after subtotal colectomy for CC, regardless of whether the patient has a TPC or an IRA. ■

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IS SURGEON MANUAL DEXTERITY AND TACTILE SENSE COMPROMISED BY DOUBLE GLOVING? R.L. St. Germaine, C.J. de Gara, R. Fox, Z. Kenwell, S. Blitz. Department of Surgery, University of Alberta Hospital and The Cross Cancer Institute, Edmonton, Alta.

An important and frequent reason cited by surgeons for not double gloving is the belief that 2 pairs of gloves will affect their manual dexterity and tactile sense and as a consequence lead to poorer quality surgery. It is our belief that this is perception rather than reality, and the purpose of this series of experiments is to demonstrate that double gloving does not diminish manual dexterity and tactile sense.

Ten surgeons from the Royal Alexandra Hospital, Edmonton, Alta., were invited to carry out a series of 3 bench experiments designed to test manual dexterity and tactile sense. Each surgeon was required to perform tasks with both single and double gloves. The first experiment involved measuring the final tension of knots tied around a load cell. The second experiment was the Crawford Manual Dexterity Test, a well-validated technique of assessing manual dexterity by manipulating screws into a tray using forceps. The time required to complete the task is measured. To stimulate the tactile sense of discrimination, a third test consisted of variable sized ball bearings placed into a standard Penrose drain with the surgeons required to describe the size difference, if any, of the bearings within the Penrose drain.

In comparing the single to double gloving results for the 3 experiments, no significance difference was measured between the 2 gloving methods.

This objective measure of tactile sense and manual dexterity was equal for both single and double gloving. Our hope is that more surgeons will begin to employ the latter, thereby increasing their personal safety in the operating room.

14
WHY STUDENTS AREN'T CHOOSING GENERAL SURGERY. J.T. Wong. Department of Surgery, University of Saskatchewan, Saskatoon, Sask.

Objective: To ascertain the reasons behind the recent decline in interest in general surgery among medical school graduates.

Methods: An anonymous self-administered questionnaire was distributed to the students in all 4 classes at the University of Saskatchewan College of Medicine. **Results:** There was an 86% response rate. 25.8% of respondents were considering general surgery as a specialty, but only 6.8% as their first choice. Demographically, a significantly larger proportion of students interested in surgery were male and unmarried. 79.5% of respondents listed lifestyle-related concerns among the 3 most important considerations in choosing their career, and 30.5% named lifestyle as the single most important consideration. This was not significantly different between the group interested in surgery and those who were not. Of the sources of influence, clinical experience was most frequently cited, followed by role models in the field, family members in medicine and residents. **Conclusions:** Lifestyle is an increasingly important factor in student career choice, listed as 1 of the top 3 factors by 79.5% of students and as the most important factor by 30.5% of students. Interestingly enough, even those students interested in general surgery rated lifestyle as a significant consideration in their choice of a career. Clinical experience, followed by role models, family members in medicine and residents were the greatest sources of influence on the decision-making process.

15
THE SURGICAL MANAGEMENT OF BREAST CANCER: CANADIAN PRACTICE PATTERNS. H.M. McMullin, G.A. Porter. Department of Surgery, Dalhousie University, Halifax, NS

Breast cancer is a common disease and the surgical management is continually evolving. The objective of this study was to describe the current breast cancer practice patterns amongst Canadian surgeons.

All active general surgeons ($n = 1072$), as accredited by the Royal College of Physicians and Surgeons of Canada, were sent a 31-item questionnaire in June 2001. Anonymous responses were collected and analyzed regarding surgeon demographics, practice and perceptions regarding surgical care of breast cancer patients.

Overall 640 (60%) surgeons responded; of these 519 (81%) treated breast cancer and formed the study cohort. Practice settings included community (55%), community with univer-

sity affiliation (28%) and academic (17%). The majority of surgeons (76%) stated that 25% or less of their practice was devoted to breast cancer, and 42% performed 2 or less breast cancer operations/month. Immediate breast reconstruction (IBR) was available to 57% of surgeons, and 27% of surgeons performed sentinel lymph node biopsy (SLNBx). Surgeons with an interest in breast cancer, as demonstrated by volume of breast cancer surgery (> 3 cases/mo) or a fellowship in surgical oncology, were more likely than other surgeons to have IBR available (65% v. 45%; $p < 0.0001$) and perform SLNBx (36% v. 13%; $p < 0.0001$). Similarly, surgeons in an academic setting were more likely to have IBR available (97% v. 49%; $p < 0.0001$) and perform SLNBx (48% v. 22%; $p < 0.0001$). Of the 640 surgeons who responded, 75% stated that all general surgeons should perform breast cancer surgery.

In Canada, most breast cancer surgery was performed by general surgeons who did not appear to have a defined interest in breast cancer. Although variability regarding specific surgical issues was found among subgroups of surgeons, most respondents felt that *all* general surgeons should treat breast cancer.

16
DOPAMINE-SECRETING PHEOCHROMOCYTOMA — AN EXTREMELY RARE CLINICAL ENTITY.
S. Jayaraman, D. Gray. Division of General Surgery, University of Western Ontario, London, Ont.

Pheochromocytoma is a well-known clinical entity. These catecholamine-secreting tumours commonly secrete norepinephrine, epinephrine and occasionally dopamine. However, very rarely, pheochromocytoma can secrete dopamine exclusively. The purpose of this study is to examine 2 cases of dopamine-secreting pheochromocytoma. Specifically, we hope to describe the presentation, pathology and possible treatment options for this rare diagnosis.

Two patients presented with symptoms ranging from vague abdominal discomfort to severe headaches. After subsequent diagnostic work-up, both were found to have large adrenal masses. Each of these patients was found to have normal urine catecholamines as well as serum metanephrine values that were within normal limits. Plasma dopamine levels were elevated in both patients. Adrenalectomies were performed and plasma dopamine levels returned to normal in each case. Pathological examination of the specimens showed dopamine-secreting pheochromocytoma in both cases.

Though the pathophysiology of conventional pheochromocytomas is understood, the dopamine-secreting variety is somewhat of a mystery. In a thorough literature review, no previous cases have been reported. This extremely rare clinical entity is poorly understood and should be studied more closely.

17
LAPAROSCOPIC RESECTION OF GASTRIC STROMAL TUMOURS. S.E. Burpee, C.M. Schlachta, J. Mazza, K. Pace, E.C. Poulin. The Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Objective: To review the results of laparoscopic resection of

gastric stromal tumours from 1 surgical group. **Methods:** A prospectively collected database was used to compile and analyze 8 cases of laparoscopic resection of gastrointestinal stromal tumours. The procedures were performed at a university teaching hospital between November 1997 and September 2001. **Results:** Four resections were for tumours located on the anterior surface of the stomach, and these were all resected with an endoscopic stapler. Three tumours were located near the gastroesophageal junction, and these were excised with electrocautery and then the defect closed with intracorporeal suturing. One tumour was located posteriorly, and this was resected with the endoscopic stapler after considerable gastric mobilization. The mean age of the patients was 62.7 years (range 44–81 yr). Five patients were female and 2 were male. Six patients presented with dyspepsia while 1 presented with bleeding. Mean operative time was 175 minutes (range 75–265 min) but was considerably shorter in those patients in whom endoscopic stapling was used. There were no conversions to open surgery and there were no intraoperative or postoperative complications. Tumour size averaged 3 cm (range 1.4–6 cm). The median length of stay was 4 days (range 3–5 d). The mean follow-up has been 31 months and there has been no evidence of recurrence. Pathological analysis revealed less than 5 mitoses per high-powered field in all specimens. **Conclusion:** Laparoscopic resection of gastric stromal tumours is safe and feasible. Various techniques may be required depending on tumour location.

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MANAGEMENT OF ANAL STRICTURES. J. Freeman, P. Tranqui, D. Trottier, A. Bodurtha. Division of General Surgery, University of Ottawa, Ottawa Hospital — General Site, Ottawa, Ont.

With the advent of newer operations for low rectal malignancies, ulcerative colitis and in certain forms of Crohn's disease, tight, nondilatable ischemic strictures, unresponsive to dilatation, present a challenging problem. We avoided major, reoperative surgery in 12 such patients utilizing Bake's dilators and the Lone Star retractor in the operating room. This provides an excellent view of the small orifice and avoids making false passages. With progressive dilatation, the strictured ring is incised longitudinally in 1 or 2 quadrants, during 1 or 2 settings as judged by clinical and manometric assessment of continence. The incision is either closed transversely or filled with an island flap anoplasty. The scarred stricture base is injected with steroids. Although some of the (pouch) patients were already diverted, diversion has not been necessary in any of the patients. All patients had a complete bowel preparation and were maintained on fluids for several days. They were reassessed and redilated every 6 to 12 weeks under conscious, intravenous sedation in the endoscopy suite. Redilatation was supplemented by further steroid injections using a 15-cm radiologic (CHIBA) needle. This longer needle also facilitates injection of local anesthetic into the stricture, thereby reducing pain during dilatation. Six of 12 required 2 trips to the operating room, where strictureplasties were performed in 2 opposite quadrants on each occasion. At 18-month follow-up, all patients have functioning lumens of 8 to 15 mm, without clinical or manometric incontinence.

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PANCREATIC TRAUMA. A. Sarma, N. Bheerappa, R.A. Sastry. Department of Surgical Gastroenterology, Nizam's Institute Of Medical Sciences, Hyderabad, India

Introduction: Pancreatic trauma occurs in approximately 10% of major abdominal injuries. Nowadays pancreatic injuries are increasing due to increase in road traffic accidents. (The incidence of pancreatic trauma is directly related to population prevalence of road traffic accidents and levels of civilian violence.) Pancreatic injuries continue to challenge the surgeons treating traumatized patients. Owing to the retroperitoneal location of the pancreas and its proximity to major vascular structures, associated injuries play a role in morbidity and mortality.

Aim: To study the pattern of pancreatic injuries and to establish guidelines to treat the patients with pancreatic injuries. **Procedure:** At Nizam's Institute of Medical Sciences 17 cases of pancreatic injury were seen over 12 years. Blunt injury is the commonest mode of injury, commonly seen in a younger age group, people between the age of 20 to 40 years, and in men. Ten cases were operated on, and 7 cases were managed conservatively. Associated complications seen are liver injury in 4 patients, duodenal injury in 1 patient, renal injury in 1, and Colle's fracture, venous gangrene in 1. Drainage procedure was done in 9, resection procedure in 6, necrosectomy in 5. Eight out of 10 operated patients developed complications due to necrosis; viz. pancreatic fistula and intestinal fistula that were managed conservatively. There was no mortality in the present series. **Conclusions:** Early diagnosis and aggressive treatment improve survival and outcome. Computed tomography scan helps in early diagnosis, accurate assessment and judicious resection; adequate drainage will reduce the complications and mortality.

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SURGERY VOLUMES AND GASTRIC CANCER SURVIVAL. C.J. de Gara, J. Hanson, S. Hamilton. Department of Surgery and Department of Epidemiology, The Cross Cancer Institute, University of Alberta, Edmonton, Alta.

Patient outcomes are intimately related to surgery and institution volumes particularly in pancreatic and rectal cancer.

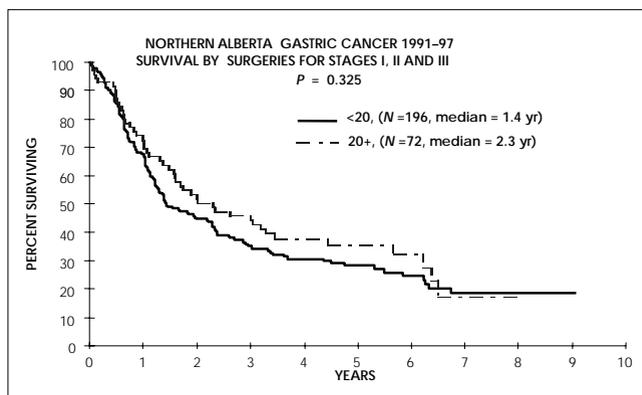
This study aims to determine whether patient survival is affected by the number of gastrectomies for gastric cancer performed by surgeons.

This population-based study utilized the provincial cancer registry, which by law records every case of cancer, associated patient demographics, treatment and overall survival in Alberta.

Between 1991 and 1997 there were 577 new cases of gastric cancer (60% male, mean age 71 ± 13 yr) in northern Alberta (population 1.8 million).

There were 67 patients presenting as stage I (median survival, 77 mo), 55 as stage II (median survival, 75 mo), 155 as stage III (median survival, 12 mo), 235 as stage IV (median survival, 3 mo) and 65 could not be staged (median survival, 4 mo).

Gastrectomy was carried out in 314 (54%), 79.3% in 1 of the 4 University of Alberta, City of Edmonton Hospitals. Surgical volumes ranged from a low of 1 procedure to a maximum of 27 gastrectomies by a single surgeon during the study period. Operative (30 d) mortality was 12.2%.



Kaplan-Meier survival plot comparing the arbitrarily selected more than (4 surgeons) or less than 20 gastrectomies is shown (Fig. 1). Using the cut off of more (12 surgeons and 190 patients) or less than 10 (190 patients) gastrectomies, again no survival difference was detected ($p = 0.64$). Whether it is tumour biology rather than surgical technique, we conclude from these population-based data not prone to selection bias that surgical volume does not influence overall survival in gastric cancer.

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OUTCOMES OF SURGICAL RESECTION AND RADIOFREQUENCY ABLATION FOR LIVER MALIGNANCIES. M.C. Taylor. Department of Surgery, St. Boniface General Hospital, Winnipeg, Man.

The standard treatment for malignant diseases of the liver continues to be surgical resection. Radiofrequency ablation (RFA) destroys tumours with heat applied via needle electrodes inserted directly into the tumour. It has been used to treat malignancies that are not suitable for surgical resection. In order to compare the outcome of patients treated with RFA to those treated with surgical resection, all patients undergoing surgical treatment of liver malignancies have been prospectively entered in a database and followed.

Fifty-eight patients have been operated on for treatment of liver primary and secondary malignancies since October 1996. Forty-six patients had colorectal metastases, 4 had hepatocellular carcinoma and 8 had miscellaneous malignant lesions. Twenty-four patients underwent resection alone, 12 underwent RFA alone and 6 underwent combined resection and RFA for multiple lesions. Sixteen patients underwent laparotomies for attempted resection or RFA but were found to be untreatable at surgery.

Of those who underwent resection alone over 1 year ago, 14 of 17 (82.4%) are alive as are 6 of 9 (66.7%) of those who underwent surgery more than 2 years ago. Of those who underwent RFA (\pm resection) over 1 year ago, 5 of 7 (71.4%) are still alive as are 2 of 4 (50%) of those who underwent RFA more than 2 years ago. Since RFA has been used for patients deemed to be unresectable, early results appear to support the ongoing use of this technology.

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EFFECTS OF ASPHYXIA AND DIFFERENTIAL OXYGEN RESUSCITATION ON INTESTINAL BLOOD

FLOW IN NEONATAL PIGLETS. E. Haase, J. Stevens, V. Rigo, J. Richards, D.L. Bigam, P.-Y. Cheung. Department of Surgery and Department of Pediatrics, University of Alberta Hospitals, Edmonton, Alta.

The objectives of our study were to determine the effects of hypoxia and reoxygenation on superior mesenteric arterial flow, and to compare hypoxia-reoxygenation injury in piglets resuscitated with 21%, 50% or 100% oxygen.

Twenty-four newborn piglets 1 to 3 days old, weighing 1.5 to 2.5 kg were anesthetized and acutely instrumented. Superior mesenteric artery (SMA) blood flow was monitored continuously via a transonic flow probe placed directly around the SMA. Hypoxia (P_{aO_2} between 20 and 40 mm Hg) was induced by decreasing the inspired oxygen concentration to 10% to 15% for 2 hours. Piglets were then reoxygenated for 1 hour with 21%, 50% or 100% oxygen, followed by 3 hours at 21% oxygen. A control group of piglets ($n = 6$) underwent the same experimentation without any period of hypoxia or reoxygenation. Ileal tissue samples were examined for evidence of hypoxia-reoxygenation injury following experimentation. Statistical analysis was done by one-way ANOVA with significance defined by $p < 0.05$.

Moderate asphyxia was achieved in the experimental groups with a decrease in arterial pH to 7.03 to 7.06, and decreased arterial P_{O_2} to 23 to 35 mm Hg ($p < 0.001$ v. controls). SMA blood flow decreased to less than one-third of control values after 2 hours of hypoxia ($p < 0.001$). Upon reoxygenation, SMA flow immediately improved to control values in all 3 experimental groups. Tissue analysis showed gross and microscopic small intestinal necrosis in 2 of 6 piglets in the 100% reoxygenation group, and in 1 of these piglets, frank pneumatosis intestinalis was evident.

Resuscitation of asphyctic newborn piglets with 100% oxygen shows no improvement on intestinal blood flow compared to resuscitation with 21% oxygen. Furthermore, the added oxidative stress as a result of exposure to high oxygen concentrations may contribute to serious intestinal injury. These results may have clinical implication in the prevention of necrotizing enterocolitis in newborn infants with asphyxia.

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NEEDLESCOPIC BILATERAL THORACIC SYMPATHECTOMY. S.E. Burpee, C.M. Schlachta, J. Mamazza, K. Pace, E.C. Poulin. The Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Objective: The purpose of this study was to evaluate the safety and efficacy of needlescopic bilateral thoracic sympathectomy. **Methods:** Thirty-six patients underwent thoracic sympathectomy between 1997 and 2001. Thirty-four had simultaneous bilateral procedures while 2 had a unilateral procedure. Follow-up consisted of a clinical examination at 1 month and a symptom severity and patient satisfaction questionnaire administered from 6 to 32 months postoperatively. The procedure consisted of resecting the sympathetic chain from T2 to T4. The first 4 cases were performed using two 10- to 15-mm incisions and the last 32 were performed using needlescopic instrumentation with 2 3-mm trochars and

1 5-mm trochar per side without the need to collapse the lung. **Results:** Thirty-four patients were operated on for palmar hyperhidrosis while 2 had severe facial blushing. Mean operating time was 93.5 minutes. Estimated blood loss was a median of 10 mL. Three patients had significant intraoperative bleeding (1200, 250 and 200 mL), but there were no transfusion requirements and no conversions. Chest tubes were required in 6 patients: the 3 with intraoperative bleeding, 2 patients had minor parenchymal injuries and 1 patient had a concomitant bullectomy. There were no mortalities. All 36 had resolution of their symptoms with no recurrences. There were no cases of Horner's syndrome or intercostal neuralgia. Compensation was noted in 76% at 1 month and 78.9% at 6 months or more. This was classified as mild by 47%, moderate by 40% and severe by 13%. Only 1 patient reported being dissatisfied by the results, while 95% were very satisfied. **Conclusion:** Needlescopic bilateral thoracic sympathectomy is a safe and efficacious procedure with a high degree of patient satisfaction.

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GASTRIC BYPASS FOR MASSIVE OBESITY (BODY MASS INDEX OVER 70). D.M. Grace, S. Gupta. Department of Surgery, University of Western Ontario and Department of Clinical Nutrition, London Health Sciences Centre, University Campus, London, Ont.

We assessed results of gastric bypass for massive obesity carried out between July 1, 1997, and Apr. 1, 2002. Patients with body mass index (BMI, weight in kg/[height in m]²) over 70 were assessed. Vertical gastric bypass with an isolated pouch, gastrojejunostomy, retrocolic and retrogastric loop, and 75-cm Roux-en-Y was used. Gastrostomy tube and drain were inserted.

During this period 14 of 184 gastric bypass patients met the criteria for massive obesity. There were 7 males and 7 females with a mean age of 34.5 years (range 20–50 yr) and BMI of 79 (range 72–106). Mean weight was 235 kg (range 182–302 kg). Three early patients without gallstones required cholecystectomy after successful weight loss. Two had prior and 9 simultaneous cholecystectomy (4 with gallstones). Eleven of 14 had sleep apnea and 10 used CPAP. Five had severe leg stasis changes with ulceration. Four were diabetic. Five were socially isolated and 2 bed confined. None were able to work.

Experienced anesthesia was needed. Five patients had awake intubation. 6 required 2 or 3 days in the intensive care unit. There were no major operative complications and no postoperative deaths. One leak was controlled by reoperation. One pulmonary embolus occurred in spite of subcutaneous heparin. Average length of stay was 14 days (6–56 d) but 11 stayed 10 days or less. Average weight loss at 1 year was 40% (9 patients) and at 2 years 45% (6 patients). Sleep apnea and diabetes resolved quickly. Improvement in mental state and mobility was remarkable. Late problems included gallstones (3), incisional hernia (3) and stoma ulceration (1).

We conclude that gastric bypass for extreme obesity can be safe and lifesaving. A team including experienced nurses, anesthetists, internists and nutritionists is needed for the care of these challenging patients. Long-term follow up is still necessary.

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CYSTIC TUMOURS OF THE PANCREAS. A. Sarma, N. Bheerappa, P. Radhakrishna, R.A. Sastry. Department of Surgical Gastroenterology, Nizam's Institute of Medical Sciences, Hyderabad, India

Background: Cystic tumours of pancreas are an uncommon entity. Thanks to advancing imaging technology more and more cases are recognized. **Aim:** To present an experience of wide spectrum of cystic tumours of pancreas with reference to their presentation, diagnosis and management. **Methods:** A retrospective analysis of all the cystic tumours of pancreas seen at NIMS, Hyderabad, between 1987 and 1999. Pseudocysts were excluded. **Results:** A total number of 18 cases were seen. There were 6 cystadenomas of which 3 were serous and 3 were mucinous. There were 2 cystadenocarcinomas. Papillary solid cystic neoplasm, a rare entity, was seen in 3 cases. Two were part of multicystic disease, out of which 1 was von Hippel-Lindau's disease with associated pheochromocytoma and cerebellar angioblastoma. Most common surgery done was distal pancreatectomy. Two patients who had cystic tumours in the head required Whipple's procedure. There was no mortality in this series. **Conclusions:** (1) High awareness is essential to diagnose cystic tumours of the pancreas. (2) Possibility of tumours should be borne in mind whenever a pseudocyst is managed. (3) Surgery is the mainstay of treatment.

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MULTIPLE INFARCTIONS IN SICKLE CELL TRAIT: AN UNUSUAL CAUSE OF AN ACUTE ABDOMEN. S. Malik, P. Duffy, P. Schulte, R. Cameron. Department of Surgery, Department of Internal Medicine and Department of Radiology, Regina General Hospital, Regina, Sask.

We report an unusual case of an acute abdomen in an East Indian male patient who was diagnosed with sickle cell trait (SCT). A review of the literature was also conducted. He presented with symptoms of an acute abdomen and was found to have splenic and renal cortical infarctions with no evident precipitating factors. Sickle cell diseases are the commonest genetic disorder of hemoglobin synthesis and usually affect African Americans. Individuals with SCT are for the most part asymptomatic. However, these patients are susceptible to splenic and renal infarctions precipitated by hypoxic events, infection and exposure to high altitudes. We would like to emphasize the role of nonsurgical treatment of a patient with known SCT, presenting with an acute abdomen in the absence of recurrent splenic pain or infarctions, sepsis or abscess, subcapsular hemorrhage and pneumoperitoneum.

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LAPAROSCOPIC VERSUS OPEN DONOR NEPHRECTOMY: A COST-UTILITY ANALYSIS. K.T. Pace, S. Dyer, V. Phan, E. Poulin, C. Schlachta, J. Mamazza, R. Stewart, R.J. Honey. Division of Urology and Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Background: Compared with open donor nephrectomy (OpenDN), laparoscopic donor nephrectomy (LapDN) offers

donors more rapid recovery and recipients equivalent graft function, but LapDN costs remain greater. We compared LapDN and OpenDN with cost-utility analysis. **Methods:** Utilities were assessed with time trade-off techniques, probabilities derived from systematic review of the literature, and costs derived from 27 OpenDN and 34 LapDN patients performed contemporaneously from July 1, 2000, to Dec. 31, 2001. A decision-analytic modelling approach was taken, from a societal perspective; the model included lost employment costs. The incremental cost-effectiveness ratio (ICER) was calculated with "best-" and "worst-case" scenarios for confidence intervals; sensitivity analyses assessed model robustness. **Results:** LapDN costs are lower (\$11 170.71 v. \$12 631.91), while quality of life (QOL) is superior (0.7247 v. 0.6585 QALY), rendering LapDN a dominant strategy. The model was robust to all variables, and LapDN remained dominant from a payer perspective. In a worst-case scenario, the ICER for LapDN was at most \$2231.61 per QALY. **Conclusions:** LapDN offers improved QOL, at lower costs, despite the fact that patients in this analysis included the learning curve of LapDN at our institution. By potentially increasing organ donor rates, LapDN may be further cost saving by decreasing the number of patients on dialysis.

Funding: Departmental and Biomedical Research Grant from the Kidney Foundation of Canada

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METASTATIC BREAST CARCINOID. R. Kanthan, S.C. Kanthan. Department of Pathology and Department of Surgery, Royal University Hospital, University of Saskatchewan, Saskatoon, Sask.

Metastatic tumours of the breast are uncommon. Breast metastases from nonmammary malignant neoplasms are rare, accounting for approximately 2% of all breast tumours.

We report a case of ileal carcinoid tumour metastatic to the breast 8 years after the initial diagnosis. A 53-year-old woman presented to the clinic with a palpable breast lump. The mammogram was nonspecific. A lumpectomy was performed that on frozen section revealed a neoplastic lesion. Permanent sections demonstrated the tumour to be composed of sheets of small uniform cells divided into lobules by delicate vascular septa. Immunohistochemical analysis revealed the lesional cells to be strongly positive to the neuroendocrine marker panel of antibodies: chromogranin A, neuron-specific enolase, synaptophysin, serotonin and low molecular weight keratin. The lesional cells were negative to cytokeratins 7 and 20 (CK7, CK20), estrogen and progesterone receptors (ER, PR), carcinoembryonic antigen (CEA) and Cerb-B2 antibodies. The presence of pleomorphic neurosecretory type granules within the cytoplasm of the tumour cells by ultrastructural analysis strongly suggested a metastatic lesion from a midgut carcinoid. Detailed review of the past medical records confirmed a right hemicolectomy for ileal carcinoid with lymph-node and omental metastases performed elsewhere 8 years ago. Detailed pathological analysis of this lesion by light microscopy, histochemical, immunohistochemical and ultrastructural analysis aided in confirming the metastatic nature of the current breast lesion.

Accurate diagnosis of unusual breast tumours with particular reference to nonmammary metastatic lesions of the breast is important to avoid unnecessary mastectomy and to implement an appropriate systemic therapy.

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SURGERY ABOARD THE LIFELINE EXPRESS — AN INNOVATIVE SURGICAL SOLUTION TO DISABILITY IN THE THIRD WORLD. S. Jayaraman. Department of Surgery, University of Western Ontario, London, Ont.

Poverty, overcrowding and disease are challenges that are faced by all developing nations. As a result, curable disabilities like cleft lip, hearing loss, post-poliomyelitis wound contractures and cataracts often go untreated. In India, the financial barrier to proper medical care is well known. However, India is one of the largest countries in the world, thus providing a geographic barrier as well. As a result, many of India's rural peoples have never seen a physician or surgeon. To overcome this barrier to care an organization — Impact India — has developed an elegant solution to a complex problem: a mobile surgical unit, on a train.

The Lifeline Express uses India's extensive network of railways to deliver surgical care to the most isolated villages and regions. This train is fully equipped with an operating theatre capable of running 3 operations at once. In addition, there are recovery room facilities and autoclaves for instrument sterilization. Using a volunteer surgical team, the Lifeline Express is capable of providing operations for 50 to 60 patients per day. This innovative solution to a very complex problem has improved the quality of life for thousands of people living with curable disabilities. The villagers are so touched by the impact of the train that they have dubbed it the "Magic Train."

As a fourth year medical student, the author travelled to Ghatsila, a remote village in north eastern India. The purpose of this paper is to demonstrate the diversity of problems addressed by the Lifeline Express, to illustrate the volume of cases performed, as well as to raise awareness regarding surgery in the third world.

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SURGICAL CLINICAL RESEARCH IN THE EVIDENCE-BASED-MEDICINE (EBM) ERA: ARE THERE ADEQUATE RANDOMIZED CONTROLLED TRIALS (RCTS)? M.A. Aarts, M.J. Solomon, R.S. McLeod. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

To practise EBM there must be good evidence to guide treatment decisions. RCTs provide the most unbiased source of this information. Historically there have been few, poor-quality surgical RCTs published in the surgical literature.

In order to compare the proportion of RCTs published in 1990 and 2000, 4 surgical journals — *Annals of Surgery*, *Surgery*, *Diseases of the Colon and Rectum* and the *British Journal of Surgery* — were hand-searched, and articles were classified according to design. All RCTs were assessed for quality (on a 10-point scale), methodologic rigor and funding by 2 assessors. Discrepancies were resolved by consensus.

There was no significant increase in the proportion of RCTs

published between 1990 (7.4%, 55/743) and 2000 (8.6%, 59/690) ($p = 0.4$) or in the quality of these studies (1990, 7.4 ± 1.61 ; 2000, 7.31 ± 1.7 , $p = \text{NS}$). RCTs published in 2000 tended to be small (mean number of subjects = 101 ± 95 ; 42% had a sample size of 60 or less), and only 50.8% had sufficient power to justify conclusions. Most did not report a sample-size calculation (75%); 28.8% followed up patients more than 1 year; 13.6% evaluated quality of life. Only 33.9% of studies had funding and only 19% were funded by a peer-reviewed granting agency.

There are still few RCTs published in the surgical literature and most are of relatively poor quality. Thus, more RCTs and increased funding to perform RCTs are needed in order to base surgical decisions on high-quality evidence.

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A MEDICAL LEGAL SURVEY OF CANADIAN GENERAL SURGEONS. S. Ong, D. Pitt,* W. Stephen, J. Latulippe, M. Girotti, S. Bloom. CAGS Medical Legal and Bioethics Committee. *Ottawa Hospital, University of Ottawa, Ottawa, Ont.

In the face of the increasing number of medical legal actions and the rising cost of malpractice insurance, despite great advances in the safety and science of surgery, the CAGS Medical Legal and Bioethics Committee conducted a survey of Canadian general surgeons to gather information about how experienced general surgeons manage patients to prevent legal actions before they get to the Canadian Medical Protective Association (CMPA).

A questionnaire was inserted in the newsletters of the Canadian Association of General Surgeons, the Quebec Association of General Surgeons and the Ontario Association of General Surgeons. General surgeons were asked their age, sex, number of years in practice, province, size of their community, university or community practice, the influence of legal concerns on practice decisions, frequency of CMPA contacts, the number of lawsuits and college complaints against them, what they could have done to avoid their legal problems and what advice they had for young surgeons to avoid legal problems.

Three hundred and thirty-four surgeons replied. The data from the survey have been analyzed and will be presented. The advice from experienced surgeons about how to avoid legal difficulties emphasizes communication skills and appropriate documentation. Our conclusion was that the traditional art of communicating with patients and their families remains a vital component of surgical practice.

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HEALTH-RELATED QUALITY OF LIFE (HRQL) FOLLOWING LAPAROSCOPIC AND OPEN NEPHRECTOMY. K. Pace, S. Dyer, R. Stewart, R.J. Honey, E. Poulin, C. Schlachta, J. Mamazza. Division of Urology and Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Background: Laparoscopic (lap) and open procedures are often compared to demonstrate differences in postoperative recovery but equivalent surgical outcomes. However, postoperative recovery is often assessed with biased parameters, such as

pain and time to return to work. The postoperative recovery scale (PRS) is a validated self-administered questionnaire based on the SF-36 and designed to assess pain, activities of daily living and HRQL in postoperative patients. **Methods:** The PRS was administered prospectively to patients undergoing contemporaneous lap and open radical nephrectomy (with organ-confined, asymptomatic renal cell carcinomas) and donor nephrectomy. All open cases were performed via an extraperitoneal, extrapleural, non-rib-resecting, supra-12 flank incision, while all lap cases were performed transperitoneally. Pre- and postoperatively results were analysed with repeated measures analysis of covariance and survival analysis to compare how quickly patients returned to 75% of preoperative HRQL. **Results:** Seventeen open (12 donor nephrectomy, 5 radical nephrectomy) and 25 lap (22 donor nephrectomy, 3 radical nephrectomy) patients had 3-month follow-up data. Patients were comparable in age (36.9 v. 40.1 yr), gender (8 v. 14 females), body mass index (27.9 v. 26.5) and extraction incision size (7.3 v. 7.4 cm). Operative time was longer in the lap (231 v. 160 min, $p < 0.001$) but hospital stay was shorter (median 3 v. 5 d, $p = 0.010$). HRQL scores were consistently higher for lap patients from postoperative days 3 to 90 (ANCOVA $F(7,26) = 2.734$, $p = 0.010$). Lap patients recovered faster than open patients: median time to return to 75% of preoperative score was 90 versus 42 days for open and lap patients (log rank, $p = 0.0245$). **Discussion:** Application of an objective HRQL instrument confirms that patients undergoing lap nephrectomy recover faster, with a greater HRQL than open nephrectomy patients. The PRS can be applied to patients undergoing other abdominal procedures and may prove useful for comparisons of other minimally-invasive surgical techniques.

Funding: Departmental and Biomedical Research Grant from the Kidney Foundation of Canada

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DOES ESTROGEN AFFECT THE BIOLOGIC BEHAVIOUR OF WELL-DIFFERENTIATED THYROID CANCER? J.C. Furlan, I.B. Rosen. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

This cohort study was undertaken to evaluate biologic behaviour of well-differentiated thyroid cancer (WDTC) among groups with different influences of estrogen.

Among WDTC patients who underwent operation between 1964 and 2000, 427 were randomly selected and divided into 4 groups: (1) males ($n = 86$; ages 9–82 yr, mean = 46 yr); (2) females with history of WDTC growth during pregnancy until 6 months after delivery ($n = 26$; ages 23–54 yr, mean = 34 yr); (3) females in the fertility period (< 45 yr) but no pregnancy in the last 6 months ($n = 164$; ages 18–44 yr, mean = 34 yr); (4) Females presumed menopausal ($n = 151$; ages 45–89 yr, mean = 58 yr) Charts were retrospectively reviewed and data analyzed by χ^2 test or ANOVA. Mean follow-up was 56 months (1–420 mo).

No statistically significant difference was observed comparing the 4 groups regarding tumour size (group I: 20.6 mm; II: 22; III: 20.8; IV: 23.7; $p = 0.458$), tumour multicentricity (I: 37.2%; II: 30.8%; III: 33.5%; IV: 35.8%; $p = 0.901$), tu-

mour invasiveness (I: 8.1%; II: 3.9%; III: 5.5%; IV: 9.9%; $p = 0.424$), node metastases (I: 29.1%; II: 19.2%; III: 22.6%; IV: 23.2%; $p = 0.619$), distant metastases (I: 3.5%; II: 0%; III: 1.2%; IV: 5.3%; $p = 0.150$) and disease recurrence (I: 5.8%; II: 0%; III: 2.4%; IV: 3.3%; $p = 0.393$). All groups were similar regarding extent of thyroidectomy ($p = 0.381$), neck dissection ($p = 0.139$) and adjuvant therapy ($p = 0.787$). Only distribution of WDTC subtypes in each group varied ($p = 0.002$); however, papillary carcinoma was always the most prevalent.

We concluded that estrogen promotes incidence of WDTC but not adverse behaviour militating against antiestrogen therapies. Moreover, estrogen exposure is irrelevant for surgical planning.

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AXILLARY STAGING FOR EARLY INVASIVE BREAST CANCER: A DECISION ANALYSIS. T.K. Asano, P.I. Haigh, R.S. McLeod. Department of Surgery, Mount Sinai Hospital and University Health Network, University of Toronto, Toronto, Ont.

Is axillary lymph-node dissection (ALND) or sentinel node biopsy (SNB) the preferred initial procedure for axillary lymph-node staging for patients with early invasive breast cancer?

Decision analysis with a simple tree structure was used to compare a choice between the 2 procedures: (1) ALND or (2) SNB followed by ALND if the SNB is positive. The base case was considered for women 50 to 69 years old with early invasive breast cancer with a single primary tumour 5 cm or less, clinically negative axillary lymph nodes over a 10-year time horizon. The utilities of chronic lymphedema, axillary recurrence and chemotherapy and the short-term disutility of the ALND and SNB procedures and mortality were considered in the trade-offs between the 2 procedures. Primarily, the probabilities were obtained from meta-analyses and the utilities were obtained from published expert opinion. One way sensitivity analyses were conducted to determine the robustness of the model. The outcome values were expressed in quality-adjusted life years (QALYs).

The model indicated that for the base case scenario, selecting the SNB option would result in 7.65 QALYs whereas the ALND would result in 7.63 QALYs. The 6 quality-adjusted life days difference between the 2 options was not clinically significant and was considered a "toss-up." From one-way sensitivity analyses, if the sensitivity of the SNB was less than 71% (false-negative rate of 11%) or if the utility of lymphedema was greater than 0.99 the analysis would favour ALND.

In a clinical setting when considering 1 of the 2 surgical methods of axillary staging for early invasive breast cancer, individual patient preferences and surgeon experience and personal results with SNB should be considered.

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ISCHEMIC COLITIS PRESENTING AS PANCOLONIC ISCHEMIA — CASE SERIES AND REVIEW OF THE LITERATURE. N. Al Saleh, B. Taylor. London Health Sciences Centre, University of Western Ontario, London, Ont.

Ischemic colitis is the most common form of gastrointestinal is-

chemia. The causes are related to factors that compromise mucosal blood supply, and the diagnosis is often elusive, creating difficulties in management. We will present a case series comprising 3 patients with an atypical pancolonic presentation of ischemic colitis, 2 with acute perforations and abdominal sepsis and 1 with chronic bacteremia from the ulcerated colonic mucosa. We will also compare these 3 patients to the typical cases previously documented in surgical literature. The purpose of this review will be to increase diagnostic suspicion for ischemic colitis in the setting of non-classic patient presentations.

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LAPAROSCOPIC CHOLECYSTECTOMIES: STAFF VERSUS RESIDENT SURGEONS. A.A. Karimuddin, J. Marschall, A. McFadden. Department of Surgery, Royal University Hospital, University of Saskatchewan, Saskatoon, Sask.

Results of 209 laparoscopic cholecystectomies performed by staff surgeons experienced in laparoscopic surgery and by third-, fourth- or fifth-year residents under supervision of a staff surgeon were compiled retrospectively. Elective cases on the waiting list as of January 2000, and completed by March 2002 were used to generate the database. Emergent cases were excluded. Laparoscopic cholecystectomies and laparoscopic cholecystectomies converted to open were included in the study. Operating times, complication rates, conversion rates and hospital stays were compared, using the *t*-test, with significance being achieved with a *p* value of less than 0.05.

Both patient populations were equivalent in gender, age and number/type of previous surgeries. For detailed comparison, please refer to Table 1.

	Staff	Residents	Significant
Operating times (minutes)	44.68	51.27	Yes
Hospital stays (days)	1.26	1.03	No
Converted to open (%)	1.6	2.5	No
Patients with complications (%)	6.2	7.4	No
Patients discharge by postoperative day 1 (%)	64.1	67.9	No

Although residents may have longer operating times in the performance of laparoscopic cholecystectomy, this does not appear to adversely affect patient complications or hospital stay. We feel that this small investment in time is reasonable given the opportunity to train residents.

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CANADIAN ASSOCIATION OF GENERAL SURGEONS' QUESTIONNAIRE ON SURGICAL TRAINING. W.G. Pollett, E. Dicks. Department of Surgery, Memorial University, St. John's, Nfld.

Members of the Canadian Association of General Surgeons were surveyed on location and pattern of practice, and how well their primary fellowship prepared them for their current practice. Questions included demographics, size of community, location of training, whether or not they practised other surgical specialties or subspecialties and where they obtained

training for such practice. **Results:** Over 50% of general surgeons in communities of less than 50 000 practise in other surgical specialties: plastics, obstetrics/gynecology, orthopedics and/or urology. A significant proportion of practitioners obtain the training for these specialties outside the primary fellowship (approximately 40%–75%). With respect to subspecialty practice, over 75% of general surgeons in communities up to 100 000 practice head and neck surgery. Vascular and thoracic surgery is practised infrequently in communities of less than 50 000 with a peak in communities of 50 000 to 100 000. Subspecialty training is more frequent in primary fellowship but 15% to 20% of practitioners obtain their training from senior colleagues after commencing practice. **Conclusions:** General surgeons provide significant subspecialty and other surgical services, particularly in smaller communities. Canadian training programs fail to provide adequate training for many of these services. Community needs vary by size, availability of other specialists and proximity to regional and tertiary centres. If Canadian general surgery programs are to respond to rural and regional surgical needs they should provide appropriate training in other surgical specialties and subspecialties. This would require flexibility in training programs and recruitment to specific communities at an early stage of training.

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MOST CHRONIC ANAL FISSURES RESPOND TO MEDICAL SPHINCTEROTOMY. P. Tranqui, D. Trotter, J. Freeman, A. Bodurtha. Division of General Surgery, University of Ottawa, Ottawa Hospital — General Site, Ottawa, Ont.

The treatment of anal fissure aims to reduce internal sphincter tone and increase anodermal perfusion. Sphincterotomy, while simple and time-tested, has inherent risks, which increase with time and are compounded when patients require other anorectal operations later in life. Topical agents also lower sphincter tone but the effects are reversible. Nitroglycerine (NG) was the first such agent. It is associated with high failure and noncompliance rate and does little for pain. In 3 years, we treated 110 patients with chronic anal fissure, initially with NG and pneumatic dilatation and, subsequently, with nifedipine and Botox. The median follow-up was 43 months. All patients received typed medical instructions. They were followed clinically and with manometry. Medical therapy was successful in all but 2 (both received NG). We have not operated on any patient in the past 24 months. Eighty-nine percent of patients had no pain or a significant improvement. Healing rates were 18% for NG, 65% for pneumatic dilatation with NG and 87% for Botox with nifedipine. Botox achieved a higher healing and lower recurrence rate than dilatation (7% v. 23%). After initial treatment, most patients have persistent, smaller fissures, which are painless with a red base. The dose of Botox is higher (100 Units) than originally described, and it can be safely given up to 3 times. Nifedipine (mixed with 5% Xylocaine ointment) is more effective than NG, associated with fewer side effects and is an excellent supplement to Botox. There have been no instances of clinical or manometric incontinence. Ninety-five percent of patients with chronic anal fissure can be successfully treated with medical sphincterotomy

thereby avoiding the potential lifelong risks of incontinence associated with surgical sphincterotomy.

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POTENTIAL REDUCTION IN PERIOPERATIVE MORTALITY DUE TO REGIONALIZATION OF FIVE MAJOR SURGICAL PROCEDURES TO HIGH-VOLUME HOSPITALS IN ONTARIO. D.R. Urbach, C.M. Bell, P.C. Austin. Department of Surgery, Department of Health Policy Management and Evaluation, Department of Public Health Sciences, and Department of Medicine, University of Toronto, and the Institute for Clinical Evaluative Sciences, Toronto, Ont.

Since perioperative death is uncommon, the benefit of regionalizing complex procedures to high-volume hospitals (HVH) may be exaggerated if volume-outcomes associations are reported as relative risks instead of absolute reductions in the number of postoperative deaths. We sought to estimate the absolute number of lives that potentially could be saved from postoperative death, if all persons having 5 major surgical procedures in Ontario were referred to HVH.

We collected data on all persons who had an esophagectomy ($n = 613$), colon or rectal resection for colorectal cancer ($n = 18\ 805$), pancreaticoduodenectomy ($n = 686$), pulmonary lobectomy or pneumonectomy for lung cancer ($n = 5153$), or repair of unruptured abdominal aortic aneurysm ($n = 6276$) in Ontario from 1994 to 1998. We calculated the excess number of deaths within 30 days of surgery, adjusted for age, sex and comorbidity, for the 75% of persons treated in lower volume hospitals, as compared to the 25% treated in the highest volume quartile of hospitals. Bootstrap methods were used to estimate 95% confidence intervals (CIs).

Among 31 533 persons having any of the 5 procedures, 1336 (4.24%) died within 30 days of surgery. If all persons in Ontario have these procedures in HVH, the number of lives potentially saved from perioperative death per year is 5 (95% CI, 0–11) for esophagectomy, 17 (95% CI, –0.5 to 35) for colon and rectal resection, 6 (95% CI, 1–12) for pancreaticoduodenectomy, 8 (95% CI, –2 to 19) for pulmonary lobectomy or pneumonectomy and 12 (95% CI, 1–24) for repair of abdominal aortic aneurysm.

The potential gain in the number of lives saved from perioperative death due to regionalization of major surgical procedures to HVH in Ontario is modest. Regionalization of major surgical procedures appears more beneficial when volume-outcome associations are expressed as relative risks instead of absolute reductions in mortality.

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PROGNOSTIC FACTORS IN RESECTED PANCREATIC ADENOCARCINOMA: ANALYSIS OF 5-YEAR SURVIVORS. S.P. Cleary, R. Gyfe, P. Greig, L. Smith, R. Mackenzie, S. Strasberg, S. Hanna, B. Taylor, B. Langer, S. Gallinger. Department of Surgery, University of Toronto, Toronto, Ont.

Our objective was to determine the actual 5-year survival rate of patients with pancreatic adenocarcinoma who underwent a resection with curative intent in 5 hospitals within the Univer-

sity of Toronto. We then sought to determine clinical and histopathologic features of 5-year survivors to determine factors associated with a more favourable prognosis.

A retrospective chart review was performed to identify patients who had a surgical resection (Whipple, total or distal pancreatectomy) for pancreatic adenocarcinoma between Jan. 1, 1988, and Dec. 31, 1996.

One hundred and twenty-three patients from 7 surgical practices were identified who had a resection and a pathologic diagnosis of pancreatic adenocarcinoma. The perioperative mortality rate was 4.8%. Mean survival for all patients was 32.8 ± 7.6 months. There were 18 5-year survivors (15.3%) including 4 patients (3.6%) who survived more than 10 years. The survivors included 13 patients with a Whipple resection, 4 with a distal pancreatectomy and 1 with a total pancreatectomy. Four of the long-term survivors died of recurrent pancreatic cancer at 60, 62, 79 and 106 months, and 2 patients died of other causes. Twelve patients are still alive at a mean of 112.6 ± 22.3 months after surgery. In univariate analysis, tumour size less than 2.5 cm, negative lymph nodes, stage I cancers, well-differentiated histology and absence of jaundice were all associated with a significant survival advantage (all $p < 0.05$ by Fisher's exact test). In multivariate Cox proportional hazards modelling, only nodal status, absence of jaundice and tumour size were independently associated with improved survival ($p < 0.05$). The mean survival by nodal status: N0 $41.0\% \pm 12.8\%$ versus N1 $21.8\% \pm 8.8\%$ (hazard ratio 1.60, $p = 0.002$ by log rank). We conclude that pancreatic adenocarcinoma is occasionally curable if identified in its early stages. These, and other similar data, should provide further stimulus for the development and evaluation of novel screening strategies, especially for those subjects with inherited predisposition to the disease.

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REASSESSING THE ROLE OF AXILLARY LYMPH-NODE DISSECTION (ALND) IN EARLY-STAGE BREAST CANCER. J. Marschall, P. Nechala, R. Chibbar, P. Colquhoun. Department of Surgery and Department of Pathology, Royal University Hospital, University of Saskatchewan, Sask., and Department of Surgery, Cleveland Clinic Florida, Weston, Fla.

The aim of the study was to assess the impact of lymph-node status in assigning systemic adjuvant therapy to patients with early-stage breast cancer.

All stage I/II breast cancer patients treated in Saskatoon between Jan. 1, 1998, and Dec. 31, 2000, were identified. Data collected included: patient age, sex, tumour size, hormone receptor status, nuclear grade, presence of lymphovascular invasion (LVI) and axillary lymph-node status. Patients were categorized as high risk for recurrence based on a primary tumour size of more than 1 cm or the presence of nodal metastases. Intermediate risk was assigned to patients with 1 or 2 poor prognostic factors (histologic grade 3/3, estrogen receptor negative or presence of LVI). The influence of nodal status on subsequent therapies was determined assuming all patients with high and intermediate risk of recurrence would receive chemotherapy.

Altogether, 328 patients with stage I /II breast cancers and

all prognostic factors available for analysis were identified. Ninety-five patients (29%) were lymph-node positive and 237 (72%) had tumours more than 1 cm, fulfilling criteria for systemic therapy. Using the presence of 1 or 2 poor prognostic factors as sufficient criteria to assign chemotherapy, 261 patients (80%) and 246 patients (75%) respectively, would be assigned chemotherapy based on primary tumour characteristics alone. Excluding patients 70 years of age or more as candidates for chemotherapy, only 53 patients (16%) required ALND to guide adjuvant therapy.

For most patients, nodal status has little influence on subsequent management. Adoption of a selective approach to ALND could avoid the potential morbidities of this procedure in many patients with early-stage breast cancer.

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N,O-CARBOXYMETHYL CHITOSAN (NOCC) REDUCES ADHESION FORMATION AND REFORMATION. J. Zhou, T.D.G. Lee. Department of Surgery, Faculty of Medicine, Dalhousie University, Halifax, NS

This study assessed the efficacy of NOCC in rabbit models of adhesion formation and reformation after abdominal surgery. For adhesion formation, the large bowel and cecum were injured by abrasion and the sidewall was injured by removing a piece (3 × 5 cm) of transverse abdominal muscle. Nine rabbits per group were randomly assigned to be either treated with NOCC or left as untreated controls. After 14 days adhesion incidence and severity were assessed in a blinded fashion. For adhesion reformation, the primary surgery was as for the control above. Then a second laparotomy was performed 20 days after the primary surgery. Adhesions from the primary surgery was recorded and then lysed. Rabbits were then randomly assigned to a treatment or nontreatment group. Adhesion reformation was assessed 14 days after second laparotomy. In the adhesion formation experiment, the control group showed 100% incidence of adhesion formation. In 7 of 9 animals the entire sidewall injury was involved. In contrast, only 3 of 9 animals treated with NOCC showed adhesions. All the controls adhesions were severe (> 50%) whereas only 1 rabbit in the NOCC treated group showed a severe adhesion. In the reformation experiment, all the animals developed severe adhesions after primary surgery. After adhesiolysis, 8/9 control animals showed 100% adhesion reformation. In contrast, only 1 NOCC treated animal showed severe adhesion reformation after adhesiolysis and 6/9 animals did not have any adhesion reformation. These data show that NOCC is capable of reducing the initial adhesion formation and the reformation of adhesions after adhesiolysis, and may provide scope for future effective therapy limiting the mortality and morbidity of adhesive disease.

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MATRIX METALLOPROTEINASES IN PERIAMPULLARY TUMOURS: DO ELEVATED LEVELS AFFECT PATIENT OUTCOME? A.T. Meneghetti, G.J. McKenna, D. Owen, C.H. Scudamore, R.M. McMaster, S.W. Chung. Department of Surgery, Department of Pathology and Department of Medical Genetics, Vancouver General Hospital, University of British Columbia, Vancouver, BC

The purpose of this study was to determine whether elevated levels of matrix metalloproteinases (MMPs) in relation to corresponding levels of tissue inhibitors of metalloproteinases (TIMPs) (i.e., MMP/TIMP ratio) in tissue samples taken from patients with periampullary tumours is associated with a more aggressive tumour and thus a worse prognosis.

A 2-year prospective study was conducted, involving 16 patients with periampullary tumours. Specimens were taken from the tumour and lymph nodes of these patients and the messenger RNA expression of MMPs that degrade type IV collagen in the basement membrane (i.e., MMP2, MMP7, MMP9) along with their associated inhibitors (TIMP2, TIMP1) were evaluated. Ratios of MMP2/TIMP2, MMP7/TIMP1, MMP9/TIMP1, MMP(7+9)/TIMP1 were then calculated. The 16 patients were then monitored through follow-up appointments with the specialist and family physician involved in their care.

Tumour specimens were obtained from 12 of the 16 patients. Patients still alive (6): 4 had MMP2/TIMP2 less than 5.0; 2 had MMP2/TIMP2 more than 5.0. Patients deceased (6): 5 had MMP2/TIMP2 more than 5.0; 1 had MMP2/TIMP2 less than 5.0 ($p = 0.24$). Lymph-node specimens were obtained from 15 of the 16 patients. Patients still alive (7): 4 had MMP2/TIMP2 less than 1.5; 3 had MMP2/TIMP2 more than 1.5. Patients deceased (8): all 8 patients had MMP2/TIMP2 more than 1.5 ($p = 0.02$). No correlation was found for MMP7/TIMP1, MMP9/TIMP1, MMP(7+9)/TIMP1.

Patients with elevated MMP2/TIMP2 levels in their lymph nodes had an overall worse prognosis. There was no correlation found between the other MMP/TIMP ratios and patient outcome. Certain matrix metalloproteinases may be useful prognostic indicators in periampullary tumours.

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EMPIRIC ANTIMICROBIAL THERAPY IN CRITICAL ILLNESS: A PHYSICIAN SURVEY. M.A. Aarts, J. Granton, D.J. Cook, J.M.A. Bohnen, J.C. Marshall. Department of Surgery, University of Toronto, Toronto, Ont., and McMaster University, Hamilton, Ont.

Antibiotics are among the most commonly prescribed medications in the ICU. Therapy is often initiated empirically; however, patterns of practice are not well characterized. We probed approaches to empiric antibiotic therapy among a group of surgeons.

A scenario-based questionnaire was sent to members of the Surgical Infection Society. Three cases addressed approaches to a patient with pyrexia and leukocytosis, in whom cultures and investigations were negative while on broad-spectrum antibiotics; a fourth assessed the use of vancomycin for line infection.

The 113 respondents were primarily surgeons (95.6%) who attended in an ICU (71.7%) and had a university-based practice (92.0%); 81 (76.1%) were from the United States. Average length of time in practice was 14 ± 7.5 years. While 62.5% or respondents considered overuse of antibiotics to be a problem in their own ICU, only 18.9% identified inadequate treatment of infection as a concern.

Faced with a febrile patient with negative cultures on antibi-

otics, estimates of the likelihood of infection increased across the 3 scenarios as the degree of organ failure increased ($p < 0.0001$, Wilcoxon sign rank test). Evidence of deteriorating organ function predicted a decision to broaden empiric therapy (58.4% v. 32.7%, $p < 0.0001$), rather than stop antibiotics and re-culture (15.0% v. 51.3%, $p < 0.0001$), and in particular, to initiate antifungal therapy (27.4% v. 8.8%, $p < 0.0001$). There was great variability in the physician's most likely management strategy, across the 3 scenarios, even with the patient with the greatest degree of organ dysfunction, 58.4% of physicians would likely add or change empiric therapy whereas 30.1% would not. For each case 23 to 25 different antibiotic combinations were selected as the therapy of choice. For suspected central venous catheter infection, 45.1% of respondents would initiate empiric vancomycin, whereas 54.9% would not. Variability in approach was not explained by country, academic rank or whether the physician practised critical care.

Clinical deterioration, reflected in worsening organ function, is a potent determinant of a decision to increase empiric antibiotic therapy in critical illness. However, there is substantial variability in approach, suggesting a state of clinical equipoise that would justify more rigorous evaluation of the utility of contrasting approaches in a randomized controlled trial.

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COLORECTAL CANCER (CRC) SCREENING: DO WE PRACTISE WHAT WE PREACH? P. Colquhoun, E. Weiss, J. Efron, J. Nogueras, A. Vernava, S. Wexner. Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, Fla.

The aim of this study was to determine screening compliance in colorectal surgeons (CRS) assumed to be well educated and informed of the risks of CRC.

A postal survey of members of the American Society of Colon and Rectal Surgeons (ASCRS).

Eleven hundred and ninety-five were surveyed of whom 302 responded (25%). One hundred percent of respondents indicated they advocate CRC screening. 298/299 (99%) respondents support screening of baseline risk patients at age 50 or less. Colonoscopy (CS) every 10 years (67%) and annual fecal occult blood testing (FOBT) (57%) were the most common strategies advocated to individuals with baseline risk. CS every 5 years and FOBT were the most common strategies advocated to patients with a family history of polyps (77% and 46%) and cancer (94% and 42%), respectively. CRS indicated sensitivity and specificity to be the most important factors when choosing their own CRC screening strategy. 163/294 (55%) respondents report having undergone screening. 129/130 (99%) of the remaining CRS reported that they planned to undergo screening. 96/111 (85%) respondents who were 50 or older reported they had undergone screening: CS every 5 years (65%) and FOBT (53%) were the most common screening undergone. 75/160 (47%) respondents who had undergone screening were being screened with more than 1 test. 31/118 (26%) CRS who have not had screening plan to undergo screening using more than 1 test. 25/57 (47%) CRS older than 50 with baseline risk had screening before the age of 50. 67/180 (37%) respondents who were less than 50 years old had undergone screening. CS every 5 years (65%)

and FOBT (37%) were the most common forms of screening undergone by respondents less than 50. 22/66 (33%) CRS who were less than 50 had undergone screening using more than 1 test.

CRC screening compliance is high amongst ASCRS members. These rates may be the result of heightened awareness of the risks of CRC. Improved compliance may come at the expense of an overindulgence in screening.

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LAPAROSCOPIC ADRENALECTOMY: PATHOLOGY DETERMINES OUTCOMES. E.C. Poulin, C.M. Schlachta, S.E. Burpee, K.T. Pace, J. Mamazza. The Centre for Minimally Invasive Surgery, Department of Surgery, St. Michael's Hospital and the University of Toronto, Toronto, Ont.

Objective: To evaluate the outcomes of laparoscopic adrenalectomy in patients assigned in the 3 groups most often seen clinically: Bilateral adrenalectomy for Cushing's disease (group I), pheochromocytoma (group II) and unilateral adrenalectomy for nonpheochromocytoma patients (group III). **Summary background data:** The differential outcomes of laparoscopic adrenalectomy are not well described. **Methods:** Review of a longitudinal database of 72 consecutive cases of laparoscopic adrenalectomy between 1997 and 2001. **Results:** Patients in group I tended to be older (49 yr) and heavier (87 kg) ($p < 0.05$). They had a longer operation (255 min) ($p < 0.05$), more postoperative complications (15%) and a longer postoperative stay (4 d) ($p < 0.05$). Patients in group II had intermediate outcomes with operating time (198 min), complication rate (8.3%) and hospital stay (3 d) ($p < 0.05$). However, they had more intraoperative blood loss (150 mL). Group III had the best outcomes with the shortest operative time (125 min) ($p < 0.05$), least blood loss (50 mL) ($p < 0.05$), fewer complications (6%) and shortest hospital stay (2 d) ($p < 0.05$). **Conclusions:** Despite the fact that outcomes of laparoscopic adrenalectomy are uniformly good, patients can be divided into groups that have different expected outcomes, largely based on the underlying pathology. Patients requiring a unilateral adrenalectomy except for pheochromocytoma have the best recorded outcomes. Surgeons transferring to laparoscopic adrenalectomy would benefit from selecting patients in Group III during their learning curve.

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LYMPH-NODE SAMPLING IN THE MANAGEMENT OF WELL-DIFFERENTIATED THYROID CARCINOMAS. I.B. Rosen, J.C. Furlan. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

This retrospective study was performed in order to evaluate the role of lymph-node sampling (LNS) for well-differentiated thyroid cancer outcome.

From 1971 to 2000, 315 patients who underwent thyroidectomy for well-differentiated thyroid cancer without clinically detected node metastasis were randomly selected for LNS or no node sampling (NNS). Data were analyzed by χ^2 and Student's *t* tests.

There were 254 females and 61 males aged 9 to 89 years

with mean of 46 years. LNS ($n = 217$) and NNS ($n = 98$) groups were statistically similar regarding age ($p = 0.21$), gender ($p = 0.44$) and histopathology ($p = 0.48$). LNS patients had 5 resected nodes on average. Bilateral thyroidectomy ($p < 0.01$) and radioactive iodine ($p < 0.01$) were more frequent in the LNS group. After a mean follow-up of 45 months, there was no significant difference between both groups regarding distant metastasis ($p = 0.78$), recurrence ($p = 0.59$) and post-operative elevated thyroglobulin ($p = 0.85$). There was neither cause-specific death nor morbidity. LNS group demonstrated neck metastasis in 15% (33 of 217) of whom 3 showed recurrence who underwent modified neck dissection.

We concluded that LNS (1) did not influence survival, (2) removes additional 15% of cancer, (3) provides basis for recurrence surveillance, (4) improves reliability of risk analysis schemes, (5) indicates need (3 of 33) or lack of need (30 of 33) for neck dissection, (6) permits intraoperative recognition of significant metastatic lymphadenectomy, (7) and may suggest other factor assessment in poor treatment outcome.

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THE IMPACT OF EPIDURAL VERSUS INTRAVENOUS ANALGESIA IN OPEN BARIATRIC SURGERY. R. Charghi, T. Schricker, S. Backman, F. Rouah, N.V. Christou. Section of Bariatric Surgery, Division of General Surgery, Department of Anesthesia and Department of Biostatistics, McGill University Health Centre, Montreal, Que.

We tested the hypothesis that epidural analgesia will diminish the length of stay of patients undergoing open bariatric surgery by providing superior postoperative pain control and early mobilization. We retrospectively reviewed the charts and the Bariatric Surgery Database of 86 patients undergoing a standardized Roux-en-Y gastric bypass between Nov. 1, 1999, and Nov. 1, 2001. The PCA group, $n = 40$, received intravenous analgesia (loading dose followed by self-administered morphine via pump). The epidural group, $n = 46$, received morphine or bupivacaine/fentanyl via epidural catheter placed in the operating room. Pain control and postoperative care was managed by standard protocol. See the data analysis follows:

	PCA group	Epidural group	<i>p</i> value
Number	40	46	
Men/women	13/27	8/38	
Age (yr)	39 ± 11	38 ± 9	0.83
BMI (kg/m ²)	53 ± 7	52 ± 8	0.08
Surgery time (min)	86 ± 15	88 ± 26	0.96
Time in OR (min)	128 ± 18	150 ± 39	0.01
Step-down unit (h)	26 ± 14	22 ± 10	0.25
Time to ambulation (h)	37 ± 17	36 ± 14	0.48
Hospital stay (h)	130 ± 46	115 ± 17	0.19
Wound infection	6 (15%)	18 (39%)	0.01

Mean pain VAS scores at rest were similar in all patients throughout the study. The incidence of pruritus was the same in both groups (~18%). The length of stay was unaffected by the epidural analgesia. The wound infection rate was significantly higher in the epidural group. Logistic regression analysis showed that the epidural group had a 3.6 higher odds ratio

to develop a wound infection unaffected by gender, age, body mass index, duration of surgery, incidence of diabetes or type of antibiotic prophylaxis. We conclude that epidural analgesia has no benefit over intravenous (PCA) analgesia in open bariatric surgery; it prolongs the total time in the operating room and may actually be harmful.

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THE EFFECT OF TRAUMA ON PLASMA OXIDATIVE HOMEOSTASIS. A. Obayan, R. Keith, B.H.J. Jurulink. Department of Surgery and Department of Anatomy and Cell Biology, University of Saskatchewan, Saskatoon, Sask.

A prospective study of 120 patients over 7 months aimed at understanding the effect of trauma (a common cause of oxidative stress) on the production of free radicals, free radical effect (protein carbonyl) and the antioxidant reserve in the plasma. This study may provide a basis for prophylactic antioxidant therapy in trauma patients.

Entry criteria for the study included all multiply injured patients over 15 years of age seen at the Royal University Hospital, Saskatoon (a regional trauma unit) between April and September 2000. The study involved measuring changes in antioxidant reserve using the ferric reducing ability (FRAP) assay, changes in free radical production using the novel oxidant assay and changes in protein carbonyl using Levine's method.

A 30% decline in the antioxidant reserve from the basal levels within 6 hours of trauma, maximum decline at 24 hours and slight recovery but not up to basal levels after 7 days was observed. The oxidant levels were quite high on admission with a 25% decline within 6 to 12 hours and a maximum rise between 12 and 18 hours followed by another decline over the next 7 days. The protein carbonyl levels were highest on admission followed by significant decline within 6 to 12 hours and a subsequent rise at about 18 hours and then a fall. There was a similarity in the pattern of changes in the plasma oxidant levels and plasma protein carbonyl levels.

We conclude that trauma results in increased free radical production leading to protein degradation, antioxidant depletion and subsequent oxidative stress. We suggest that early introduction of antioxidant therapy in trauma patients will decrease the tendency to develop complications of oxidative stress and improve outcome.

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CD8⁺ T LYMPHOCYTES MEDIATE ALLOGRAFT VASCULOPATHY THROUGH DIRECT CYTOLYTIC AND INDIRECT EFFECTOR MECHANISMS. A.I. Skaro, R.S. Liwski, J. Zhou, T.D.G. Lee, G.M. Hirsch. Department of Surgery and Department of Microbiology and Immunology, Dalhousie University, Halifax, NS

Allograft vasculopathy (AV) has emerged as a major obstacle to long-term heart-transplant survival. The molecular mechanisms involved remain unclear. We demonstrated that CD8⁺ cytotoxic T lymphocytes (CTLs) mediate AV in the absence of CD4⁺ T cells and other lymphocytes. We examined the role of CD8⁺ effector (direct and indirect) mechanisms in AV by em-

ploying adoptive transfer experiments. C3H donor aortas were transplanted into immune-deficient B6 Rag-1^{-/-} recipients, subsequently reconstituted with CD8⁺ CTLs from knockout (KO) B6 mice with targeted deletions for specific cytotoxic molecules (perforin and Fas-Ligand; *FasL*). Both major pathways of cytotoxicity were interrupted simultaneously using an aortic allograft from a Fas-deficient donor and CTLs from perforin-deficient (*ppf*) mice. Indirect effector function was evaluated using a graft from class I MHC-deficient donor mice and wildtype (*wt*) CD8⁺ CTL. CD8⁺ T cells induced AV despite the blockade of either *ppf* or *FasL*. However, when both major pathways of direct CTL activity are blocked in vivo there is a reduction in intimal hyperplasia ($p < 0.05$). Interestingly, CD8⁺ CTLs were able to generate AV in aortic allografts from MHC I-deficient mice, although the degree of intimal hyperplasia was less than *wt* allografts ($p < 0.044$). These data indicate that direct cytolytic mechanisms contribute to the generation of AV. CD8⁺ CTL-mediated AV does occur independently of direct CTL activity via indirect effector mechanisms. This study emphasizes the important role of CD8⁺ CTLs in AV and their resistance to conventional immunosuppression and co-stimulatory blockade might explain the limited efficacy of current transplant pharmacotherapy. Interventions which address CD8⁺ T cell effector function might provide scope for future effective treatment.

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25% ALBUMIN PREVENTS LUNG INJURY BY SUPPRESSING CHEMOKINE EXPRESSION AND ADHESIVE INTERACTION BETWEEN NEUTROPHILS AND THE ENDOTHELIUM. K.A. Powers, R.G. Khadaroo, G. Papia, A. Kapus, O.D. Rotstein. Department of Surgery, University of Toronto, Toronto General Hospital, University Health Network, Toronto, Ont.

Neutrophil (PMN) sequestration in the lung is a hallmark of acute respiratory distress syndrome (ARDS). We have shown that 25% albumin (A25) resuscitation attenuates lung injury after hemorrhagic shock and lipopolysaccharide (LPS) by reducing lung leukosequestration. We hypothesize that this protective property is mediated by alteration of neutrophil-endothelial cell adhesive interactions and/or altered chemotactic stimulus from the cytokine-induced neutrophil chemoattractant (CINC). Rats were bled to a mean arterial pressure (MAP) of 40 mm Hg, and maintained in shock for 1 hour, then resuscitated with either shed blood (SB) and an equal volume of Ringer's lactate (RL) or with SB plus 25% of their SB volume of A25. One hour after resuscitation, LPS (30 µg/kg) or saline was given intratracheally. At various time points blood was collected and immunostained with anti-CD11b or anti-L-selectin antibodies. PMN surface expression of these molecules was evaluated by flow cytometry. At 4 hours following LPS lungs were harvested and whole-lung CINC and ICAM-1 mRNA expression was assessed by Northern blotting.

Resuscitation with A25 significantly attenuated the increase in PMN CD11b expression observed in RL resuscitated animals at end resuscitation and at 4 hours post LPS (Table 1, control was normalized to 100%). While PMN L-selectin levels remained stable in RL treated animals, A25 resuscitation

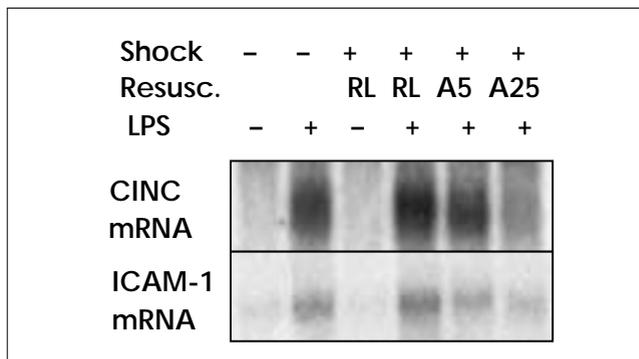
resulted in a significant decrease in surface L-selectin expression at 4 hours post LPS (Table 1). The lung endothelial cell mRNA for ICAM-1, an important ligand for CD11b, was increased in RL-resuscitated animals. This effect was inhibited by 61% ($n = 4$, $*p < 0.05$, Fig.1) in A25 animals. Further, A25 suppressed the augmented CINC mRNA expression induced by RL resuscitation by 72% ($n = 4$, $*p < 0.05$, Fig.1).

A25 resuscitation following shock exerts its lung protective activity at various levels, including altering the interaction between PMNs and endothelial cells via suppressed expression of adhesion molecules. It also downregulates the PMN chemoattractant CINC. These findings suggest a novel role for resuscitation with A25 as an anti-inflammatory agent in PMN-mediated disease processes ensuing from ischemia/reperfusion injury.

Table 1

Mean Channel Fluorescence (% of Control ± SEM)				
Adhesion molecule	Resus fluid	Pre-shock control	1 h post shock	4 h post LPS
L-selectin	RL	100%	127.8 ± 15.6%*	61.5 ± 5.2%*
	A25	100%	30.9 ± 2.5%†	31.3 ± 0.8%†
CD11b	RL	100%	187.5 ± 10.7%**	135.9 ± 6.9%**
	A25	100%	77.6 ± 3.5%†	108.8 ± 2.5%†

* $p < 0.05$ v. A25 (t-test)
† $p < 0.05$ v. sham (paired t-test)



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RELEVANCE OF VASCULAR INVASION IN PAPILLARY AND FOLLICULAR THYROID CARCINOMAS WITH REGARD TO TREATMENT AND PROGNOSIS. J.C. Furlan, I.B. Rosen. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

The purpose of this retrospective study was to evaluate clinical relevance of vascular invasion and its implications for treatment of the papillary (PTC) and follicular (FTC) thyroid carcinomas.

From a university-hospital database, 358 patients who underwent thyroidectomy for PTC or FTC were randomly selected and divided into 2 groups based on presence or absence of vascular invasion for cancer behaviour. Data were statistically analyzed by χ^2 and Fisher's exact tests.

Study population consisted of 289 females and 69 males age 18 to 89 years with mean of 44 years. Mean follow-up was 48 months. PTC ($n = 308$ or 86%) was more frequent than FTC. Most patients showed no vascular invasion ($n = 323$ or 90%).

The results demonstrated no significant differences between both groups for: overall distant metastasis rate ($p = 0.39$), overall recurrence rate ($p = 0.67$), PTC distant metastasis rate ($p = 0.42$), PTC recurrence rate ($p = 0.97$), FTC distant metastasis rate ($p = 1$), and FTC recurrence rate ($p = 1$). There was no cause-specific death. Treatment was essentially similar for both groups.

Our experience indicates that vascular invasion in PTC and FTC does not adversely influence local recurrence or distant metastasis rates. PTC and FTC vascular invasion shows no outcome variation in treatment. Vascular invasion is a postoperative pathological finding that does not justify an ominous prognosis or drastic therapeutic measure. Other biologic factors must be sought in thyroid malignancy to explain lack of conventional vascular invasion influence usually seen in cancer behaviour.

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RECEPTOR STATUS IN BREAST CANCER: FAMILIAL VERSUS SPORADIC AND THE IMPLICATIONS FOR ANTESTROGEN CHEMOPREVENTION. A.F.C. Stratford, R.L. George, L. VanManen. Kingston Familial Oncology Unit, Kingston Regional Cancer Centre, Kingston, Ont.

The NSABP chemoprevention trial showed an overall reduction in the incidence of breast cancer among women taking tamoxifen. There was no reduction in the number of estrogen receptor (ER) negative tumours. This study looks at the incidence of ER negative tumours among women at familial risk for breast cancer, in an effort to identify those who may benefit from antestrogen chemoprevention strategies.

A prospective database from the Familial Oncology Unit in Kingston identified 126 women with breast cancer and familial risk sufficient to meet criteria for genetic counselling. A control group of 108 sporadic nonfamilial breast cancer patients was prospectively collected from referrals to the Breast Site Group at the Kingston Regional Cancer Centre. Age at diagnosis, receptor status and family history were recorded. Parametric data was analyzed with the Student's *t*-test, non-parametric by χ^2 and Fisher's exact test. Odds ratios were calculated with 95% confidence intervals.

Fifteen familial and 7 sporadic patients were excluded from analysis, as their receptor status could not be verified, leaving 111 and 101 patients in each group. The familial patients were more likely to have an ER negative tumour (OR = 3.80, confidence interval $1.96 < OR < 7.45$, $p < 0.001$), and present at a younger age (mean 49 v. 58.5 yr, $p = 0.001$). Premenopausal women (age 45 yr or younger) from the familial group showed the strongest tendency towards ER negative cancers (OR = 13.72, confidence interval $2.6 < OR < 112$, $p < 0.001$). Peri- and postmenopausal women in BOTH familial and sporadic groups showed a trend toward ER positive tumours.

ER negative tumours predominate among young women (≤ 45 yr) with significant familial risk. Chemoprevention with antestrogen strategies would be unlikely to significantly reduce the number of cancers among this group. Peri- and postmenopausal women with significant familial risk of breast cancer have a greater incidence of ER-positive tumours (approaching that of the sporadic group), and would be more likely to benefit from antestrogen therapy.

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PATIENT-BASED OUTCOMES AFTER LAPAROSCOPIC TREATMENT FOR ACHALASIA. D.R. Klassen, L.S. Feldman, S. Mayrand, L. Mercier, D. Stanbridge, G.M. Fried. Department of Surgery, McGill University, Montreal, Que.

Achalasia is an uncommon condition resulting in progressive dysphagia, weight loss and diminishing quality of life. We have used laparoscopic Heller myotomy with Dor fundoplication as the preferred surgical management. The goal of surgery is to relieve symptoms and improve quality of life. Since October 1999, 23 patients (12 male and 11 female, age range 21–77 yr, median 46 yr) have undergone a uniform procedure consisting of 7 to 9 cm laparoscopic anterior myotomy of the distal esophagus and gastric cardia with a Dor anterior hemifundoplication. All patients were evaluated prospectively before and after surgery. Data collected included the SF-12 (general physical and mental health status), symptom score (4-point Likert scale) to assess the typical achalasia-specific symptoms of dysphagia, regurgitation, chest pain, and heartburn (0 = none, 1 = mild, 2 = moderate, 3 = severe), weight change, and patients' satisfaction regarding their disease (6 point scale: 0 = very satisfied, 1 = satisfied, 2 = neutral, 3 = dissatisfied, 4 = very dissatisfied, 5 = incapacitated).

Median follow-up is 6 months (range 0–24 mo). Preoperative and latest postoperative data (mean \pm SD) were compared by *t*-test for paired data. $p \leq 0.05$ was considered significant (denoted by *).

	SF-12		SF-12						
	Physical	Mental	Dysphagia	Regurg.	Ch Pain	Heart B	Wt. (kg)	Satisfn	
Preop	50 \pm 6	48 \pm 10	2.5 \pm 0.6	2.0 \pm 1.0	1.5 \pm 1.0	1.2 \pm 1.1	68.2 \pm 13.1	3.3 \pm 1.2	
Postop	51 \pm 6	56 \pm 7*	0.7 \pm 1.0*	0.4 \pm 0.6*	0.3 \pm 0.5*	0.9 \pm 0.9	71 \pm 12.5	0.9 \pm 1.0*	

Patients undergoing laparoscopic Heller myotomy and Dor fundoplication experience significant improvement in symptoms, mental quality of life and satisfaction with their condition. Weight and physical quality of life increase, but not significantly.

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TREATMENT WITH ANTI-ICOS ANTIBODY AND SIROLIMUS LEADS TO PROLONGED ISLET ALLOGRAFT SURVIVAL. S.A. Nanji, W.W. Hancock, C. Anderson, A.M.J. Shapiro. Department of Surgery and Surgical-Medical Research Institute, University of Alberta, Edmonton, Alta.

The objective of this study was to determine if co-stimulatory blockade of the novel inducible co-stimulatory molecule (ICOS) on the T cell with its ligand B7RP-1 on the antigen presenting cell, using a specific anti-ICOS antibody (Ab), could lead to prolongation of islet allograft survival, either alone or in combination with temporary immunosuppression.

Islet allografts were transplanted under the renal capsule of fully MHC-mismatched recipient mice, rendered diabetic by streptozotocin (200 mg/kg). Five transplant groups were studied: (1) no therapy, (2) anti-ICOS Ab (0.1 mg/d) alone, (3) anti-ICOS Ab (0.1 mg/d) combined with cyclosporin (10mg/kg/d), (4) anti-ICOS Ab (0.1 mg/d) combined with

sirolimus (0.2 mg/kg/d), and (5) sirolimus (0.2 mg/kg/d) alone. All agents were given intraperitoneally for 14 days post-transplant then discontinued. Serum glucose levels in mice were monitored for evidence of allograft rejection.

The median duration of graft survival posttransplant was 14 days for no therapy, 13 days for anti-ICOS Ab alone and 16 days for anti-ICOS Ab with cyclosporin. Median rejection for mice treated with anti-ICOS Ab with sirolimus was 39 days, with half the mice demonstrating prolonged allograft survival (> 120 d). Nephrectomies of graft-bearing kidneys at more than 100 days in mice with extended graft survival resulted in diabetes, confirming the functionality of the islet allograft. Log rank comparisons of graft survival among groups revealed that mice treated with anti-ICOS Ab combined with sirolimus had significantly improved survival when compared to mice given no therapy ($p = 0.0002$), anti-ICOS Ab alone ($p = 0.0002$) or anti-ICOS Ab and cyclosporin ($p = 0.0009$). At present, control mice (i.e., sirolimus alone) for the anti-ICOS Ab with sirolimus group are ongoing.

These data indicate that treatment with anti-ICOS antibody, combined with a brief course of sirolimus, leads to prolonged islet allograft survival in a murine model, without the need for chronic immunosuppression.

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DIFFUSE SPASTIC GASTROINTESTINAL MOTILITY DISORDER — A POTENTIALLY LIFE-THREATENING VARIANT OF IRRITABLE BOWEL SYNDROME.

A. Butter, L. Martins, B. Taylor. Division of General Surgery, University of Western Ontario, London, Ont.

Irritable bowel syndrome is a common usually mild disorder affecting colonic motility in 2 million Canadians. We believe that we have seen the effects of a much more serious motility disorder manifested initially by severe constipation, then constipation with spuriously diarrhea, and finally the development of upper gastrointestinal symptoms from esophageal dysmotility, delayed gastric emptying and altered small bowel transit. One hundred and twenty (120) patients are currently being followed, and over the past 12 years, over 50 have been managed surgically with at least colectomy and ileostomy for severe refractory symptoms and most have experienced significant relief from the chronic constipation and abdominal pain. However, in some patients the upper GI symptoms are refractory to conservative treatment, and some have required tube feeding or intravenous alimentation. Of major concern is that 5 patients have died suddenly during exacerbations of this syndrome — 1 from air embolism from an accidentally disconnected central line, 1 from aspiration and 3 from unknown causes. All of these patients with this severe spastic gastrointestinal motility disorder are female, and most are less than 50 years of age. No common historical etiologic factor has been found. We will discuss the nature of this motility disorder and discuss our current results. We believe that this diffuse spastic motility disorder has not been previously recognized and that physicians and surgeons must be aware of this disorder in young women.

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RETROSPECTIVE REVIEW OF 243 MAJOR HE-

PATIC RESECTIONS: INDICATIONS, MORBIDITY AND MORTALITY. M.C. Ott, K. Rycroft, W.J. Wall. Division of General Surgery, London Health Sciences Centre, University of Western Ontario, London, Ont.

A retrospective review was undertaken to determine the indications for major hepatic resection, and analyze the morbidity and mortality of the procedure. Two hundred and forty-three consecutive hepatic resections performed between 1986 and 2001 were included in the analysis. One hundred and sixty-six (68%) resections were for malignant lesions and 77 (32%) were for benign lesions. The most common malignant indication was metastatic colorectal cancer ($n = 115$). The most common benign indication was hemangioma ($n = 19$). Resection was performed for living related donation in 18 patients. The most common resection performed was a right hepatic lobectomy (41%). Overall mortality was 0.82% (2 cases). Overall morbidity was 9.8% with the most common complication being atelectasis. The procedure with the highest morbidity was an extended right hepatic lobectomy (22%). Morbidity for living related donors was slightly higher (16%) but less severe, and length of stay and transfusion requirements were less. A trend of increasing morbidity with increasing age was observed. Increased morbidity and mortality was observed in the group of resections for malignancy compared to resections for benign disease. Previous cardiovascular disease increased morbidity, but respiratory disease did not significantly alter outcomes. Perioperative transfusion was required in 38% of the resections. There was no significant difference in transfusion rates based on year of resection or technique (cavitron use or none). There was a reduction in length of stay over the 15-year period from 14.3 to 8.0 days. Major hepatic resection can be performed with acceptably low mortality and morbidity, even in older age groups.

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LAPAROSCOPIC HELLER MYOTOMY: AN ANTIREFLUX PROCEDURE IS NOT A PREREQUISITE. S.E. Burpee, C.M. Schlachta, J. Mamazza, K. Pace, E.C. Poulin. Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Objective: To review the results of laparoscopic Heller myotomy without a concurrent antireflux procedure. **Methods:** A prospectively collected database was used to compile and analyze 57 cases of laparoscopic Heller myotomy. The procedures were performed at a university teaching hospital between November 1997 and September 2001. Minimal hiatal dissection was performed to preserve the integrity of the phrenoesophageal membrane and intraoperative endoscopy was used to accurately identify the gastroesophageal junction thereby avoiding injury to the gastric sling fibres. Follow-up data were obtained via office charts and a telephone questionnaire. **Results:** Fifty-seven patients underwent laparoscopic Heller myotomy. Six patients had concomitant antireflux procedures (4 Toupet, 2 Dor). Mean operating time was 115 minutes. There were no conversions. Mean length of stay was 1.9 days. Reoperation was required in 2 patients for inadequate myotomy (8 and 18 months postoperatively). Fifty-five patients (95%) reported excellent outcomes. Ten patients

(17%) reported symptoms of heartburn requiring medication. **Conclusion:** Laparoscopic Heller myotomy is an effective procedure for achalasia. The laparoscopic approach combined with endoscopy can provide the means to perform an adequate esophageal myotomy while simultaneously preserving most of the natural antireflux mechanisms thus eliminating the need for a routine concurrent antireflux procedure.

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WAITING LIST MANAGEMENT IN GENERAL SURGERY. M.C. Taylor. Department of Surgery, St. Boniface General Hospital, Winnipeg, Man.

The Western Canada Waiting List Project was initiated to develop instruments for prioritization of patients awaiting medical services. Five panels were assembled addressing the areas of hip and knee replacement, cataracts, pediatric mental health, MRI and general surgery. The general surgery panel developed an instrument (PCS) for use in all patients that general surgeons operate on. Initial validity testing was carried out by 13 surgeons in 3 cities on 561 patients. PCS score was compared to the surgeon's estimate of urgency on a visual analogue scale (VAS). R^2 using VAS as dependent variable = 53%. Reliability testing was done on taped hypothetical patient scenarios, yielding an inter-rater agreement with VAS, ICC = 0.83. Three criteria on the PCS had ICC more than 0.75. Intrarater test-retest agreement was high, with an ICC = 0.92.

Pilot testing of the form at 2 Winnipeg hospitals on 444 patients was done between January and May 2001. Urgency was determined using the PCS, VAS and surgeon's estimate of maximum acceptable waiting time. The correlation between the PCS and the VAS score was 0.67, and the correlation between the PCS and the maximum acceptable waiting time was -0.49. For both hospitals, virtually all surgery was carried out within the surgeon's estimate of maximum acceptable waiting time. Future plans for this instrument involve assessing its validity and reliability for vascular surgery patients, and assessing the impact of waiting on health-related quality of life for patients of varying levels of severity.

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WHAT IS THE TRUE INCIDENCE AND CLINICAL IMPLICATIONS OF SURGICAL SITE INFECTIONS (SSI) IN OPEN BARIATRIC SURGERY? N.V. Christou, J. Jarand, J.L. Sylvestre, A.P.H. McLean. Section of

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The incidence of wound infections in open bariatric surgery is reported as low as 1% (International Bariatric Surgery Registry) and as high as 10% (general literature). We maintain our own prospective Bariatric Surgery Outcomes Database, which records all complications including wound infections. A query of the database for the last 5 years returned 116 wound infections in 680 patients or a rate of 17%. In order to confirm this high incidence of wound infections following open bariatric surgery at our centre, we asked a trained infection control practitioner (J.J.) to independently audit the charts of patients operated from Apr. 1 to Dec. 31, 2001. Chart audits were supplemented with patient interviews and follow-up in the bariatric clinic as needed. Risk categories were obtained using the National Nosocomial Infection Surveillance (NNIS) definitions and stratification. Expected site-specific rates are adjusted for duration of operation, degree of wound contamination (wound class) and underlying disease condition (ASA) of the patient. Ninety-five patients undergoing a standardized open Roux-en-Y gastric bypass were studied. Over 90% received ticarcillin/clavulanic acid 3.1 g intravenously with induction of anesthesia as antibiotic prophylaxis against a wound infection.

Risk index	No. of operations	MUHC no. of SSI	Expected no. of SSI	MUHC SSI rate	NNIS SSI rate (all gastric surgery)
0	35	11	0.89	31.4%	2.56%
1	59	19	2.68	32.2%	4.55%
2	1	0	0.09	0	9.71%
Total	95	30	3.7	31.6%	
Expected: no. of operations times the NNIS rate divided by 100					

The most common bacteria were α -hemolytic streptococcus (37%), *Staphylococcus aureus* (26%), *Proteus mirabilis* (11%), *Bacteroides fragilis*, *Propionibacterium* (each 7%) and *Escherichia coli*, *Enterococcus* and *Klebsiella* (each 4%). All wounds responded to partial opening and packing (20% received oral antibiotics). There was a high correlation (0.86) between wound infection and subsequent incisional hernia formation. We conclude that the true incidence of wound infections following open bariatric surgery is underreported and that these infections carry significant morbidity. ■

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MINIMALLY INVASIVE THYMECTOMY FOR MYASTHENIA GRAVIS: A 5-YEAR SINGLE-INSTITUTION EXPERIENCE. A. Behzadi, L. Tan, H. Unruh. Section of Thoracic Surgery, University of Manitoba, Winnipeg, Man.

Transcervical thymectomy (TCT) is a minimally invasive approach to resection of thymus gland, which has gained popularity in the past decade as part of the treatment of myasthenia gravis (MG). The purpose of our study was to review our experience with this innovative approach and identify its benefits and shortfalls compared to the standard transsternal thymectomy (TST). We retrospectively reviewed the charts of all the patients who underwent thymectomy at Health Sciences Centre over the period of 5 years (1996–2000 inclusive). The clinical information was collected using clinic and hospital charts. When required, patients were contacted by phone. The severity of MG was determined preoperatively and postoperatively using Modified Osserman Score. Patients' characteristics and responses to the treatment were compared between those who underwent the minimally invasive approach (TCT group) and those who underwent the standard approach (TST group).

Thirty-two patients underwent thymectomy for MG, 19 had TCT and 13 had TST. All patients showed moderate but significant ($p < 0.05$) improvement after surgery regardless of the type of the operation. Patients who underwent TCT had an average length of hospital stay of 2.7 days with significantly decreased postoperative score ($p < 0.01$) while still requiring medical therapy. The TST group had the same overall response postoperatively but their average length of hospital stay was 13.9 days. Major postoperative complications occurred in 16% of TCT patients and 39% of TST patients.

In our experience, the minimally invasive approach to thymectomy is as effective as the standard approach, with the added benefit of shorter hospital stay and lesser morbidity. The overall partial response to the combined medical and surgical approach demonstrates the lack of definitive treatment for this disabling disease.

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SYMPTOMS, ACID EXPOSURE AND MOTILITY IN

PATIENTS WITH BARRETT'S ESOPHAGUS. M.G. Brandt, G.E. Darling, L. Miller. University of Toronto, Toronto, Ont.

The purpose of this study was to investigate whether individuals with Barrett's esophagus subjectively experience fewer symptoms or symptoms of decreased severity despite sustaining greater acid exposure than individuals with gastroesophageal reflux disease but without Barrett's.

A retrospective chart review of patients with gastroesophageal reflux disease (GERD) was conducted. To be included, patients were required to have undergone an esophagogastrosopy, motility and 24-hour pH study. Of those patients having undergone these tests, 58 patients (29 male, 29 female) were identified with documented GERD based on an abnormal 24-hour pH study (DeMeester score) of whom 21 patients (14 male, 7 female) were found to have histologically confirmed Barrett's esophagus.

The results suggest that individuals with Barrett's esophagus experience significantly less severe symptoms ($p < 0.01$) as well as fewer symptoms ($p < 0.01$) than those individuals with GERD. Those individuals with Barrett's esophagus also had a greater degree of acid exposure as identified by higher DeMeester scores ($p < 0.01$), longer episodes of acid exposure ($p < 0.09$), a greater number of prolonged episodes (> 5 min) of acid exposure ($p < 0.01$), and an increased percentage of time that their pH was less than 4 ($p < 0.08$).

For individuals with Barrett's esophagus, the columnar epithelium may serve a protective function in guarding against the experience of symptoms. However, because of a lack of symptoms, patients with Barrett's may not seek medical attention and this may have implications in terms of surveillance.

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IS THERE A ROLE FOR INDUCTION CHEMOTHERAPY FOR LARGE (> 5 CM) EARLY STAGE NON-SMALL CELL LUNG CANCER? A.J.E. Seely, D.E. Maziak, D. Gunning, M.T. Do, M. Bukhari, F.M. Shamji. Division of Thoracic Surgery, Ottawa Hospital, University of Ottawa, Ottawa, Ont.

Given high rates of locoregional and systemic recurrence with

large early stage non-small cell lung cancer (NSCLC), the role of induction chemotherapy prior to complete surgical resection merits evaluation.

Seventeen patients (September 1998–October 2001) with large (> 5 cm) early stage tumours were selected to receive induction chemotherapy; all patients had negative mediastinoscopy and negative metastatic work-up (clinical TNM: T2N0-1M0). All but 1 patient received 2 or more cycles (mean \pm SD: 2.3 ± 0.7) of platinum based preoperative chemotherapy (cisplatin/vinorelbine in 94%) beginning 35 ± 19 days after presentation. Patients then underwent complete surgical resection by standard lobectomy ($n = 6$), extended lobectomy ($n = 7$, including arterioplasty, extrapleural dissection or diaphragm resection), standard pneumonectomy ($n = 3$) or sleeve pneumonectomy ($n = 1$). The interval between presentation and resection was 3.9 ± 1.4 months.

Three patients (18%) suffered serious complications from induction chemotherapy, which were severe dehydration, pulmonary embolus and febrile neutropenia. Intraoperative complication was seen in 4 patients (24%) in the form of bleeding more than 500 cc. Postoperative morbidity included pneumonia ($n = 3$), persistent air leak more than 7 d ($n = 3$), and myocardial infarction, ileus, urinary retention, (all $n = 1$). Mean length of hospitalization was 8.3 ± 3.2 days. A single patient (sleeve pneumonectomy) died within 30 days of operation of refractory respiratory failure.

Following induction therapy, 15 (88%) patients had objective radiologic response, 11 patients (65%) had partial pathologic response, and 11 patients (65%) had no evidence of lymph-node spread (N0) on final pathology. Treatment failure has been observed in 4 patients (24%), with local recurrence in 1 and systemic spread in 3, following a median interval of 10.3 ± 11.9 months. Median follow-up for all patients without evidence of recurrence was 17.0 ± 10.9 months.

Induction chemotherapy of large early stage NSCLC prior to complete surgical resection is associated with favourable radiologic and pathologic response with acceptable perioperative morbidity.

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THE RISK OF RIGHT PNEUMONECTOMY. A. Abdu-rahman, G. Darling, R. Ginsberg, M. Johnston, T. Waddell, S. Keshavjee. University of Toronto, Toronto, Ont.

The purpose of our study was to compare the morbidity and mortality of right versus left pneumonectomy in our institution.

A retrospective chart review of all pneumonectomies performed during the period 1990 to 2000, excluding pleuro-pneumonectomy for mesothelioma, completion, carinal and donor pneumonectomy.

There were 187 pneumonectomies: 119 left, 68 right. Our primary study endpoint was in-hospital death due to complications of surgery. There were 11 deaths: 4/119 (3.3%) left, 7/68 (10.3%) right: $p = 0.10$. When the cause of death was examined, we found that 5 deaths were attributable to bronchopleural fistula (BPF) and its subsequent complications. There was a higher risk of BPF on the right: 9/68 (13.2%) versus left: 6/119 (5.0%) $p = 0.05$. The mortality associated with BPF was 1/6 (16%) left versus 4/9 (44%) right. Other causes of death were (1 each of) ARDS, pulmonary embolus, pneu-

monia, coagulopathy, acute myocardial infarction and ventricular fibrillation. Because of a previous report of increased mortality in right pneumonectomy after induction therapy, mortality was reanalyzed excluding 31 patients who had received preoperative induction therapy. With these patients excluded (1 death each from ARDS, pneumonia and MI), there were 8 deaths: 3 left (3.0%) and 5 right (10.6%), $p = 0.11$.

Right pneumonectomies were more likely to require an intrapericardial or other extended dissection ($p = 0.003$) and were more often hand sutured ($p < 0.0001$) and buttressed ($p < 0.0001$). Hand-sewn closure was also associated with BPF, $p < 0.0001$. Although there was no difference between right and left with respect to stage, patients having right pneumonectomies were more likely to have had induction treatment ($p = 0.05$).

By univariate analysis, factors associated with an increased mortality were: BPF ($p < 0.0001$), hand-sewn closure ($p = 0.001$) and a history of smoking ($p = 0.01$), but by multivariate analysis, the most important factors were BPF (OR 64.4; 95% CL 6.8–604.5) and postoperative complications excluding BPF (OR 8.5; 95% CL 0.9–78.5). Right-sided pneumonectomy was also associated with an increased odds ratio for death (2.45; 95% CL 0.6–9.99) but this was not statistically significant in the multivariate analysis.

Our results demonstrate that right pneumonectomy is associated with a higher mortality rate even in the absence of induction therapy and this is primarily related to the increased risk of, and mortality from, BPF on the right side. The increased number of BPFs on the right may be attributable to more extensive resections as suggested by the finding of more intrapericardial dissections and hand-sewn closures. We did not find that preoperative comorbidity or pulmonary function testing were predictive of mortality and there were no primary respiratory deaths in the patients not treated with induction therapy.

Addressing technical factors that contribute to early BPF may reduce the mortality.

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THE EPIDEMIOLOGY OF THORACIC TRAUMA. G. Cuccarolo, T. Charyk-Stewart, K. Inaba, R. Malthaner, D. Gray, M. Girotti. Department of Trauma, London Health Sciences Centre, London, Ont.

The epidemiology of chest trauma has not been well documented. A comprehensive review of chest injuries in trauma patients at 13 lead trauma hospitals in Ontario from 1994 to 1998 was therefore undertaken.

The Ontario Trauma Registry was used to obtain data on the demographics, etiology, injury profile, management and outcome of patients more than 16 years old, with an ISS more than 12, sustaining chest injuries between January 1994 and December 1998. A descriptive assessment of thoracic trauma during this 5-year period was carried out.

Of the 12 856 traumatized patients treated during this time, 41% sustained blunt and 3% penetrating injury to the chest. Compared to patients with blunt chest injuries, patients with penetrating injuries were younger, predominantly male and had a lower ISS. These patients had a higher mortality and significantly more died within the first 24 hours of admission. Survivors of penetrating injuries had a shorter ICU and total length of stay with better functional outcome as docu-

mented by the Functional Independence Measure with a significantly higher rate of discharge home and less reliance on home care, rehabilitation and chronic care facilities. Blunt chest trauma was caused by motor vehicle collisions (77%), falls (13%) and suicide/assault (3%). The most common bluntly injured structure was the rib cage followed by lung, then heart and great vessels. In penetrating injuries, the lung was followed by the heart and great vessels. Patients with penetrating injuries had a higher rate of operative management with an ER thoracotomy rate of 6%. Nearly all penetrating patients had tube thoracostomy while a third of blunt patients had tube placement at the referral hospital and another third at the trauma centre.

Chest injuries remain a common component of multisystem injury complexes and a large target area for penetrating injury. Although both heavily impact injury severity, penetrating and blunt chest injured patients retain distinct injury profiles and outcomes.

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DETECTION OF LUNG CANCER IN ASYMPTOMATIC PATIENTS USING ULTRAFAST COMPUTED TOMOGRAPHY. S.C. Grondin, S.M. Tutton, M.J. Sichelau, C. Pozdol, T.J. McDonough, G.A. Masters, D.W. Ray, M.J. Liptay. Thoracic Oncology Program, Evanston Northwestern Healthcare, Northwestern University, Evanston, Ill.

Ultrafast computed tomography (UCT) is a validated screening test for the detection of coronary artery disease (CAD) that includes images of the lungs. Since risk factors for CAD and lung cancer (LC) are similar, we reasoned that UCT may also detect undiagnosed LC.

From December 1999 through December 2001 we obtained UCT of asymptomatic patients who were either self-referred (60%) or referred by their primary care doctor (40%). Six-millimetre (mm) images of the lung and 3-mm images of the heart were obtained. Abnormal lung findings were followed-up with conventional computed tomography.

Three hundred and twenty (199 male: 121 female) patients (mean age 53 yr/range 30–72 yr) underwent UCT. Patient risk factors for LC included emphysema (9) and smoking (285) (mean pack years 24/range 0.5–105). No lung nodules were seen in 280/320 patients (88%), while 36 noncalcified nodules 2 to 10 mm were found in 36/320 patients (11%). These nodules were followed at 3- to 60-month intervals depending on the characteristics of the nodule. Of these 36 nodules, 2 increased in size and were resected (typical carcinoid tumour [1]/stage IA LC [1]). Four patients (1%) had nodules more than 10 mm (average 15 mm/range 10–25 mm) which were resected (stage IA [3]/stage IB [1]).

UCT identified early stage LC in approximately 2% of patients. While UCT has been proven useful in detecting CAD, it may also have the added benefit of screening for curable LC in higher risk patients. ■