

## **ABSTRACTS**

of presentations to  
the Annual Meetings of the

Canadian Society  
of Colon and Rectal  
Surgeons

Canadian Association  
of General Surgeons

Canadian Association  
of Thoracic Surgeons

## **RÉSUMÉS**

des communications présentées  
aux congrès annuels de la

Société canadienne  
des chirurgiens du côlon  
et du rectum

Association canadienne  
des chirurgiens généraux

Association canadienne  
des chirurgiens thoraciques

## **CANADIAN SURGERY FORUM**

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# Canadian Surgery Forum 2004 Forum canadien de chirurgie 2004

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

**1**  
**BC RECTAL CANCER PROJECT UPDATE, MAY 2004.** P.T. Phang and the Colorectal Cancer Site Working Group, Surgical Oncology Network, BC Cancer Agency, University of British Columbia, Vancouver, BC

After an educational program, BC surgeons began submission of outcome data for rectal cancer patients in October 2003. Here, we present an update on adherence to the recommended management protocol.

47 rectal cancer patients have been submitted to the prospective database. Assessment of completeness of data collection is pending receipt of quarterly listings of all rectal cancer patients from hospital medical records.

- Preoperative imaging: chest x-ray 87%, CT 96%, endorectal US 45%, MRI 38%, abdominal US 4.3%.
- Preoperative radiation given in 7/13 stage 1, 1/1 stage 2, 7/19 stage 3, and 0/3 stage 4; unknown stage 2/7.
- Preoperative chemoradiation given in 0/13 stage 1, 0/1 stage 2, 8/19 stage 3, 2/3 stage 4, unknown stage 1/7.
- Preoperative chemotherapy given in 6/13 stage 1, 0/1 stage 2, 4/19 stage 3, 1/3 stage 4, unknown stage 4/7.
- Postoperative radiation given in 0/12 stage 1, 3/11 stage 2, 1/18 stage 3, 0/3 stage 4.
- Postoperative chemotherapy given in 1/12 stage 1, 0/11 stage 2, 5/18 stage 3, 0/3 stage 4.
- Pathology: Average number of lymph nodes 10 (0–31). Radial margin assessments R0 77%, R1 8.5%, R2 4.3%, no margin reported 11%. TME specimen assessments grade 1, 6%; grade 2, 49%; grade 3, 11%; not reported, 34%.

We conclude that: (1) Preoperative imaging is improved for use of CT but suboptimal for use of endorectal US and MRI. (2) Adjuvant preoperative radiation and postoperative chemotherapy use is suboptimal and inappropriate in a number of cases. (3) Pathology reporting needs improvement for number of lymph nodes, radial margin assessment, and TME specimen grade. (4) Quality of surgical resection seems improved from high negative radial margin rate but is uncertain due to high rate of incomplete TME specimen grade reporting.

**2**  
**LONG-TERM FOLLOW-UP OF A RANDOMIZED, CONTROLLED TRIAL OF INTERNAL SPHINCTEROTOMY VERSUS TOPICAL NITROGLYCERIN IN THE TREATMENT OF CHRONIC ANAL FISSURE.**

C.J. Brown, C. Bergerone, B. O'Connor, C.S. Richard, R. Gregoire, E.A. Plewes, R. Silverman, C. Burul, D. Buie, R. Reznick, T. Ross, M. Burnstein, R.S. McLeod. Canadian Colorectal Surgical Trials Group, Toronto, Ont.

Although there is enthusiasm for nonoperative management of anal fissures, most trials have been of short duration (6–8 wk), and long-term outcome is unknown. Thus, the purpose of this study was to assess long-term outcome in 2 cohorts of patients who had participated in a randomized controlled trial (RCT) to compare the effectiveness of topical nitroglycerin to internal sphincterotomy in the treatment of chronic anal fissure.

Between February 1997 and October 1998, 82 patients with chronic anal fissure were accrued and randomized to either 0.25% nitroglycerin ointment tid (NTG) or lateral internal sphincterotomy (LIS). A telephone survey of trial participants was conducted in March 2004. Patient satisfaction, symptom recurrence and the need for further medical and/or surgical treatments were assessed.

To date, 10 patients have been surveyed (5 NTG, 5 LIS). Three of the 5 NTG patients surveyed have required lateral internal sphincterotomy since the study was completed. However, ongoing follow-up is being undertaken and will be discussed further.

Preliminary results of the long term follow-up suggest that LIS is a more durable treatment for chronic anal fissure compared with topical nitroglycerin therapy, but further follow-up is required.

**3**  
**PRIMARY LYMPHOMA OF THE COLON AND RECTUM: THE SOUTHERN ALBERTA EXPERIENCE.** C.N. Ming-Lum, W.D. Buie, A.R. MacLean. Department of Surgery, Foothills Medical Centre, University of Calgary, Calgary, Alta.

The purpose of this study was to evaluate the prevalence and clinicopathological features of colorectal lymphoma in Southern Alberta and to compare our findings with published literature.

A retrospective analysis of the records of histologically diagnosed cases of large bowel lymphoma from the Tom Baker Cancer Centre Registry was conducted. Data extracted included patient demographics, clinical presentation, diagnosis, location of tumours, pathology, treatment modalities and survival.

There were 20 cases of large bowel lymphoma identified. A

male-to-female ratio of 2:1 was observed. The most common presenting signs and symptoms were abdominal pain (70%), abdominal mass (35%), fever (25%), obstruction (25%) and change in bowel habit (25%). The most frequent site of involvement was the cecum (50%). Histologically, 18 (90%) were classified as high-grade, and 2 (10%) as intermediate-grade-to-low-grade lymphoma. According to the International NHL Prognostic Index (IPI), 17 cases (85%) were classified as low risk, 2 (10%) as low intermediate risk, and 1 (5%) as high intermediate risk. Surgical resection and adjuvant chemotherapy was the most common course of management (80%). Median follow-up was 46 months. Eleven patients were followed out to 3 years. The 3-year disease-free survival was 57%. The 3-year overall survival rate was 45%.

Primary colonic lymphoma is an uncommon entity. It occurs most commonly in men and typically presents as a painful abdominal mass. The primary tumour is usually of high histological grade and is most commonly found in the cecum. Primary surgery with adjuvant chemotherapy is the most common form of treatment.

#### 4 UNUSUAL FOREIGN BODY EXTRACTION FROM THE RECTUM. S. Yeretsian. Clinique Médec-Aide, Montréal, Que.

For esoteric reasons and with the complicity of his friend, a 26-year-old man had introduced a key shaped instrument in his rectum. The device measured 15 cm long and had a 5-cm triangular-shaped head.

This foreign body was extracted automatically, without prior thinking about the steps to be taken for the extraction of the object. In order to comprehend each step of the extraction, a paper was rolled into a cylindrical form, representing the bowel, a hole was punctured and the key was introduced in it. Then each step of the introduction of the key was repeated during the introduction of the key by the patient, and the phases of the extraction by the surgeon were interpreted.

Considering that this foreign body was extracted automatically, without thinking about all the steps of the procedure, an important question could be raised: what is the significance of the reflexive actions taken by a surgeon during an operation? Could we rely, always, solely on our reflexes while we operate on a patient? What goes to our mind when we encounter an unexpected situation?

In a well known situation, based to our experience, we perform surgical procedure without hesitation and without thinking. But when we encounter an unusual situation, we stop operating in order to find an effective and harmless solution.

#### 5 CLOSED BLOODLESS HEMORRHOIDECTOMY: A NEW TECHNIQUE IN PROCTOLOGY. S. Yeretsian. Clinique Médec-Aide, Montréal, Que.

It is commonly taught that emergency hemorrhoidectomy is best handled with conservative therapy.

Theoretically, the complications of thromboembolism and portal pyema are feared. The purpose of this study was to perform acute hemorrhoidectomy safely by using this novel technique.

Under local anesthesia (xylocaine 1%), without intravenous sedation, retractor or speculum, a crile is placed at the perianal skin outside the mucocutaneous junction, opposite each primary cushion. A gentle traction is exercised on the forceps, and eversion of the hemorrhoidal complex is obtained. A modified crile is applied at the base of the internal hemorrhoid; then, with catgut chromic No. 2-0, a running suture is passed under the crile from the anal to the perianal skin. Then the knife is applied at the concave aspect of the forceps and excision of the internal hemorrhoid mass is performed. Following this, the crile is applied at the base of the external hemorrhoid by encroaching on the first row of sutures which was used to secure the internal hemorrhoid. A running suture is performed from the tip of the modified forceps till the end of its jaws. The knife is applied at the concave aspect of the forceps for the excision of the external hemorrhoid, resulting in a homogeneous linear surgical wound. Hemostasis is secured before excision, to avoid bleeding and electrocautery.

A few minor complications were observed, such as anal fissure, urinary retention, local infection and, in 1 case, late hemorrhage. This was dealt with conservative treatment. No life-threatening complications were encountered.

By applying this novel technique, emergency (acute) hemorrhoidectomy could be executed without delay, safely, as an office procedure.

US Patent No. 6688312

#### 6 OUTCOMES OF RESECTION OF LOCALLY RECURRENT RECTAL CANCER. B.J. Wells, M.A. Ko, J. Wunder, C.J. Swallow. Department of Surgical Oncology, Princess Margaret Hospital and Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Locally recurrent rectal cancer is a devastating problem for the patient and a difficult challenge for the treating physician. A decision to proceed with resection should be based on the predicted outcomes. Our objective was to describe the patient and tumour variables, and oncologic outcomes, of patients undergoing resection of locally recurrent adenocarcinoma of the rectum in our centre. We undertook a retrospective review of patients who underwent resection of a local recurrence between January 1998 and August 2003. Only patients with a prior R0 or R1 resection were included. Patient demographics, tumour features, treatment, date and site of re-recurrence and date of death were recorded. Follow-up was complete. A total of 24 patients had resection, 20 of whom had isolated local recurrence. Fifteen patients were female and 9 male. Median age ( $n = 24$ ) was 61 (range 36–78) years; in the 4 patients with cancer at a distant site who underwent resection of local disease, median age was 42. Procedures were 8 LAR, 2 APR, 3 posterior pelvic exenteration (PE), 8 total PE and 3 other. In addition, 11 patients had an *en bloc* sacrectomy, and 13 had flap reconstruction. In-hospital and 30-day mortality were 0. Half of the patients experienced at least 1 major complication in the early postoperative period. Median overall ( $n = 24$ ) and disease-free ( $n = 20$ ) survival were 40 and 21 months, respectively. Overall 5-year survival was 22%. Despite a high incidence of significant morbidity, resection of locally recurrent rectal cancer is safe in carefully selected patients. The long-

term oncologic outcomes mandate careful consideration of resection in this patient population.

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**THE EFFECT OF NEOADJUVANT AND ADJUVANT THERAPY ON LATE RECURRENCE OF RECTAL CANCER.** H. Cox, W.D. Buie, J.A. Heine, D. Jenken, D.R.E. Johnson, W. Rosen, A.R. MacLean. Department of Surgery, University of Calgary, Calgary, Alta.

The purpose of this study was to determine the effect of adjuvant chemoradiation on the rates and timing of local and systemic recurrence following radical resection for cure of rectal cancer.

A retrospective chart review of all patients with rectal cancer operated on by 6 colorectal surgeons at 3 hospitals in Calgary from 1990 to 2002 was carried out. All patients underwent curative resection of a rectal adenocarcinoma. Exclusion criteria included metastatic disease, transanal excision and re-excision of recurrent disease. Data extracted from the charts included patient demographics, surgical procedures, tumour pathology, adjuvant chemoradiation, complications, local and distal recurrence.

Three-hundred and forty patients underwent curative resection for rectal cancer during the study period. There were 208 males (61.2%), with a mean age of 67 years. Eighty-five percent had low anterior resections, while 15% had abdominoperineal resections. T stage distribution was T1 53, T2 112, T3 156, T4 19. Adjuvant chemoradiation was used in 177 patients. Mean follow-up was 35.6 months (range 1–76 mo). Local recurrence occurred in 13 patients (3.8%), while 39 patients (11.5%) had distal recurrence. Following adjuvant chemoradiation, 3 of 6 local recurrences (50%) were late (> 3 yr), while only 1 of 7 patients (14.3%) without adjuvant therapy suffered a late recurrence.

Local recurrence in this series was low. While the numbers are small, local recurrence appears to be delayed by adjuvant chemoradiation. Patients who undergo adjuvant treatment may benefit from close follow-up for a longer period of time.

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**DID TME RATES IN BC INCREASE FROM 1996 TO 2000: ASSESSING OPERATIVE REPORTS?** P.T. Phang, J.F.M. Oosthuizen. BC Cancer Agency, University of British Columbia, Vancouver, BC

Total mesorectal excision (TME) has been shown to significantly decrease the local recurrence rate for rectal cancer when combined with adjuvant therapy and has been advocated in BC since Heald's visit to UBC in 1991. Because local recurrence rates for rectal cancer were higher in a review for BC rectal cancer outcomes in 1996 relative to published outcomes, we question whether TME was being performed as the preferred technique for rectal cancer excision in 1996.

We compared the rates of TME performed in 1996 and 2000 by assessing operative reports to determine the type of surgery performed. These rectal cancer cases have been identified previously during review of pathology reports for 1996 and 2000. OR reports available on the BCCA database were reviewed to determine whether TME was performed or not performed by seeking key phrases within the text of the report.

A larger proportion of the cases from 2000 had reports available on the database than those from 1996: 35% versus 20%. Twenty percent of the 2000 cases were deemed to satisfy the criteria for TME performance, whereas no cases from 1996 fulfilled the criteria.

We conclude that key phrases were not recorded in operative reporting to indicate that TME was the method of rectal cancer resection in BC in 1996. Operating room reports in the year 2000 had improved content of TME key phrases. We need to educate surgeons on key phrases of operating room reporting and/or adopt an operating room reporting synoptic template in order to increase the likelihood that TME is being performed as the preferred surgical technique of rectal cancer excision.

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**THE IMPACT OF SURGERY FOR COLORECTAL CANCER ON QUALITY OF LIFE (QL) AND FUNCTIONAL STATUS IN THE ELDERLY.** T. Mastracci, S. Hendren, B.I. O'Connor, R.S. McLeod. Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Although colorectal cancer is a common diagnosis in the elderly, there are concerns about their outcome following surgery and there may be reluctance to treat them surgically.

The objective of this study was to compare QL and functional status of elderly patients (age > 80 yr) who have undergone surgery for colorectal cancer to a younger (< 70 yr) procedure-matched control group.

Patients in the case (> 80 yr) and control groups (< 70 yr) were identified from the colorectal cancer database at Mount Sinai Hospital. All had treatment for colorectal cancer in the last 5 years. Patients were surveyed by mail using the EORTC-C30 and EORTC-CR38 QL scales. Student's *t*-test was used to test differences.

There were 32 patients in the study and 32 patients in the control groups. The response rates were 93% and 90%, and the average ages were 83.2 (SD 2.79) years and 67.7 (SD 5.10) years, respectively. The 2 groups scored similarly on the EORTC-C30 and CR38 scales in all domains except physical functioning, functional role, micturation and stoma-related problems (Table).

EORTC-C30 domain	Domain score, mean (and SD)		<i>p</i> value
	Study group	Control group	
Physical function	66 (23.2)	78 (20.8)	0.002
Function role	65 (36.0)	83 (23.8)	0.02
Micturation problems	33 (16.0)	20 (13.7)	0.05
Stoma-related problems	79 (23.6)	14 (4.8)	0.03
SD = standard deviation			

Elderly patients greater than 80 years who are selected for surgery have a QL comparable with younger patients in most respects. However, older patients requiring a stoma appear to have significantly more problems.

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**SEXUAL FUNCTION AND QUALITY OF LIFE (QL) AFTER SURGERY FOR RECTAL CANCER.** S.K. Hendren, B.I. O'Connor, Z. Cohen, C.J. Swallow, H.M.

**MacRae, R. Gryfe, R. S. McLeod. Department of Surgery, University of Toronto, Toronto, Ont.**

The objective was to measure sexual function and QL after rectal cancer treatment.

Patients undergoing curative rectal cancer surgery from 1980 to 2003 were identified. Patients <86 years and free from recurrence were mailed a questionnaire, including the Female Sexual Function Index (FSFI) or International Index of Erectile Function (IIEF), and the EORTC QLQ-C30/CR-38. Multiple logistic regression was used to test associations of clinical factors with outcomes.

Eighty-one women (81.0%) and 99 men (80.5%) returned the questionnaire. Thirty-two percent of women and 50% of men are currently sexually active, compared with 61% and 91% preoperatively ( $p > 0.05$ ). Twenty-nine percent of women and 45% of men reported that "surgery made their sexual lives worse." Mean (and SD) FSFI and IIEF total scores were 17.5 (11.9) and 29.3 (22.8), approximating scores of patients with diagnosed sexual dysfunction. Mean scores were lowest in both genders after APR. Specific sexual problems were: libido 41%, arousal 29%, lubrication 56%, orgasm 35% and dyspareunia 46% in women and libido 47%, impotence 32%, partial impotence 52%, orgasm 41% and ejaculation 43% in men. Negative body image was reported by men and women. Patients seldom remember discussing sexual risks preoperatively and seldom seek treatment for dysfunction.

Multivariate analysis revealed independent associations of current age ( $p < 0.0001$ ), surgical procedure ( $p = 0.003$ ) and preoperative sexual activity ( $p = 0.001$ ) with the outcome "currently sexually active." Sex (male,  $p = 0.014$ ), surgical procedure ( $p = 0.005$ ) and radiation therapy ( $p = 0.0001$ ) were independently associated with the outcome "surgery made sexual life worse." QL scores were high, despite reported problems.

Sexual problems after rectal cancer are common, multifactorial, inadequately discussed and treated. Validated instruments should be used to measure sexual and QL outcomes.

### 11

**PORTAL VEIN THROMBOSIS FOLLOWING ILEAL POUCH-ANAL ANASTOMOSIS: INCIDENCE AND ASSOCIATION WITH POUCHITIS. C.G. Ball, A.R. MacLean, W.D. Buie, D. Smith, E.L. Raber. Department of Surgery and Department of Diagnostic Imaging, Foothills Hospital, University of Calgary, Calgary, Alta.**

The objective of this study was to determine the rate of portal vein and/or superior mesenteric vein thrombosis following restorative proctocolectomy (RP) with ileal pouch-anal anastomosis (IPAA), as well as the clinical implications associated with thrombi.

All patients who underwent RP between 1997 and 2002 were identified retrospectively. Patient demographics, perioperative and postoperative data were extracted from patient charts. Those patients who had a postoperative CT scan for any reason within the first 30 days postoperatively were identified. The CT images were then re-reviewed by 2 expert radiologists, who were blinded to patient data. Images were scored as positive, negative or indeterminate for the presence of su-

perior mesenteric vein (SMV) or portal vein (PVT) thrombi.

A total of 111 patients underwent RP with IPAA for UC during the study period. Of these, 28 (25.2%) had a CT scan performed postoperatively. The most common indications for CT in these patients were prolonged ileus (32.1%), abdominal pain (28.6%) and fever (17.9%). PVT were diagnosed in 11 patients (39.3%), and findings were suspicious but indeterminate in another 4 (14.3%). Portal vein thrombi were only diagnosed on the initial reading of the CT image in 2 patients (18.2%), while the other 9 were diagnosed on re-review of the scans. There was no association between PVT and pelvic sepsis. After a mean follow-up of 36.2 months, 2 of the 13 (15.4%) patients without PVT developed postoperative pouchitis, compared to 1 of the 4 (25%) indeterminate scans, and 4 of the 11 (36.4%) patients with PVT.

Portal vein thrombi are a common finding in the subset of patients who require a CT scan following RP. Patients with PVT seem to have a higher incidence of postoperative pouchitis. Prospective evaluation of the risk of PVT and its association with pouchitis is required.

### 12

**SENTINEL LYMPH NODE MAPPING IN COLON CANCER. N.H. Merritt, P. Belliveau. Department of Surgery, Queen's University, Kingston, Ont.**

This study was undertaken to determine the feasibility and significance of lymphatic mapping and sentinel lymph-node biopsy (SLNB) in patients with clinical stage I, II or III colon cancer.

Seventeen consecutive patients that met the inclusion criteria were recruited. All patients underwent open colectomy with intraoperative nodal mapping. Tumour was palpated once the colon was fully mobilized and 1 mL of lymphazurin dye was injected circumferentially. Blue-stained lymphatics were visualized and followed to the SLN, which was tagged with an 0-silk. The fresh specimen was then sent to pathology for further analysis. The sentinel node was serially sectioned and stained using both H&E as well as immunohistochemistry. The SN status was then compared with the status of the remaining lymph nodes contained in the specimen.

Sentinel nodes were identified in 94% of patients. The SN was never outside of the planned resection. The sensitivity of SLNB was 100%. Six percent of patients were upstaged to node-positive disease when immunohistochemistry with multiple serial sectioning was applied to the SN.

Sentinel lymph-node biopsy, using lymphazurin blue, in colon cancer is a feasible procedure with high sensitivity and accuracy. Approximately 6% of patients with colon cancer were upstaged to node-positive disease in this small series.

### 13

**INJURIES SUSTAINED BY COLORECTAL SURGEONS PERFORMING COLONOSCOPY. A.S. Liberman, I. Shrier, P.H. Gordon. Division of Colorectal Surgery and Centre for Clinical Epidemiology and Community Studies, Lady Davis Institute for Medical Research, Sir Mortimer B. Davis—Jewish General Hospital, McGill University, Montréal, Que.**

The purpose of this study is to identify injuries specific to physicians routinely performing colonoscopy with the goal of identifying strategies to prevent and alleviate those injuries.

A survey was sent to all 2173 worldwide members of the ASCRS. Response rate was 28%. Ninety-six percent of respondents perform colonoscopy. The survey queried colonoscopists regarding any injuries or disabilities that resulted from performing colonoscopy and methods used to deal with or alleviate symptoms relating to the procedure.

Respondents who perform colonoscopy had a mean age of 48 (SD 9.5) years; 89.3% were male and 10% were female (missing data on 0.7%); they have been in practice for a mean of 14.8 (SD 8.6) years. They engage in colonoscopy an average of 2.4 (SD 1.9) days/week, performing 7 (SD 4) colonoscopies/day. At least 1 injury or pain believed to be related to performing colonoscopy was reported by 39% of respondents. The most frequently reported injuries were to hands and fingers (right,  $n = 137$ , and left,  $n = 112$ ), neck ( $n = 65$ ) and back ( $n = 52$ ). Less commonly reported injuries included knee pain, shoulder pain, carpal tunnel syndrome, elbow and foot pain. Methods adopted to alleviate injury included: (1) changing the height of the stretcher or video monitor for neck and back injuries, (2) changing from standing to sitting or vice versa for neck, back and elbow pain, (3) minimizing torque on the scope for hand and wrist injuries, (4) having an assistant torque for thumb pain, and (5) rest or taking time off from scoping, mostly for finger and hand pain. Two respondents also created devices to make the scope more ergonomic.

The number of colorectal surgeons encountering injury (39%) as a result of colonoscopy highlights the need for preventative strategies. The most common injury being to hands and fingers suggests it may be necessary to improve the design of colonoscopes and make them more ergonomic. Appropriate positioning of endoscopist, patient and monitors may diminish some of the other injuries encountered.

#### 14

**COLORECTAL CANCER SCREENING IN ONTARIO: FACTORS INFLUENCING PATIENTS AND THEIR PHYSICIANS.** T.K. Asano, R.S. McLeod. Department of Surgery, Mount Sinai Hospital and University of Toronto, Toronto, Ont.

The objective of this survey was to determine factors that influence patient completion of a colorectal cancer (CRC) screening test within the previous 5 years. An interpersonal systems approach was used, and factors relevant to the patient and their primary care physician were considered.

A telephone survey was conducted with 1002 randomly selected Ontario residents between the ages of 50 and 75 years. Sixty-nine percent of the subjects provided contact information for their current primary care physicians. Multiple wave mailed questionnaires were sent to the identified physicians, and 472 responded. Seventy-nine patients and 30 of their physicians were excluded because the patients' most recent CRC screening tests were more than 5 years ago. The data were analyzed using descriptive and univariate analyses. Adjusted odds ratios were generated using multiple logistic regression.

Forty-six percent of patient subjects never had and did not strongly intend to have a CRC screening test, 25% were also

nonscreeners yet strongly intended to have a screening test, and 29% had completed a CRC screening test within the previous 5 years. Individuals were more likely to have completed a screening test if they had a CRC screening discussion with their physician (OR 8.4, 95% CI 5.4–13.0). This discussion was more likely to have occurred if the physician's self-reported practice was the routine recommendation of CRC screening (OR 2.0, 95% CI 1.3–3.3), if the patient had at least 1 physician visit within the previous year (OR 11.5, 95% CI 2.6–50.1), if there was a positive family history of CRC (OR 4.4, 95% CI 2.5–7.7), or if the length of clinic visits was longer.

CRC screening continues to be underutilized despite increased awareness. Both patient and physician factors are important for CRC screening adherence.

#### 15

**HIGH-DOSE PREOPERATIVE RADIATION/CHEMORADIATION AND FULL-THICKNESS LOCAL EXCISION FOR SELECT RECTAL CANCERS.** J.H. Marks, W. Hamdan, U.B. Kawun, M. Mohiuddin, G. Marks. The Lankenau Hospital and Lankenau Medical Research Institute, Wynnewood, Pa.

Downstaging after preoperative therapy has changed treatment for rectal cancer management, extending sphincter preservation. Complete response rates of 25%–30% after preoperative chemoradiation has increased interest in full-thickness local excision (FTLE). The advent of transanal endoscopic microsurgery (TEM) allows the technical ability to perform local excision up to the rectosigmoid. We present our experience over the last 2 decades with local excision after high-dose radiation and chemoradiation in the treatment of invasive adenocarcinoma of the rectum.

All patients with rectal cancer were examined and size, configuration, stage and fixity were prospectively recorded before and after high-dose preoperative radiotherapy. Unfavourable cancers ( $\geq T3$ , or N1) and all cancers in the distal 6 cm of the rectum underwent irradiation (45–70 Gy; fx of 1.8 Gy). Beginning in 1997, concurrent chemotherapy with 5FU CVI was added ( $n = 22$ ). Decisions regarding sphincter preservation and FTLE were based on cancer characteristics 4–10 weeks posttreatment, to allow for maximal benefit of downstaging. Surgery was performed by 1–4 techniques in a full-thickness disc ( $n = 41$ ) or hemircumferential ( $n = 43$ ) fashion: transanal ( $n = 41$ ), transsphincteric ( $n = 15$ ), transsacral ( $n = 6$ ), TEM ( $n = 22$ ).

Eighty-four patients (48 males) underwent FTLE from 1985 to 2003. Mean age was 67.7 years. The level from the anorectal ring ranged from 0 cm to 7 cm. Mean tumour size was 2.7 cm. Stage on presentation was as follows: T1, 7; T2, 44; T3, 24. There was no perioperative mortality. Mean follow-up was 36.8 (2–104) months. Overall Kaplan–Meier 5-year survival was 76.06%. Disease-specific survival was 87.89%. Disease-free survival was 71.0%. Overall local recurrence was noted to be 15.5%. Colostomy was avoided in 88% of patients. Normal long-term function was noted in 90.9%.

FTLE can be performed selectively in the treatment of rectal cancer, allowing the surgeon to alter the surgical treatment approach based on the cancer's response to preoperative therapy with excellent survival rates, avoidance of abdominal sur-

gery and colostomy, and with acceptable local recurrence rates and function.

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**REDEFINING CONTRAINDICATIONS TO LAPAROSCOPIC COLORECTAL RESECTION IN HIGH-RISK PATIENTS.** U.B. Kawun, J.H. Marks, G. Marks. The Lankenau Hospital and Lankenau Medical Research Institute, Wynnewood, Pa.

Patients with major comorbidities are often denied laparoscopic colorectal resections because they are felt to be too "high-risk." Paradoxically, these patients generally have the most to gain from a minimally invasive surgical approach. The purpose of this study is to examine the feasibility and safety of laparoscopic colorectal resection to determine if it is contraindicated in "high-risk" patients.

From August 1996 to November 2003, 347 consecutive patients undergoing a laparoscopic colorectal procedure by a single surgeon were prospectively studied regarding pre-, peri- and postoperative events. High-risk patients ( $n = 180$ ) were defined as: elderly (age  $\geq 80$  yr)  $n = 26$ ; morbidly obese (BMI  $\geq 30$  kg/m<sup>2</sup>)  $n = 51$ ; ASA III or IV  $n = 122$  and preoperative radiotherapy  $n = 52$ . Multiple risk factors were found in 64 patients, 5 of whom had 3 risk factors. Eighty-five patients were men. Median age was 66 (19–92) years. Diagnosis was as follows: rectal cancer  $n = 45$ , diverticulitis  $n = 41$ , colon cancer  $n = 31$ , benign polyp  $n = 25$ , and other  $n = 38$ . Procedures performed were the following: colon resection  $n = 108$  (L = 73, R = 35), rectal resection (LAR or pouch)  $n = 45$ , coloanal anastomosis  $n = 22$ , and other  $n = 5$ . Data regarding intent to treat, operative events, morbidity, mortality and outcomes were analyzed and form the basis of this report.

There were no mortalities. Major morbidities occurred in 3%. There were no anastomotic leaks. Cases completed laparoscopically: 93%; laparoscopically assisted: 4%; and converted to open: 4%. Median estimated blood loss was 200c and only 4% required perioperative transfusion. Perioperative course was as follows (median POD): flatus, 2; bowel movement, 4; clears, 1; regular diet, 3; hospital discharge, 5.

In experienced hands, laparoscopic colorectal resection can be performed safely in "high-risk" surgical patients. These

better-than-expected outcomes in this patient population reinforce the benefits of minimally invasive surgery in this patient group and argue against using parameters of increased age, morbid obesity, high ASA class or preoperative radiation alone as contraindications to even complex laparoscopic colorectal procedures.

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**REOPERATION FOR INTRALUMINAL RECTAL CANCER RECURRENCE.** L.R. Rudmik, W.D. Buie, J.A. Heine. Department of Surgery, University of Calgary, Calgary, Alta.

The objective of this study is to examine locoregional control and survival in patients who underwent re-resection for an intraluminal rectal cancer recurrence.

From 1994–2003, 9 patients (7 males, median age 68 yr) with intraluminal rectal cancer recurrence were treated for cure at our centre.

Initial procedures performed were: 4 high anterior resections and 5 low anterior resections, for tumours having a median distance from the anal verge of 12.5 (7.5–16) cm. Median resected distal margin was 2.5 (1.2–4.0) cm. Original tumour staging was: T2N0M0 3; T3N0M0 3; T3N1M0 1; and T3N2M0 2. Median time between primary resection and intraluminal recurrence was 21 (8–53) months. Intraluminal recurrence distal to the anastomosis occurred in 3 of 9 patients, and anastomotic recurrence occurred in 6 of 9 patients. Pathologically clear margins were obtained in all patients at the time of curative re-resection. Three patients received adjuvant therapy. Following re-resection, patients were followed for a mean of 30 (6–59) months. No patient has developed locoregional recurrence to date or to the time of patient death. Six of 9 patients are alive and disease-free with a median follow-up of 34.5 (6–59) months. One patient died with no evidence of disease at 35 months. One patient died from pulmonary metastases 30 months postoperatively, and another patient developed liver metastasis 11 months postoperatively.

This data provides a rationale for luminal surveillance following sphincter-sparing rectal cancer resection and suggests that re-resection for intraluminal recurrence results in locoregional control and significant disease-free survival.

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## Canadian Association of General Surgeons Association canadienne des chirurgiens généraux

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**THE ASSOCIATION BETWEEN PERIOPERATIVE VASOPRESSORS AND GASTROINTESTINAL ANASTOMOTIC LEAKS.** T. Zakrison, S. Rizoli, L. Tremblay, T. Chughtai, F. Brenneman. Sunnybrook and Women's College Health Sciences Centre, University of Toronto, Toronto, Ont.

There is scarce evidence whether vasopressor/vasoconstrictor use in the early postoperative time is associated with GI anastomotic leaks. As such, we performed a retrospective chart review of 156 high-risk surgical patients requiring Intensive Care admission following esophageal, gastric, small- or large-bowel anastomosis in an academic hospital with large volumes of elective, urgent and trauma surgery.

The incidence of anastomotic leak was found to be 9.6% (15 patients). The main results are presented in the Table below. When compared to those without anastomotic leak there

Characteristic	Leak (n = 15)	No leak (n = 141)	p value
Age, mean (and SD), yr	47 (23)	60 (18)	0.01
Steroid use prior to anastomotic leak (n = 6), %	16.6	9.9	NS
Urgent/emergent operations (n = 49), %	33.3	31.2	NS
Intraoperative blood transfusion (n = 85), %	53.3	54.6	NS
Intraoperative pressor* (n = 76), %	46.6	48.9	NS
ICU pressor* (n = 16), %	26.6	8.5	NS
ICU length of stay, h	188	77	0.02
No. of deaths (n = 4)	1	3	NS

\*Norepinephrine, epinephrine, dopamine, vasopressin.  
ICU = intensive care unit; NS = not statistically significant; SD = standard deviation

was no difference in gender, prevalence of comorbid conditions, epidural catheters, stapled or hand-sewn anastomosis, intraoperative fluid requirement, length of surgery, TPN or use of drains. Three patients (20%) with anastomotic leaks required reoperation. Data were analyzed by parametric and nonparametric tests as appropriate, with a significant value of 0.05.

In this study, we found that in spite of a trend, there is no significant difference between those treated with vasopressors and GI anastomotic leaks. Considering the life-support role of these drugs, our findings would suggest that there is no rea-

son to withhold their use during the perioperative time. A larger study is needed to confirm these results.

19

**UPPER GASTROINTESTINAL HEMORRHAGE-ASSOCIATED MYOCARDIAL INFARCTION AND GASTROSCOPY: IS GASTROSCOPY PRUDENT?** S. Malik, C. Stuglin, L. Ruo, A. McFadden. Department of Surgery and Division of Cardiology, University of Saskatchewan, Royal University Hospital, Saskatoon, Sask.

The management of patients who present with an acute upper-gastrointestinal hemorrhage complicated by myocardial infarction is challenging and demands a multidisciplinary approach. Although current literature favours the safety of gastroscopy in patients who are clinically stable, no definitive data are available to guide the practical management of these patients. We questioned whether the practical management of these patients followed suit.

A retrospective chart review was conducted for the period 1998–2003 to include all patients with upper gastrointestinal hemorrhage and acute myocardial infarction who subsequently underwent gastroscopy. Patient and treatment data were analyzed in the context of clinical outcomes.

Twelve of 63 (19%) charts reviewed fit the criteria for inclusion. The median age was 82 years (range: 69–94) including 6 males, 6 females. The most common presenting symptoms were melena (11/12, 92%) and epigastric pain (4/12, 33%). Five of 12 (42%) had a history of congestive heart failure and 6 of 12 (50%) had a history of hypertension, but none had history of previous coronary artery disease. Five of 12 (42%) were anticoagulated with warfarin. The ASA classifications for the patients were I (0), II (4/12, 33%), III (3/12, 25%), IV (5/12, 42%), V (0). The median presenting hematocrit and hemoglobin were 0.24 (range 0.16–0.37) and 77 g/L (range 50–110). Ten of twelve (83%) patients had prerenal azotemia. The median number of units of packed red blood cells transfused prior to endoscopy was 5 (range 1–10). The median time to diagnosis of myocardial infarction from time of admission was 24 hours (range 2–72). All patients had elevated cardiac enzymes (total CK, CK-MB% and troponin I). Eight (67%) patients had ECG changes. Gastroscopy was performed on average 5 days after admission. Gastroscopy was performed by 8 general surgeons and 3 gastroenterologists. The median arterial pressure at initiation of gastroscopy was 92 (range 61–115). Endoscopic diagnoses included: gastric ulcer (2/12,

17%), duodenal ulcer (5/12, 42%), gastritis (4/12, 33%) and both duodenal ulcer and gastric ulcers (1/12, 8%). Three (25%) patients died within 10 days of admission. The mean arterial pressures for these patients were 61, 64 and 73 respectively. Two patients died from cardiac arrest and 1 patient died from multiple organ failure. One patient (8%) had a cardiac arrest during gastroscopy. The median length of hospital stay was 26 days (range 5–53).

While there are few diagnostic or therapeutic options in this group of patients, our small study suggests that endoscopy is not without hazard. Hemodynamic stability at gastroscopy may be critical to the clinical outcome. Further investigation is required to examine the benefits of early endoscopic intervention in this select group of patients and its impact on mortality.

### 20

**COLONOSCOPIC FOLLOW-UP AFTER RESECTION FOR COLORECTAL CANCER.** S. Atwal, D.R.E. Johnson, W.D. Buie, J.A. Heine, A.R. MacLean. University of Calgary, Calgary, Alta.

The purpose of this study was to assess the findings at 1-year follow-up colonoscopy after curative resection for cancer of the colon or rectum, to determine the incidence of significant findings.

All patients who underwent resection of an adenocarcinoma of the colon or rectum by colorectal surgeons at 2 large urban hospitals between January 1994 and December 2002 were identified. A retrospective review of a random sample of the patients' hospital and office charts was carried out. Patient demographics, preoperative colonoscopic findings, including completeness of exam and whether additional polyps were excised, type of operation performed, cancer stage, the use of adjuvant chemotherapy or radiation, and the findings at the 1-year follow-up colonoscopy were extracted. Patients with hereditary cancer syndromes and those with incomplete preoperative exams or polyps not excised were excluded.

Two hundred patients were identified who met the inclusion criteria. On 1-year follow-up colonoscopy, there were no recurrent cancers. Only 6/200 (3%) patients were found to have a polyp greater than 1 cm in size. All 6 were excised and were benign adenomas. Two additional patients had polyps that were smaller than 1 cm, but contained high-grade dysplasia.

Our data suggest that endoscopic follow-up done at 1 year postoperatively has a relatively low yield. Because the incidence of significant findings is low, a larger study will be required to identify risk factors for the development of significant pathology at 1 year post-resection. The rationale for repeat colonoscopy at 1 year may need to be reassessed.

### 21

**SURGICAL VOLUME AND MORTALITY ANALYSIS FOR ESOPHAGEAL, HEPATIC AND PANCREATIC RESECTIONS WITHIN A TERTIARY CARE REFERRAL CENTRE.** A.A. Karimuddin, G. Groot. Saskatoon Health Region, University of Saskatchewan, Saskatoon, Sask.

There has been much recent controversy regarding surgical outcomes and volume of surgery performed by both surgeons

and hospitals. Much of the recent literature has indicated that both high surgeon and hospital volumes correlate quite strongly with positive patient outcomes. In light of current literature, 30-day and in-hospital mortality data for esophageal, pancreatic and hepatic resections in the Saskatoon Health Region (SHR) from 1994 to 2003 was analyzed. Data analysis was performed between high- and low-volume surgeons within the SHR, and also with control data.

There are no high-volume esophageal surgeons in SHR, and medium- and low-volume-surgeon mortality rates are consistent with control mortality data (13.9% and 15.9%). Our region's high-volume pancreatic surgeons had a lower mortality rate than low-volume pancreatic surgeons (2.56% and 14.3%). There was no difference between high- and low-volume hepatic surgeons (5.56% and 5.19%). Mortality rates were consistent with control data.

Data analysis was limited by the number of procedures performed in SHR with statistical significance not being reached; however, some conclusions could be made. Given that the literature shows that for esophageal, pancreatic and hepatic resections, surgeon and hospital volumes are intimately related to patient outcomes, and by examining our data, we conclude that esophageal and pancreatic surgery, in our region, should be limited to currently medium- and high-volume surgeons, respectively. We are unable to conclude any relationship between surgical volume and hepatic resection outcome. Further analysis and follow-up is needed.

### 22

**LAPAROSCOPIC REPAIR OF PARAESOPHAGEAL HERNIAS: A SHORT- AND INTERMEDIATE-TERM OUTCOME ANALYSIS.** R.P. Boushey, S. Burpee, D. Kumar, E.C. Poulin, C.M. Schlachta, J. Mamazza. Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

The surgical approach to paraesophageal hernias (PEH) has changed dramatically with the advent of laparoscopic techniques over the past decade. Despite this increasing trend, considerable variation in both perioperative outcomes and hernia recurrence rates have been reported in the literature. The objective of this study was to evaluate our short and intermediate outcomes with laparoscopic PEH repair. A retrospective review of patients undergoing laparoscopic repair of PEH in our institution between June 1998 to September 2002 was performed. Only patients with greater than 1 year follow-up were included in this analysis. Elective laparoscopic repair of a PEH was performed in 58 consecutive patients with a mean age of 60 years. These included type II (13), type III (44), and type IV (1) PEH. The most common symptoms included epigastric pain (57%), dysphagia (40%), heartburn (31%) and vomiting (28%). Laparoscopic procedures included 56 Nissen funduplications and 2 gastropexy's. All crural defects were closed primarily with or without pledgets, while 2 patients required the use of mesh. One laparoscopic procedure was converted to open due to intraoperative bleeding secondary to a consumptive coagulopathy, but no other major intraoperative emergencies were observed. Minor or major complications occurred in 15 patients (26%). Early postoperative complications included 2 postoperative leaks, 1 ileus, 3 pulmonary and 2 car-

diac complications. Late postoperative complications included 1 umbilical hernia. Median length of hospital stay was  $3.8 \pm 2.5$  days. Nineteen patients were completely asymptomatic following surgery, while the majority of the remaining subset of patients (83%) described marked symptom improvement with a mean follow-up of 24 months. UGI series performed in symptomatic patients identified 5 recurrent paraesophageal hernias (8.6%) and 5 small sliding hernias (8.6%). Laparoscopic repair of PEH is associated with improved long-term symptom relief, low morbidity, and acceptable recurrence rates when performed in an experienced centre.

**23**  
**IMPACT OF SURGEON PRACTICE PROFILE ON WAIT TIMES FOR ONCOLOGIC SURGERY.** M. Dzierzanowski, C.G. Jamieson, G.A. Porter. Department of General Surgery, Queen Elizabeth II Health Sciences Centre, Dalhousie University, Halifax, NS

Waiting for procedures is a reality of government-funded health care. There is increasing interest in prioritization tools for use in wait-list management; however, wait-list management for surgery is still primarily performed by individual clinicians. Although numerous studies have examined the effects of practice profile on surgical outcomes, there is little data investigating the role of surgical practice profile on individual surgeon prioritization. The objective of this study was to examine the impact of practice profile on wait times for oncologic surgery.

A wait-list database capturing all patients undergoing non-emergent surgery within a single Division of General Surgery between 03/01–04/03 was implemented. 10 participating surgeons' practice profiles were reviewed and divided into 3 categories; surgeons whose practice was primarily oncology (PO, >50% of cases), a balanced practice group (BP, 10%–50%) and primarily nononcologic (PNO, <10%). Wait times included the time from consult receipt to actual consult (TTC), time from consult to decision for surgery (TTD), time from decision to operation (TTO). Analysis of wait times was examined using nonparametric methods.

Among the 2257 cases, 772 (34%) procedures were deemed to be oncologic. Patients of surgeons in the BP group appeared to have shortest wait times for TTC and TTO intervals, as seen in the Table. No difference was observed for the TTD interval. Significant variability in each interval was identified between surgeons.

Practice profile	Mean (and SEM) wait times for different intervals, d					
	TTC	<i>p</i>	TTD	<i>p</i>	TTO	<i>p</i>
PO ( <i>n</i> = 580)	18 (1.19)		15 (2.09)		36 (2.66)	
BP ( <i>n</i> = 136)	13 (2.00)	<0.001	15 (3.95)	NS	24 (2.23)	<0.05
PNO ( <i>n</i> = 56)	27 (5.01)		14 (4.72)		37 (6.61)	

BP = balanced practice group; PO = practice is primarily oncology; PNO = practice is primarily non-oncology; SEM = standard error of the mean; TTC = time from consult receipt to actual consult; TTD = time from consult to decision for surgery; TTO = time from decision to operation

Surgical practice profile, as measured by proportion of oncologic cases performed, was significantly associated with specific wait times for oncologic surgery. It is possible that a more

balanced practice can accommodate schedule changes to shorten wait times for oncologic procedures.

**24**  
**ASSOCIATION BETWEEN HISTOLOGIC PATTERN OF SENTINEL LYMPH NODE METASTASIS FROM MELANOMA AND STATUS OF THE LYMPH NODE BASIN.** A. Govindarajan, W.L. Leong, D.M. Ghazarian, D.R. McCready. University of Toronto, Toronto, Ont.

Positive sentinel lymph nodes (SLN) are associated with increased rates of recurrence in cutaneous melanoma and worse survival. However, no study has examined the histological patterns of SLN metastases and their role in prognostication. Our objective was to determine if the histologic pattern of melanoma metastasis affects the status of the completion lymphadenectomy after SLN biopsy, as well as recurrence rates.

A retrospective chart review of all melanoma cases with positive SLN from March 1999 to March 2002 was performed. Histological location of metastatic deposits (divided into subcapsular, parenchymal or sinusoidal) and other factors relating to the SLN were correlated to the status of the completion lymph-node dissection. In addition, recurrence and overall survival for the different metastasis locations were compared using survival analysis.

Metastatic deposits in the sinusoidal location show a non-significant trend toward higher rates of lymph node basin positivity. In the group consisting of SLNs in which all 3 locations were involved, there was also a nonsignificant trend toward lymph node basin positivity. In addition, this group also had significantly higher recurrence rates and worse overall survival than other groups. Finally, other factors that significantly correlated with lymph node basin positivity were size of the largest positive SLN and size of the largest metastatic focus.

Increased tumour burden in the SLN as measured by the number of involved areas may be associated with increased recurrence and worse survival as well as higher rates of lymph node basin positivity. Deposits specifically in the sinusoidal location show a nonsignificant trend toward increased lymph node basin positivity.

**25**  
**MANAGEMENT OF SPLENIC ARTERY ANEURYSMS: ONE ACADEMIC INSTITUTION'S EXPERIENCE.** J. Caulfeild, J. Mamazza. Centre for Minimally Invasive Surgery, St. Michael's Hospital, University of Toronto, Ont.

Splenic artery aneurysms are rare despite being the most common form of visceral artery aneurysm. They are most often detected incidentally during radiologic investigations for unrelated symptoms, although they may become symptomatic or even rupture. Indications for treatment include size greater than 2 cm, aneurysms which are enlarging or symptomatic and those found in women of childbearing age. Management options include interventional angiographic techniques, such as coil embolization, or surgical ligation or resection. Splenectomy may be necessary. Recently, laparoscopic techniques have been employed.

A retrospective chart review was conducted on all patients diagnosed with splenic artery aneurysm at our institution from

April 1, 1995 to February 29, 2004. Six patients were identified (2 males and 4 females) with a mean age of 40.5 years. All aneurysms were found incidentally on ultrasound or CT. Five patients had true aneurysms while 1 patient had a traumatic pseudoaneurysm.

The median size was 3.0 cm with a range of 2.6 cm to 8.2 cm. Five patients with aneurysms ranging in size from 2.6 to 3.8 cm were treated with angiography and coil embolization. There were no complications and the mean postembolization length of stay was 1.8 days. There was 1 outlier with an 8.2 cm aneurysm. This was treated with preoperative embolization for vascular control and laparoscopic aneurysmectomy with splenectomy. There were no complications and the postoperative length of stay was 4 days.

Embolization is a safe and effective treatment for smaller splenic artery aneurysms (<4 cm) with low morbidity and short hospital stays. For larger aneurysms, laparoscopic resection is a safe and viable alternative to open surgery, with minimal morbidity and short length of stay.

26

**CLOSTRIDIUM DIFFICILE COLITIS: A SURGICAL CHALLENGE.** J. Clément, J. Pépin, O. Martinet. Service de Chirurgie Générale et Service d'Infectiologie, Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Que.

A dramatic increase in the incidence of *Clostridium difficile* (*C. difficile*) colitis has been observed in our institution, with up to 395 new cases during the last year. Presentations range from mild diarrhea and abdominal discomfort to septic shock and death. Clinical decision to surgical treatment is difficult and critical to reduce the mortality of severe forms, but also to prevent unnecessary surgeries. The aim of this project was to identify clinical parameters that could help surgeons when considering to operate on patients with severe forms of *C. difficile* colitis.

Files of patients with a positive diagnosis of *C. difficile* colitis (positive *C. difficile* cytotoxin, endoscopy, pathology) from 1992 to 2003 were retrospectively reviewed. Twenty-four patients with a fulminant form of *C. difficile* colitis (deteriorating conditions in the ICU, megacolon, colon perforation, death), have been identified. A subtotal colectomy with terminal ileostomy was performed in 13 patients. Conservative treatment was the option for 11 patients taking into account clinical conditions or patient's decisions to refuse surgery. Deteriorating clinical conditions despite maximal medical treatment, comorbidities (diabetes, immunosuppression, cardiac, respiratory and renal failure), signs of peritonitis, elevated WBC count and progressive renal failure were factors associated with a decision to surgical treatment. Mortality rates were 23% (3/13) and 64% (7/11) in patients treated surgically and medically, respectively. All patients who went to the ICU for their colitis and did not undergo surgery died. No association has been found between timing of the diagnosis, surgical consultation and outcome.

Severe form of *C. difficile* colitis is an increasingly encountered problem for the surgeon. Clinical decisions for surgical treatment and its timing are difficult. Close surveillance of the involved patients is important. Deteriorating clinical conditions, progressive renal failure and elevated WBC count are to be taken into consideration toward decision for surgery.

27

**WHICH SCHOOL RECRUITS THE MOST MEDICAL STUDENTS INTO GENERAL SURGERY, AND HOW THIS SHOWS WHY MAKING GENERAL SURGERY MORE LIFESTYLE-ORIENTED MAY NOT IMPROVE APPLICATION NUMBERS.** S. Minor, J. Park, R. Walker. Queen's University, Kingston, Ont., and University of Manitoba, Winnipeg, Man.

Application rates to General Surgery have been in decline over the past 10 years. In order to maintain the competitiveness of the specialty and ensure that there will be adequate numbers of general surgeons in the future, a recruitment strategy needs to be developed. The previous literature and expert opinions have suggested that by making general surgery more lifestyle oriented we will be able to recruit more students into General Surgery.

We reviewed institution-specific General Surgery application rates for each Canadian school over the past 10 years, in order to identify which schools have had more success recruiting medical students into General Surgery. Through survey of undergraduate Canadian surgery directors ( $n = 8$ ) and medical students from across Canada applying to General Surgery ( $n = 41$ ) we described the General Surgery clerkship lifestyle for every school. Call frequency, requirement to stay past midnight on call, a home-at-noon postcall policy and amount of responsibility demanded during the rotation were recorded.

The University of Southwestern Ontario has proportionally recruited more students into General Surgery over the past 10 years than any other school ( $p < 0.05$ ). Its clerkship also has the least lifestyle-oriented design, with the highest call frequency, not allowing its clerks home at midnight, not having a home-at-noon postcall policy and placing the highest burden of responsibility on its clerks than any other school.

This study places in doubt the popular wisdom of trying to make General Surgery more lifestyle-oriented in order to increase application rates, and represents a major paradigm shift in recruitment strategy.

28

**CHANGING GENDER DEMOGRAPHICS IN MEDICAL SCHOOL AND ITS ROLE IN THE DECLINING NUMBER OF GENERAL SURGERY APPLICANTS.** S. Minor, J. Park, R. Taylor, D. Poenaru. Queen's University, Kingston, Ont., and University of Manitoba, Winnipeg, Man.

The purpose of this study was to identify the impact of the increasing number of women in medical school on General Surgery application rates. Our hypothesis was that the decline in General Surgery application numbers could be explained, in part, by the increased number of women entering medical school.

Canadian Residency Matching Service data over the past 10 years were reviewed to quantify the change in the gender distribution of medical schools, and identify gender-specific application rates to General Surgery.

518 women comprised 40% of the medical school population in 1993 and slowly increased to 610 and 50% of all students in 2003. Meanwhile, the total number of students ap-

plying to General Surgery as their number 1 career choice declined sharply from 75 in 1993 to 46 in 2003. The average proportion of females applying to General Surgery as their first career choice was significantly less than their male counterparts (0.03 v. 0.06,  $p < 0.05$ ).

Three different mathematical models were employed to demonstrate the impact of gender on General Surgery application rates. The first model assumed all women to be men, and demonstrated an increase of 184 applicants over 10 years to General Surgery ( $p < 0.05$ ). Secondly, we modelled the effect of maintaining the same 1993, 60:40 men-to-women ratio on application rates over the last decade, and this demonstrated an increase of 17 applicants ( $p < 0.05$ ). Third, we made no changes to the contribution made by women, but maintained the same 1993 male application rates over the last 10 years. This model demonstrated an increase of 164 applicants over 10 years ( $p < 0.05$ ).

General Surgery would have access to many more applicants if medicine was still an all-male specialty. However, the impact of the increased female medical-student population over the last decade has had a smaller effect on the overall application numbers to General Surgery than one might expect. The most significant contribution to the decrease in General Surgery application numbers has been the decline in the popularity of the specialty in the male student population.

## 29

**EVALUATION OF ULTRASONIC TECHNIQUE IN THE GENERAL SURGEON'S ARMAMENTARIUM. I.B. Rosen, J.C. Furlan. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.**

Ultrasonography (US) features ease, simplicity, and accessibility providing diagnostic appeal. The American College of Surgeons' annual and regional meetings feature didactic teaching for general surgeons to use US in head and neck, abdomen and breast. Other specialty organizations of appropriate interest are following suit. There has been no comparable Canadian undertaking. A trial of general surgical involvement of US  $\pm$  FNAB assessment of thyroid lesions was initiated in the months of January–March 2004. Sixty-five patients (11 males, 54 females), ages 27 to 77 (mean 45) made up our study group. Indications for US included Group 1 postop cancer surveillance ( $n = 15$ ), Group 2 occult micronodular thyroid disease ( $n = 41$ ), Group 3 failed office FNAB result ( $n = 9$ ). Multinodular lesions occurred in 27/48 in Group 2, 3. In Group 1,  $< 1$ -cm nodules ( $n = 4$ ) were acellular, 1-cm nodule in medullary cancer was benign. One partial showed contralateral 1-cm nodule as benign. In Group 2, nodule size was  $< 1$  cm (15), 1–1.5cm (15),  $> 1.5$  cm and less than 2 cm (6),  $> 2$  cm (11). Cytology was acellular in 6, “benign” 10, colloid 11, thyroiditis 10. Papillary cancer was detected in 2. In Group 3 nodule size showed  $> 1$  cm (3),  $> 1.5$  cm and less than 2 cm (1),  $> 2$  cm (4). Cytology was acellular in 3, benign 3, colloid 2. In Group 2, 3 redo US FNAB was required in 9/50 for a rate of 18%, while others were followed up only. US enables the general surgeon to assess extent and nature of thyroid nodular disease in an office setting and the opportunity to carry out needle biopsy for appropriate lesions, facilitating patient management. This is an assimilatable skill where experi-

ence provides expertise. Cost of machinery, institutional and government attitude are factors that require consideration and discussion.

## 30

**THE NATURE OF THYROID CANCER ASSOCIATED WITH HYPERPARATHYROIDISM. I.B. Rosen, J.C. Furlan. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.**

While the frequency of thyroid cancer in the general population varies from 0.003% to 0.004%, thyroid cancer is also most rapidly increasing malignancy as reported by the Canadian Cancer Society. Forty-seven percent of patients with hyperparathyroidism (HPT) demonstrate thyroid nodularity of which 4%–6% is due to malignancy. The nature and implications of that malignancy have been questioned. Nine cases of thyroid cancer in 200 cases of HPT coming to treatment in the last 3-year period of time were retrospectively analyzed. There were 9 females 41 to 63 years of age with a mean of 53. All patients had papillary cancer. Size varied from 6 to 72 mm with a mean of 10 mm. Multicentricity occurred in 5/9, extrathyroidal invasion 4/9 (44%), metastatic disease in 0, radiation (RAI or external) 3/9 (33%), metastatic nodal disease 1/9 (11%). Five of 9 patients underwent coincidental treatment for thyroid and parathyroid disease; 4 patients had undergone a prior thyroidectomy which in 2 cases represent overlooked HPT necessitating demanding reoperation. All patients are alive and well.

It is apparent, therefore, that while thyroid malignancy has an exceptionally good outlook, the occurrence of multicentricity, extrathyroidal invasion and nodal involvement in this series suggest that thyroid cancer occurring in HPT should not be dismissed only as coincidental micro-occurrence. Patients presenting with parathyroid or thyroid disease require an appropriate assessment to exclude HPT and thyroid cancer before initiating an operative procedure.

## 31

**CLINICOPATHOLOGICAL SIGNIFICANCE OF TUMOUR CAPSULE INVASION IN PAPILLARY AND FOLLICULAR THYROID CARCINOMAS. J.C. Furlan, Y.C. Bedard, I.B. Rosen. Department of Surgery and Department of Pathology and Laboratory Medicine, Mount Sinai Hospital, University of Toronto, Toronto, Ont.**

This study was undertaken to evaluate influence of CI on the biological behavior of papillary (PTC) and follicular (FTC) thyroid carcinoma and its prognostic implication.

From a university-hospital database, 350 patients who underwent thyroidectomy for cancer were randomly selected and retrospectively reviewed. The study population was divided into PTC and FTC groups. Every group was subdivided into CI+ (with CI) and CI- (without CI or capsule) subgroups. Long-term prognosis was assessed using AJCC pTNM staging, AMES, AGES and MACIS prognosis scoring systems. Data were analyzed using chi-square, rank sum, Fisher's exact and Student's  $t$  tests.

There were 301 cases of PTC (56 males and 245 females, age 19 to 89 years with mean of 44.3) and 49 patients with

FTC (10 males and 39 females, age 23 to 89 years with mean of 43.2). PTC (86%) was more frequent than FTC. CI+ occurred in 53.1% of the patients. Demographics were similar between PTC subgroups as well as FTC subgroups. While patients with CI+ PTC were more radically treated than the subgroup with CI- PTC, there was no significant difference for treatment between CI+ and CI- FTC subgroups. There was no cancer-specific death in this series within a mean short-term follow-up of 45.4 months. There were no significant differences between both PTC subgroups for tumour multicentricity ( $p = 0.904$ ) and nodal involvement ( $p = 0.194$ ), but CI+ PTC tumours were larger ( $p < 0.001$ ), more angioinvasive ( $p < 0.001$ ) and more locally invasive ( $p = 0.009$ ) than CI- PTC tumours. After a short-term follow-up (mean 41.9 mo), there were no significant differences between the PTC subgroups for distant metastasis ( $p = 0.995$ ), postoperative elevated thyroglobulin ( $p = 0.995$ ) and recurrence rates ( $p = 0.371$ ). Long-term prognosis was poorer for CI+ PTC subgroup based on AMES ( $p < 0.001$ ) and MACIS ( $p = 0.012$ ), but not on AGES ( $p = 0.101$ ). Also, there was a trend for poorer prognosis in CI+ PTC group based on AJCC pTNM ( $p = 0.061$ ). There were no significant differences between the FTC subgroups for tumour size ( $p = 0.105$ ), multicentricity ( $p = 1$ ), angioinvasion ( $p = 0.172$ ) and lymph node metastasis ( $p = 1$ ). However, there was a trend for higher frequency of local invasion in CI+ FTC subgroup ( $p = 0.052$ ). After a mean short-term follow-up of 67.1 months, both FTC subgroups had similar distant metastasis ( $p = 0.306$ ), postoperative elevated thyroglobulin ( $p = 1$ ) and recurrence rates ( $p = 1$ ). were similar for. While prognosis was similar for both FTC subgroups using AJCC pTNM ( $p = 0.56$ ) and AGES ( $p = 0.244$ ), CI+ FTC subgroup showed poorer prognosis based on AMES ( $p < 0.001$ ) and MACIS ( $p < 0.006$ ).

The presence of CI did not influence the short-term survival of patients with PTC/FTC during study period. Nonetheless, individuals with CI+ carcinoma showed poorer prognosis at least according to AMES and MACIS prognostic scoring systems, justifying the need for complete resection and adjuvant therapy. Greater knowledge of prognostic factors can improve quality of life and survival of patients with thyroid cancer.

**32**  
**BREAST CANCER RISK STRATIFICATION USING THE GAIL SCORE AT FIRST PRESENTATION OF A BREAST COMPLAINT.** B. Paun, R.L. George, G.R. Walker, J. Henson, L. Fenkell, D. Thain, A. Wintonic, S. Lloyd, J. Warner, P.A. Isotalo. Breast Assessment Program, Hotel Dieu Hospital and Department of Pathology and Molecular Medicine, Queen's University, Kingston, Ont.

The Gail model is a widely used assessment tool, estimating an individual's 5-year and lifetime risk of developing breast cancer. We hypothesized that it may be of value assessing referrals with a breast complaint for their present risk of breast malignancy.

Patients referred to our Breast Assessment Program completed a health form, assisted by a program nurse. Forms included demographic and general health data, as well as the information required to calculate 5-year and lifetime Gail scores. Age, number of children, age at menarche, first live birth, de-

tailed family history, hormone use, menopausal status, medications and previous breast and biopsy history were collected. Gail scores were calculated and patients were followed to the completion of their investigations and determined to have either benign or malignant disease. Cancers were confirmed by biopsy.

Data was collected and investigations completed on 622 consecutive women. Five-year Gail scores were consistently higher for women with breast cancer (2.0 v. 1.4,  $p = 0.0006$ ). Absolute scores were more discriminating in postmenopausal women (2.5 v. 1.9,  $p = 0.0006$ ) and in particular, the 50-60 year age group. By decade, the differences in score were most significant for women under 40 and women aged 50-60, and ineffective for women aged 70-80.

The Gail model is a useful adjunct in the assessment of women presenting with a breast complaint and is most predictive of cancer risk in woman under the age 40 and for those in the 50-60 year age group. It was particularly ineffective in women over the age of 70.

**33**  
**CAN CYTOLOGY ACCURATELY PREDICT BENIGN FOLLICULAR NODULES?** J. Smith, R. Cheifetz, N. Schneidreiteit, K. Suen, K. Berean, T. Thomson. Departments of Surgery and Pathology, University of British Columbia and BC Cancer Agency, Vancouver, BC

The reliability of fine-needle aspiration (FNA) biopsy in differentiating benign from malignant follicular lesions of the thyroid has recently become controversial. The goal of this study was to determine whether FNA can be used as a diagnostic tool to safely identify patients with follicular thyroid nodules who do not require immediate surgical intervention.

A retrospective review was performed on a random sample of 24 patients diagnosed with either follicular adenoma or follicular carcinoma following surgical excision of a thyroid nodule. Information was collected regarding patient demographics (age, gender), size of the nodule and initial FNA diagnosis. The initial FNA biopsies were then independently reviewed by 2 experienced cytopathologists in a blinded fashion.

In the study sample, there were 17 follicular adenomas (71%) and 7 follicular carcinomas (29%). Twenty (83%) of the patients were female, and the average age was 50 years (range 15-86 years). The average thyroid nodule size was 3.1 cm (range 1-4.8 cm). Upon review of the FNA slides, pathologist A correctly identified 9/17 (53%) benign nodules and 5/7 (71%) malignant nodules; overall accuracy was 58%. The positive predictive value (PPV) of a benign diagnosis was 82%; PPV of a malignant diagnosis was 38%. Pathologist B identified 10/17 (59%) benign nodules and 5/7 (71%) malignant nodules; overall accuracy was 63%. The PPV of a benign diagnosis was 83%; PPV of a malignant diagnosis was 50%. Concordance between the 2 pathologists was 6/17 (35%) for benign nodules and 4/7 (57%) for malignant nodules.

Currently, surgical intervention is recommended for all thyroid follicular cytology. This study suggests that a benign FNA biopsy report from an experienced cytopathologist has a high positive predictive value. The predictive value may not, however, be high enough, and other factors may need to be considered before recommending a nonoperative approach.

34

**COMPARING TOTAL ESOPHAGOGASTRIC DISCONNECTION (TEGD) WITH GASTROSTOMY TUBE/FUNDOPLICATION (GTF) IN NEUROLOGICALLY IMPAIRED CHILDREN.** H. Wang, E. Haase, M. Evans, G.M. Lees. Department of General Surgery, University of Alberta Stollery Children's Hospital, Edmonton, Alta.

We hypothesize that the morbidity and mortality rates for total esophagogastric disconnection (TEGD) is not significantly different than that of gastrostomy tube/fundoplication (GTF) in treating gastroesophageal reflux in neurologically impaired children.

In our study, we retrospectively reviewed a total of 50 patients who have been surgically treated for gastroesophageal reflux between September 2001 and August 2003 at the University of Alberta Stollery Children's Hospital. We examined 43 GTF patients and 7 TEGD patients. Of the GTF patients, 6 have had previous GTFs and 24 were neurologically impaired. All TEGD patients were neurologically impaired. TEGD required significantly more OR time than GTF, but the length of hospital stay and surgical mortality rate between the 2 groups were not statistically significant. The TEGD patients had a lower rate of ICU stay than the subgroup of GTF patients who were neurologically impaired (0% v. 29%). However, the rates of bowel obstruction (14% v. 0%), wound infection (14% v. 4.2%), other infection (29% v. 4.2%) and blood transfusion (14% v. 4.2%) were all higher in the TEGD group.

The results of this study suggest that while TEGD may have similar mortality rates and decreased ICU stay rates compared to GTF, the complications associated with it are still significant.

35

**ATTITUDES OF SURGEONS AND PHYSICIANS TOWARD MEDICAL EDUCATION.** E. Brennan, C.J. de Gara. Department of Surgery, University of Alberta, Edmonton, Alta.

The majority of clinical education at the University of Alberta is provided by unpaid clinical faculty. Could reliance on such altruism endanger the educational mandate?

An anonymous 17-question postal survey was sent to 135 surgeons (8 specialties) and 184 medical specialists (12 specialties). Validated survey methodology including Likert and agreement scales, multiple-choice and numeric open-ended questions were employed.

Both surgeons and medicine specialists enjoyed teaching, self-evaluated teaching skills positively, and desired more departmental emphasis on education. Dissatisfaction was expressed equally by both groups with unprepared students, student disinterest, and lack of appreciation for teaching given and because clinical work takes longer when teaching. Loss of income was not a concern. Medical specialists feel more accountable to negative student evaluations, both when paid ( $p < 0.05$ ) and unpaid ( $p < 0.01$ ). Surgeons were less likely to put effort into improving teaching, and more likely to stop educating completely. Payment for teaching improved the rate of positive response in both groups dramatically. Only 11% of surgeons and 6% of medicine specialists did not want compen-

sation. Current methods, gift certificates (< 3% preferred) and certificates of appreciation (< 15% preferred) were not valued.

Compared with males, female teachers were more satisfied with passing on important information ( $p = 0.05$ ), influencing residency decisions ( $p < 0.001$ ), were more likely to feel that passion ( $p < 0.001$ ) and extensive knowledge ( $p < 0.001$ ) were important for being a good teacher. Not being rated as good teacher concerned female more than male teachers ( $p < 0.05$ ).

Part-time faculty value and enjoy teaching, with few differences between specialties or gender. Since monetary rewards are linked to accountability and are much more highly regarded than tokens of appreciation, we conclude that the attitude toward education is not altruistic.

36

**USING A VIRTUAL REALITY (VR) SIMULATOR TO DEVELOP LAPAROSCOPIC SKILLS.** V. Sherman, L.S. Feldman, D. Stanbridge, G.M. Fried. Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University, Montréal, Que.

To determine the validity of a VR simulator (LapSim) as a useful educational tool for the acquisition of laparoscopic skills.

Four sets of experiments were performed. The first 2 studies examined the transferability of skills from the VR environment to the physical environment. As well, they examined whether complex laparoscopic skills could be acquired from practice of basic tasks. Two groups of novice laparoscopists performed intracorporeal suturing in a physical simulator and were then randomized to practise a basic laparoscopic task using either the MISTELS physical simulator or the LapSim VR simulator. All subjects were then retested in intracorporeal suturing. The third study examined the transferability of skills from the VR environment to the *in vivo* environment. Three groups of novice laparoscopists underwent baseline assessment of intracorporeal suturing in a pig model. They were then randomized to no practice or practice using either the MISTELS or LapSim. *In vivo* intracorporeal suturing was assessed again, as a final score. The fourth study examined the learning curves of 3 groups (experts, juniors and naïve laparoscopists) as they performed repeated iterations on 3 VR tasks. Metrics were developed to provide a global assessment of performance. The construct validity of the LapSim was also assessed using these metrics.

Practice using selected VR tasks results in enhanced performance of a complex laparoscopic task in a physical environment. As well, skills developed using the LapSim transfer well to performance of a complex laparoscopic skill *in vivo*. Summary metrics were developed and they provide construct validity for the LapSim. The series of experiments performed suggests the utility of some VR tasks and provides early validation. VR simulators are effective training tools for novice laparoscopists.

37

**FACTORS INFLUENCING WAITING TIMES FOR ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY.** R. Lau, B. Vair, G. Porter. Department of Surgery, Dalhousie University, Halifax, NS

The objective of this study was to examine the impact of demographic, clinical and surgeon factors on waiting times for laparoscopic cholecystectomy (LC).

A wait-list database for all surgical procedures was comprehensively applied across a Division of General Surgery; further chart review of all patients undergoing LC in 2002 was performed to collect additional demographic and clinical data. Patients undergoing LC on an emergent basis, or as a secondary procedure, were excluded. For each patient, 2 intervals were recorded: time from receipt of consult to surgical consult (interval A), and time from surgical consult to LC (interval B). Surgeons were categorized *a priori* into low- and high-volume groups based on the median number of LC procedures performed. All analyses examining waiting times were performed using nonparametric methods.

No associations were identified between any of the examined waiting times and age, gender, diagnosis, or Charleston comorbidity index. Significant variation was identified among individual surgeons for both intervals A ( $p < 0.001$ ) and B ( $p < 0.001$ ). High surgeon volume was associated with longer waiting times for interval A (median 26 v. 19 days;  $p = 0.039$ ) and interval B (median 57.5 v. 34.5 days;  $p = 0.003$ ). In addition, high surgeon volume was associated with greater number of episodes of biliary colic (2.7 v. 2.0;  $p = 0.029$ ). Significant variability in specific waiting times for LC exists and appears to be associated with surgeon volume. Better prioritization of patients undergoing non-emergent LC is required to improve patient care.

### 38 SHOCK-RUPTURED ANGIOMYOLIPOMA AS PRESENTING FEATURE OF COEXISTING RENAL CARCINOMA: CASE STUDIES OF 2 CASES. J.S. Bhullar, P.S. Bedi, A.S. Rakhra, S. Bhullar, N.S. Brar, A. Preet. Department of Surgery, Government Medical College, G.N.D. Hospital, Amritsar, India

Renal angiomyolipoma is a rare benign tumour often associated with congenital anomalies. Only 1 documented case of malignant transformation of angiomyolipoma has been reported. As many as 25% of cases can present with spontaneous rupture and subsequent hemorrhage into the retroperitoneum.

We present our experience of 2 abnormal presentations, as concurrent ruptured angiomyolipomas and renal carcinomas were present in the same kidney. Female patients (aged 39 on average) presented in the surgical emergency with shock and acute abdomen. The patients were resuscitated and underwent emergency ultrasound, which showed massive retroperitoneal bleeding with poor visualization of the kidney. CT scan abd showed ruptured angiomyolipomas with retroperitoneal bleeding in both the cases.

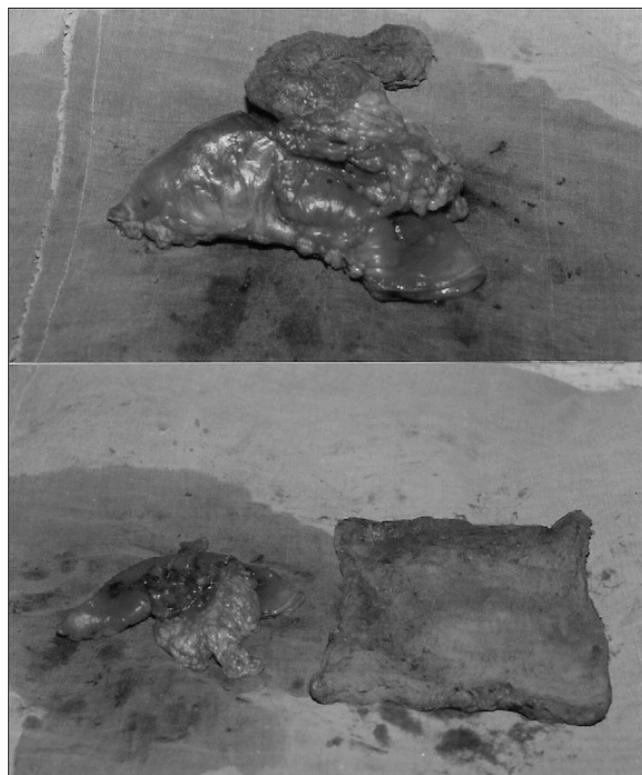
Both patients underwent emergency surgery and in both cases suspicious growths were noticed in the kidney in addition to the burst angiomyolipoma. Nephroureterectomy was done in both cases. Biopsy reports confirmed concurrent renal cell carcinomas. As the most reliable investigational modality for this is the CT scan, which relies on areas with fat density values (-60-8UH) for detecting lesion in the kidney with un-homogenous density due to hemorrhage, concurrent smaller pathologies may be missed.

Such presentations are extremely rare and to the best of our knowledge no such documented cases have been reported before. As angiomyolipomas are multiple in origin, so peroperative kidney inspection is very important before deciding the operative procedure. Any suspicious pathology needs frozen section for confirmation. It is recommended that in any such cases, the clinician should have a high degree of suspicion for other concurrent pathologies and moreover consent for nephrectomy should always be taken in all cases of angiomyolipomas.

### 39 GOSSYPIBOMA: AN UNUSUAL CAUSE OF INTERMITTENT DIARRHEA. J.S. Bhullar, P.S. Bedi, A.S. Rakhra, S. Bhullar, N.S. Brar, A. Preet. Department of Surgery, Government Medical College, G.N.D. Hospital, Amritsar, India

The term "gossypiboma" denotes a mass of cotton that is retained in the body following surgery. Gossypiboma is a medico-legal problem, especially for surgeons. To the best of our knowledge, the patient presented herein is the third reported patient in whom the exact site of migration of a retained surgical textile material into the intestinal lumen could be demonstrated by preoperative imaging studies and the first with such atypical presentation.

A 29-year-old female presented with intermittent diarrhea and generalized abdominal pain due to an incomplete intraluminal migration of a laprotomy towel 2 years after lower-segment cesarean section (LSCS). Plain abdominal radiography did not show any sign of a radio-opaque marker in the abdomen. Ultrasound showed a mass of matted intestinal loops near the pelvis, with gas shadows and a provisional diagnosis of foreign-body granuloma. However, contrast enhanced



abdominal computerized tomography revealed a well-defined soft tissue mass with a dense, enhanced wall, containing an internal high-density area with air bubbles near the pelvis. A fistula between the abscess cavity containing the suspicious mass and the gastrointestinal tract was identified by upper gastrointestinal series. The presence of a foreign body was considered. It was surgically removed with a partial small-bowel resection followed by anastomosis.

Although gossypiboma is rarely seen in daily clinical practice it should be considered in the differential diagnosis of acute mechanical intestinal obstruction and other atypical abdominal pathological presentations in patients who underwent laparotomy and other open abdominal operations previously. The best approach in the prevention of this condition can be achieved by meticulous count of surgical materials in addition to thorough exploration of surgical site at the conclusions of operations and also by routine use of surgical textile materials impregnated with radio-opaque marker.

#### 40

**SURGICAL RECOVERY FOLLOWING LAPAROSCOPIC LIVE-DONOR NEPHRECTOMY.** S. Bergman, L.S. Feldman, F. Carli, M. Anidjar, P.P. Metrakos, J.I. Tchervenkov, S. Paraskevas, D. Klassen, C.G. Andrew, M.C. Vassiliou, D.D. Stanbridge, G.M. Fried. McGill University, Montréal, Que.

The purpose of this study was to describe convalescence following laparoscopic live-donor nephrectomy (LLDN) using both objective and subjective measures.

This is a prospective study of consecutive patients undergoing LLDN at a single institution between September 2001 and January 2004. At baseline and 4 weeks post-op, functional exercise capacity was measured using the 6-minute walk test (6MWT), and health-related quality-of-life was assessed with the SF-36, using the physical component summary (PCS) and mental component summary (MCS) scores. Pain and fatigue were assessed on a 10-point verbal response scale. Data were analyzed using Student's *t* test.

38 patients underwent LLDN and 34 participated in the study. Post-op assessment was done at 29 days (IQR 22–29). At follow-up, median patient-stated recovery was 90% (IQR 75–93). 6MWT distance and PCS scores were lower at follow-up, while pain and fatigue scores were higher; MCS scores were unchanged from baseline (Table). Post-op patient-stated recovery correlated inversely with both the decline in PCS ( $r = 0.6$ ,  $p < 0.001$ ) and the decline in 6MWT distance ( $r = 0.6$ ,  $p < 0.001$ ).

Four weeks following LLDN, patients have not yet returned

Assessment	Preoperative, mean (and SD)	Postoperative, mean (and SD)	<i>p</i> value
6MWT, min	547 (87)	515 (89)	0.07
PCS	55.6 (5.1)	43.6 (9.8)	<0.0001
MCS	53.4 (9.0)	54.6 (8.8)	0.33
Pain	0.2 (0.5)	1.3 (1.2)	<0.001
Fatigue	1.6 (1.8)	2.8 (2.3)	<0.01

MCS = mental component summary; PCS = physical component summary; SD = standard deviation; 6MWT = 6-minute walk test

to baseline exercise capacity or general physical health. Patients' self-assessment of the extent of their recovery correlates with results obtained from other standardized measures of convalescence.

#### 41

**INTRAOPERATIVE FLUID RESTRICTION IN LAPAROSCOPIC LIVE-DONOR NEPHRECTOMY.** S. Bergman, L.S. Feldman, F. Carli, M. Anidjar, M. Vassiliou, C.G. Andrew, D.D. Stanbridge, G.M. Fried. Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University, Montréal, Que.

The purpose of this study was to demonstrate that conservative intraoperative fluid management during laparoscopic live-donor nephrectomy (LLDN) improves donor outcomes without compromising recipient outcomes.

This is a prospective study of 52 patients who underwent LLDN between December 2000 and January 2004. The fluid-restriction group ( $n = 28$ ) received intravenous crystalloids intraoperatively at a rate of  $<10$  mL/kg/h, while the fluid-load group ( $n = 24$ ) received  $>10$  mL/kg/h. Postoperative serum creatinine levels, length of stay, and complications were recorded in the donors and the recipients. Self-reported pain scores at rest and with activity were recorded every morning of hospitalization for the donors. In the recipients, incidence of delayed graft function and acute rejection were noted. Data are expressed as median (range) and were analyzed using Mann-Whitney's U test. The chi-square test was used for categorical data.

Patients in the fluid-restriction group received less fluid (1.5 L [0.9–2.5] v. 3.5 L [1.4–8.5],  $p < 0.01$ ) and had a lower urine output intraoperatively (98 mL/h [20–173] v. 135 mL/h [61–856],  $p < 0.01$ ). There were no differences in post-op creatinine levels or complications between the 2 groups. Pain scores at rest were significantly lower in the fluid-restriction group on postoperative days 1 and 2 ( $p < 0.01$ ), and donors in this group had a shorter length of stay (2 d [2–4] v. 3 d [2–5],  $p < 0.05$ ). There were no differences in post-op creatinine levels, incidence of delayed graft function, acute rejection, or hospital stay between the recipients in the fluid-restriction and fluid-load groups.

Conservative intraoperative fluid management in LLDN is associated with improved donor outcomes and does not appear to worsen short-term graft function.

#### 42

**IS EVIDENCE-BASED SURGERY AN OXYMORON?** C.J. de Gara, D. Hochman, N. Wasey, R. St. Germaine, J. Baughan. Division of General Surgery, University of Alberta, Edmonton, Alta.

Much of surgery lacks definitive level 1 evidence. However, incontrovertible evidence from multiple RCTs and meta-analyses exists for heparin, antibiotic and drain prophylaxis in elective colorectal surgery, the wearing of double gloves during surgery and the technique and suture material for abdominal fascial closure.

In a consecutive series of 98 elective colorectal surgeries from a single institution with 12 general surgeons, 37% of pa-

tients received incorrect heparin prophylaxis, only 5% correctly received preoperative (with no postoperative) antibiotics and 51% had a drain inserted needlessly ( $p < 0.001$ ).

In a separate study, the entire 170 surgeons within the Capital region were surveyed. 57% (ranging from 100% of urologists to 13% of orthopedic surgeons) do not double-glove. Diminished manual dexterity was the commonest (46%) reason cited. Only 23% of 36 general surgeons provided with current evidence indicated they would change practice based on the evidence.

Hodgson and colleagues meta-analysis found a 32% relative risk reduction of incisional hernia with running nonabsorbable fascial closure. Comparing 61 consecutive midline laparotomies carried out at a single institution ( $n = 566$  beds) prior to the meta-analysis publication with 56 carried out immediately following publication, 0% and 5% closed the fascia using a nonabsorbable running technique, respectively. One year later, 44% of 120 consecutive laparotomies were closed appropriately ( $p < 0.001$ ).

Despite 88% of 50 surgeons surveyed recognizing RCT as the best evidence when presented with 4 operative scenarios only 40%–52% staff general surgeons and urologists and 58%–67% residents chose running nonabsorbable (or PDS) fascial closure.

We conclude that the majority of surgeons in our region are resistant to practising evidence-based surgery.

### 43

**THE MANAGEMENT OF CANCER METASTASIZING TO THE PANCREAS.** G. Doumit, P. Barron. The Ottawa Hospital, Ottawa, Ont.

Patients presenting with a mass in the pancreas are rarely found to have isolated metastases from a nonpancreatic primary. The purpose of this study was to identify the incidence of such lesions and review management.

Between 01/04/1996 and 01/01/2003 at the Ottawa Hospital, a tertiary care centre associated with University of Ottawa, 388 patients presenting with a localized pancreatic mass (head 314, body 30, tail 44) causing obstructive jaundice or other abdominal complaints were identified. Patients presenting with pancreatic masses as part of a spectrum of widely metastatic disease were excluded from the study.

Five cases of isolated metastatic cancer to the pancreas were identified: 3 renal-cell cancers, 1 breast cancer, and 1 carcinoid tumour. Three tumours were located in the head of the pancreas, 1 in the body and 1 in the tail. One patient had 2 lesions, 1 in the head and the other in the tail. One renal-cell cancer, the breast cancer and carcinoid tumour were resected for cure. All are alive at 54 mo, 66 mo, and 84 mo, respectively. One renal-cell cancer had invasion of the portal vein and received palliative radiation treatment only. Another renal-cell cancer had significant comorbidities and was judged unfit for surgery. The pathological diagnosis was made following surgery in the resected cases, as it is not our practice to perform preoperative biopsy in radiologically resectable pancreatic lesions. No postoperative adjuvant treatment was given.

Our results show that such lesions are rare but should be suspected in patients with a history of previous malignancy. If operable long-term survival may be obtained. An isolated

metastasis to the pancreas from a carcinoid tumour has not been reported previously.

### 44

**CURRICULAR CHANGE AND PRACTICAL UNDERGRADUATE SURGICAL EXPERIENCE.** A. Ladak, J. Hanson, C.J. de Gara. Department of Surgery, University of Alberta, Edmonton, Alta.

There is a current trend of shortening surgical clerkships and removing didactic surgical teaching from nonclinical years. Of concern is that this policy has led to a decrease in surgical exposure and a diminished interest in students pursuing a surgical career. The purpose of this retrospective study was to determine the effect of curricular change on practical experiences and evaluate overall clinical exposure of students during surgical clerkship. The curriculum change entailed moving a portion of the surgical rotation from 4th year to 3rd year and the elimination of a 24 surgical lecture series from 2nd year of the medical program. The survey involved analyzing 15 procedural skills. Numbers of procedures completed before and after the curriculum change were determined and compared to any changes in student performance. In addition, an overall survey of 4 classes measuring clinical exposure was completed. 400 logbooks were reviewed. There was no significant change in practical surgical exposure resulting from the curriculum change. The curriculum change did result in a decrease in end-of-rotation MCQ score performance demonstrated by a decrease in class average of 5% postcurriculum change. There were no effects on the performance of students on ward evaluations and OSCE scores. There were significant gaps in clinical exposure both before and after the curriculum change demonstrated by > 50% of students in each class failing to complete 8 out of 15 procedures at least once. Overall, clinical clerkship experience did not diminish with curricular change. While most students do carry out a variety of core procedures during their clerkship, a significant proportion does not. Strategies to prevent students from avoiding this component of their education need to be instituted.

### 45

**TREATMENT OF ESOPHAGEAL ACHALASIA WITH HELLER MYOTOMY: RETROSPECTIVE EVALUATION OF PATIENT SATISFACTION AND QUALITY OF LIFE USING THE ZANINOTTO SYMPTOM SCORE.** Y. Dang, C.D. Mercer. Department of Surgery, Kingston General Hospital, Queen's University, Kingston, Ont.

The purpose of this study was to compare the symptoms of esophageal achalasia before and after Heller myotomy.

Starting in July 1990, 22 patients underwent Heller myotomy (9 open and 17 laparoscopic) for achalasia, from which 17 (77%) were successfully contacted. Four patients had redo operations for symptom recurrence and were analyzed as a separate group. Mean follow-up was 46 months (range 6 to 109 months). Preoperative and postoperative data regarding the symptoms of dysphagia, regurgitation, and heartburn were retrospectively gathered through a mailed questionnaire. Symptom scores were calculated.

Overall, symptom scores decreased, with mean preoperative and postoperative values of 23.1 and 7.3 respectively ( $p < 0.001$ ). Of the 13 patients in the Single Heller group, symptoms scores decreased for all but 1 patient, with mean preoperative and postoperative scores of 23.3 and 5.3, respectively ( $p < 0.001$ ). The patient in whom symptoms did not improve is a candidate for a redo procedure. Of the 4 patients in the redo Heller group, mean preoperative and postoperative scores for the first Heller myotomy were 22.2 and 13.8, respectively ( $p = 0.078$ ). Postoperative symptom scores increased to a mean of 17.5 after a mean of 45 months (range 23–75 mo) and decreased to a mean of 13.8 after the second procedure ( $p = 0.177$ ). One patient of the redo group had a repeat motility test after his second failed Heller myotomy, which demonstrated zero lower esophageal sphincter pressure and absent primary peristalsis, and endoscopy, which demonstrated a tortuous esophagus.

Heller myotomy appears to be effective in alleviating the symptoms of achalasia. Redo Heller myotomies are occasionally required, however, outcomes are less favourable.

#### 46

**IS THERE ROOM FOR OPEN SPLENECTOMY IN THE LAPAROSCOPIC ERA? T. Boghossian, M. Henri, C. Patino, Y. Bendavid, M. Morin. Université de Montréal, Montréal, Que.**

This retrospective study describes our ongoing experience with laparoscopic (LSC) splenectomy compared to open splenectomy. Our aim is to compare outcomes between LSC and open splenectomy.

Fifty-five patients underwent LSC splenectomy and 19 patients had open splenectomy between 1988 and 2003.

Indications for LSC splenectomy were ITP (34), hemolytic anemia (6), spherocytosis (7), lymphoma (2), tricholeukemia (1), chronic lymphoid leukemia (1), cystic hamartoma (1), myelofibrosis (1) and TTP (2). Moderate splenomegaly (12–20 cm) was found in 16 patients.

Results are shown as mean (range). Operative time for all LSC splenectomies, spleens  $< 11$  cm, and moderate splenomegaly was 137 minutes (40–280), 128 minutes (40–255), and 159 minutes (75–280) respectively. There were 4 conversions (7.3%). Blood loss was 151 mL (25–1450). The endobag tore in 2 cases. Early postoperative complication was splenic vein thrombosis. Late complications occurred in 2 patients: 1 patient presented with splenosis 7 years later and 1 patient had recurrence of ITP from a missed accessory spleen. Hospital stay was 4.4 days (2–16).

Indications for open splenectomy were lymphoma (7), splenic abscess (3), tricholeukemia (1), ITP (2), hemolytic anemia (2), TTP (1), falciform anemia (1), and polycythemia vera (1). 12 patients had splenomegaly. Operative time was 111 minutes (25–225) for all cases, 125 minutes (60–165) for moderate splenomegaly (12–20 cm,  $n = 6$ ) and 97 minutes (50–160) for massive splenomegaly (21–30 cm,  $n = 6$ ). Blood loss was 795 mL (25–2500). There was 1 laceration of the tail of the pancreas (5.3%). Postoperative complications included 2 pneumonias (10.5%). One patient developed an incisional hernia (5.3%). Hospital stay was 15 days (4–61).

Although LSC splenectomy remains the treatment of choice

for some hematologic conditions, open splenectomy remains a safe option for some cases of splenomegaly.

#### 47

**TRANSABDOMINAL ADRENALECTOMY: 9-YEAR EXPERIENCE. T. Boghossian, M. Henri, C. Patino, Y. Bendavid, M. Morin. Université de Montréal, Montréal, Que.**

The retrospective study has for aim to analyze the results of a single surgeon's experience.

Fifty-one patients underwent adrenalectomies between 1994 and 2001. There were 2 groups: laparoscopic adrenalectomy (LA,  $n = 46$ ), and open adrenalectomy (OA,  $n = 5$ ).

Results are presented as mean (range). Twenty-one right, 24 left, and 1 bilateral adrenalectomy were performed in the LA group. The indications for surgery were Cushing's syndrome (3), Cushing's disease (1), Conn's disease (23), incidentaloma (3), hyperplasia (1), pheochromocytoma (9), and metastasis (6). Right adrenals measured 4.5 cm (1.5–9 cm) and left adrenals 3 cm (0.9–7 cm). Operative time average was 144 minutes (60–240). One patient was converted to open because of suspicion for peritoneal invasion. Three patients underwent only a biopsy because of extensive metastatic disease found during surgery. Postoperative complications included 1 patient with ileus and 1 patient with atrial fibrillation. Late complications included 1 trocar-site hernia. Average hospitalization was 4.5 days (1–18).

Three right and 2 left adrenalectomies were performed in the OA group. The average adrenal size was 11.4 cm (3–23 cm). Indications were Conn's disease (1), incidentaloma (2), leiomyosarcoma of the IVC invading the adrenal (1) and extrarenal pheochromocytoma with a distal pancreatic cancer (1). Operative time was 221 minutes (120–320). Intraoperative complications included laceration of the spleen necessitating splenectomy. Postoperative complications included 1 patient with ileus and atelectasis, and 1 patient with sepsis, atrial fibrillation and urinary infection. Average hospitalization was 10.6 days (4–19).

Although LSC adrenalectomy has become the gold standard for most cases, there are still indications for the open approach which include masses  $> 10$  cm and locally invading cancer.

#### 48

**AFTER SEVERE ACUTE PANCREATITIS: DETERMINATION OF QUALITY OF LIFE AND DEVELOPMENT OF CHRONIC PANCREATITIS SCREENING QUESTIONNAIRE. D. Hochman, B. Louie, S. Hamilton, R. Bailey. University of Alberta Hospital and Royal Alexandra Hospital, Edmonton, Alta.**

Severe acute pancreatitis carries a significant morbidity and mortality. Clinical experience suggests a significantly reduced quality of life, but few studies exist and cannot confirm this experience. We seek to objectively demonstrate the quality of life after severe pancreatitis and to identify a progression among patients from acute to chronic pancreatitis with a new Chronic Pancreatitis Screening Questionnaire.

Forty-two patients were assessed 24–36 months following an episode of severe pancreatitis. Patients completed the

English Standard Short Form 36 and the newly developed Chronic Pancreatitis Screening Questionnaire to assess their quality of life and symptoms of chronic pancreatitis.

Compared to the general Canadian population, survivors of severe acute pancreatitis have significantly reduced SF-36 scores. There is a significant correlation between the Ranson score at presentation and the SF-36 Physical Composite Score at time of follow-up ( $\rho = -0.47$ ,  $p = 0.03$ ). 76% of patients have ongoing symptoms suggestive of chronic pancreatitis. These include abdominal pain, diarrhea, unintentional weight loss, new-onset diabetes mellitus and requirement of regular pancreatic enzyme supplementation.

Survivors of severe acute pancreatitis have a reduced quality of life to healthy controls. Higher Ranson's score at presentation may predict who is more likely to suffer poorer outcomes. The CPSQ identified patients with symptoms of chronic pancreatitis and this may allow identification of patients prone to chronic pancreatitis following acute disease.

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### **BREAST CANCER IN BRANT COUNTY: ROOM FOR IMPROVEMENT? PART 1: DIAGNOSTIC EVALUATION OF BREAST LESIONS. C. Hanley, R. Kessaram. Department of Surgery, Brantford General Hospital, Brantford, Ont.**

A retrospective chart review of 180 patients with 182 breast lesions was undertaken, examining the diagnostic tools utilized by 6 general surgeons for palpable and nonpalpable breast lesions operated on at the Brantford General Hospital (BGH) in 2000. The objective of this study was to determine if the diagnostic evaluation of breast lesions at the BGH is in accordance with national recommendations.

Of the 182 breast lesions, 89 (49%) were histologically malignant. Of the 100 palpable lesions removed, fine-needle aspiration biopsy (FNAB) was performed on 48. Positive FNABs in this study were very predictive of malignancy (100%). The concordance of positive physical examination, mammography and FNAB in this study was 93% predictive of malignancy. Mammographic results were recorded using the BIRADS (American College of Radiology Breast Imaging Reporting and Data System) categorization system. Of the 78 mammograms done on nonpalpable lesions, the PPV (positive predictive value) of malignancy for "suggestive" lesions was 100%, 75% for "suspicious" lesions, 40% for "probably benign" lesions, 0% for "benign" lesions and 37% for lesions that were categorized as "needs additional imaging." The only other preoperative diagnostic tools utilized in the study were 44 ultrasounds, 1 core biopsy and 3 stereotactic biopsies. Only 15 of the first operations performed on patients in this study were definitive cancer operations.

Both positive mammography and FNAB were highly predictive of malignancy in this study. Benign mammographic results from the BGH were not as negatively predictive of malignancy as those described in the literature. National guidelines recommend the preoperative diagnosis of benign lesions to reduce the need for open surgical biopsy and of malignant lesions to reduce the number of operations performed. In this study, variation existed between surgeons in terms of preoperative diagnostic procedures used for palpable and nonpalpable

lesions and the use of positive diagnostic results to determine types of surgeries performed.

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### **BREAST CANCER IN BRANT COUNTY: ROOM FOR IMPROVEMENT? PART 2: SURGICAL MANAGEMENT OF BREAST LESIONS. C. Hanley, R. Kessaram. Department of Surgery, Brantford General Hospital, Brantford, Ont.**

A retrospective chart review of 180 patients with 182 breast lesions was undertaken, examining the surgical management of palpable and nonpalpable breast lesions by 6 general surgeons at the Brantford General Hospital (BGH) in 2000. The objective of this study was to determine if the surgical management of breast lesions at the BGH is in accordance with national recommendations.

Of the first operations performed in this study, 76 were lumpectomies and 88 were needle localized biopsies. Fifteen patients' first operations were definitive cancer operations. Positive margins were found in 61% of needle-localized lumpectomies and in 75% of lumpectomies for palpable lesions. Only 11% of surgical specimens were oriented for pathology. Reoperations were done on 67% of women with malignancies in this study. Five percent of women had documented complications after first operations and 24% had complications after reoperations.

There were high rates of margin positivity in this study, which resulted in many reoperations. In most cases first operations were considered biopsies to establish diagnosis versus definitive cancer surgeries. In addition, guidelines for intact surgical specimens and orientation of specimens were not followed consistently by all study surgeons.

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### **SHOULD LAPAROSCOPIC COLORECTAL SURGERY BE PERFORMED IN A COMMUNITY HOSPITAL SETTING? H. Sebahang, S. Hegge, C. McKinley. Centre for Minimally Invasive Surgery, North Bay District Hospital, North Bay, Ont.**

In recent years, the use of the laparoscopic approach to perform colorectal surgery has been the subject of active debate. Many studies demonstrating the safety and feasibility of the laparoscopic approach in tertiary care centers have been published. The aim of this study was to examine the results of laparoscopic colorectal surgery performed in a community hospital setting.

Between October 2000 and December 2003, 100 consecutive patients (56 women and 44 men, mean age 64 yr) underwent laparoscopic bowel resections for benign and malignant disease at the North Bay District Hospital (a 200-bed acute care community hospital, located 400 km away from the nearest tertiary care center). All cases were performed by 2 community surgeons who transitioned themselves from an open to a laparoscopic approach. Conversion rate, morbidity and mortality, operating times, length of stay, and short-term oncologic follow-up are presented.

The conversion rate to an open procedure was 10%. There was no intraoperative mortality and one 30-day mortality sec-

ondary to cardiogenic shock. There were 3 intraoperative complications. There were 10 major postoperative complications and 14 minor postoperative complications. The median operating time for this laparoscopic case series was 165 minutes (range 70–350 min). The median length of stay was 4.5 days (range 2–5 d). Fifty-four patients underwent colorectal resections for benign disease and 46 patients underwent colorectal resections for malignant disease.

The mean number of lymph nodes retrieved from the oncologic resections was 11. At 12 months mean follow-up, there was no locoregional or trocar-site recurrence noted.

Community surgeons experienced in open colorectal surgery can safely transition themselves from an open to a laparoscopic approach. Furthermore, laparoscopic colorectal surgery for benign and malignant disease can be performed in a community hospital setting with results similar to tertiary care centres.

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**EARLY EXPERIENCE OF STAPLED HEMORRHOIDECTOMY IN A COMMUNITY HOSPITAL SETTING.** E. Touzin, S. Hegge, C. McKinley. Centre for Minimally Invasive Surgery, North Bay District Hospital, North Bay, Ont.

Stapled hemorrhoidectomy was introduced as a new procedure for the surgical management of hemorrhoidal disease in 1993. The procedure is characterized by less postoperative pain than conventional hemorrhoidectomy, and is often performed in an outpatient setting. We present short-term outcomes of a prospective longitudinal cohort of patients treated with the stapled hemorrhoidectomy compared with a group of patients treated with a conventional hemorrhoidectomy performed in a community hospital setting.

41 consecutive patients who underwent a conventional open diathermy (Ferguson) hemorrhoidectomy between September 1999 and September 2001 were compared to 34 consecutive patients who underwent a stapled hemorrhoidectomy procedure between September 2001 and October 2003. Perioperative and postoperative complications, length of hospital stay and patient satisfaction at 2-week follow-up were analyzed for both groups. We also performed a total cost comparison of the 2 techniques.

The stapled hemorrhoidectomy group was comprised of 11 males and 23 females, with a mean age of 50 years. The open technique group was comprised of 9 males and 32 females, with a mean age of 52 years. There were no intraoperative complications in either group. A total of 3 patients (9%) presented with postoperative complications in the stapled hemorrhoidectomy group, including urinary retention (1) and significant bleeding (2). Three patients required admission to hospital postoperatively and 31 underwent the procedure as outpatients. A total of 14 patients (34%) presented with postoperative complications in the open technique group, including urinary retention (2), significant bleeding (2), and pain requiring hospital admission (10). A total of 11 patients required admission to hospital postoperatively, 33 underwent the procedure as outpatients. At 2-week follow-up, 30 patients (88%) presented no complaints regarding the procedure in the stapled hemorrhoidectomy group versus 27 (66%) in the open technique group. Complaints in the stapled hemorrhoidectomy

group included pain or burning sensation at defecation and mild fecal incontinence. Complaints in the open technique group included pain or burning sensation, bleeding, fecal urgency and mild fecal incontinence. The total cost calculated for the stapled hemorrhoidectomy procedure was \$736.38, while the total cost of the open procedure was \$760.00.

The stapled hemorrhoidectomy technique is a safe alternative to the traditional open hemorrhoidectomy. It can be performed as an outpatient procedure, and subjects the patient to minimal postoperative discomfort. Costs are not significantly different from conventional surgical therapy.

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**IMPROVED SURVIVAL IN EXPERIMENTAL SEPSIS WITH AN ORALLY ADMINISTERED INHIBITOR OF APOPTOSIS.** J.G.R. Weaver, M.S. Rouse, J.M. Steckelberg, A.D. Badley. University of Ottawa, Ottawa, Ont., Mayo Clinic and Foundation, Rochester, Minn.

The pathophysiology of sepsis involves excessive lymphocyte apoptosis, which correlates with adverse outcomes, and disordered cytokine production, which may promote host injury. As the protease inhibitor (PI) class of antiretroviral agents is known to prevent apoptosis *in vitro*, we evaluated their impact on survival, lymphocyte apoptosis and consequent cytokine production in mice with sepsis induced by cecal ligation and perforation. Mice pretreated with PI have improved survival (67%;  $p < 0.0005$ ) compared to controls (17%), and a significant ( $p < 0.05$ ) reduction in lymphocyte apoptosis. Importantly, even mice receiving therapy beginning 4 hours after perforation also demonstrated improved survival (50%;  $p < 0.05$ ) compared to controls. PI therapy was associated with an increase in the Th1 cytokine TNF- $\alpha$  ( $p < 0.05$ ) early in sepsis, and a reduction in the Th2 cytokines IL-6 and IL-10 ( $p < 0.05$ ) late in sepsis, and despite no intrinsic antibacterial effects, PI reduced quantitative bacterial blood cultures. The beneficial effects of PI appear to be specific to lymphocyte apoptosis, as lymphocyte deficient Rag1<sup>-/-</sup> mice did not experience benefit from treatment with PI.

Thus, inhibition of lymphocyte apoptosis by PI is a candidate approach for the treatment of sepsis.

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**COMPARISON OF DATA EXTRACTION FROM STANDARDIZED VERSUS TRADITIONAL OPERATIVE REPORTS FOR DATABASE-RELATED RESEARCH AND QUALITY CONTROL.** A. Harvey, J. Nixon, C.J. Brown. Peter Lougheed Centre, University of Calgary, Calgary, Alta.

Dictated operative reports are the primary record of surgical procedures. Standardized reports have been shown to improve outcomes in other area of medical record-keeping. The purpose of this study is to develop a standardized dictated summary for laparoscopic cholecystectomy, and subsequently compare the completeness of operative data include in this standardized operative report (SR) with the nonstandardized traditional dictated operative report (TR).

Between October 1 and December 31, 2003, all surgeons and residents at the Peter Lougheed Centre agreed to perform

standardized dictated summaries for all laparoscopic cholecystectomy procedures. Traditional reports dictated in the 3 months prior to the study period were reviewed for comparison. Two separate physicians extracted data from reports and entered it into a spreadsheet. Completeness of data extraction from the 2 types of reports was the main outcome measure. Compliance with the standardized dictation, time requirements and interobserver reliability of data extraction were secondary outcome measures. A sample size of 100 of each report types was required to detect a difference of 10% with a power of  $> 0.80$ . Nonparametric statistical analysis was used to compare the completeness of data extraction from the 2 types of reports. Statistical significance was set at  $p < 0.05$ .

Compliance with the standardized report was 63.4%. Completeness of data extraction for identifying variables such as patient name, age, date of procedure and surgeon was similar between the 2 types of reports. Categorical variables such as the procedure urgency (93.2% v. 63.7%), admission status (97.5% v. 49.0%), perioperative antibiotics (95.0% v. 14.7%) and DVT prophylaxis (97.5% SR v. 13.7%) were more completely reported in the SR group ( $p < 0.05$ ). In addition, some qualitative (GB appearance 100% v. 37.3%) and quantitative variables (no. artery clips 99.2% v. 72.5%) were more consistently found on the standardized reports ( $p < 0.05$ ).

Standardized operative reports result in more efficient and complete data extraction when compared to traditional dictations.

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**THE NEUROENDOCRINE PROTEIN 7B2 IS ELEVATED IN SERUM OF PATIENTS WITH NEUROENDOCRINE TUMOURS BUT DOES NOT CORRELATE WITH TUMOUR BURDEN.** C. Rochon, S. Liu, N. Seidah, P. Metrakos. Department of Surgical Research, Hepatobiliary and Transplantation Laboratory, Royal Victoria Hospital, McGill University, Montréal, Que.

7B2 is a chaperone protein that promotes the proper folding of proprotein convertase 2. It is secreted in the serum of normal human subjects at levels between 40 and 140 pmol/L (9.3e-7 to 3.2e-6 g/L). We have previously observed that 7B2 protein levels are high in functioning neuroendocrine tumours (NET) of the pancreas when compared with 7B2 protein levels in nonfunctioning (NF) NET, unaffected pancreas, normal pancreas and normal islet cells. The objective of this study was to determine the 7B2 levels in the serum of patients with NET.

We obtained blood samples of patients with NET and healthy volunteers. The serum was analyzed via an ELISA assay. Microtiter plates were coated with serum and incubated with antihuman-7B2 rabbit antibody followed by an alkaline phosphatase labeled secondary antibody. p-nitrophenyl phosphatase (pNPP) was the liquid substrate. The samples were read on a spectrophotometer at 405 nm.

The 7B2 blood level of healthy volunteers ranged from 8.71e-8 g/L to 9.56e-7 g/L. The mean 7B2 blood levels were much higher in patients with NET: 1.19e-3 g/L  $\pm$  1.62e-3 g/L; range 2.81e-7 g/L to 4.5e-3 g/L (see the graph, left). NET patients can be further subdivided into 3 categories: NF tumours (mean 2.5e-3  $\pm$  1.8e-3 g/L), functioning tumours (mean 1.45e-5  $\pm$  3.3e-5 g/L) and carcinoid tumours (mean 8.5e-3  $\pm$  1.2e-3 g/L; see graph, right). The magnitude of 7B2 serum elevation did not correlate with tumour burden or metastatic disease.

The 7B2 blood levels of NF NET and functioning NET are inversely proportional to the tumour 7B2 protein levels. Our results correspond with previously published data where 5 patients with NF NET were found to have very high serum 7B2 levels. To our knowledge, no one has reported 7B2 serum elevation in functioning NETs and carcinoid tumours. To further establish 7B2 as a serologic tumour marker, we need to define if levels return to normal after surgical resection and if a rise coincides with disease recurrence.

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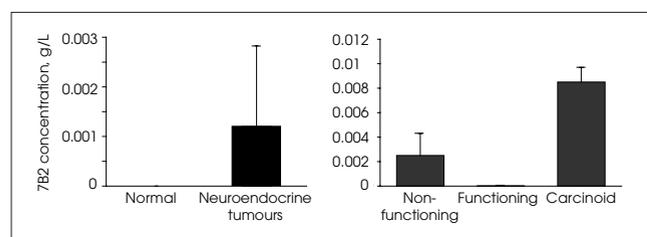
**MEASUREMENT OF INTRAOPERATIVE LAPAROSCOPIC SKILL.** M. C. Vassiliou, L. S. Feldman, C. G. Andrew, S. Bergman, H. Al-Qadhi, D. Stanbridge, G. M. Fried. Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University, Montréal, Que.

A reliable and valid intraoperative assessment tool is needed as an outcome measure for curricula designed to train residents in laparoscopy. The aim of this study was to develop a global assessment tool (GAT) for evaluation of laparoscopic skill in the operating room and to assess its reliability and validity.

A GAT consisting of 5 items (depth perception, bimanual dexterity, efficiency, tissue handling and overall competence) scored on a 5-point Likert scale was developed in consultation with expert laparoscopists. 21 participants (8 novice and 13 experienced surgeons) were evaluated by the attending surgeon and 2 trained evaluators during 51 laparoscopic performances of gallbladder dissection from the liver bed. The interrater reliabilities were calculated using the intraclass correlation coefficient (ICC). Construct validity was assessed by comparing mean observer (obs) scores for novice and experienced participants using the Student's *t* test. Concurrent validity was ascertained using linear regression to compare GAT total scores (obs) to performance in the MISTELS (McGill Inanimate System for Training and Evaluation of Laparoscopic Skills) simulator in 19 subjects.

The interrater reliability for the GAT total score between observers was 0.93, and between observers and attending surgeons was 0.83. The mean total score by the observers for novice subjects (PGY 1-3) was 13 (95% CI 10.8-15.2) compared to 19.4 (95% CI 17.5-21.3) for experienced subjects (PGY 4—attending,  $p = 0.001$ ). The correlation coefficient for the total scores on the GAT (obs) versus MISTELS was 0.81 ( $p < 0.001$ ).

Our data suggest that this assessment tool is feasible, reliable and valid. The findings support its use for intraoperative assessment of laparoscopic skill. The data also demonstrate a



high correlation between GAT and MISTELS scores, suggesting that simulator performance may predict intraoperative laparoscopic skill.

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#### **TRENDS IN THE USE OF LAPAROSCOPIC CHOLECYSTECTOMY IN ONTARIO FROM 1988 TO 2001.**

**J. Choi, D.R. Urbach.** Department of Surgery, University of Toronto, The Institute for Clinical Evaluative Sciences, Toronto, Ont.

Over the last 2 decades, laparoscopic cholecystectomy has become the standard of care for the treatment of symptomatic gallbladder disease. We examined trends in the use of laparoscopic cholecystectomy in Ontario, Canada.

We used the Canadian Institute for Health Information (CIHI) database to identify all cholecystectomies done on residents of Ontario from 1988 to 2001 according to Canadian Classification of Procedures (CCP) codes. We used linear regression to examine trends in the use of cholecystectomy in relation to surgical approach (laparoscopic or open) and acuity (emergent or elective).

The number of cholecystectomies per year increased from 21 266 in 1988 to 28 466 in 2001 (an increase of 34%). In 1988 0.3% were laparoscopic procedures, as compared with 92% in 2001. In 1992, the majority of cases (77.8%) were laparoscopic. The proportion of elective cholecystectomies completed laparoscopically began to plateau in 1994 at approximately 93%. The proportion of emergent cholecystectomies completed laparoscopically was 85% in 2001, and continued to rise through the entire study period (average annual increase 8.3% [95% CI 6.2–10.4,  $p < 0.001$ ]). The total number of emergent cholecystectomies decreased over the study period (7109 in 1988 as compared with 6459 in 2001).

Laparoscopic cholecystectomy appears to have become the preferred surgical approach for the treatment of gallbladder disease. In Ontario, the increase in the use of cholecystectomy since 1988 is due solely to an increase in elective operations. While the use of a laparoscopic approach for elective procedures may have plateaued, use of laparoscopic cholecystectomy in the emergent setting appears to be continuing to rise.

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#### **WAITING TIMES FOR CANCER SURGERY IN ONTARIO, 1984–2000.**

**T. Bardell, P. Belliveau, J. Huang, W. Kong, W.J. Mackillop.** Queen's University, Kingston, Ont.

The aim of this study is to describe changes in waiting times for cancer surgery in Ontario between 1984 and 2000, and to determine factors associated with increased waiting time.

The interval between date of diagnosis and admission for surgery for all patients receiving surgical treatment for cancers of the larynx, hypopharynx, stomach, colon, rectum, breast, cervix, uterus, prostate, bladder, lung and esophagus was calculated for all patients in Ontario between 1984 and June, 2000. This was accomplished by retrospective review of prospectively gathered electronic records.

Median waiting times increased over the study period for all cancer types. A substantial increase was seen in patients with esophageal cancer (from 14 days in 1984–87 to 33 days in

1998–2000), breast cancer (12 days to 27 days), and laryngeal cancer (16 days to 33 days). A decrease was seen in the proportion of cases admitted at time of diagnosis for colon resection (from 79.4% in 1984–87 to 47.9% in 1998–2000), for laryngeal cancer (35.5% to 9.4%), and for lung cancer (61.6% to 23.0%). The greatest increases in waiting time (excluding cancer location) were related to surgery at a site remote from the diagnosing hospital (OR 3.879) and surgery in a teaching hospital (OR 1.421). Patients treated near the end of the study period were more likely to increased waiting time, while patients at the extremes of age were more likely to have decreased waiting time. Women tended to have surgery sooner than men. Patients with cancers of the cervix and prostate typically waited longer for their operations (OR 2.68 and 3.927 respectively) when compared to patients with non-small-cell lung cancer.

Waiting times for cancer surgery increased substantially between 1984 and 2000. This may reflect a general lack of resources.

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#### **A PROSPECTIVE AUDIT OF OUTCOMES FOLLOWING ABDOMINAL AORTIC ANEURYSM SURGERY: AN EXAMPLE OF CONTINUING QUALITY ASSURANCE AND PRACTICE APPRAISAL.**

**T.L. Forbes.** Division of Vascular Surgery, London Health Sciences Centre and The University of Western Ontario, London, Ont.

Studies have reviewed the role of hospital and surgeon case volumes in determining outcomes following major surgical procedures, but few have analyzed this relationship at the level of the individual surgeon. The purpose of this study was to display the value of a unique analytical tool as a form of an ongoing practice audit.

All patients who underwent an elective open abdominal aortic aneurysm repair by an individual surgeon over a 5-year period were analyzed prospectively using the cumulative sum failure method. Outcomes were converted to the necessary “success” or “failure” format with a failure defined as the presence of early mortality, myocardial infarction, or a complication resulting in another surgical procedure or prolonged hospitalization. A target failure rate of 10% was chosen following a literature review.

The study cohort consists of 138 consecutive patients over 5 years (1998–2003). There were 5 early mortalities (3.6%), 15 myocardial infarctions (10.9%), and 3 major morbidities (2.2%). All patients were plotted sequentially as a cumulative-sum curve, during the majority of which the slope remained flat or negative, indicating satisfactory or improved results compared to the target failure rate. However, over an early 17-patient period the curve adopted a positive slope, indicating a deterioration in results and raising alarms. This prompted a review that eventually attributed this run to an excess of medical comorbidities in this subgroup of patients.

The cumulative-sum failure method provides a technique that allows a surgeon to prospectively audit his or her results and recognize trends in performance prior to their recognition by standard statistical tools. As such this serves as an example of a practice review or appraisal as defined by Section 5 of the Royal College's Maintenance of Certification Program.

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**COMBINED BLOCKADE OF CD40 LIGAND AND ICOS COSTIMULATION INDUCES IMMUNOLOGICAL TOLERANCE TO ISLET ALLOGRAFTS AND PREVENTS THE ONSET OF AUTOIMMUNE DIABETES IN NOD MICE.** S.A. Nanji, C.C. Anderson, W.W. Hancock, B. Luo, L.F. Zhu, A.M.J. Shapiro. Department of Surgery, University of Alberta, Edmonton, Alta., Department of Pathology and Laboratory Medicine, Children's Hospital of Philadelphia and University of Pennsylvania School of Medicine, Philadelphia, Pa.

The blockade of costimulation is a promising strategy to prevent allograft rejection and induce tolerance. We tested the effectiveness of CD40 ligand (CD40L) and ICOS costimulation blockade on islet allograft survival, and in the prevention of spontaneous autoimmune diabetes in the NOD mouse.

BALB/c islets were transplanted under the renal capsule of streptozotocin-treated diabetic B6 mice. Recipients were treated with blocking mAbs to ICOS (0.1 mg/d ↔ 14 d) and CD40L (0.25 mg on days 0, 2, 4, 6) i.p., and graft function was monitored by serial blood-glucose measurements. Compared to untreated controls, anti-ICOS alone did not prolong graft survival (MST = 13 d, *n* = 11), while anti-CD40L monotherapy resulted in 60% (6/10) of grafts surviving >100 days. Combination therapy with anti-ICOS and anti-CD40L was synergistic with 93% (26/28) of grafts being maintained >200 days. Nephrectomy of the graft-bearing kidneys in these mice confirmed graft function and rechallenge with second grafts indicated that donor-specific immunological tolerance was established. However, *in vitro* analysis demonstrated that tolerant mice maintained intact antidonor proliferative and cytotoxic responses. The maintenance of tolerance despite the presence of alloreactive T cells was attributed to regulatory T cells within the islet allograft based on (a) immunohistochemistry of tolerant grafts revealed intragraft T cells and (b) islet (BALB/c)-kidney (B6) composite grafts harvested from tolerant but not immunodeficient control mice were accepted indefinitely when transplanted into naïve diabetic B6 mice in the absence of immunosuppression. In addition, monotherapy with anti-ICOS and anti-CD40L in NOD mice was ineffective at preventing spontaneous autoimmune diabetes. However, combination therapy prior to the onset of diabetes for 14 days resulted in a significant reduction in primary diabetes, with only 11% (2/19) of treated mice becoming diabetic, as compared to 74% (20/27) of control mice.

Combined blockade of CD40L and ICOS signalling induces robust immunological tolerance to islet allografts mediated by an intragraft regulatory mechanism, and prevents the onset of autoimmune diabetes in NOD mice.

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**DIAPHRAGMATIC RUPTURE IN BLUNT TRAUMA: 191 CONSECUTIVE CASES.** T. Chughtai, P. Sharkey, L. Tremblay, S. Rizoli, P. Chu, F. Breneman. Trauma Program and the Department of Surgery, Sunnybrook and Women's College Health Sciences Centre, University of Toronto, Toronto, Ont.

Blunt diaphragmatic rupture (BDR) in trauma is sometimes a

diagnostic challenge and must be addressed on the initial CXR. All cases of BDR over an 18-year period (1986–2003) at a regional trauma centre were identified from the trauma registry and retrospectively reviewed. Demographic data, mechanism of injury, associated injuries, management and outcomes were evaluated.

Out of 10 380 blunt trauma patients admitted over the study period, 191 cases of BDR were identified. Mean age was 42 years, 64% were male, mean Injury Severity Score was 38 and the most common mechanism was motor vehicle-related (93%). Diaphragmatic tears were left-sided in 124 patients, right-sided in 43, and bilateral in 4 (N/A in 20). Associated injuries as quantified by the mean Abbreviated Injury Scale score (range 0–6) were as follows: head 2.6, chest 3.7, abdomen 2.9, pelvis 1.6, and extremity 2.3. There were 13 patients (7%) with associated blunt aortic injury. Mean length of stay in hospital was 29 days and mortality was 28%.

Although BDR is uncommon in trauma, we have accumulated a large experience managing this injury. Early recognition and repair avoids the respiratory and gastrointestinal complications associated with its missed diagnosis. The repair itself is straightforward; however, these patients almost always have severe associated injuries which ultimately determine outcomes.

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**MINIMAL POSTOPERATIVE PAIN USING PROPERITONEAL, NONTENSION, SUTURED REPAIR OF DIRECT INGUINAL HERNIAS.** M.T. Nutley, R. H. Mulloy, N.A. Hagen. Departments of Surgery and Medicine, University of Calgary, Calgary, Alta.

We describe a novel, inexpensive technique that uses the placement of a conventional properitoneal tension-free mesh for repair of direct inguinal hernias. A single-centre, 3-year prospective follow-up of 52 patients undergoing this repair demonstrated a single early failure. Postoperative pain was surveyed using a numerical pain scale (0 “no pain” and 10 “worst possible pain”). Overall, postoperative pain was very low: at 2 months, it was  $0.81 \pm 1.97$  (mean pain  $\pm$  SD); at 1 year,  $0.1 \pm 0.64$ ; at 3 years,  $0.18 \pm 0.98$ ; at work,  $0.26 \pm 0.92$ ; and with recreational activities,  $0.43 \pm 0.92$ . More than one-third of patients had returned to work at 1 week (37.8%), with 62.2% returning by 2 weeks and 100% by 6 weeks. Fully 90.9% of patients had resumed full recreational activities by 8 weeks.

In addition to providing a very low risk of recurrence, these results demonstrate that this repair provides significantly less postoperative pain than has been reported in other nontension repairs, results in an earlier return to work and early resumption of full recreational activities.

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**THE IMPLICATION OF RECURRENT THYROID CANCER.** I.B. Rosen, J.C. Furlan. Department of Surgery, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

Thyroid cancer is increasing more rapidly than any other malignancy, according to Canadian Cancer Society statistical report. Thyroid cancer enjoys a “benign” image, which militates

against "complete" management and post-op surveillance. A retrospective review of our recurrent cases was carried out to determine their biological relevance.

Twelve hundred cases of thyroid cancer underwent retrospective chart review to detect recurrence, methods of detection, sites involved, management, risk factors and survival.

There were 58 recurrences (4.8%) with 20 males, 38 females ages 20–85 years with a mean of 55.6 followed for 1–30 years (mean of 10). Twenty-five were referred with recurrence; 23 treated primarily showed a recurrence rate of 2.3%. Cases consisted of well-differentiated cancer (WDC) 49, medullary 7, lymphoma 2. In WDC, detection included TGB, ultrasound FNAB, TBS and clinical findings. Number of WDC recurrences was 1 (26), 2 (9), 3 (8), 4 (4). First recurrence was noted in neck nodes 33, primary site 6, bone 7, lung 5, skin 1, breast 1, multiple areas 1. Relevant risk factors showed age < 50 8, ≥ 50 20, neck nodes 48, extrathyroidal invasion 25, vasculoinvasion 8, multifocality 10, abnormal histology 8, radiation exposure 2, tumour size < 1.5 cm (6), 1.5 to 4 cm (15), > 4 cm (15). Management was by surgery 41. Alive with disease 8, dead of disease 17, dead without disease 1 for mortality rate of 30%, failure rate of 43%. Seven cases of medullary cancer with ages from 38 to 52, 3 males 4 females, all sporadic, underwent partial thyroidectomy 3, and showed calcitonin elevation 6, negative gene analysis 7. Recurrence affected primary site 1, neck nodes 6; 6 of 7 failed. In the 2 lymphoma cases, 1 female died of GI lymphoma and 1 Hodgkin's male age 30 had 3 recurrences but is controlled 6 years after marrow transplant.

Thyroid cancer recurrence is infrequent but is a dire event, showing an impressive management failure and mortality. Causes include node positivity, size > 4cm, extrathyroidal invasion, histological dedifferentiation and male gender. Initial complete treatment and adjuvant RAI appear justified in minimization of recurrence but there is need for new adjuvant measures.

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**INFLUENCE OF LYMPHOCYTIC THYROIDITIS ON THE BIOLOGICAL BEHAVIOUR OF PAPILLARY THYROID CARCINOMA.** J.C. Furlan, Y.C. Bedard, I.B. Rosen. Department of Surgery and Department of Pathology and Laboratory Medicine, Mount Sinai Hospital, University of Toronto, Toronto, Ont.

While immune response to papillary thyroid carcinoma (PTC) has been associated with lymphocytic thyroiditis (LT), the causative link between them remains controversial. This study was undertaken to compare demographics, histopathological data and clinical outcomes in PTC groups with (group 1) and without LT (group 2).

From a university hospital database, 308 patients who underwent thyroidectomy for PTC between 1964 and 2000 were randomly selected. Data was analyzed using Student's *t* test, rank sum, and chi-square tests.

There were 100 individuals with LT (89 females and 11 males, ages 22 to 83 years with mean of 42) and 208 patients without LT (160 females and 48 males, ages 18 to 89 years with mean of 45). Although women were significantly more frequent ( $p = 0.018$ ) in Group 1 (89%) than in Group 2 (76.9%), there were no statistical difference between groups for age ( $p = 0.172$ ), extent of thyroidectomy ( $p = 0.321$ ),

neck dissection ( $p = 0.565$ ), adjuvant therapy ( $p = 0.572$ ) and follow-up time (46 mo v. 42 mo;  $p = 0.057$ ). Groups 1 and 2 were similar regarding tumour size ( $19.4 \pm 1.3$  v.  $20.8 \pm 1$  mm, respectively;  $p = 0.542$ ), tumour multicentricity (46%, 35.6%;  $p = 0.103$ ), angioinvasion (5%, 6.2%;  $p = 0.858$ ), tumour capsular invasion (53%, 47.6%;  $p = 0.443$ ), extrathyroidal invasion (3%, 8.6%;  $p = 0.109$ ), nodal involvement (27%, 25.5%;  $p = 0.884$ ), local recurrence (2%, 1.4%;  $p = 0.905$ ), postoperative elevated thyroglobulin (0%, 1.9%;  $p = 0.391$ ), and distant metastasis (0%, 1.4%;  $p = 0.557$ ). The AJCC pTNM, AMES and AGES systems demonstrated comparable prognosis for both groups but MACIS showed worse prognosis for Group 2 ( $p = 0.032$ ). The AJCC pTNM ( $p = 0.748$ ), AMES ( $p = 0.587$ ) and AGES ( $p = 0.12$ ) systems demonstrated comparable prognosis for both groups, but MACIS showed worse prognostic prediction for group 2 ( $p = 0.032$ ).

Our results indicate that PTC without LT has poorer long-term prognosis based on MACIS, even though no significant difference is detected in the short follow-up term. Those findings justify orientation of cytokine therapy in management of recurrent or high-risk PTC.

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**LOWER GI BLEEDING FROM RADIATION PROCTITIS: SMOKING AS A RISK FACTOR.** M. Stirling, R.L. George, H. Campbell, P.A. Isotalo. Departments of Surgery, Radiation Oncology, Pathology and Molecular Medicine, Queen's University, Kingston, Ont.

Lower GI bleeding after radiotherapy is an indication for endoscopic consultation. This study assesses the likelihood of radiation proctitis as the source of bleeding and suggests vascular disease and smoking increase the probability of radiation proctitis. Cardiovascular disease and diabetes are linked to radiation injury; this is the first study to implicate smoking.

Patients presenting for assessment of lower GI bleeding after pelvic radiotherapy for prostate/gynecologic malignancies were included. Age, radiotherapy dose, brachytherapy, sex and cancer type were recorded, as was the presence of IHD, PVD, diabetes and hypertension. Smoking history and the interval between onset of bleeding and completion of radiotherapy were noted. Endoscopy was used to confirm the bleeding source. Categorical data was analyzed with the Fisher's exact test and parametric data examined with the Student's *t* test. An asymptomatic postradiation therapy control group with prostate/gynecologic cancers was screened for the same risk factors. Design is case-control.

Over 2 years, 38 symptomatic patients and 33 asymptomatic controls were accrued. Twenty-three symptomatic patients were found to have chronic radiation proctitis. Fifteen had another source of bleeding identified. Vascular risk factors were strongly correlated with radiation injury (76%,  $p = 0.004$ ). Smoking was the most significant single risk (93%,  $p = 0.01$ ). The majority of patients with chronic radiation proctitis presented within 2 years of radiotherapy. Onset of bleeding beyond 3 years from radiation was likely to be from another source (75%,  $p = 0.006$ ).

Vascular risk factors increased the likelihood of radiation proctitis. Smoking was the most significant single factor. Late

presentation reduced the likelihood of radiation proctitis as the bleeding source. Patients undergoing pelvic radiotherapy should be encouraged to stop smoking.

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**CHIRURGIE COLIQUE ASSISTÉE PAR LAPAROSCOPIE: EXPÉRIENCE EN MILIEU INTERMÉDIAIRE.** L.V. Do, J.P. Gagné, R. Laplante, S. Miller. Hôpital Ste-Croix, Drummondville, Que.

Notre centre s'intéresse à la chirurgie laparoscopique depuis plusieurs années. Le but de notre étude était de démontrer la faisabilité et l'innocuité de traiter des pathologies coliques par laparoscopie dans notre milieu et de démontrer le bénéfice d'une telle approche. Nous avons procédé à une étude rétrospective en relevant les chirurgies coliques par laparoscopie des 5 dernières années dans notre milieu.

Nous avons abordé par laparoscopie 156 patients (148 résection). Les indications pré-opératoires étaient les suivantes : maladie diverticulaire (83), diverticulite perforée (5), cancer du colon gauche (18), cancer du colon droit (13), cancer du transverse (1), cancer de l'appendice (2), angiodyplasie du colon droit (8), lésion bénigne du colon droit (9), lésion bénigne du colon gauche (3), lésion bénigne du transverse (2) volvulus (3) occlusion (1), perforation suite à colonoscopie (1) et fermeture de Hartman (7). 62 % des patients avaient des antécédents chirurgicaux, dont 31 % pour laparotomie sous-ombilicale. 53% avaient des facteurs de co-morbidité, les deux plus fréquents étant l'obésité (19 %) et l'hypertension (24 %).

Le taux de conversion a été de 10 %. Le temps opératoire moyen a été 136 minutes (134 minutes pour les résections du sigmoïde). L'hospitalisation moyenne a été de 5,6 jours et en moyenne, les patients ont toléré une diète après 2,4 jours. Le taux de mortalité a été de 2.1 % pour les patients complétés par laparoscopie. Le taux de complications a été de 22 %. Dans une grande proportion, les répercussions cliniques ont été minimes. Un seul patient a dû être ré-opéré pour une complication post-opératoire.

Notre étude nous a permis de démontrer la faisabilité et la sécurité de la chirurgie colique assistée par laparoscopie dans notre milieu en se comparant à la littérature.

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**POST-BARIATRIC SURGERY CHANGES IN THE SEVERITY OF ASTHMA AND SLEEP APNEA SYNDROME IN PATIENTS WITH MORBID OBESITY.** S. Biron, H. Turcotte, B. Simard, P. Marceau, F.-S. Hould, S. Lebel, S. Marceau, L.-P. Boulet. Service de chirurgie générale, Institut de cardiologie et de pneumologie et Unité de recherche en pneumologie de l'Université Laval, Hôpital Laval, Sainte-Foy, Que.

Asthma and sleep apnea syndrome (SAS) are frequently reported in obese patients. 139 patients evaluated for bariatric surgery in a university-affiliated tertiary care centre completed a written questionnaire on asthma and SAS (mean BMI 51.4 kg/m<sup>2</sup>) before and 2 years after bariatric surgery (BMI 30.5 kg/m<sup>2</sup>). Before surgery, the prevalence of self-reported asthma was 24.5% and that of SAS, 33.8%. No significant correlation was found between asthma and SAS diagnosis ( $p = 0.10$ ). Sig-

nificant relationships were observed between the diagnosis of asthma and age, hip circumference, waist/hip ratio, weight and BMI, and between the diagnosis of SAS and gender, waist circumference, hip circumference, waist/hip ratio, weight and BMI. Two years after surgery, asthma was reported improved in 79.3% of patients and SAS was improved in all but 1 with this condition; among 29 SAS patients using CPAP before surgery, only 4 were still using this treatment after 2 years. The prevalence of asthma and SAS is high in the morbidly obese population and correlates with markers of obesity. We found no correlation between the diagnosis of asthma and SAS diagnosis in this population. Bariatric surgery improved self-reported severity of asthma and SAS symptoms.

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**FACTORS AFFECTING SURGICAL MARGIN STATUS AFTER BREAST-CONSERVING SURGERY, COMPARING PALPABLE AND NONPALPABLE BREAST CANCERS.** P.J. Lovrics, S. Cornacchi, H. Liaconis, F. Farrokhyar, A. Fridkin, S. Franic, V. Chen. Surgical Outcomes Research Centre, McMaster University, Hamilton, Ont.

Due to the widespread availability of screening mammography, 25%–35% of breast cancers are not palpable at diagnosis and require needle localization (NL) for excision. Despite the widespread use of NL, there are few reports of positive margin rates and of the factors that affect margin status after excision of nonpalpable (NP) cancers. Margin status is a key determinant of the risk of local recurrence, independent of other tumour factors and adjuvant therapies. The objectives of this study were to determine the rates of positive margins of palpable and NP tumours, and the factors that affect margin status.

A cohort of 447 patients with stage I or II disease seen at a regional cancer centre was reviewed. NP tumours (39% of sample) were significantly smaller, lower-grade, more frequently ER-positive, more often associated with negative nodal status, and patients were significantly older ( $\chi^2$  tests,  $p < 0.01$ ). Positive margin rates were 21.7% for palpable tumours and 24.6% for NP ( $p = 0.48$ ). Multivariable logistic regression analysis for palpable tumours determined that volume of tissue excised (odds ratio 0.99, 95% CI 0.98–0.99), histologic type (lobular v. ductal, OR 3.7, 1.3–9.9) and presence of lymphovascular invasion (OR 2.8, 1.3–6.0) were significant predictors of positive margin status. For NP, nonconfirmed preoperative diagnosis (OR 3.9, 1.5–10.5), larger tumour size (OR 4.1, 2–8.5), and presence of multifocality (OR 6.8, 1.5–24.7) were significant predictors of positive margin status. Variables such as academic versus community hospital, excision of cavity margins, obesity, EIC and tumour grade were not significant in the regression models.

This study determined that positive margin rates are similar for palpable and NP tumours; however, tumour characteristics and the factors that predict margin status are different in both groups.

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**EVOLUTION OF CYTOLOGY COMPARED TO QUICK SECTION IN THE MANAGEMENT OF THYROID CANCER DURING THE LAST 3 DECADES.** J.C. Furlan, Y.C. Bedard, I.B. Rosen. Department of

**Surgery and Department of Pathology and Laboratory Medicine, Mount Sinai Hospital, University of Toronto, Toronto, Ont.**

This study analyzes evolution of the use and accuracy of the fine needle aspiration biopsy (FNAB) and frozen section (FS) in the management of thyroid cancer during the last 3 decades.

We collected data on FNAB and FS of 720 consecutive patients who underwent thyroidectomy for cancer from 1971 to 2000 by the same surgeon (IBR). All cases were divided into decade groups: 70s (group 1), 80s (group 2), and 90s (group 3). Data was analyzed using chi-square test and z-test.

There were 568 females and 152 males, ages 9 to 98 years with mean of 46. Group 1 consisted of 54 individuals, group 2 of 178, and group 3 of 488. FNAB sensitivities increased decade by decade: group 1 66.7%, group 2 78.6%, and group 3: 85.6% ( $p < 0.05$ ). FS sensitivities were 56.8% (group 1), 56.5% (group 2) and 42.7% (group 3) being comparable between 1 and 2 ( $p = 0.906$ ), 1 and 3 ( $p = 0.066$ ), but not 2 and 3 ( $p = 0.002$ ). Distribution of histopathological diagnosis was significantly different among the 3 groups ( $p < 0.001$ ) showing an increasing incidence of papillary thyroid carcinoma (PTC) during the 70s (35.2%), 80s (50%) and 90s (86.7%). Then we analyzed only PTC subgroups based on the 3 decades. There was no significant difference for FNAB sensitivity among PTC subgroups (70s 85.7%, 80s 75.9%, 90s 84.7%;  $p \geq 0.05$ ), whereas FS showed trends to decreasing sensitivity in the 70s (83.3%), 80s (68.1%) and 90s (43.7%).

Our results suggest that the conventional FNAB and FS were well-established techniques since the 70s. The increasing incidence of PTC may be a result of improving overall FNAB sensitivity over the last 3 decades although the FNAB sensitivity for PTC diagnosis remained unchanged. The FS sensitivity has decreased in the last 3 decades, confirming the contribution of FNAB.

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**REPAIR OF VENTRAL HERNIAE IN IMMUNOSUPPRESSED ORGAN-GRAFT RECIPIENTS: THE BASTED-HEM REPAIR. A.S. MacDonald, M. Saleh, V. McAlister. Dalhousie University, Halifax, NS, and University of Western Ontario, London, Ont.**

A recurrence rate of 45% is commonly reported for suture repair of abdominal ventral herniae. The addition of synthetic mesh patches had reduced this to 20%, but with additional complications related to the mesh. We have developed a technique which restores abdominal wall continuity, but with minimal use of mesh and have conducted a pilot study in 100 patients (40% recurrent herniae, 18% with previous mesh repair and 52% obese) who have been followed for a minimum of 32 months. Of these 28 were graft recipients on a variety of drug protocols and up to 12 years postkidney, -liver, or kidney-pancreas transplant.

The technique uses 20-cm mesh strips to baste the peritoneal surface of the musculofascial edges of the hernia and non-absorbable continuous sutures for closure with complete elimination of the defect and repositioning of muscles. Good outcomes are dependent on attention to detail.

The overall recurrence rate is 6%, and is 10% in transplant recipients especially those with chronic infections or fistulae at the time of repair. Minor modifications continue to lower this figure. The restoration of function and superior cosmesis has led to a high patient-satisfaction rate.

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**EARLY RESULTS AFTER LAPAROSCOPIC ISOLATED ROUX-EN-Y GASTRIC BYPASS: EFFECT OF THE LEARNING CURVE. C.G. Andrew, W. Hanna, D. Look, A.P.H. MacLean, N.V. Christou. Department of Surgery, McGill University Health Centre, Montréal, Que.**

This study was performed to evaluate the safety and efficacy of laparoscopic isolated Roux-en-Y gastric bypass (LIGB) for morbid obesity and to describe the relationship between learning curve and outcomes.

Analysis was performed on the initial 201 consecutive patients who underwent LIGB by a single university-based surgeon over 24 months. Data was acquired from a prospective database and supplemented with a retrospective chart review. Patients were divided into 3 consecutive groups of 67 patients (Grp1, Grp2, and Grp3) for analysis.

The mean patient age was  $37.1 \pm 9.2$  years, and 80.1% were female. Mean BMI was  $49.2 \pm 8.3$  kg/m<sup>2</sup>. BMI was similar in Grps1 and 2 ( $47.1 \pm 5.9$  and  $48.7 \pm 8.9$  kg/m<sup>2</sup>), but increased in Grp3 ( $52 \pm 9.7$  kg/m<sup>2</sup>,  $p < 0.01$ ). Operative time decreased from  $145 \pm 30$  minutes in Grp1 to  $114 \pm 24$  minutes in Grp2 ( $p < 0.01$ ), and was maintained at  $119 \pm 23$  minutes in Grp3. Median length of stay was 3 days for all 3 groups. Early and late complication rates were 13.9% and 12.6%, respectively. Early complications included: anastomotic leak (3.0%), intra-abdominal abscess (0.5%), bleeding (1.5%), wound infection (0.5%), DVT (0.5%) and PE (1.5%). Late complications included: anastomotic stricture (5.6%), bowel obstruction (2.5%), stomal ulceration (1.0%), and incisional hernia (0.5%). Leak rates decreased from 6.0% in Grp1 to 1.5% in Grps2 and 3, but did not reach statistical significance ( $p = 0.18$ ). Anastomotic stricture rates decreased from 12.1% in Grp1 to 3.0% in Grp2 ( $p < 0.01$ ). Postoperative excess weight loss was 55.8% (95% CI 53.0–58.6), 77.3% (95% CI 73.0–81.6), and 83.9% (95% CI 77.1–90.7) at 6, 12, and 18 months follow-up, respectively.

LIGB can be performed with acceptable morbidity and results during the learning curve. In our series, operative time and anastomotic stricture rates decreased with experience, despite an increase in mean BMI.

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**COMPLICATIONS OF PERCUTANEOUS BEDSIDE TRACHEOSTOMY IN 278 CONSECUTIVE PATIENTS. T. Bardell, W.D.T. Kent, W.M. Hopman, J.W. Drover. Queen's University, Kingston, Ont.**

We sought to review the local experience with percutaneous bedside tracheostomy in order to describe complications, their likelihood and risk factors.

Patients consisted of a prospective cohort of all intensive care unit (ICU) referrals for tracheostomy between 1998 and

2002, excluding open procedures. Retrospective chart review was performed for follow-up.

278 men and women between the ages of 18 and 92 requiring tracheostomy for airway protection, airway obstruction, or prolonged ventilation were included in the study. Complication rates including clinically significant bleeding, infection, pneumothorax, pretracheal placement and conversion to open were determined.

The Ciaglia method of tracheostomy placement was used 225 times, and the translaryngeal technique was used 53 times. Of 278 percutaneous attempts, 4 (1.4%) were converted to open. Other complications included 3 surgical-site infections (1.1%) and 8 clinically significant bleeds (2.8%). Two patients had a pneumothorax. Seven patients (2.5%) had initial pretracheal placement of the tracheostomy tube, 1 of which resulted in cardiorespiratory arrest. The overall complication rate was  $16/282 = 5.7\%$ . Fifty-three patients died in the ICU, and 81 died during the admission (29%). Complications were not related to procedure type, indication or select measures of physiologic status, but were related to surgeon experience ( $p = 0.04$ ).

Percutaneous bedside tracheostomy is a relatively safe procedure with an overall complication rate of 5.7%. Pretracheal placement is a serious complication that if unrecognized can have dire consequences. Complication rates may be related to experience with these procedures.

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**CAREER OPTIONS IN GENERAL SURGERY: ATTITUDES, INFLUENCES, PERCEPTIONS, REALITY.** W.G. Pollett, G. Goldsand, D. Thurber. Memorial University of Newfoundland, St. John's, Nfld., University of Alberta, Edmonton, Alta., and Canadian Post-MD Education Registry, Ottawa, Ont.

In order to study the evolving patterns of General Surgery training and care, questionnaires were mailed in June 2003 to 737 of the 756 physicians registered as General Surgery RIII in Canada from 1988 to 1997. Responses were received from 401 (54%). Three hundred and forty-five (86%) achieved certification in General Surgery. Of these 136 (39%) completed subspecialty training. Thirty-nine (10%) transferred into another primary surgery specialty.

Data were analyzed concerning the training pathways and career decisions of these new Canadian-trained general surgeons. Practice patterns related to community size will be discussed. Qualitative data provided a rich source of information concerning status and quality of life. General surgery is an interesting, rich and satisfying career with broad variations in practice relating to community size. Recommendations concerning the tailoring of training to match the anticipated work environment and also changes that would increase recruitment to general surgery will be presented.

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**TELEMENTORING: AN IMPORTANT ENABLING TOOL FOR THE COMMUNITY SURGEON.** H. Sebahang, P. Trudeau, A. Dougall, S. Hegge, C. McKinley, M. Anvari. Centre for Minimally Invasive Surgery, North Bay District Hospital, North Bay, Ont.,

Centre Hospitalier de la Sagamie, Chicoutimi, Que., and Centre for Minimal Access Surgery, McMaster University, Hamilton, Ont.

The aim of this study was to evaluate telementoring as an enabling tool for community general surgeons who attempt to perform advanced laparoscopic surgical procedures.

We present a series of 19 patients who underwent advanced laparoscopic surgical procedures in 2 community hospitals between November 2002 and July 2003. In each case, the mentee (4 community surgeons with no formal advanced laparoscopic training) was telementored by an expert surgeon from a tertiary care hospital. Telementoring was achieved with real-time 2-way audio-video communications over various bandwidths. The procedures included 10 bowel resections, 5 Nissen funduplications, 2 splenectomies, 1 reversal of Hartmann's and 1 ventral hernia repair.

The primary surgeon considered telementoring useful in all cases (median score 4 out of 5). The mentor was also comfortable with the quality of laparoscopic surgery delivered (median score 4 out of five). Telecommunication bandwidth for audio and video transmission was found to be a critical factor in the quality of telementoring process.

Two procedures were converted to open. There were no intraoperative complications and 3 postoperative complications.

Telementoring is safe and feasible. It allows community surgeons with no formal advanced laparoscopic surgery training to benefit from expert intraoperative advice during the performance of advanced laparoscopic procedures. It may also reduce health-care costs by avoiding the need to refer patients to tertiary care centers for advanced laparoscopic procedures.

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**TELEROBOTIC ASSISTING: AN IMPORTANT ENABLING TOOL FOR THE COMMUNITY SURGEON.** C. McKinley, M. Anvari. Centre for Minimally Invasive Surgery, North Bay District Hospital, North Bay, Ont., and Centre for Minimal Access Surgery, McMaster University, Hamilton, Ont.

Since the first telerobotic surgery performed on a patient in Strasbourg by a surgeon in New York City, many questioned the feasibility of telerobotic remote surgery for advanced laparoscopic procedures and its application in rural communities. We report our experience of 22 telerobotic procedures performed between a teaching hospital in Hamilton, Ontario and a community hospital in North Bay, Ontario.

Between February and December 2003, 22 patients (11 women and 11 men, mean age 53 years) underwent telerobotically assisted laparoscopic procedures. This series includes 13 Nissen funduplications, 3 right hemicolectomies, 3 sigmoid resections, 2 inguinal hernia repairs and 1 anterior resection. A Zeus TS micro joint system (Computer Motion Inc, Santa Barbara CA) was used to provide telepresence for the telerobotic surgeon in Hamilton. The 3 arms of the robot in North Bay were set up during each case by the local laparoscopic surgeon.

There were no major intraoperative complications. There were 2 minor intraoperative complications involving serosal

tears of the colon from the robotic graspers which had no clinical significance. There were no postoperative complications. At short-term follow-up of the Nissen funduplications, 2 patients had mild dysphagia and 1 patient had atypical chest pains. One right hemicolectomy was converted from a telerobotically assisted to a conventional laparoscopic approach secondary to robotic arm-placement issues. Both surgeons involved considered remote telerobotic assisting safe and effective.

Remote telerobotic assisting provides local surgeons with assistance by an expert robotic/laparoscopic surgeon. The ease with which the 2 surgeons have collaborated during these procedures demonstrates the safety and efficacy of this technique.

Furthermore, remote telerobotic assisting may improve access to advance laparoscopic procedures for patients in rural and remote settings.

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**A MODIFIED EILBER PROTOCOL PROVIDES MAXIMUM LOCAL CONTROL AND MINIMUM MAJOR MORBIDITY IN SOFT-TISSUE SARCOMA.** L.A. Mack, P.J. Crowe, W.J. Temple, N.S. Schachar, J.L. Yang, D.G. Morris, E. Kurien, R.L. Lindsay, E. Magi, W.G. DeHaas. University of Calgary, Calgary, Alta.

A local recurrence rate of 15%–30% for soft-tissue sarcomas (STS) is still unacceptable. Our hypothesis was that a refined neoadjuvant chemotherapy (CT) and radiation therapy (RT) protocol (modified Eilber protocol) improves local control while minimizing major morbidity.

All consecutive patients (pts) presenting with STS deep to the fascia of the extremity/trunk during 1984–1996 were treated with 3 days of intravenous (IV) or intra-arterial (IA) Adriamycin (30 mg/d) and sequential radiotherapy (RT) (300 cGy/d for 10 d). Wide surgical excision with limb preservation was performed 4–8 weeks after completion of RT. Treatment complications, margins, local recurrence (LR), and survival (log-rank, Kaplan–Meier) were prospectively documented for a minimum of 5 years or until death.

75 patients, including 10 recurrent STS, were analyzed. 51% of cases were of the proximal lower limb and 23% of the distal lower limb. Mean age was 50 (13–84), 66% had tumours >5 cm and 71% were of grade II or grade III. Histologies included liposarcoma (22.7%), MFH (21.3%), leiomyosarcoma (16%), synovial-cell sarcoma (16%) and other (24%). In 8 patients, limb salvage would not be possible if negative margins were to be achieved. Of these 8, 4 had amputation (95% limb salvage). Of the 67 patients with negative margins, a local control rate of 94% and an overall survival of 63% was achieved. Although margin ( $p = 0.001$ ) and stage ( $p = 0.035$ ) were predictive of LR, these were not significant on MVA.

Risk factors for death included tumour grade (hazard ratio [HR] 1.4;  $p = 0.02$ ) and TNM stage (HR 1.54;  $p = 0.001$ ). Three pts (4%) required reoperation for tissue loss and 8 pts (10.6%) developed minor wound complications. Four pts had complications directly attributable to IA CT. There were no in-hospital or 30-day mortalities.

This modified Eilber protocol is ideal to maximize local control and minimize complications for STS.

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**OUTCOMES AFTER VAGINAL RESECTION FOR ANORECTAL OR PELVIC TUMOURS.** S.K. Hendren, C.J. Swallow, R. Gryfe, H.M. MacRae, Z. Cohen, B. O'Connor, R.S. McLeod. Department of Surgery, University of Toronto, Toronto, Ont.

Surgical treatment of locally advanced rectal and other pelvic tumours may require simultaneous vaginal resection. Functional outcomes of these women have not been studied.

All women undergoing vaginal resection during surgery for anorectal or pelvic tumours since 1985 at 1 hospital were identified. Charts were reviewed, living patients were contacted, and a telephone survey was conducted.

Forty-four patients were identified: 26 were living, and 2 were lost to follow-up. For the 24 study patients, mean age at surgery was 56.5 years, and median follow-up was 28 months. Fifteen (62.5%) had surgery for primary colorectal, 3 for anal, 4 for locally recurrent colorectal and 2 for pelvic tumours. Fourteen underwent primary closure, and 10 had flap reconstruction of the vagina. 70.8% of patients had radiation therapy. 91.7% had complications of surgery, including 4 vaginal fistulas (16.7%, 2 urinary/2 rectal) and 2 perineal hernias (8.3%). Of 16 patients with perineal resections, 9 (56.3%) had perineal wound complications. The median time to perineal healing was 3.8 months (range 1–24).

Twenty-one patients were able to complete the telephone survey. Six patients are sexually active and 15 are not, because of inability (8) or preference (7). Of the 8 patients (38.1%) unable to have intercourse, 4 had primary closure of the vagina and 4 had flaps. Reasons for inability to have intercourse include: short/inadequate vagina (4), persistent perineal wound (3), rectovaginal fistula (1) and severe vaginal pain (1). Only 5 patients (23.8%) remember any preoperative discussion of sexual effects of surgery. Despite sexual problems, the mean health/quality of life (QOL) score is high (5.1 on a scale of 1–7).

In conclusion, tumour resections involving the vagina are associated with a high rate of complications, including the inability to have intercourse after surgery. Women should be counselled regarding potential loss of sexual function.

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**INTRAOPERATIVE 3D ULTRASOUND IMAGING OF A LUNG TUMOUR.** V. Hornblower, L. Gardi, E. Yu, J.J. Battista, A. Fenster, R.A. Malthaner. Imaging Research Laboratories, Robarts Research Institute, Canadian Surgical Technologies and Advanced Robotics Centre, Division of Thoracic Surgery, London Health Sciences Centre, University of Western Ontario, London, Ont.

We have developed a technique of creating intraoperative, near-real time, 3-dimensional (3D) ultrasound images of lung nodules using thoracoscopic techniques.

Multiple 2-dimensional (2D) ultrasound images of a subpleural nodule scanned intraoperatively were reconstructed into 3D images. We adapted the HDI 5000, LapL9-5 laparoscopic probe to a transducer holder containing a mechanical motor attached to a standard computer. The modified probe was used to thoracoscopically detect and remove a subpleural nodule through three 12-mm incisions. Before the 3D ultrasound scan was obtained, the optimum position of the transducer was confirmed by 2D ultrasound imaging. During data acquisition the ultrasound transducer was held by the surgeon while it rotated around its long axis through an angle of 100° for approximately 6 seconds. Simultaneous to the gathering of the 2D ultrasound images, the 3D image was constructed and displayed on the monitor of the computer.

The device was easy to use and the images accurately identified the tumour. The images correlated well with the preoperative CT scan and final pathology. 3D ultrasound imaging allowed the inspection of the tumour in image planes chosen by the surgeon interactively. Inspection of the tumour margins in 3D revealed that there were no major motion artifacts or geometric distortions.

Intraoperative 3D ultrasound proved to be feasible in localizing invisible or nonpalpable lung nodules in near-real time and provided an accurate representation of the anatomy during thoracoscopic lung surgery. This is the first example of thoracoscopic 3D ultrasound imaging of a lung nodule. It may prove to be useful in the minimally invasive diagnosis and treatment of lung nodules, including image-guided robotic surgery and therapy.

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**PREVALENCE OF TRACHEOSTOMY COMPLICATIONS IN PATIENTS WITH TRAUMATIC NEURO-**

**LOGICAL INJURY.** T.A. Horan, L.M. Araujo, F.F. Santiago, P.S. Beraldo. Departments of Surgery and of Medicine, Hospital SARA, Brasilia, DF, Brazil

To identify the number of posttracheostomy complications in cervical spine and brain lesion patients admitted during a 2-year period of observation.

All patients admitted who had received tracheostomy for the respiratory management of their neurological condition were studied by videobronchoscopy.

76 patients received tracheostomy prior to and 11 after transfer to our hospital. A total of 101 tracheal complications were identified in 58 patients (66%). The 47 brain and 40 cervical spine lesion patients were equal in overall rate of tracheal complications.

Ganuloma (33) and stenosis (36) were the most frequent serious complications. Twenty-four of the 36 patients with stenosis required surgical intervention. Sex, age and duration of tracheostomy had no significant effect on the rate of complication. A duration of oral-tracheal intubation prior to tracheostomy between 1 and 2 weeks had a higher incidence of tracheal stenosis than shorter or longer duration. Chondromalacia was more frequent in patients with spinal cord trauma. Granuloma was associated with positive tracheal cultures for staphylococcus and pseudomonas. On 43 occasions forced oscillation technique of respiratory resistance measurement (FOT) was obtained. Resonance frequency on FOT examination was strongly correlated with the presence of a tracheal lesion ( $r = 0.743$ ).

The rate of post tracheostomy lesions in brain and cervical spine lesion patients is high. FOT examination may be useful in deciding which neurologically injured patients should receive bronchoscopy.

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**INITIAL CLINICAL OUTCOMES AFTER COMPLETION OF TRAINING IN A ROYAL COLLEGE OF CANADA THORACIC SURGERY PROGRAM.** S. Milman, T. Ng. Department of Surgery, Brown University School of Medicine, Providence, RI.

The adequacy of Thoracic Surgery training in Canada was assessed by evaluating the morbidity and mortality of major pulmonary and esophageal resections in the first 2 years after training.

The morbidity rate and 30-day or in-hospital mortality rate during the first 2 years of practice was prospectively collected for pneumonectomies, lobectomies, sleeves, segmentectomies and esophageal resections. The data was from a single thoracic surgeon who completed 5 years of General Surgery and 3 years of Thoracic Surgery training with certification from the Royal College of Physicians and Surgeons of Canada and is the only dedicated thoracic surgeon at the largest tertiary care hospital of the university.

During the 2-year period, 21 pneumonectomies, 137 lobectomies (9 with chest wall, 1 with diaphragm), 5 sleeves, 2 segmentectomies, and 25 esophagectomies (18 transhiatal, 4 Ivor-Lewis, 2 thoracoabdominal, 1 three-incision) were performed. Mortality rate for all major lung resections was 1.8% (pneumonectomy 4.8%, lobectomy 1.4%) and morbidity was 38% (pneumonectomy 33%, lobectomy 37%, sleeve 80%) with major morbidity at 19.4% (pneumonectomy 33%, lobectomy 18%, sleeve 20%). Mortality for all esophagectomies was 4% and morbidity was 44%, with major morbidity at 32%. Leak rate was 12%. Major morbidity was defined as those complications resulting in prolonged hospital stay.

These results compare favourably with clinical outcomes published from large series. Training in Canada is very adequate and prepares the surgeon well to perform major thoracic procedures. In the future, this data can be used to compare traditional training with the current available fast tract training in Canada (3 years of general surgery, 3 years of thoracic surgery) and also with training in the USA certified by the American Board of Thoracic Surgery.

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**THE EFFECT OF ANTERIOR FUNDOPLICATION ON PATIENTS UNDERGOING LAPAROSCOPIC HELLER MYOTOMY FOR ACHALASIA.** C. Finley, J. Clifton, S. Lim, J. Yee, R. Finley. Division of Thoracic Surgery, University of British Columbia, Vancouver, BC

Anterior fundoplication (AF) following laparoscopic Heller myotomy (LHM) for achalasia may prevent esophageal leaks and gastroesophageal reflux but cause dysphagia. The purpose of this study is to determine the effect of AF on esophageal leaks, nuclear-medicine esophageal clearance (EC), symptom frequency (SF) and Van Trappen symptom scores (SS) for dysphagia, regurgitation, and heartburn (1 = none; 2 ≤ once/week for a few seconds; 3 ∅ once/week; 4 = more severe/weight loss).

Between 1995 and 2004, EC, SF and SS scores were compared in the preoperative and postoperative (2–10 mo) periods in 88 patients who underwent LHM for achalasia with ( $n = 71$ ) and without ( $n = 17$ ) AF.

There were no leaks or deaths in the study. LHM with AF decreased the frequency of postoperative dysphagia, regurgitation and heartburn (96% pre-op v. 6% post-op, 94% v. 3%, 58% v. 6%) in the AF group ( $p = 0.001$ ). Without AF, only dysphagia and regurgitation frequencies (100% v. 0%, 88% v. 0%) improved ( $p = 0.001$ ). LHM improved all SS in both groups. There was no difference between postoperative dysphagia ( $1.39 \pm 0.65$  v.  $1.12 \pm 0.33$ ) and heartburn ( $1.29 \pm 0.62$  v.  $1.53 \pm 0.80$ ) scores between the AF and non-AF groups. LHM improved EC in the supine and upright positions in both groups ( $p = 0.001$ ). There was a trend towards improved

EC (10 min upright) in the no AF group (35% v. 28%).

In patients with achalasia, LHM with or without AF improves esophageal transit and the frequency and severity of dysphagia and regurgitation in a safe manner. Compared to the non-AF group, AF decreases the frequency of heartburn with a trend towards decreased esophageal clearance.

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**SELECTION CRITERIA FOR OUTPATIENT CERVICAL MEDIASTINOSCOPY.** S.C. Grondin, A. Graham, S. McFadden, C. Tirtua, G. Gelfand. Division of Thoracic Surgery, Department of Surgery, University of Calgary, Calgary, Alta.

To efficiently use health care resources and maintain patient safety, we sought to determine the selection criteria that would predict which patients (pts) would safely tolerate outpatient cervical mediastinoscopy (CM).

A retrospective chart review of all pts undergoing CM from September 1, 2002 to September 31, 2003 was completed. Pts were divided into inpatient group (IPG) and outpatient group (OPG) depending on whether they were scheduled to be discharged or admitted after CM. Information gathered included age, indication for surgery, American Society of Anesthesiologists (ASA) risk classification score, and travel time to our medical center. We excluded pts who were inpatients prior to CM or had combined procedures.

A total of 223 CM were performed of which 144 pts (67 male/77 female) were eligible (IPG 104 pts [72%]/OPG 40 pts [28%]). Indications for CM included lung cancer staging (87%; IPG 91 pts/OPG 34 pts) and mediastinal adenopathy/mass (13%; IPG 13 pts/OPG 6 pts). Mean age for IPG was 62 (13 pts age > 75) and 58 (2 pts age > 75) for OPG. IPG ASA scores were ASA 1, 3 pts (3%); ASA 2, 66 pts (63%); and ASA 3, 35 pts (34%). OPG scores were ASA 1, 1 pt (2%); ASA 2, 28 pts (70%); and ASA 3, 11 pts (28%). Forty-eight pts (46%) from IPG and 17 pts (42%) from OPG lived < 1-hour drive to our medical center. Two (2%) postoperative complications (PC) occurred in the IPG (both age > 75, ASA 3, > 1 h travel), 1 (2%) in the OPG (age < 75, ASA 3, < 1 h travel). All PC were diagnosed within 8 hours. No mortalities reported.

Outpatient CM can be safely performed in pts with ASA 1 (3). Uncommon early PC suggests most pts could undergo outpatient CM safely with adequate postoperative observation. Pts age > 75, ASA 3, living > 1 hour from hospital may require longer observation or warrant overnight admission.

## 83

**PREOPERATIVE IRINOTECAN AND CISPLATIN WITH CONFORMAL RADIOTHERAPY PLUS SURGERY FOR ESOPHAGEAL CANCER.** G. Darling, J. Knox, R. Wong, M. Guindi, M. Haider, J. Hornby, S. Keshavjee. University Health Network, Toronto, Ont.

To determine the efficacy and toxicity of preoperative concomitant irinotecan, cisplatin, conformal radiotherapy plus surgery.

Phase II study of patients with resectable squamous or adenocarcinoma of the esophagus (> 20 cm) or gastroesophageal junction, were treated with irinotecan (65 mg/m<sup>2</sup>) and

cisplatin (30 mg/m<sup>2</sup>) weekly ×2 followed by a 1-week break and then concomitant conformal radiotherapy of 40 Gy in 20 fractions with the same chemotherapy weeks 4, 5, 7 and 8. Patients then received a boost of RT (10 Gy). Following a 4–8-week interval the patients underwent resection. *En bloc* resection and 2 field lymphadenectomy were encouraged.

Of 31 patients entered to date, 25 have completed induction therapy and 17 have had surgery. There was 1 death due to a CVA following 1 cycle of chemotherapy and 1 postop death due to aspiration of gastrografin. Toxicity has been acceptable with grade 4 neutropenia in 2/25, grade 4 leukopenia in 1/25, and grade 4 anorexia in 2/25. Two patient withdrew from the study after 1 cycle of chemotherapy because of anorexia and fatigue. Dysphagia resolved with pre-op treatment in 17/21 symptomatic patients. FACT-E scores improved in 12/17 patients after preoperative therapy in whom questionnaires were available. Postoperative complications consisted of anastomotic leak (clinical, 3/17; radiographic only, 1/17), atrial fibrillation (2/17), pneumonia (4/17), pulmonary embolus (1/17), and DVT (1/17). The resection rate was 100% and 16/17 patients had R0 resections. Clinical response rates in 21 patients were 1 CR, 8 PR, 11 SD, 1 progressive disease. Pathological responses in 17 resected patients include 4 pCR and 5 microscopic minimal residual disease.

Concomitant irinotecan and cisplatin with conformal radiotherapy followed by a radiotherapy boost and then surgical resection is well tolerated with acceptable toxicities and no increase in postoperative complications. Clinical response rates of 43% are encouraging with 4 patients experiencing complete pathological response and 5 only microscopic residual disease.

**84**  
**ESOPHAGEAL PERFORATION: A 22-YEAR EXPERIENCE.** D. Fortin, C. Sirois, M. Cadeddu, R.I. Inculet, R. Malthaner. Division of Thoracic Surgery, London Health Sciences Centre, London, Ont.

The management of an esophageal perforation is usually determined by site of perforation and time to recognition. Traditionally, primary repair is not an option in delayed presentation (> 72 h), but recently, this treatment is being advocated. A single-institution experience was reviewed to examine treatment strategies and results.

A retrospective review was performed on all patients admitted to the London Health Sciences Centre with the diagnosis of esophageal perforation between 1981 and 2004. One hundred and two patients were identified (64 males, 38 females). There were 10 cervical, 84 thoracic, and 8 intra-abdominal perforations. The overall mortality was 19/96 (20%), 10/83 (12%) in nonmalignant cases, 9/13 (69%) in patients with perforation associated with malignancy.

The thoracic esophagus was most frequently involved. Thirty-four perforations were spontaneous (33 Boerhaave's syndrome, 1 foreign body), and 34 were iatrogenic. Sixteen occurred in patients with cancer (13 esophageal cancer, 3 lung cancer). In the nonmalignant thoracic group, primary repair was done in 45/64 patients (mortality 9%, median length of stay [LOS] 22 days), surgical drainage or conservative treatment in 14 patients (mortality 22%, LOS 37 days), and resection and diversion in 5 patients (mortality 20%, LOS 34 days).

A second operation was required in 15 of the 45 patients undergoing primary repair. Sixteen patients presented > 72 hours. Eight were treated with primary repair (mortality 13%, LOS 20 days), and 8 patients were treated with surgical drainage or conservative treatment only (mortality 25%, LOS 37 days).

The mortality of esophageal perforation remains high, especially if associated with malignancy. Primary repair of patients presenting late is feasible with acceptable mortality and hospital length of stay.

**85**  
**THE MANAGEMENT OF THORACIC HYDATID DISEASE.** W. Saleh, M. Rafay, W. Hajjar, C. Mullangi, Sh. Mozel, M. Ashour, K. AlKattan, R.H. Burnett. Sections of Thoracic and Cardiac Surgery, King Faisal Specialist Hospital and Research Centre and King Khalid University Hospital, Riyadh, the Kingdom of Saudi Arabia

Hydatid disease is endemic in the Middle East, and is a common affliction here. We have retrospectively reviewed the past 5 years' experience at the King Faisal Specialist Hospital and Research Centre and King Khalid University Hospital, Riyadh, the Kingdom of Saudi Arabia. A total of 45 cases of thoracic hydatid disease are reviewed: 2 mediastinal, and 43 pulmonary. Of the latter, 4 were complicated by hepato-pulmonary disease. Three of these 4 underwent a combined resection via thoracotomy, and 1 was complicated by a biliary-pulmonary fistula resulting in severe ARDS, and was not operable. Of the 39 pulmonary cases, 4 were bilateral. There were 43 resections, and of these 19 were complicated by endobronchial rupture, and 2 with pleural rupture. Twenty-two of the 43 pulmonary hydatid cysts were intact at the time of surgery.

The etiology, presentation, and pathology of this widespread parasitic infection are reviewed. Both the current medical and surgical management are presented, with the emphasis on the thoracic form of the disease. Complications of hydatid thoracic disease, such as pleural involvement, endobronchial cyst and rupture, and biliary-bronchial fistulae are discussed. A mechanism leading to endobronchial rupture has been proposed. We believe this allows the identification of pulmonary hydatid cysts which are at an increased risk of endobronchial rupture. This is an important criterion in selecting who should have earlier surgical intervention, to reduce the risk of endobronchial rupture, versus who might undergo a longer period of medical management.

A variety of surgical techniques have been proposed to facilitate the safe surgical removal of the hydatid cysts from the lung and thorax. Some of these are complicated and awkward. We believe the approach we advocate is more straightforward to perform, and equally safe and effective. It is applicable to all areas of thoracic involvement.

Improvements in medical management have been made, as well as surgical. However, public health issues and education of the public remain essential factors in controlling this disease.

**86**  
**DEVELOPMENT OF A DISEASE-SPECIFIC QUALITY-OF-LIFE QUESTIONNAIRE FOR PATIENTS WITH POTENTIALLY CURABLE CARCINOMA OF THE**

**ESOPHAGUS.** J. Clifton, R. Finley, G. Gelfand, J. Lim, R. Inculet, R. Malthaner, L. Tan, A. Graham, J. Singer, C. Lovato, R. Milner. Department of Surgery and Department of Health Care and Epidemiology, University of British Columbia, Vancouver, BC, Department of Surgery, University of Calgary, Calgary, Alta., Department of Surgery, University of Western Ontario, London, Ont., Department of Surgery, University of Manitoba, Winnipeg, Man.

We developed a quality-of-life (QOL) questionnaire, EQOL, for potentially curable patients with esophageal carcinoma to assess treatment associated quality of life.

In the development phase, 38 patients were enrolled in 3 centres. Literature reviews, patients, family members and health care professionals generated 195 items in 5 domains. Patients assigned importance ratings. Impact scores were calculated. Item impact scores less than 20/100 were excluded. Pearson's correlation coefficients compared domains with the MOS SF-20. Fifteen items remained in the EQOL. In the validation phase, 65 patients enrolled in 4 centres. EORTC QLQ-C30, EQOL, MOS SF-36 and a Global Rating of Change Questionnaire were completed at baseline, 1 week, and post-op time intervals. Reliability was assessed comparing mean baseline and 1-week scores. Responsiveness compared mean scores of changed and unchanged patients. A responsiveness index was calculated. The MOS SF-36 was used for criterion validity. Construct validity included 4 a priori predictions.

Mean scores between baseline and 1 week for unchanged patients were not significant ( $p > 0.05$ ), except in the physical function domain ( $p = 0.025$ ). Symptom, physical function and social domains were responsive to change at all time intervals ( $p < 0.05$ ). Emotional function was responsive at 1 and 3 months, ADLs at 1 and 6 months. Magnitude of change was significant when direction of change was stated. Between better and worse, magnitude of change was significant in all domains except at 6 months in symptoms, emotional and physical domains. The minimal clinically important difference was consistently around 0.5 for all domains. Only 2 out of 16 time intervals had poor correlations with the SF-36, establishing criterion validity. Of the 4 a priori predictions for construct validity, only the 2nd part of 1 prediction, in the emotional function domain, was not confirmed.

Quality of life can be assessed using the EQOL.

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**THE DEVELOPMENT OF A 3D PREOPERATIVE PLANNING SYSTEM FOR THE SURGICAL TREATMENT OF LUNG CANCER.** Y. Hu, R.A. Malthaner. Canadian Surgical Technologies and Advanced Robotics and the Division of Thoracic Surgery, London Health Sciences Centre, London, Ont.

The preoperative assessment of resectability of lung cancer can be difficult and time-consuming. Three-dimensional (3D) displays from standard 2-dimensional (2D) computed tomograms (CT) could make this more efficient. The current research is to develop a 3D planning system to aid in determining the resectability of lung cancer. The research consists of (1) the development of a preoperative planning system

for lung surgery, and (2) the experimental evaluation of the system in predicting the resectability of lung cancer. Six patients with lung cancer underwent standard spiral CT scans using the GE scanner ranging from 2.5 mm to 7.0 mm slice thickness. From these scans, 3D displays of thoracic cavities were rendered using the AMIRA software by a user blinded to the patients' clinical information. Participants with varying surgical experience were presented with 2D CT images and 3D displays in a randomized order. The participants were asked to identify the location of the lesion and the possible procedure of its resection. Measurements of performance included the amount of time taken to decide, the error rate of the predicted resectability, and user-experienced workload. The results were compared to the true clinical and pathologic outcomes. Our preliminary results showed that the error rates between 2D images and 3D displays were similar. The 3D displays reduced clinical planning time by about 3 minutes per patient or about 50% compared to 2D CT images. This time saving would translate into 1.0 to 2.0 hours of reduced planning time in a clinical day. Less mental workload was required in 3D displays. A full-scale evaluation is in progress. Our preliminary results suggest that a 3D planning system is preferred to a standard 2D CT reader. A 3D preoperative planning system may soon become routine for thoracic surgery.

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**LONG-TERM OUTCOME AFTER SURGERY FOR ACHALASIA.** T. Boghossian, D. Ouellette, G. Beauchamp. Division of Thoracic Surgery, Université de Montréal, Montréal, Que.

This retrospective study describes longterm results in 68 patients having had surgery for achalasia between 1980 and 2001. Patients were subdivided into 4 groups: transthoracic Heller (TTH,  $n = 17$ ), transthoracic Heller with Belsey Mark IV (TTHB,  $n = 25$ ), transabdominal Heller with Dor's (TAHD,  $n = 24$ ), and others (OG,  $n = 2$ ). Outcomes measured were esophagitis and recurrence of dysphagia.

Fifty-nine patients had preoperative gastroscopy. 5 showed evidence of esophagitis. Postoperative gastroscopy was performed in 50 patients. Esophagitis was found in 12 patients: 3 from the TTH group, 6 from the TTHB group and, 3 from the TAHD group. Two patients required redo surgery because of reflux esophagitis.

Medical treatment for reflux was needed in 11 patients post-operatively: 4 from the TAHD group, 3 from the TTHB group, 3 from the TTH group and 1 from the OG group.

Eight patients had recurrent dysphagia (7 months–9 years) that needed either pneumatic dilatation (3) or surgery (5). Two patients requiring surgery were from the TTH group and 3 were from the TTHB group. Four had redomyotomy with a fundoplication, and 1 patient had redomyotomy and defundoplication.

Follow-up averaged 7 years for the TTH group ( $n = 15$ ), 1.3 years for the TAHD group ( $n = 21$ ), 6.7 years for the TTHB group ( $n = 22$ ), and 11 years for the OG group ( $n = 1$ ).

In general, even if different surgical approaches are used, good results are obtained and patients are satisfied. However, postoperative esophagitis and recurrent dysphagia requiring intervention remain problems to be solved.

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