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COMPARING THE ADEQUACY OF LYMPH NODE HARVEST IN LAPAROSCOPIC VERSUS OPEN COLORECTAL CANCER PROCEDURES. *J.D. Rivard, D. Hochman.* Department of Surgery, University of Manitoba, Winnipeg, Man.

Recently, a study was published outlining a model to more accurately determine the minimal number of lymph nodes that should be harvested during colorectal resections for cancer, based on several patient characteristics. Our study seeks to determine whether laparoscopic colorectal cancer surgery achieves appropriate number of lymph nodes for staging using this model.

This study is a retrospective analysis on a prospectively collected database of patients who have undergone surgical resection for their colorectal cancer. All operations were performed by a single, fellowship-trained colorectal surgeon. Patient characteristics, including age, American Society of Anesthesiologists (ASA) grade, Dukes staging, operative urgency, degree of differentiation, histological type of tumour, type of resection and preoperative radiotherapy, have been recorded, and appropriate statistical analysis will be performed.

We anticipate that the lymph node harvest in laparoscopic colorectal surgery will be equal to or superior to the lymph node harvest obtained in traditional open surgery for colorectal cancer. We also expect to corroborate the fact that appropriate surgical lymph node harvest is determined on numerous patient factors and characteristics, which should be taken into account when determining an adequate sample of lymph nodes expected for staging in colorectal surgery.

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PREOPERATIVE PREDICTION OF CONVERSION IN PATIENTS UNDERGOING LAPAROSCOPIC RECTAL SURGERY FOR CANCER: A CT-SCAN BASED MODEL. *A. Bouchard, G. Martel, C. Walsh, N. Fasih, J. Mamazza, E.C. Poulin, R.P. Bousbey.* Minimally Invasive Surgery Research Group, Department of Radiology, The Ottawa Hospital, Ottawa, Ont.

Laparoscopic rectal resection can be technically challenging given the bony confines of the pelvis. Difficult angles and limitations with laparoscopic instruments often necessitate conversion. The aim of the present pilot study is to develop a computed tomography (CT)-based model, using simple metrics, to predict conversion accurately and reproducibly in straight laparoscopic rectal cancer surgery.

We undertook a retrospective review of 30 consecutive cases of laparoscopic proctectomy for rectal cancer located below 15 cm from the anal verge. Preoperative staging CT scans and reconstructed pelvic images were reviewed for each patient. Eight pelvic measurements (including pelvic volume) were obtained by 2 independent observers and analyzed. The charts of all patients were reviewed, and reasons for conversions were identified. Descriptive statistics were obtained, and Spearman correlation coefficients were calculated.

Five out of 30 patients (16.7%) were converted to open surgery, including 0 of 9 anterior resections, 4 of 10 low anterior resections and 1 of 11 abdominoperineal resections. The recorded reasons for conversion were "narrow pelvis" in all cases and difficulty in obtaining adequate margins in 2 cases. Two of 8 recorded metrics were independently associated with conversion: the "sacral deepest point" measuring greater than 35.6 mm and the "lumbar to coccyx" angle greater than 10.5°. These 2 variables were also significantly inversely correlated with one another (Spearman correlation = -0.574, $p = 0.0017$). Finally, a plot graph analysis demonstrated that the combination of both cut-off metrics was the strongest predictor of conversion.

Two simple CT scan metrics can be used to accurately and reliably predict conversion in patients undergoing straight laparoscopic resection for rectal cancer.

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DIGITAL RECTAL EXAMINATION IN THE PREOPERATIVE EVALUATION OF DISTAL RECTAL CANCERS. *F. Haggag, Y. Al-Subaibani, G. Martel, H.S. Stern, R.P. Bousbey.* Department of General Surgery, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

To assess the reliability of digital rectal examination (DRE) and to compare the reported clinical tumour stage (T-stage) with the results from pelvic MRI and pathological staging.

From May 2006 to June 2007, a DRE was performed on 44 sequential patients by at least 1 experienced colorectal surgeon and a fellow who were blinded to the radiologic stage. Preoperative decisions regarding the need for neoadjuvant therapy (NT) were based on clinical assessment and radiologic staging. Radiologic staging consisted of preoperative pelvic MRI. The interrater reliability was assessed, as well as the extent of agreement of the clinical stage with the radiologic and pathologic T-stages using kappa statistics.

Thirty-four patients with median age of 69 (interquartile range [IQR] 57-79) years had DRE and MRI performed

before receiving preoperative therapy. Of these, 10 patients did not undergo surgery and were excluded. Interrater reliability for determining the clinical T was fairly good (kappa value = 0.61). Surgeons' prediction of the need for NT, based on their clinical exam alone, compared well (78%) with the actual rates of neoadjuvant therapy received. Clinical assessment determined by the DRE correlated well with the actual pathologic stage. For the subset of early cancers that did not receive NT, DRE was better at correlating with the final pathological stage than MRI. When MRI staging indicated that NT was appropriate, 80% received NT, while 20% did not. However, when MRI staging predicted that NT was not necessary, 33% received NT, while 67% did not. MRI examination correctly identified 7 T1–T2 (69%), 10 T3 (63%) and 3 T4 (100%) lesions in patients who did not receive NT.

DRE is an essential tool in the preoperative assessment for NT for patients with distal rectal cancer and is more accurate than MRI in correctly staging T1/T2 rectal tumours.

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THE USE OF PROSTHETIC MESH IN PARAESOPHAGEAL HERNIA REPAIR AMONG CANADIAN EXPERTS. F. Hagggar, H. Moloo, R.P. Boushey, E.C. Poulin, J. Mamazza. Department of General Surgery, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

We undertook a survey to assess the incidence of recurrence among expert surgeons, assess their attitudes, practices regarding screening of recurrences and current approach for the use of prosthetic mesh.

Experts in paraesophageal hernias (PEH) from 16 university-affiliated centres were invited to participate in a 29-item questionnaire. Surgeons were provided with a list of other participants and asked to provide additional names of experts in PEH surgery.

Of the 23 identified surgeons, 91% responded to the questionnaire. Almost every respondent (95%) indicated laparoscopic PEH (LPEH) surgery as their preferred operative approach. The most commonly used techniques for LPEH were primary repair with pledgets (38.1%) or without pledgets (38.1%). Fewer respondents preferred primary repair with synthetic mesh (19.1%), biologic collagen matrix mesh (14.3%), composite mesh (4.8%), pledgets and synthetic mesh (4.8%) and pledgets and bioabsorbable mesh (4.8%). Respondents reported recurrences rates of < 10% (38.1%) and 11%–15% (23.8%), with a few (14.3%) reporting rates of > 21%. Recurrences were most commonly attributed to tension on repair (70%), poor connective tissue (55%), poor crural quality (10%) and surgeon-related factors (20%). Most respondents (76%) routinely performed postoperative upper gastrointestinal series to screen for recurrences. Of the discovered recurrences, < 10% were managed surgically. The majority (71%) of surgeons believe the current evidence on the effectiveness of prosthetic mesh to be lacking.

There remains considerable practice variation among expert surgeons performing PEH surgery. There is no clear consensus regarding the most effective method of repair, use of prosthetic mesh and screening regime for recurrences. While the majority of surgeons identified tension on the repair as the likely cause for recurrence, the majority of surgeons perform a

primary repair without a prosthesis. The majority of surgeons recognize the need for better evidence regarding the use of mesh in the primary repair of PEHs.

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QUALITY OF LIFE, SEXUAL AND BLADDER FUNCTION FOLLOWING RECTAL CANCER SURGERY. F. Hagggar, G. Martel, E.C. Poulin, J. Mamazza, R.P. Boushey. Department of General Surgery, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

To evaluate the studies on quality of life (QoL) and sexual and bladder function following rectal cancer surgery.

All papers assessing rectal cancer-specific QoL in the English language were identified in Medline, EMBASE and the Cochrane Library from January 1980 to September 2007.

Thirty papers on aspects of QoL in rectal cancer surgery were identified. Eleven studies were cross-sectional or retrospective and 19 were prospective. Among prospective studies, 11 were randomized controlled trials (RCT). Sample sizes ranged from 18 to 1891 patients; follow-up was from 1 month to a median of 6.8 years after surgery. Global QoL was not formally measured using validated questionnaires in 4 studies. The most commonly used tools were the European Organization for Research and Treatment of Cancer QoL questionnaire core 30 (EORTC QLQ-C30) (43%), which measures psychological, functional and social impact of disease and QLQ-CR38 (40%) (colorectum 38), which is validated for use inpatients with colorectal cancer. These studies suggest that overall QoL is better after surgery. Only 2 studies reported quality of life in patients with rectal cancer following radiotherapy, while another 6 assessed quality of life during chemotherapy and radiotherapy. There were 11 studies that dealt with the effect of rectal surgery on function; the symptoms investigated pertained mainly to sexual, urological and defecatory functions. To date, only 2 RCTs have described QoL, bladder and/or sexual functions. Both studies compared outcomes between laparoscopic and open rectal surgery. These studies concluded that laparoscopic surgery does not adversely affect bladder function, but that there may be a trend toward worse sexual function, especially in males, in the laparoscopic group.

Recent prospective studies suggest that QoL measured by generic questionnaires is better after rectal surgery. However, there continues to be a paucity of quality prospective studies reporting on sexual and urinary functions.

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PALLIATIVE INVASIVE PROCEDURES IN OUTPATIENT PALLIATIVE COLORECTAL PATIENTS. A. Easson, A. Walsh, S. Chadi, T. Kandasamy, G. Rodin, C. Zimmermann. Departments of Surgical Oncology and Psychosocial Oncology and Palliative Care, Princess Margaret Hospital, University Health Network, Toronto, Ont.

Palliative invasive procedures (PIPs) are used for symptom relief when curative treatment is not possible. The present study retrospectively assesses PIP treatment patterns in patients with metastatic colorectal cancer referred for specialized palliative care (PC).

The medical records of 276 colorectal patients ($n = 81$ ascending colon, $n = 59$ descending colon, $n = 136$ rectal) referred for PC were reviewed for PIPs. PIPs were examined by cancer site and treatment method, stratified as: open/laparoscopic, endoscopic, interventional radiology (IR) and bedside. The interval between PC and PIP was calculated and examined with a 2-way (cancer site \times PIP) analysis of variance (ANOVA).

Of the 276 patients reviewed, 137 (50%) received 315 PIPs; included, 107 open/laparoscopic, 32 endoscopic, 129 IR, 47 bedside. Median time from diagnosis to PC was 22.8 months, and median time from diagnosis to PIP was 15.7 months. Median time from PC to death was 2.6 months. Sixty percent of PIPs occurred before PC. Time interval between PC and PIP was significantly related to PIP ($p < 0.001$) but not cancer site. On average open/laparoscopic procedures occurred 7.9 months before PC, endoscopic occurred 1.6 months before PC, IR procedures occurred 1.6 months after PC, and bedside procedures occurred 1.8 months after PC.

Palliative invasive procedures in colorectal cancer patients are common, required by 50% of patients referred for specialized palliative care. IR and bedside PIPs were common after PC referral, although 60% of PIPs were performed before referral. With patient quality of life the primary focus of palliation, these findings suggest further prospective investigation is necessary to determine the extent to which PIPs contribute to relief of burden and distress at the end of life.

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DO RIGHT-SIDED LAPAROSCOPIC COLECTOMIES TAKE LONGER TO RECOVER? AN ANALYSIS OF 649 CASES. *G. Martel, A. Bouchard, C.M. Schlachta, E.C. Poulin, J. Mamazza, R.P. Boushey.* Minimally Invasive Surgery Research Group, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The objective of this study was to test whether right- and left-sided laparoscopic colectomies differ in terms of postoperative recovery of bowel function.

Consecutive patients undergoing laparoscopic colorectal procedures from 1991 to 2007 were analyzed from a prospectively collected database. Cases were unselected, as all referred patients were offered laparoscopy. To standardize bowel function recovery, all conversions and defunctioning ostomies were excluded. Summary statistics and univariate analyses were performed. A multiple linear regression model was built to evaluate risk factors associated with prolonged return to normal diet.

A total of 649 colectomies were retrieved from the database, including 280 right- (RT) and 369 left-sided (LT) resections. Both groups were comparable in terms of basic demographics, although the RT group was more likely to be taking steroids (10.0% v. 1.9%, $p < 0.0001$), to have had previous abdominal operations (28.6% v. 19.2%, $p = 0.0053$) and to have a diagnosis of colon cancer (57.5% v. 47.4%, $p = 0.011$). Intraoperative complication rates were similar between the 2 groups, although median operative times were significantly shorter among right-sided colectomies (146 v. 175 min, $p < 0.0001$). Postoperatively, the rate of surgical complications, including ileus and anastomotic leak, was similar between the 2 groups. However, medical complications were significantly

more common within the RT group (17.9% v. 10.0%, $p = 0.0037$). The median times required to resume a normal diet (3 [interquartile range [IQR] 3–5] v. 3 [IQR 2–4] d, $p = 0.0368$) and to discharge from hospital (5 [IQR 4–7] v. 4 [IQR 4–6] d, $p = 0.0198$) were significantly longer among right-sided resections, although the absolute differences were small. A multivariate model identified anastomotic leak ($p < 0.0001$), ileus ($p < 0.0001$), medical complications ($p < 0.0001$) and right-sided resections ($p = 0.0094$) as predictive factors of longer time to return to a normal diet.

Return of bowel function following laparoscopic colectomy is a complex phenomenon. Patients undergoing right-sided laparoscopic colectomies appear to be slower to recover than patients undergoing left-sided resections.

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AN ANALYSIS OF 1486 COLORECTAL RESECTIONS PERFORMED FOR INFLAMMATORY BOWEL DISEASE IN CANADA. *P.J. Karanicolas, P.H.D. Colquhoun, L. Dubois, C.J. Swallow, G.H. Guyatt.* Department of Surgery, University of Western Ontario, London, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Department of Surgery, University of Toronto, Toronto, Ont.

Inflammatory bowel disease (IBD) is a common indication for colorectal resection. Patients and surgeons need accurate estimates of expected outcomes following resection in order to make informed management decisions.

We obtained data from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database on all adult patients who underwent colorectal resection for IBD in Canada (excluding Quebec) between January and December 2005. We performed logistic regression to identify variables associated with a higher likelihood of in-hospital death.

Surgeons performed 1486 colorectal resections in patients with IBD, the majority (59.4%) in patients with Crohn disease. There were a similar proportion of men and women (48.1% v. 51.9%), with a median age of 43 (interquartile range 32–55) years. We classified 53.6% of procedures as elective and 46.4% as urgent or emergent (hospital admission through an emergency department or with a primary diagnosis other than IBD). Increasing age (odds ratio [OR] 1.1/y, $p < 0.001$) and urgency of surgery (OR 9.2 for urgent or emergent, $p = 0.004$) were independently associated with a higher likelihood of death. The overall mortality was 1.8%, significantly higher in urgent cases than in elective cases (3.6% v. 0.3%, $p < 0.001$).

Colorectal surgery for IBD is common, with an overall low mortality rate. Older patients undergoing urgent operations are at higher risk of perioperative death. Management that avoids urgent surgery would substantially reduce mortality.

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OUTCOMES FOLLOWING LAPAROSCOPIC COLECTOMY FOR CANCER: NOT ALL SIDES ARE CREATED EQUAL. *G. Martel, A. Bouchard, C.M. Schlachta, E.C. Poulin, J. Mamazza, R.P. Boushey.* Minimally Invasive Surgery Research Group, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The objective of this study was to compare the outcomes of

right- and left-sided laparoscopic colectomies for cancer.

Consecutive patients undergoing laparoscopic colorectal procedures from 1991 to 2007 were analyzed from a prospectively collected database. Cases were unselected, as all referred patients were offered laparoscopy. Inclusion criteria from the Clinical Outcomes of Surgical Therapy (COST) trial were applied, limiting the analysis to right- and left-sided colectomies for cancer. To standardize bowel function recovery, all conversions and defunctioning ostomies were excluded. Summary statistics and univariate analyses were performed.

A total of 336 cases of laparoscopic colectomy for cancer were identified, including 161 right- (RT) and 175 left-sided (LT) resections. Both groups were well matched for sex, weight, comorbidities, previous abdominal surgery and perioperative steroid use. The RT cohort was slightly older (69.9 v. 66.2 y, $p = 0.016$). There was no significant difference between the 2 groups in the distribution of American Joint Committee on Cancer (AJCC) stages, with stage 2 disease being the most frequent (37.3% v. 32.0%, $p = 0.31$). The median operative time was significantly shorter within the RT group (147 v. 180 min, $p < 0.0001$), although both cohorts had comparable rates of intraabdominal adhesions (11.8% v. 13.7%, $p = 0.6$) and intraoperative complications (5.0% v. 5.7%, $p = 0.76$). Postoperatively, the RT cohort had more frequent medical complications (21.7% v. 12.0%, $p = 0.017$) and demonstrated a trend toward greater overall complication rates (35.4% v. 25.7%, $p = 0.054$). Median times to resumption of a normal diet and to discharge were not significantly different between the 2 groups. Surprisingly, the RT group showed an excess postoperative mortality rate (8/161, 5.0% v. 1/175, 0.6%, $p = 0.016$). Among mortalities, only 1 case was attributable to a surgical complication, whereas others were medical complications (6/9) or unknown (2/9).

Stage for stage, right-sided laparoscopic colectomy for cancer may be associated with a greater rate of morbidity and mortality compared with left-sided resections. The observed difference in postoperative outcomes does not appear related to surgical complications.

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ACCURACY OF ENDORECTAL ULTRASOUND IN THE EVALUATION OF RECTAL CANCER IN ST. JOHN'S, NEWFOUNDLAND. *S.L. Wong, M. Savoie, D.A. Wirtzfeld, W.G. Pollett.* Department of Surgery, Health Science Centre, St. John's, NL.

Endorectal ultrasound (ERUS) is reported as an accurate method for the staging of rectal cancer. However, ultrasonographic evaluation is known to be operator dependent. This study aims to evaluate the accuracy of ERUS in the evaluation of rectal cancer in St. John's, Newfoundland.

A retrospective chart review of 80 rectal cancer patients who underwent ERUS between April 2001 and March 2005 was undertaken to compare the accuracy of ERUS against the final pathology report in the determination of depth of invasion (T-stage) and nodal status (N-stage).

The overall accuracy for detection of the level of invasion was 44%. The overall sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) in uT3 and uT4 staging were 57%, 59%, 59%, and 57% respectively. The rotating probe appeared to be less accurate in comparison to

the nonrotating probe with recorded values of 52% and 71%, respectively. The overall accuracy for nodal status was 57%. The sensitivity, specificity, PPV and NPV for nodal status were 5%, 93%, 33% and 59%, respectively. The overall sensitivity, specificity, PPV and NPV for radiologists in determining uT3 and uT4 staging were 60%, 57%, 54% and 63%, respectively.

ERUS is a valuable tool used in the staging of rectal cancer and upon which important treatment decisions are based. We have shown that the accuracy, especially for depth of invasion, is low in a group of radiologists who employ this technique in our centre. Recommendations for the enhanced preoperative staging of rectal adenocarcinoma are made.

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MOST ELDERLY PATIENTS RETURN HOME AFTER SURGERY FOR COLORECTAL CANCER—BUT WHICH ONES AND AT WHAT COST? *K.M. Devon, D.R. Urbach, R.S. McLeod.* Department of Surgery, Mount Sinai Hospital, University Health Network, University of Toronto, Institute for Clinical Evaluative Sciences, Toronto, Ont.

The elderly population is growing. The objective of this study is to describe the disposition and resource utilization of Ontario's elderly who undergo colorectal cancer surgery.

A cohort of 33 238 patients aged 50 years and over with a diagnosis of colorectal cancer was identified using the International Classification of Diseases (ICD)-9 and -10 codes in the Ontario Cancer Registry linked to procedure codes in the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) representing colorectal operations within 6 months of diagnosis from 1997 to 2004. Data were collected from the Chronic-Care Reporting System (CCRS), the Registered Persons Database (RPDB) and the Ontario Home Care Administrative System (OHCAS).

On multivariate analysis (Table 1), patients aged 75–79 and over 80 were more likely to be readmitted (OR 1.31; confidence

Table 1, abstract 87. Resource utilization of elderly patients after surgery for colorectal cancer

Resource utilization	Age, y			
	50–64	65–74	75–79	80+
Mean LOS (SD), d	10.2 (8.25)	11.8 (10.4)	13.8 (13.3)	16.9 (15.6)
Disposition postsurgery, %				
Readmitted within 30 d	11.1	13.0	14.9	18.2
Home*	98.4	96.4	89.2	78.6
Chronic care	0.41	0.83	2.22	4.59
Home care	43.5	47.5	51.8	55.6
Mean no. visits				
In 1st mo	19.7	20.0	19.4	17.7
In 1 y	59.2	65.4	70.4	73.7
HC service type, %				
Nursing	93.2	89.0	81.2	67.92
Home making	2.38	6.70	14.04	24.32
Stoma care	3.75	2.95	2.23	2.10
Other	0.67	1.35	2.52	5.66
HC = home care; LOS = length of hospital stay; SD = standard deviation. *since 2002.				

interval [CI] 1.19–1.45 and OR 1.59; CI 1.44–1.75), receive home care (OR 1.44; CI 1.34–1.55 and OR 1.71; CI 1.59–1.83), not return home (OR 5.62; CI 3.99–7.98 and OR 11.59; CI 8.32–16.13) and stay 2.78 (standard error [SE] 0.219) and 5.16 (SE 0.19) days longer, respectively. Factors predisposing patients over 75 years to all outcomes were urgent admission, stoma and Charlson score.

Elderly patients can return home following colorectal cancer surgery but may have increased supportive needs.

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LAPAROSCOPIC COLECTOMY FOR COMPLEX DIVERTICULAR DISEASE: PUSHING THE ENVELOPE. *G. Martel, A. Bouchard, C.M. Schlachta, E.C. Poulin, J. Mamazza, R.P. Boushey.* Minimally Invasive Surgery Research Group, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The objective of this study was to evaluate the safety and feasibility of laparoscopic colectomy for complex diverticular disease.

Consecutive patients undergoing laparoscopic colorectal procedures from 1991 to 2007 were analyzed from a prospectively collected database. Patients with diagnoses of acute diverticulitis, chronic diverticulitis and diverticulosis were included. Complex cases (CX) were defined as having abscesses, perforations, fistulae or strictures, and were compared with uncomplicated cases (UN), which served as controls. Patients with acute diverticulitis were operated on urgently or for failure of conservative therapy. All patients underwent straight laparoscopy; there were no hand-assisted cases. Summary statistics and univariate analyses were performed.

A total of 183 patients were analyzed, of which 39 had CX and 144 had UN. Within the CX cohort, there were 15 (38.5%) abscesses/perforations, 17 (43.6%) fistulae and 10 (25.6%) strictures. CX patients were older (63.7 v. 53.3 y, $p < 0.0001$) and were more likely to have had previous abdominal surgery (30.8% v. 10.4%, $p = 0.0015$). The vast majority of patients underwent left-sided colectomies (100% v. 92.4%, $p = 0.12$). Nevertheless, median operative times were longer (289 v. 170 min, $p = 0.058$), and ostomies were fashioned more frequently (18.0% v. 4.9%, $p = 0.013$) in CX patients. Intraoperative complications were comparable between the 2 groups (7.7% v. 9.7%, $p = 1.00$), although CX cases were converted much more frequently (23.1% v. 4.2%, $p = 0.0007$). Postoperatively, rates of surgical complications were not significantly different for anastomotic leak, ileus and wound infection, although medical complications were significantly more frequent in the CX group (33.3% v. 4.9%, $p < 0.0001$). There were no mortalities. Finally, the median time required to resume a normal diet (4 v. 3 d, $p = 0.036$) and to discharge from hospital (6 v. 4 d, $p = 0.0009$) were both significantly longer in the CX group.

Laparoscopic surgery for complex diverticular disease is safe and feasible. Despite a high rate of conversion to open surgery, laparoscopy is applicable to complex diverticular disease in the great majority of patients.

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TRANSANAL EXCISION IS A VIABLE TREATMENT OPTION FOR T1 RECTAL CANCER. *A. Karimuddin, C. Victor, H. M. MacRae, Z. Cohen, C.J. Swallow, R.S. McLeod.* Dr. Zane Cohen

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Transanal excision (TAE) remains an attractive and controversial treatment modality for early rectal cancer. The recent literature has raised concerns regarding an increased local recurrence rate with TAE, with a questionable impact on overall survival in comparison with radical, transabdominal surgery (TAS). The objective of our study was to compare the outcomes of patients with T1 rectal cancer who underwent TAE or TAS in relation to local recurrence, disease-free survival and overall survival (OS).

All patients who had surgery for T1 rectal cancer between 1997 and 2007 were identified through the Mount Sinai Hospital Colorectal Cancer database. Sixty-three patients were identified, with 32 undergoing TAE and 31 TAS. There were no significant differences in patient sex or age (Table 1).

Table 1, abstract 89. Characteristics and outcomes of patients undergoing transanal excision versus transabdominal surgery for T1 rectal cancer

Characteristics	Transanal excision (n = 32)	Transabdominal surgery (n = 31)
Media age (IQR), y	61.5 (50.5–71.0)	62.0 (55.0–73.0)
Sex, no. (%)		
Male	19 (59.4)	15 (48.4)
Female	13 (40.6)	16 (51.6)
Median length of follow-up (IQR), mo	83.0 (58.0–103.0)	63.5 (22.0–99.0)
Local recurrences, %	3 (9.4)	0 (0.0)
Deaths	2 (6.3)	1 (3.2)
Cancer-related deaths	0 (0.0)	0 (0.0)
5-year survival (95% CI)		
Disease-free	0.91 (0.73–0.97)	1.00 (1.00–1.00)
Overall	0.94 (0.77–0.98)	0.95 (0.72–0.99)

CI = confidence interval; IQR = interquartile range.

There were 3 recurrences in the TAE group, but all were treated successfully on diagnosis with surgical intervention. There appears to be no significant difference in disease-free survival and/or overall survival.

The main concern with TAE for early rectal cancer has remained local recurrence. Our study shows that in well selected and well informed patients, T1 rectal cancer can be treated effectively with TAE. This approach appears to have a minimal impact on overall survival, and while local recurrence is higher than with TAS, careful and judicious surveillance allows for prompt diagnosis and treatment of recurrences, with negligible impact on overall survival.

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TRANSANAL ENDOSCOPIC MICROSURGERY (TEM) FOR RECTAL LESIONS: SHORT-TERM OUTCOMES. *C.J. Brown, P.T. Phang, M.J. Raval.* Department of Surgery, St. Paul's Hospital, University of British Columbia, Vancouver, BC.

Transanal excision of rectal polyps and early rectal cancers is an alternative to radical surgery. However, recent data suggest

that local recurrence in patients with early rectal cancer (T1 lesions) is unacceptably high, ranging from 15% to 18%. Transanal endoscopic microsurgery (TEM) uses an operating anoscope and laparoscopic instruments to facilitate local excision of rectal lesions. Current literature suggests that TEM results in better oncologic outcomes than convention transanal excision. St. Paul's Hospital (SPH) is one of the first centres in Canada to use this technique, and we present early outcomes of our initial cohort after 18 months of implementation.

Three colorectal surgeons at St. Paul's Hospital have collected data for the SPH TEM database as a means of quality assurance for this new technology. Demographics, surgical, pathological and outcomes data are maintained as part of this ongoing project.

Between July 2006 and December 2007, 18 patients with rectal lesions were treated by TEM at St. Paul's Hospital. Patients were treated for adenocarcinoma (8), adenoma (6), carcinoid (3) and squamous cell cancer (1). Median patient age was 67 (range 42–81) years, and 67% (12/18) were men. Median size of the lesions was 2.6 (range 0.6–6) cm, and median height was 6 (range 2–12) cm. Of the patients with adenocarcinoma, depth of invasion was T1 (4), T2 (3) and T3 (1). Seven patients (39%) had the rectal defect closed, with the remainder left open. Two patients required conversion to conventional transanal excision. There were no significant postoperative complications, and 16 of 18 patients were discharged in less than 24 hours postoperatively.

Early experience with TEM at St. Paul's Hospital has shown it to be a technically feasible and safe method of performing transanal resection of rectal lesions. Further follow-up and critical analysis of accumulating data are necessary in determining its value in treating these patients.

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OUTCOMES IMPROVED AFTER TOTAL MESORECTAL EXCISION (TME) WORKSHOPS IN BRITISH COLUMBIA (BC). *P.T. Phang, C.E. McGahan, G. McGregor, J.K. MacFarlane, C.J. Brown, M.J. Raval, R. Cheifetz, H. Kennecke, J. Hay.* Department of Surgery, University of British Columbia, Surgical Oncology Network, British Columbia Cancer Agency, Vancouver, BC.

In a province-wide audit in BC in 1996, local recurrence for rectal cancer management was 16% overall and 27% for stage 3 cancers using nonstandardized rectal cancer surgery techniques and postoperative adjuvant chemoradiation. To improve these outcomes, TME education workshops were held in BC in 2002 and 2003 with promotion of change to adjuvant short-course preoperative radiation and surgical technique standardized to TME. To assess whether pelvic recurrence was changed, a province-wide audit was repeated for patients treated in the year after the workshops.

A provincial audit was performed for 2003–2004. In total, 396 patients had radical resection of rectal cancers with curative intent. Preoperative adjuvant radiation was given to 49% of patients. Thirty-three percent of patients received adjuvant chemotherapy. Permanent colostomy was performed in 33% of patients. Median follow-up was 34.5 months, with 91% of patients followed for at least 2 years.

Overall, survival was 84%, disease-specific survival was 89%,

pelvic recurrence was 7% and distant recurrence was 14%. Pelvic recurrence was 4.7% (95% confidence interval [CI] 1.9–8.5) for patients receiving preoperative radiation and 10.3% (95% CI 4.7–13.4) for surgery alone. For stage 3 rectal cancers, pelvic recurrence was 9.2% and was significantly lower than in 1996 ($p = 0.03$, Kaplan–Meier). Overall recurrence risk was 0.57 (95% CI 0.25–0.94, hazard ratio) compared with 1996.

We conclude that pelvic recurrence was improved after TME education workshops and increased use of preoperative radiation in a province-wide cohort. Knowledge translation with integrated strategy by surgeons and radiation and medical oncologists has been successful in improving outcomes for rectal cancer management in a population setting.

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A POPULATION-BASED STUDY OF SURGICAL TREATMENT OF COLON CANCER IN ONTARIO, CANADA. *R. Nenshi, M. Simunovic, N.N. Baxter, N. Gunraj, E.D. Kennedy, S. Schultz, D. Wilton, D.R. Urbach.* Institute for Clinical Evaluative Sciences, Toronto, Ont.

Population-based patterns of treatment were determined in Ontario, Canada.

Data from administrative health databases (Canadian Institute for Health Information [CIHI] and the Ontario Health Insurance Plan [OHIP]) were linked to a population-based cancer registry (the Ontario Cancer Registry [OCR]) to measure hospitalizations and surgical treatment received by all patients with a new diagnosis of colon cancer in Ontario from March 1, 2003, to April 30, 2004.

In total, 5265 residents of Ontario were newly diagnosed with colon cancer. Over half (50.9%) were men and 20.3% were < 60 years old. Of all patients, 4801 (91.2%) had a surgical procedure. Among persons aged < 60 years, 1.3% (95% confidence interval [CI] 0.5–1.9) had a resection with a permanent stoma, 11.9% (95% CI 9.9–14) had a resection with creation of a reversible stoma, 69.1% (95% CI 66.2–71.9) had a resection with primary anastomosis and 17.8% (95% CI 15.4–20.1) had an “other” surgical procedure (intestinal bypass, local excision or other abdominal procedure). Among persons > 60 years, 1.1% (95% CI 0.8–1.4) had a resection with a permanent stoma, 11.5% (95% CI 10.5–12.6) had a resection with creation of a reversible stoma, 70.7% (95% CI 69.3–72.1) had a resection with primary anastomosis and 16.7% (95% CI 15.5–17) had an “other” surgical procedure. Of all cases, 354 (7.4%) were done laparoscopically. Among persons aged < 60 years, 8.8% (95% CI 7.1–10.6) had laparoscopic surgery compared with 7% (95% CI 6.2–7.8) in the older group (p for difference = 0.047). There was no difference in the rate of laparoscopic procedures between men and women.

The majority of patients newly diagnosed with colon cancer in Ontario undergo resection without creation of a stoma. There was no significant difference in rates of the different types of surgery received according to age. Less than 10% of operations were done laparoscopically, and younger patients were more likely to undergo laparoscopic procedures.

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STAPLED HEMORRHOIDOPEXY RESULTS IN RECURRENT

SYMPTOMATIC HEMORRHOIDS: 2008 UPDATE. *K.J. Lumb, P.H.D. Colquhoun, R.A. Malthaner, S. Jayaraman.* Department of Surgery, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ont.

In a recently published meta-analysis of 12 randomized trials comparing stapled hemorrhoidopexy (SH) to conventional excisional hemorrhoidectomy (CH), we demonstrated that SH was associated with a greater risk of hemorrhoid recurrence. The purpose of this study was to update the analysis with more trials.

A systematic review of randomized controlled trials (RCTs) comparing SH and CH with long-term results was performed using the Cochrane methodology. Included studies had a minimum follow-up of 6 months and compared circular SH to CH. Studies were analyzed for clinical and statistical heterogeneity. Primary outcomes were hemorrhoid recurrence, symptom recurrence, complications and pain. A random effects model was used in the pooling of the trials summary statistics.

Nine additional RCTs were identified for a total of 21 included studies. Nine RCTs did not meet the inclusion criteria. SH patients were more likely to have recurrent internal hemorrhoids in long-term follow-up (odds ratio [OR] 3.22, 95% confidence interval [CI] 1.59–6.51, $p = 0.001$). SH patients were also more likely to complain of prolapse (OR 3.10, 95% CI 1.43–6.72, $p = 0.004$). When all symptoms were considered, patients undergoing CH surgery were more likely to be asymptomatic (OR 0.55, 95% CI 0.35–0.84, $p = 0.006$). Patients that received SH were more likely to have external anal skin tags (OR 1.47, 95% CI 1.00–2.16, $p = 0.05$) and to require subsequent operations (OR 1.89, 95% CI 0.99–3.61, $p = 0.05$). A nonsignificant reduction in postoperative bleeding was found with CH. SH was only found to nonsignificantly reduce pain and anal obstruction/stenosis.

In conclusion, conventional excisional hemorrhoidectomy continues to be superior to stapled hemorrhoidopexy for hemorrhoid symptoms and recurrence and continues to be the gold standard.

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THE EFFECTS OF GLUCAGON-LIKE PEPTIDE 2 AND GLP-2 MIMETIBODY ON COLONIC ANASTOMOTIC HEALING IN A HYPOXIC RAT MODEL. *H.A. Redstone, W.D. Buie, S.L. Sague, P.J. Hornsby, D. Sigalet.* Department of Surgery, University of Calgary, Calgary, Alta., Immunobiology Department, Centocor, Radnor, Pa.

Glucagon-like peptide 2 (GLP-2) is a peptide hormone with intestine-specific trophic effects. It has been shown to improve intestinal adaptation in short bowel syndrome and have mucosal healing properties in animal models of inflammation, however, the native peptide has a very short circulating half-life. Given the potential utility activating the GLP-2 receptor in patients with compromised gastrointestinal function, we assessed whether the native peptide or a long-lasting variant would alter several indicators of anastomotic healing, using a previously validated hypoxic rat model of impaired colonic healing.

Fifty-six male rats underwent surgery with transection and anastomosis of the colon and were randomly allocated into 1 of 6 treatment groups. Animals were housed in either

normoxic or hypoxic conditions and received either GLP-2 30 µg subcutaneously twice daily, GLP-2 MIMETIBODY construct 2 mg/kg/dose given subcutaneously on days 0 and 3 and saline on other days or normal saline. At 5 days postoperatively, animals were euthanized, and anastomotic bursting pressures were obtained. Crypt cell proliferation was assessed by 5-Bromo-2'-deoxyuridine (BrdU) labelling. Anastomotic tissue was also obtained for analysis of cytokines (IL-1β, TNFα, IFNγ, IL-10, TGFβ and IL-13) by ELISA, and collagen types I and III and MMP-13 expression by reverse-transcription polymerase chain reaction (RT-PCR).

Anastomotic bursting pressure was not significantly different with either GLP-2 or GLP-2 MIMETIBODY treatment in either normoxic or hypoxic animals at day 5. Both GLP-2 and GLP-2 MMB treatment resulted in significantly higher numbers of positively-stained cells per crypt. Cytokine analysis showed increased levels of the proinflammatory cytokines IL-1β and IFNγ with GLP-2 treatment. Levels of the anti-inflammatory cytokines IL-10 and TGFβ were decreased by both GLP-2 treatments in both normoxic and hypoxic animals. There was no difference in the levels of TNFα and IL-13. Collagen analysis showed decreased expression of both type 1 and type 3 collagen with GLP-2 treatment.

GLP-2 treatment results in changes in the cytokine profile and collagen expression at the healing colonic anastomosis but does not affect bursting pressures. The effects on inflammatory cytokines were opposite to those seen in inflammation models, suggesting a distinct activity profile in this setting. These results suggest that clinically, if indicated, GLP-2 treatment could be continued throughout the perioperative period, but we do not see a direct benefit of GLP-2 therapy on anastomotic healing. The biological effect (crypt cell proliferation) was similar for native and GLP-2 MIMETIBODY construct treatment indicating the less frequent administration of the later was effective.

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LAPAROSCOPIC INTESTINAL RESECTION FOR CROHN DISEASE: THE TOUGH STUFF. *A. Bouchard, G. Martel, E. Sabri, C.M. Schlachta, E.C. Poulin, J. Mamazza, R.P. Boushey.* Minimally Invasive Surgery Research Group, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

To examine perioperative outcomes in patients undergoing intestinal resection for complicated Crohn disease including abdominal abscess and complex fistula disease.

Consecutive patients from 1991 to 2005 who underwent laparoscopic colorectal resections for Crohn disease were included. Cases were unselected, as all patients referred underwent a laparoscopic approach. Patients undergoing laparoscopic resection for uncomplicated Crohn disease were used as a control group for comparison. Data were obtained from a prospectively collected database. Summary statistics and univariate analyses were performed.

Eighty-four patients were studied, including 19 patients with disease complicated by abscess and fistula (group A) and 65 patients with uncomplicated Crohn disease (group B). A right-sided colectomy was performed in 89% of patients in group A and 62% of patients in group B. Other procedures included laparoscopic proctocolectomy ($n = 9$), proctectomy

($n = 8$) and total colectomy ($n = 7$). Patients in group A were more likely to be on preoperative steroids (47 v. 25%, $p = 0.056$). The rate of previous intra-abdominal surgery was identical in the 2 groups (17%). There were no intraoperative complications in group A; however, 4 patients (5%) in group B experienced an intraoperative complication, including cautery injury, significant mesenteric hemorrhage and a ureteric injury. Conversion rates were similar in groups A and B (11 v. 6%, NS). Median operative time for patients undergoing laparoscopic right colectomy in group A was 175 minutes (interquartile range [IQR] 130–195) and was not significantly different than patients in group B (140, IQR 120–210 min). The overall postoperative complication rate was 21% ($n = 18$). Interestingly, postoperative complications were more common in group B (28 v. 5%, $p = 0.06$). The 30-day mortality rate was 0 for the cohort. Median postoperative length of stay was 4 (IQR 4–7) days in group A and 5 (IQR 4–7) days in group B (NS).

Laparoscopic intestinal resection for patients with fistulizing Crohn disease and/or abdominal abscess is feasible and as safe when compared with patients undergoing laparoscopic surgical resection for medically refractory uncomplicated Crohn disease.

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PREOPERATIVE RADIATION WITH CONCURRENT CHEMOTHERAPY FOR RESECTABLE RECTAL CANCER: LONG-TERM FOLLOW-UP RESULTS OF A DOSE ESCALATION STUDY. *M. Teo, P.F. Ridgway, K.L. Wiltshire, I.G. Ward, C.J. Swallow, A.M. Oza, B. Cummings, G.R. Pond, P. Catton, J. Kim, J. Ringash, C.S. Wong, R. Wong, L.L. Siu, M. Moore, J. Brierley.* Departments of Radiation

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Neoadjuvant chemoradiation is now standard of care for locally advanced rectal cancer. Optimal dosage regimens remain disputed. The authors present the long-term follow-up of a dose escalation phase II study of neoadjuvant radiotherapy and standardized infusional 5-fluorouracil (5FU).

Primary outcomes were local recurrence-free survival (LRFS), disease-free survival (DFS) and overall survival (OS). Subgroup analysis was conducted to elucidate possible confounders such as stage, time to surgery, toxicity and comorbidity.

A total of 134 patients with adenocarcinoma of the rectum (T3/T4 or N1/N2) were treated. The initial cohort received 40 Gy in 20 fractions, the second, 46 Gy in 23 fractions, and the third, 50 Gy in 25 fractions. The 5FU was given in a synchronous fashion at (225 mg/m²/day). Statistical analysis was performed on an intention-to-treat basis, according to the Kaplan–Meier method, and comparisons were made with log-rank calculations.

A total of 121 patients underwent surgical resection. The 5-year LRFS was 91% in all 3 cohorts; 5-year DFS was 56%, 67% and 76% ($p = 0.072$) respectively. Subgroup analysis showed a trend toward increased OS with higher doses of radiation.

All treatment schedules were well tolerated. While at 2 years there was a significant difference in LRFS, the 5-year LRFS did not reveal a significant difference between the 3 cohorts. There was a trend toward increased DFS with higher doses of radiation.