Canadian Journal of Surgery
Journal canadien de chirurgie

Vol. 58 (3 Suppl 2) June/juin 2015
DOI: 10.1503/cjs.005615

Canadian Society of Surgical Oncology Annual General Meeting

Eaton Chealsea Hotel, Toronto, Ont.

Friday, May 1, 2015

Abstracts

Urinary metabolomics of gastric cancer. ***Angela W. Chan, MD,* David Broadhurst, PhD,† Pascal Mercier, PhD,‡ Daniel Schiller, MD,* Dean T. Eurich, BSP PhD,§ Sarah Robbins, MD,¶ Michael B. Sawyer, MD.**** **From the *Department of Surgery, Division of General Surgery, University of Alberta, Edmonton, AB, †Department of Medicine, Division of General Internal Medicine, University of Alberta, Edmonton, AB, ‡Department of Biochemistry, University of Alberta, Edmonton, AB, §School of Public Health, University of Alberta, Edmonton, AB, ¶Department of Medicine, Division of Gastroenterology, University of Alberta, Edmonton, AB, and the **Department of Oncology, Medical Oncology, University of Alberta, Edmonton, AB.**

Background: Gastric adenocarcinoma (GC) has 70%–75% mortality owing to delayed diagnosis. There is no standard screening in North America. Metabolomics measures low molecular weight chemicals (metabolites) in body fluids/tissues to provide a phenotypic "fingerprint" of disease. The primary hypothesis was that metabolomic profiling of urine samples using hydrogen nuclear magnetic resonance (^{1}H-NMR) spectroscopy could discriminate between GC, benign gastric disease (BN), and healthy patients. A secondary hypothesis that postoperatively metabolite profiles will return to concentrations similar to healthy controls was also tested. **Methods:** Midstream urine samples were collected and biobanked at –80°C from 40 patients with BN, 40 healthy controls and 43 patients with GC (matched on age, sex and body mass index). For each urine sample ^{1}H-NMR spectra were acquired using a 600 MHz Varian Inova spectrometer. Metabolite identification and quantification of spectral peaks was performed using Chenomx software version 7.6. Urine was sampled preoperatively, and postoperatively at 6 weeks and 6 months from 7 patients with GC; 12 healthy individuals were used as baseline controls. After standard quality assurance procedures 58 metabolites were reproducibly measured. Univariate statistics and multivariate discriminant analysis (MDA) were performed to test the proposed hypotheses. **Results:** Thirty metabolites differed significantly between the GC and control groups ($p < 0.05$). After MDA a discriminatory model with an area under the receiver operating characteristics curve of 0.996 was produced. Given a fixed specificity of 100% the corresponding sensitivity was 93% for discriminating patients with GC from healthy controls. Postoperatively 5 metabolites exhibited a significant change compared with preoperatively. Multivariate discriminant analysis identified discriminative models that separated patients with GC from healthy controls, and preoperative GC from postoperative GC at 6-week and 6-month intervals. **Conclusions:** Patients with GC have a distinct urinary metabolite profile compared with healthy controls. There is clinical potential for metabolic profiling for early GC detection; however, future studies with larger sample sizes will be required to validate these findings.

Sentinel lymph node biopsy in thin melanoma: a systematic review and meta-analysis. ***Erin Cordeiro, MD, MSc,* Mai-Kim Gervais, MD,† Prakesh Shah, MD, MRCP, MPH,‡ Nicole Look Hong, MD, MSc,† Frances C. Wright, MD, Med.†*** **From the *Department of Surgery, The Ottawa Hospital, Ottawa, ON, the †Department of Surgery, Sunnybrook Health Sciences Centre, Toronto, ON and the ‡Department of Pediatrics, Mount Sinai Hospital, Toronto, ON.**

Background: The vast majority of patients diagnosed with melanoma have a thin (≤ 1.0 mm) lesion and enjoy an excellent outcome. However, a small subset of these patients have worse outcomes, including lymph node metastases and attenuated survival. We sought to determine the pooled rate of sentinel lymph node (SLN) metastases in patients with thin cutaneous melanoma and determine the pooled effect of predictors on SLN metastases. **Methods:** Literature published between 1980 and 2014 was systematically searched and critically appraised. The primary outcome was the rate of SLN metastases in patients with thin (≤ 1.0 mm) cutaneous melanoma. Secondary outcomes were the effect of high-risk pathological features of the primary lesion on the rate of SLN metastases. These outcomes were assessed and analyzed in a pooled fashion. Summary measures were estimated using the Mantel–Haenszel method, and a random effects model was used. Heterogeneity was assessed statistically using the I^2 statistic. **Results:** A total of 47 studies incorporating 9743 patients with thin melanoma met the criteria for inclusion in the analysis. The pooled proportion of patients with a positive SLN was 4.9% (95%CI: 4.1%–5.7%; Figures). The following pathologic features of the primary melanoma were predictive of having a positive SLN on unadjusted analysis: thickness ≥ 0.75mm (OR 2.37, $p = 0.0005$), Clark's level IV/V (OR 1.84, $p = 0.0005$), presence of ulceration (OR 1.88, $p = 0.003$) and the presence of microsatellites (OR 6.94, $p = 0.001$). The presence of mitoses, regression, tumour infiltrating lymphocytes and lymphovascular invasion did not significantly impact the rate of SLN metastases. On pooled adjusted analysis, thickness ≥ 0.75 mm ($p = 0.03$), Clark's level IV/V ($p = 0.009$) and the presence of mitoses ($p = 0.03$) all significantly increased the odds of SLN metastases, whereas the presence of ulceration did not ($p = 0.06$). **Conclusion:** The overall rate of SLN metastases in thin melanoma is low; however, in the presence of any of the above high-risk features there is a significantly increased risk of SLN positivity, and a biopsy procedure should be discussed with the patient.

Preoperative neutrophil:lymphocyte ratio is a better prognostic serum biomarker than platelet:lymphocyte ratio in patients undergoing resection for nonmetastatic colorectal cancer. ***Woo Jin Choi,* Michelle C. Clegborn, MSc,† Haiyan Jiang, PhD,† Timothy D. Jackson, MD, MPH,*‡ Allan Okrainec, MDCM, MHPE,*‡ Fayez A. Quereshy, MD, MBA.*‡§*** **From the *Division of General Surgery, University Health Network, Toronto, ON, the †Department of Biostatistics, Princess Margaret Cancer Centre, Toronto, ON, the ‡Department of Surgery, University of Toronto, Toronto, ON, and the §Department of Surgical Oncology, Princess Margaret Cancer Centre, Toronto, ON.**

Background: Current risk stratification tools for patients with colorectal cancer (CRC) rely on final surgical pathology, but may be improved with the addition of novel serum biomarkers representing the host response to disease. The objective of this study was to evaluate the utility of preoperative neutrophil: lymphocyte ratio (NLR) and platelet:lymphocyte ratio (PLR) in predicting long-term oncologic outcomes in patients with operable CRC. **Methods:** All patients who underwent curative resection for adenocarcinoma at a large tertiary academic hospital

were identified. High NLR/PLR was evaluated preoperatively and defined by maximizing log-rank statistics. Recurrence-free survival (RFS) and overall survival (OS) were calculated using the Kaplan–Meier method and compared using the log-rank test. Univariate and multivariable Cox proportional hazard regression was used to identify associations with outcome measures. **Results:** A total of 549 patients were included in the study. High NLR (≥ 2.6) was associated with worse RFS (HR 2.03, 95% CI 1.48–2.79, $p < 0.001$) and OS (HR 2.25, 95% CI 1.54–3.29, $p < 0.001$). High PLR (≥ 295) was also associated with worse RFS (HR 1.68, 95% CI 1.06–2.65, $p = 0.028$) and OS (HR 1.81, 95% CI 1.06–3.06, $p = 0.028$). In the multivariable model, high NLR retained significance for reduced RFS (HR 1.59, 95% CI 1.1–2.28, $p = 0.013$) and OS (HR 1.91, 95% CI 1.26–2.9, $p = 0.002$). Patients with high NLR had 2-year and 5-year RFS of 76% and 59% and OS of 87% and 71%, respectively, compared with 2-year and 5-year RFS of 85% and 77% and OS of 93% and 85% in the low NLR group. Significantly more patients in the high NLR group were older at diagnosis, had mucinous adenocarcinoma, higher T stage and advanced cancer stage. **Conclusion:** High preoperative NLR in this series was shown to be a negative independent prognostic factor in patients undergoing surgical resection for nonmetastatic CRC. The prognostic utility of this serum biomarker may help to guide use of adjuvant therapies and patient counselling.

Patient decision-making in palliative surgery. ***Trevor D. Hamilton, MD,*† Melanie E. Tsang, MD, MSc,*† Audrey Kim,‡ Debbie Selby, MD,‡ Frances C. Wright, MD, Med.*†§***

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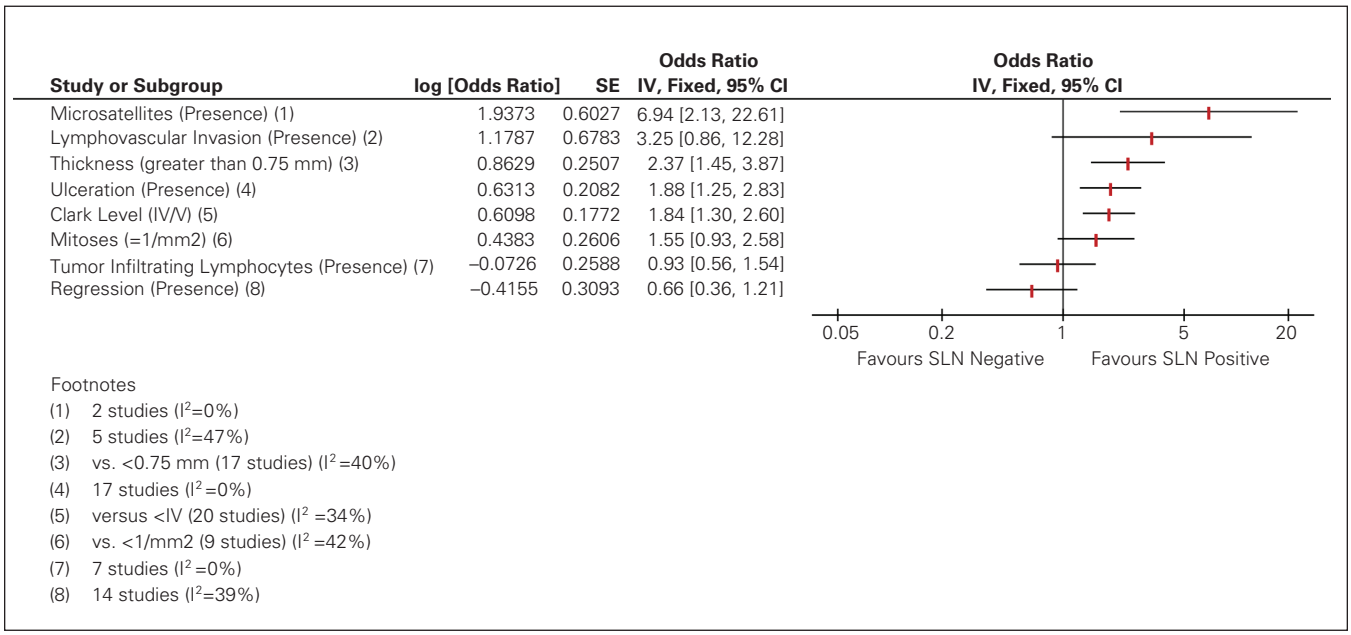
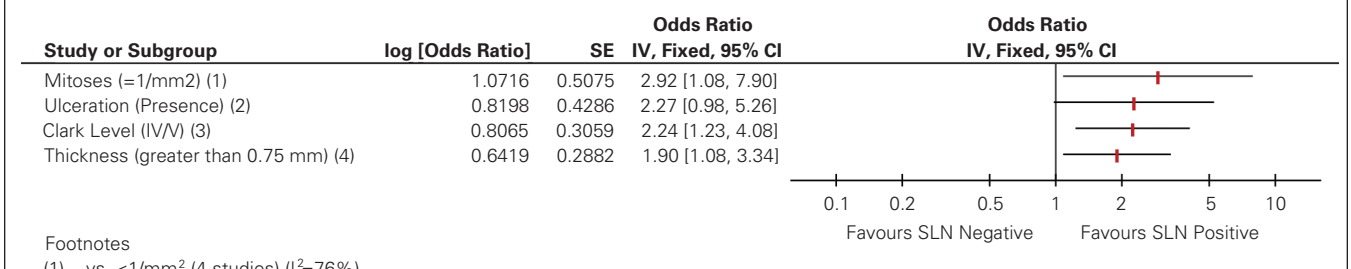
Background: Patients with incurable malignancies are often symptomatic or have acutely life-threatening surgical conditions. The decision to proceed with palliative surgery for symptom control in these situations is challenging, and data to guide patient and physician decision-making are limited. We prospectively evaluated patients with incurable cancer treated with palliative surgery for symptom control at a single institution. **Methods:** Eligible patients were assessed at a tertiary care cancer centre between January and



Footnotes
(1) 2 studies (I^2=0%)
(2) 5 studies (I^2=47%)
(3) vs. <0.75 mm (17 studies) (I^2=40%)
(4) 17 studies (I^2=0%)
(5) versus <IV (20 studies) (I^2=34%)
(6) vs. <1/mm2 (9 studies) (I^2=42%)
(7) 7 studies (I^2=0%)
(8) 14 studies (I^2=39%)



Footnotes
(1) vs. <1/mm^2 (4 studies) (I^2=76%)
(2) 3 studies (I^2=34%)
(3) versus Clark <IV (2 studies) (I^2=26%)
(4) vs. Thickness <0.75mm (2 studies) (I^2=0%)

December 2014. Semistructured qualitative interviews and quality of life assessments were obtained preoperatively and 1 month postoperatively. Qualitative analysis was performed using the inducted grounded theory approach. Quality of life was evaluated with the European Organization for Research and Treatment of Cancer QLQ-C15-PAL and compared using *t* tests. **Results:** Twenty-eight patients were approached and 20 consented to interview. Data saturation was achieved after 14 patients. The median patient age was 58 (range 40–87) years, and 56% were women. Melanoma (n = 7), lung (n = 4) and colorectal (n = 3) were the most common primary disease sites, and 78% of operations were nonelective. Perioperative complications and 30-day mortality were 44% and 22%, respectively. "No other option" was seen as a dominant preoperative theme. Other preoperative themes included a poor understanding of overall prognosis and the role of surgery in overall care. Postoperative themes included a perceived benefit from surgery and satisfaction with decision-making even in the context of significant complications. Improved understanding of prognosis and the role of surgery were also described. Quality of life scores were significantly improved pre- versus postoperatively in emotional functioning (62.1 v. 80.6, p = 0.03). **Conclusion:** Preoperatively, patients perceived they had "no option" when considering palliative surgery. Despite patient satisfaction, perioperative mortality is substantial, and should be considered by patients and physicians before embarking on such procedures.

Hospital readmission after surgery for gastric cancer: frequency, timing, etiologies and survival. ***Shaila J. Merchant, MD,* Philip H.G Ituarte, PhD,† Audrey Choi, MD,* Virginia Sun, PhD,‡ Joseph Chao, MD,§ Joseph Kim, MD.*** **From the *Division of Surgical Oncology, City of Hope National Medical Center, Duarte, CA, the †Division of Statistics, City of Hope National Medical Center, Duarte, CA, the ‡Division of Nursing Research and Education, City of Hope National Medical Center, Duarte, CA, and the §Division of Medial Oncology, City of Hope National Medical Center, Duarte, CA.**

Background: Readmission rates after cancer surgery are infrequently reported, and better understanding of the etiologies for readmission may help improve patient outcomes. Our objectives were to investigate the frequency, timing and etiologies for hospital readmission after surgery for gastric cancer and whether readmission correlates with clinical outcomes. **Methods:** Hospital readmission was examined through linkage of the California Cancer Registry with the Office of Statewide Health Planning and Development database. Patients with gastric adenocarcinoma who had undergone curative intent surgery between 2000 and 2011 were identified. First readmission within 90 days of initial surgery was analyzed with respect to timing (0–30, 31–60, and 61–90 d) and etiology for readmission. Predictors of readmission and impact on 5-year overall survival (OS) were examined. **Results:** A total of 8887 patients (5326 male, 3561 female) underwent curative intent surgery for gastric adenocarcinoma. Within 90 days of initial surgery 2559 (28.8%) patients had inpatient hospital readmission. The majority of readmissions occurred in the first 30 days (0–30, n = 1371 [53.6%]; 31–60, n = 773 [30.2%]; 61–90, n = 415 [16.2%]). The most common reasons for readmission included surgical complications (24.8%), infection (12.0%), progression of disease (10.8%), planned treatment (i.e., chemotherapy, radiation; 9.4%) and dehydration/malnutrition/electrolyte derangements/metabolic disorders (7.6%). Readmission versus no readmission within 90 days adversely affected 5-year OS in patients with local (51.2% v. 70.9%, $p < 0.0001$) and regional (23.3% v. 32.9%, $p < 0.0001$) disease. On multivariate analysis readmission within 90 days was an independent negative predictor of OS (HR 1.40, 95% CI 1.32–1.49, $p < 0.001$). **Conclusion:** Hospital readmissions are high after surgery for gastric cancer and correlate with poor patient survival. Some readmissions may be preventable. A better understanding of these issues may allow health care providers to potentially lower readmission rates and improve gastric cancer outcomes.

Clinical features and outcomes of 20 patients with desmoplastic small round cell tumour. ***Fernando A. Angarita, MD, MSc,*† Saima Hassan, MD, PhD,* Amanda J. Cannell, BScH,* Brendan C. Dickson, MD, MSc,‡§ Rebecca A. Gladdy, MD, PhD,*† Carol J. Swallow, MD, PhD,*† David Hogg, MD,¶** Abha Gupta, MD, MSc,¶†† Martin E. Blackstein, MD, PhD,¶**‡‡ J. Andrea McCart, MD, MSc.*†*** **From the *Department of Surgery, Mount Sinai Hospital, Toronto, ON, †Department of Surgery, University of Toronto, Toronto, ON, ‡Department of Laboratory Medicine and Pathology, Mount Sinai Hospital, Toronto, ON, §Department of Laboratory Medicine and Pathology, University of Toronto, Toronto, ON, ¶Department of Medical Oncology, Princess Margaret Cancer Centre, University Health Network, Toronto, ON, **Department of Medicine, University of Toronto, Toronto, ON, ††Division of Haematology/Oncology, Hospital for Sick Children, Toronto, ON, ‡‡Department of Medicine, Mount Sinai Hospital, Toronto, ON.**

Background: Desmoplastic small round cell tumour (DSRCT) is a rare, aggressive mesenchymal tumour thought to arise from the peritoneum. Management is challenging because of limited treatment options and poor outcomes. We describe our institution's experience treating DSRCT with the aim of standardizing future management. **Methods:** Patients with DSRCT were identified from medical charts and an institutional pathology database. A retrospective chart review was conducted with research ethics board approval. All patients treated for DSRCT between January 1998 and June 2014 were included. Diagnosis was confirmed by histopathology, immunohistochemistry and cytogenetics. Clinicopathological information was extracted and analyzed. Univariate analysis was performed to evaluate association between variables and overall survival (OS). **Results:** Thirty-six patients were identified; 6 were reclassified as having other sarcoma subtypes, 6 had negative/unknown *EWSR1* rearrangement status, and 4 had no clinical information available, leaving 20 patients for inclusion in the study. The median age at diagnosis was 29 (range 17–43) years. Ninety percent of patients were male. At presentation, median size of the largest tumour deposit was 14 cm (range 6.9–60.5) cm, and distant metastases were present in 11 (55%) patients. Metastases were primarily hepatic (63.6%). All patients received chemotherapy. The median number of lines of chemotherapy was 2.5 (range 1–5). Three patients received radiation therapy. Five patients underwent surgical debulking. Median follow-up time and OS were 18.1 months and 21.7 months, respectively. Two- and 5-year OS rates were 45% and 20%, respectively. Extra-abdominal metastasis was associated with higher risk of death (HR: 3.1, 95%CI 1–9.4, p = 0.04). **Conclusion:** Desmoplastic small round cell tumour mainly affects young men and generally presents with metastasis.

Surgical debulking may improve OS; however, patients were highly selected for surgery (e.g., response to chemotherapy and lacked metastasis). Despite receiving aggressive treatment, patients with DSRCT have short OS.

Biliary drainage procedures for palliation of extrahepatic cholangiocarcinoma. ***Benjamin T. Turner, MD,* Julia Bowes, MD† Cynthia Fasola,* Chad Ball, MD,* Elijah Dixon, MD,*‡ Francis R. Sutherland, MD,* Oliver F. Bathe, MD.*‡*** **From the *Department of Surgery, University of Calgary, Calgary, AB, the †Department of Medicine and Oncology, University of Calgary, Calgary, AB, and the ‡Department of Oncology, University of Calgary, Calgary, AB.**

Background: Little is known about the resource requirements for palliation of unresectable bile duct cancers. Achieving effective biliary drainage is perhaps the greatest clinical challenge, especially as the tumour progresses to more proximal ducts. Few studies have examined the disease trajectory from the perspective of biliary drainage to understand the patient experience and resource requirements. **Methods:** All patients with unresectable extrahepatic cholangiocarcinoma managed in Calgary between 2000 and 2012 were included in this retrospective review. All percutaneous and endoscopic biliary drainage procedures were recorded. The indication, technical details, complications, patency rates and survival were annotated for each procedure. **Results:** Of 261 patients diagnosed with extrahepatic cholangiocarcinoma, 204 (78.1%) had unresectable disease and 120 (79.0%) underwent a biliary drainage procedure. A total of 535 drainage procedures were performed (mean 3.5, range 0–60 procedures per patient). Of the patients with complete information on stent placement, 77 (50.6%) had internal metal stents placed, 70 (46.1%) were treated exclusively with plastic external or internal/external stents and 5 (0.3%) received sphincterotomy alone. Forty-nine percent of procedures were performed on an inpatient basis, and 51.0% were performed on outpatients. Median survival was 4.2 months. **Conclusion:** To our knowledge, this is the first study to describe the detailed clinical course of patients requiring biliary drainage for unresectable extrahepatic cholangiocarcinoma. Biliary drains remain the most important palliative treatment for these patients. Given the need for multiple challenging interventions throughout the clinical course as well as significant physical resources, palliation may best be managed centrally at a tertiary referral centre. Further study is required to define the population most likely to benefit from metal stent placement and to establish the relative advantages of endoscopic and percutaneous approaches.

Long-term outcomes following level-3 axillary lymph node dissection for breast cancer. ***Heather M. Poushay, MD, Julie Hallet, MD, MSc, Nicole Look-Hong, MD, MSc, Frances C. Wright, MD, MEd.*** **From the Division of General Surgery, Sunnybrook Health Sciences Centre — Odette Cancer Centre, Toronto, ON, and the Department of Surgery, University of Toronto, Toronto, ON.**

Background: Axillary lymph node dissection (ALND) for node-positive breast cancer traditionally includes levels 1 and 2. Data remain limited regarding outcomes following level-3 ALND for patients with level-3 nodal metastasis. We sought to assess the oncologic outcomes of patients with breast cancer undergoing level-3 ALND. **Methods:** We performed a retrospective cohort study including all patients undergoing level-3 ALND between 2004 and 2014 at a tertiary care cancer centre. Diagnosis of malignant level-3 lymph nodes (LNs) was made either preoperatively (clinical examination and imaging) or intraoperatively (surgeon assessment). Primary outcomes were overall (OS) and recurrence-free survival (RFS) and time to recurrence (TTR). Kaplan–Meier methods were used to compute survival curves. **Results:** Of 21 patients undergoing level-3 ALND, 18 had a mastectomy and 3 a lumpectomy. Additional treatment included chemotherapy in all patients, radiation in 16, and hormonal therapy in 13. Of the 13 (61.9%) patients diagnosed preoperatively who received neoadjuvant treatment (NAT), 3 demonstrated complete pathologic response, 6 had residual level-3 LN disease, and 4 had disease limited to levels 1 and 2. Among 8 patients diagnosed intraoperatively, all had metastatic disease in level-3 LNs. At a median follow-up of 34 months, actuarial 5-year OS was 67.5% (95%CI 55.0%–80.0%), and 5-year RFS was 47.4% (95%CI 34.5%–60.3%). At last follow-up, 13 (66.7%) patients were alive, including 2 (9.5%) with disease and 11 (52.4%) without disease. There were no isolated local recurrences, and 9 (42.9%) patients had distant recurrences. Median TTR was 5 (range 1–36) months. Fewer patients who received NAT recurred (31% v. 62%). **Conclusion:** Level-3 ALND provides good local control. Among patients undergoing level-3 ALND, actuarial 5-year survival was 67.5%, with the majority of patients alive without disease at last follow-up. Intraoperative identification of malignant level-3 LNs was accurate.

Adverse events related to lymph node dissection for cutaneous melanoma: a systematic review and meta-analysis. ***Haytham H. Alabbas, MD, MSc, Angel M. Rodriguez-Rivera, MD, Stanimira Krotneva, MSc, Sue-Ling Chang, MSc, MBA, Laura Patakfalvi, MD, Tara Landry, MLIS, Ari Meguerditchian, MD, MSc.*** **From McGill University, Montréal, Que.**

Background: The purpose of this study was to review the collective experience with complications associated with lymph node dissections (LND) in patients with cutaneous melanoma (CM). **Methods:** A systematic literature search was performed to review the incidence of complications associated with LND in patients with CM (PROSPERO: CRD42013006040). Data extraction quality was validated by comparing it to a second database created with 10% of randomly selected studies using a modified STROBE checklist. The incidence of each complication type was extracted from each study and compiled according to basin site and then by type of complication (wound infection, acute lymphatic, lymphedema). Meta-analyses were performed using a random-effects model, and pooled estimates of complication rates for each basin and 95% CIs were calculated. **Results:** We included 88 studies with a total of 9505 patients and 9594 LNDs. Data were collected for 372 cervical, 2476 axillary and 5867 groin LNDs. The pooled rates of wound complications for cervical, axillary and groin LNDs were 8.2% (95% CI 2.4–14), 9% (95% CI 6.5–11.6) and 22.3% (95% CI 18.9–25.7), respectively. The pooled rates of acute lymphatic complications for cervical, axillary and groin LNDs were 7.4% (95% CI 2.2–12.7), 23% (95% CI 17.8–28.2) and 25.3% (95% CI 21.1–29.4), respectively. The pooled rates of lymphedema for axillary and groin LNDs were 10.2% (95% CI 7.5–13.0) and 33% (95% CI 28.1–38.0), respectively. Intraoperative and systemic complications were uncommon or underreported in the literature. **Conclusion:** Morbidity after LND in

patients with CM remains considerably high, particularly in those undergoing groin dissections. Our results provide the collective knowledge needed to improve patient-centred outcomes and enhance recovery in this specific population. It also proposes a simple, reproducible classification of LND.

Collaborative case conferences in rectal cancer: case series in a tertiary care centre. ***Cagla Eskicioglu, MD,* Nalin Amin, MD,* Margherita Cadeddu, MD,* Shawn Forbes, MD,* Stephen Kelly, MD,* Ilun Yang, MD,* Scott Tsai, MD,† Valerie Francescutti, MD,‡ Angela Coates, MEd,* Vanja Grubac,* Ranil Sonnandara, PhD,* Marko Simunovic, MD.*§***
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Background: In many hospitals resource barriers preclude the use of preoperative multidisciplinary cancer conferences (MCCs) for consecutive patients with cancer. Collaborative cancer conferences (CCC) are modified MCCs that may overcome such barriers. **Methods:** We established a CCC at an academic tertiary care centre to review preoperative care plans for patients with rectal cancer. Attendees included surgeons who perform colorectal cancer procedures and a radiologist with expertise in cross-sectional imaging. Individual reviews began with the primary surgeon presenting case information and initial treatment plans. Cross-sectional images were then reviewed, the case discussed, and consensus achieved on CCC treatment recommendations. Study outcomes were changes in treatment recommendations defined as major (i.e., redirect patient to preoperative radiation from straight to surgery or plan uncertain or redirect patient to straight to surgery from preoperative radiation or plan uncertain) and minor (i.e., referral to a multidisciplinary cancer clinic, request additional tests, change type of neoadjuvant therapy, change type of surgery). Chart reviews provided additional patient, tumour and treatment information. **Results:** Between September 2011 and September 2012, 101 patients with rectal cancer were discussed at CCCs. Thirty-five (34.7%) patients had a change in their management plan, with 8 and 27 being major and minor changes, respectively. Available patient and tumour factors did not predict a change in treatment recommendation. **Conclusion:** Preoperative CCCs changed treatment recommendations for one-third of patients with rectal cancer. Since no factor predicted a treatment plan change, it is likely prudent that all patients with rectal cancer undergo some form of collaborative review.