OR01

Impact of revascularization versus medical therapies on left ventricular functional recovery in patients with reduced ejection fraction and coronary artery disease: A systematic review & network meta-analysis

Janet Ngu, George Wharmby, Jillian Rodger, Thin (Peter) Vo, Ming Hao Guo, Sarah Visintini, Alomgir Hassain, George Wells, Sylvian Boet, Marc Ruel, Peter Liu, Rob Beanlands, Louise Sun

Division of Cardiac Surgery

Domain: Clinical Research

INTRODUCTION: The prevalence of coronary artery disease (CAD) with reduced left ventricular ejection fraction (LVEF) is rising, but the optimal treatment remains unclear as this patient group has routinely been excluded from randomized clinical trials (RCT). The present study aims to investigate the impact of revascularization (i.e., coronary artery bypass grafting; CABG or percutaneous coronary intervention; PCI) versus medical treatment strategies (i.e., optimal medical therapy alone; OMT) on LVEF recovery in patients with CAD and LVEF <=40%. METHODS: The study protocol was registered on PROSPERO with a registration ID of CRD42017069849. A systematic literature search until May 11, 2017 on MEDLINE, EMBASE and the Cochrane Library in Ovid was performed by a medical librarian. A network meta-analysis (NMA) was conducted based on Bayesian approach to make direct and indirect comparisons of the interventions, in studies comparing revascularization strategies (CABG or PCI) against each other or OMT. The primary outcome was the mean difference (MD) in change in LVEF before and after intervention. Risk of bias assessment was performed using the Sign-50 tool for RCTs and the Newcastle-Ottawa Scale for cohort studies. RESULTS: The searches retrieved 5896 records with duplicates removed. 5256 were excluded during title/abstract screening, and 612 were excluded at full-text. Twenty-seven cohort studies and one randomized clinical trial met the inclusion criteria. A total of 5 cohort studies and 1 RCT involving 502 patients were included in the NMA. The NMA found that CABG was associated with significant improvement in LVEF compared to OMT (MD 5.5, 95% CI 1.4 to 9.4) and PCI (MD -6.3, 95% CI -0.9 to -11.7). In addition, changes in LVEF were similar following PCI versus OMT (MD -0.8, 95% CI -7.6 to 5.8). CONCLUSIONS: Among common treatment strategies for patients with CAD and reduced left ventricular systolic function, only CABG was associated with significant improvement in LVEF. Data from prospective studies and RCT is lacking. Future prospective studies are needed to address this important clinical outcome.

Presenter: Dr. Janet Ngu

Presenter Contribution: Registration of study protocol on PROSPERO, screening of abstracts and full texts, data extraction, data analysis, and drafting of abstract and manuscript.

OR02

Standardizing early drain removal after pancreatectomy to reduce pancreatic fistula and surgical site infection: a quality improvement project

Heather Smith, Fady Balaa, Guillaume Martel, Jad Abou Khalil, Kimberly Bertens

Division of General Surgery

Domain: Quality Improvement Research

Introduction: Intra-abdominal drains are often left in place post pancreatectomy to mitigate the development of a post-operative pancreatic fistula(POPF). However, surgical drains may contribute to the risk of organ space surgical site infections (SSI). To address this issue, the hepatopancreaticobiliary (HPB) surgery and quality improvement (QI) teams at The Ottawa Hospital (TOH), developed a protocol to facilitate early drain removal post pancreatectomy. Methods: A multidisciplinary team developed a protocol, implemented December 2016. Verbal feedback was obtained from the surgical team and QI leaders to assess usability. Data from all patients undergoing pancreatectomy was acquired from the National Surgical Quality Improvement Program between January 1, 2016 and October 30, 2017. The months of November and December, 2016 were excluded as the month before and after implementation. Non-parametric outcomes were assessed using Mann-Whitney U test and parametric outcomes were assessed by χ-squared test or Student's T test. Results: The protocol was implemented for 100% of patients undergoing pancreatectomy with no significant barriers to usability. There were 42 patients in the pre-implementation cohort and 47 patients in the post-implementation cohort. The median day of drain removal in the entire population was significantly reduced from 8 to 5 days post implementation of the drain protocol (p= 0.03). On subgroup analysis, the median length of stay (LOS) was significantly decreased by 2 days in patients undergoing distal pancreatectomy who did not develop a POPF (8 versus 6 days, p=0.05). The organ space SSI and POPF rate were reduced following the intervention, but did not reach statistical significance (30% to 23%, p=0.42; and 42% to 36%, p=0.51 respectively). Conclusions: We found the implementation of a standardized protocol for drain management after pancreatectomy was associated with earlier drain removal and, in patients undergoing distal pancreatectomy without POPF, a decreased length of stay. This algorithm may be a useful tool for other HPB surgery teams to facilitate early drain removal after pancreatectomy.

Presenter: Dr. Heather Smith

Presenter Contribution: Idea generation, data collection and analysis

OR03

Can a self-administered questionnaire reduce consultation wait times for potential elective lumbar spinal surgical candidates? A prospective pragmatic blinded randomized control quality improvement intervention.

Matthew J. Coyle, Darren M. Roffey, Philippe Phan, Stephen P. Kingwell, Eugene K. Wai

Division of Orthopaedic Surgery

Domain: Clinical Research

Introduction: In a public health care system, patients often experience lengthy wait times to see a spine surgeon for consultation. Alas, most patients are not surgical candidates, thereby prolonging the wait time for those that are. Our aim was to evaluate whether a 3-item self-administered questionnaire (3IQ) could re-prioritize consultation appointments and reduce the wait times for lumbar spine surgical candidates. Methods: We completed a prospective pragmatic blinded randomized control quality improvement intervention at a single Canadian academic health care centre to achieve this. This study enrolled 227 consecutive eligible participants with an elective lumbar condition that were referred for consultation with a spinal surgeon. All participants were mailed the 3IQ after their referral was received. Patients were randomized into the intervention group where reports of leg dominant pain on the 3IQ resulted in an upgrade in priority to be seen, or the control group wherein no change to wait-list priority occurred. The main outcome measured time to consultation for participants who were deemed surgical candidates after consultation. Results: There were no significant differences between groups in regards to demographics, overall group wait times, proportion of surgical candidates, or disability. 33 patients underwent surgery and/or were deemed surgical candidates after consultation. Surgical patients in the intervention group (N=16) had a significantly (P=0.0332) shorter mean wait from referral to consultation of 3.3 (95% CI: 2.5-4.1) months compared to a mean of 5.8 (95% CI: 3.6-8.0) months in the control group (N=17). The odds of seeing a surgical candidate within an acceptable time frame of 3 months was 5.4 times greater (95% CI: 1.2-24.5, P=0.0237) in the intervention group. Conclusions: Using a simple self-administered questionnaire to reprioritize referrals resulted in a shorter consultation wait time for patients that require surgery. The 3IQ may be worth considering adding to clinical care practices to better triage these patients on waiting lists.

Presenter: Dr. Matthew Coyle

Presenter Contribution: I had a primary role in this project from ethics submission, patient recruitment, statistical analysis and manuscript preparation.

OR04

The molecular subtype of Primary Glioblastoma cells correlates with response to therapeutic agents that induce apoptosis or senescence.

Ritesh Kumar, Ian Lorimer

Division of Neurosurgery

Domain: Translational Research

Introduction: Glioblastoma (GBM) is the most common adult primary brain tumour. Despite full therapy, median survival is 14 months. Resistance to therapy in GBM is due to extensive heterogeneity at the molecular level. Gene expression profiling demonstrates four major subtypes, proneural, neural, classical, and mesenchymal. Recently it has been shown that the mesenchymal subtype of GBM is resistant to radiation. However, the response of other subtypes to therapy with respect to apoptosis or senescence (irreversible growth arrest) remains unknown. Further investigation into the susceptibility of the molecular subtypes and mechanisms responsible for resistance may yield insight into novel therapy against GBM. Methods: Primary Glioblastoma (PriGO) cells were harvested from 3 human patients with GBM and cultured in serum free media. Microarray analysis was used to determine the predominant molecular subtype of each cell line. Cells were then treated with radiation, chemotherapy, or serum (an agent known to induce senescence in PriGO cells). Apoptosis was measured by cell counts, Caspase-3 activation, and Annexin-V positivity. Senescence was determined by SA-Beta-Gal assay, markers of cell cycle arrest (p21) and heterochromatin formation (PML bodies). Results: PriGO8A and PriGO9A cells were predominantly classical whereas PriGO17A cells were mostly mesenchymal. PriGO8A cells underwent apoptosis in response to radiation and the chemotherapeutic agent Triapine. PriGO8A cells underwent senescence in response to serum. PriGO9A cells demonstrated a similar response. PriGO17A cells, however, failed to undergo apoptosis or senescence in response to any agent. Inhibition of one of the key hyperactive pathways in mesenchymal cells, the RAS pathway, led to an increase in senescence induction. Conclusions: The molecular subtype of GBM correlates with response to therapy. The classical subtype is sensitive to agents that induce apoptosis and senescence. The mesenchymal subtype appears to be generally resistant to therapeutic agents. Resistance to therapy may be mediated by the RAS pathway and its inhibition may render such cells susceptible to senescence inducing agents.

Presenter: Dr. Ritesh Kumar

Presenter Contribution: I designed the experiments, performed the experiments and analyzed and interpreted the results.

OR05

The Futility of Surveillance for Old and Small Aneurysms

Mark Rockley, Dominic Leblanc, Prasad Jetty

Division of Vascular Surgery

Domain: Clinical Research

"Introduction: Current guidelines recommend ultrasound surveillance of small abdominal aortic aneurysms (AAA) to monitor for growth to a size threshold, generally 5.5 cm in men and 5.0 cm in women. However, the benefit of AAA surveillance in elderly patients is being questioned. Inspired by the Canadian Choosing Wisely campaign, we investigate the yield and expense of surveillance for small AAA in octogenarians, compared with a younger population. Methods: A retrospective cohort review was performed on all patients undergoing AAA surveillance from 2007-2017 in Ottawa. Patients were dichotomized by enrollment age (<80 vs ≥80) with cross-over to prevent lead-time bias, and stratified by enrollment AAA size. These cohorts were referenced with the Ottawa AAA Repair Database, leveraging the common LHIN to assure data capture. Survival analysis with Cox Proportional Hazards models adjusted for covariates, and cost-effectiveness analysis performed referencing OHIP codes. Results: A total of 1378 patients underwent serial AAA surveillance, of which 355 (25.8%) had significant AAA growth and 313 (22.1%) underwent AAA repair. Octogenarians were half as likely to experience significant AAA growth (HR = 0.51 [0.37–0.68]) for both small and moderate sized AAA (HR = 0.32 [0.13–0.83] and HR = 0.54 [0.43–0.68] respectively). Despite reaching a threshold sized AAA, octogenarians were also half as likely to undergo elective AAA repair (RR = 0.52 [0.45–0.59]). Both ruptured AAA repair (0.94%) and AAA-related mortality (0.58%) were rare, and age differences were not significant. AAA surveillance for octogenarians was substantially less cost effective, incurring $12,080 in surveillance fees to identify one octogenarian who proceeded with elective AAA repair. Conclusions: Octogenarians with small AAA are half as likely to experience significant aortic growth. Furthermore, in the unlikely event of AAA growth, octogenarians are half as likely to undergo repair, without significantly increased risk of requiring ruptured AAA repair. In context of patient-specific factors, surveillance of small AAA in octogenarians is costly and unlikely to be beneficial."

Presenter: Dr. Mark Rockley

Presenter Contribution: I cross-referenced data sets, performed statistical analysis, cost-effectiveness analysis, and formulation of abstract.

OR06

Do patients have preconceived notions about different surgical approaches? Results from the perspectives regarding open versus minimally invasive surgery (PROMIS) survey.

Ching Yeung, Andre Martel, Mary Hanna, Ameera Moledina, Andrew J.E. Seely, Donna E. Maziak, Farid Shamji, R. Sudhir Sundaresan, P. James Villeneuve, Sebastien Gilbert

Division of Thoracic Surgery

Domain: Clinical Research

Introduction: Patient perspectives on the use of minimally invasive (MIS) versus open surgical approaches have not been well studied. Surgeons often presume preference for MIS. The aim of this survey was to objectively document patient viewpoints on pain, functional outcomes, and treatment expectations throughout the course of treatment. Methods: From 2012-2017, 187 lung and esophageal surgical patients were prospectively enrolled in this observational cohort study. Participants completed a RAND36 short form health survey (SF-36), and a PROMIS questionnaire pre-operatively, 1 month, and 6 months after surgery. The PROMIS survey measures expectations regarding travel burden, pain, complications, cosmesis, and recovery time on a visual analog scale. The questions were asked of each anatomic region (neck, chest, and abdomen). Data was analyzed by McNemar's test, and paired and independent t-test as appropriate. Results: 76% of all distributed surveys were completed. SF-36 results indicate physical functioning, limitations due to physical health, energy level, pain, and social functioning worsened significantly at one month. All indices recovered to baseline at 6 months except for physical functioning. Preliminary PROMIS results from the visual analog scale measured out of 10 indicate risk of complications was a more important factor 7.5 (95%CI 7.2-7.9) than distance from treating center 4.0 (95%CI 3.4, 4.5) and size of incision 4.5 (95%CI3.9, 5.1). Results did not vary over time. Patients were significantly less concerned with pain to the thorax over time (pre-op 4.9 (4.4, 5.4) 1 month $p = 0.002$; 6 month $p = 0.007$). In general, there was no significant difference in responses when categorized by anatomic region or surgical approach for either survey. Conclusion: Overall, our study indicates that patients had similar perspectives on pain, functional outcomes, and treatment expectations independent of anatomical region and surgical approach. This allows the possibility of randomized control trials comparing various surgical approaches through the neck, thorax and abdomen.

Presenter: Dr. Ching Yeung

Presenter Contribution: data abstraction, collection, portion of data analysis with assistance from statistician, preparation of abstract

OR07

Ultrasound surveillance following carotid endarterectomy (CEA): Prudent or pointless?

Shira Strauss, Anika Mohan, Elham Sabri, Prasad Jetty

Division of Vascular Surgery

Domain: Clinical Research

Introduction: International guidelines recommend post-CEA duplex ultrasound surveillance (DUS) to monitor for severe carotid restenosis, enabling early reintervention for stroke prevention. However, the rarity and benign natural history of restenosis challenge this practice. Our study objective was to assess the utility of DUS surveillance regarding rates and outcomes of post-CEA restenosis. Methods: This is a cohort study of patients who underwent CEA at TOH from 2003-2017. DUS was done at TOH's accredited Vascular Diagnostic Centre as per protocol (q6, 12, 18, and 24 months then yearly). Follow-up DUS and clinical data were obtained from Vascubase and electronic medical records (vOacis). Primary outcomes included time to >80% restenosis and post-CEA stroke rate, as well as cost-effective analysis. Statistical analyses involved survival analysis, $\chi 2$ and Fisher's exact test. Results: 1027 CEAs were performed in 978 patients over the study period. Majority were symptomatic (76.8%) with stenosis 70-99% (94.9%), and received patch arterioplasty (83.4%), without a shunt (86.3%), under regional anesthetic (90.2%). There were 28 post-op TIAs/strokes. 20 occurred within 30 days post-op, prior to the initial DUS surveillance. Four more occurred within one year and the final four after one year. No post-30 day stroke was attributed to ipsilateral carotid disease. 702 surgeries (68.4%) had DUS follow up for a total 2123.5 patient years. DUS detected >80% restenosis in 30 patients (3.1%). As per TOH post-CEA protocol, the estimated cost of DUS surveillance in this cohort was $311,786.40, or $10,392 per restenosis. Not a single ipsilateral reintervention occurred. Conclusions: Severe restenosis post-CEA is rare and not associated with worse outcomes. Despite historical recommendation, TOH's management of severe restenosis has been conservative based on its benign natural history. Routine post-CEA DUS surveillance is costly and unlikely to improve outcomes or affect management, even if >80% ipsilateral restenosis is detected. Further research should determine the utility of routine DUS in this population who may be at higher risk for severe contralateral carotid disease.

Presenter: Dr. Shira Strauss

Presenter Contribution: Project-planning, data collection, meeting with statisticians, writing the abstract

OR08

Development of a sternotomy simulation model and scoring system for cardiac surgery training

Nadzir Juanda, Janet Ngu, Nada Gawad, Kathy LaBelle, Fraser D. Rubens

Division of Cardiac Surgery

Domain: Education Research

Introduction: Sternotomy is a fundamental skill in cardiac surgery. Currently, no benchtop simulation model exists for use in early residency. The objective of this study is to create a benchtop sternotomy model for cardiac surgery trainees and to test the content validity and inter-rater reliability of a scoresheet for assessment. Methods: The steps for sternotomy technique and the key points to be measured from a scoresheet were determined from an expert panel consisting of four local cardiac surgeons using the modified Delphi technique to gather content validity evidence. Junior residents participated in the simulation at a national bootcamp before (sim1) and after (sim2) exposure to a didactic video on surgical technique for sternotomy. Two senior residents assessed and timed participants' performance independently using the scoresheet. Questionnaires were distributed to participants before sim1 and after sim2 to gather feedback. Results: The final scoresheet consisted of 20 items, for which 75% consensus was achieved after two Delphi rounds. Thirteen residents participated in this study; ten were in PGY-1 and three were in PGY-2 or above. Nine (69.2%) had performed less than 10 sternotomies. On the pre-sim1 questionnaire, "injuring the heart and other structures" and "going off midline" were equally top-ranked as main sources of concern. Inter-rater reliability was 75.0% (k=0.47) and 69.2% (k=0.37) for sim1 and sim2, respectively. Participants took longer to complete the sternotomy in sim2 (227.5±16.1 vs. 187.9±14.3 seconds, p=0.003) and had significantly higher scores (14.3±0.6 vs. 8.0±0.9, p<0.001). After sim2, all participants rated the simulation sessions as either "very helpful" or "extremely helpful". Eight participants (61.5%) described the sternotomy model as "very realistic". Conclusions: We developed a simulation model and accompanying scoresheet for cardiac surgery training in sternotomy. Participants took longer and scored better after didactic teaching. There was fair to moderate inter-rater reliability of the scoresheet. This sternotomy model is a simple and valuable benchtop addition to training junior cardiac surgery residents.

Presenter: Dr. Nadzir Juanda

Presenter Contribution: - Literature review, study design, simulation model design, methodology - Simulation session assessor - Creation of didactic video for simulation session

OR09

To Improve Translation of Animal Regenerative Therapies to Humans: Direct Comparison of Human and Rat Neural Stem/Progenitor Cell Proliferation and Differentiation

Diana C. Ghinda, Ahmad Galuta, Suzan Chen, Krystal Walker, Catherine Smith, Eve C. Tsai

Division of Neurosurgery

Domain: Translational Research

Introduction: Spinal cord injury (SCI) can result in permanent paralysis and despite decades of clinical trials, there has been a 100% failure to identify a drug that works in the acute stage of the injury. While there are several animal studies showing efficacy of neural stem/progenitor cell (NSPC) therapies for SCI, the pre-clinical efficacy also fails to translate to the clinical setting. The direct comparison of human and rodent NSPCs to assess intrinsic cell differences may provide information to improve therapeutic translation but this has not been previously reported due to inability to obtain viable human spinal cord tissue. We report our results using a novel organ donor methodology. Methods: With regional ethics board approval, viable human spinal cord tissue from ten organ donors and ten Sprague Dawley rats was obtained. Human and rat NSPCs were isolated from the spinal cord and using identical cell culture conditions, they were treated with mitogens (EGF and bFGF2) and assessed for proliferation with BrdU, Sox2+ and DAPI labeled cell counts. Differentiation potential was assessed with 1% fetal bovine serum administration. Response to growth factors selected to direct differentiation to induce neural, astrocytic or oligodendrocytic fates with retinoic acid (RA), bone morphogenetic protein 4 (BMP4), or platelet derived growth factor-AA (PDGF-AA) was also assessed. Results: Rat NSPC proliferation rate was twice (2.3±0.8) that of humans. Rat NSPCs differentiated more into astrocytes (71.8±5.6%) compared to neurons (15.2±4.2%) and oligodendrocytes (2.82±1.3%). Human NSPCs differentiated more into neurons (68.5±16.9%) with little (<2%) gliogenesis. RA stimulated both human and rat NSPC differentiation into neurons, while PDFG only increased rat NSPC oligodendrocytic differentiation, and BMP4 only increased human NSPC astrocytic differentiation. Conclusion: For the first time, we are able to identify intrinsic differences in the proliferation and differentiation potential between adult human and rodent spinal cord NSPCs. This information can be used to modify therapies to improve the translational success of regenerative strategies in human patients.

Presenter: Dr. Diana C. Ghinda

Presenter Contribution: Project design and implementation, tissue sample acquisition, data interpretation

OR10

Development of a patient decision aid for individuals with complex, localized renal masses.

Kristen McAlpine, Rodney H. Breau, Dawn Stacey, Christopher Knee, Ilias Cagiannos, Christopher Morash, Luke T. Lavallée

Division of Urology

Domain: Clinical Research

Introduction: Patient decision aids are clinical tools that facilitate shared decision making for a specific population of patients facing a challenging decision. Decision aids present therapeutic options including their risks and benefits in an evidence-based fashion and help patients communicate their values. In urology, one challenging decision patients and clinicians face is between a partial nephrectomy and a radical nephrectomy to remove a complex renal mass. We sought to develop a patient decision aid for this population. Methods: The International Patient Decision Aids Standards (IPDAS) and the Ottawa Decision Support Framework were used to guide the systematic development of the decision aid. A comprehensive review of the literature was performed to identify evidence on options for management. The content of the decision aid was agreed upon by a steering committee of content and methodological experts. A 10 question, mixed-methods survey was created to assess the acceptability of the decision aid. Patients and urologists were recruited to evaluate the decision aid. Results: A structured patient decision aid presented evidence on options including probabilities of benefits and risks. Open partial nephrectomy and laparoscopic radical nephrectomy were the defined management options. Included benefits were: overall survival, recurrence-free survival, and length of hospital stay. Included harms were post-operative bleeding, urine leak, stage 3 renal failure and need for dialysis. Simple language and pictures were used to present data at a level suitable for a wide range of patients. A validated screening tool was included to assess patients' decisional conflict. Knowledge questions were included to verify patients' understanding. The decision aid met all IPDAS criteria to be defined as a decision aid, all certification criteria and 19 of 23 quality criteria. Results of acceptability testing were favourable amongst stakeholders. Conclusion: We have developed a novel patient decision aid to facilitate shared decision making for patients with complex renal masses. The effectiveness of our decision aid is currently being evaluated in a prospective fashion.

Presenter: Dr. Kristen McAlpine

Presenter Contribution: Actively involved in all steps of project (study planning, REB application, literature review, creation of patient decision aid, creation of survey, contact to participants, update of decision aid, outline of manuscript)

OR11

What is the distribution of expenditures in a population of primary total hip and total knee arthroplasty patients and what contributes to the cost for the highest expenditure patients?

Lisa Lovse, Adrian Huang, Johanna Dobransky, Stephane Poitras, Paul E Beaule

Division of Orthopaedic Surgery

Domain: Clinical Research

Introduction: In Canada, an estimated 5% of the population accounts for 84% of the costs. Understanding the distribution and contributing variables to the cost of completing total hip and total knee arthroplasty (THA and TKA) procedures is essential to meeting standards set by recent health system funding reform. Previous orthopaedic literature on back pain has demonstrated that the majority of the health care costs are attributable to a minority of the patients, following the Pareto principle which states that 80% of health care costs come from 20% of patients. The purpose of this study was to determine whether the cost distribution of primary elective THA and TKA patients fits with the Pareto principle. Methods: All inpatient primary elective unilateral THA and TKAs completed at The Ottawa Hospital from April 1, 2008 to September 30, 2017 were retrospectively examined. All cases were analyzed and compared on financial factors including type of cost incurred during their stay and direct, indirect, and total costs associated with the patient encounter as well as patient factors including age, ASA, body mass index (BMI), and Charleston Comorbidity Index (CCI). The distribution of the costs was evaluated for 5% increments of patients. Regression analysis was then performed comparing correlations between financial and patient related factors. Results: Pareto Principle did not apply: 3714 elective primary THA completed, 5% of the patients accounted for 11% of the costs while 20% of patients accounted for 30% of costs. A similar trend was noted with the 4883 elective primary TKA completed with 5% of patients accounting for 12% of costs and 20% of patients accounting for 31% of costs. ASA was most predictive of costs ($p < 0.001$). Conclusions: The cost distribution for a population of primary elective THA and TKA is relatively homogenous and does not follow Pareto's principle. This suggests that cost optimization strategies should focus on the population as a whole rather than targeting a subset of the population.

Presenter: Dr. Lisa Lovse

Presenter Contribution: I had a central role as the resident involved in this study, being involved in every step of the project including: Literature review/synthesis of current state of knowledge Data analysis and interpretation Manuscript preparation.

OR12

Surgical Stress Suppresses Natural Killer Cell IFNγ Release in Colorectal Cancer Patients

Andre B. Martel, Leonard Angka, Ahwon Jeong, Manahil Sadiq, Marisa Kilgour, Laura Baker, Christiano Tanese de Souza, Michael A. Kennedy & Rebecca Auer

Division of General Surgery

Domain: Translational Research

Introduction: Surgical stress results in profound immune suppression. NK cell dysfunction, as measured by NK cell cytotoxicity (NKC), following surgery has been linked to cancer metastases in various animal models and clinical studies. However, NK cell activity (NKA), as measured by secretion of interferon-γ (IFNγ), is a more global measure of NK cell function. NKA has been correlated with cancer prognosis, the effects of surgery on NKA have not been previously reported. The objective of this study was to investigate the impact of surgical stress on NKA in colorectal cancer (CRC) surgery patients. Methods: A total of 27 healthy participants and 43 CRC surgery patients were enrolled in a prospective translational clinical study (May 2016 to June 2017), which was approved by the Ottawa Health Science Network Research Ethics Board and registered under ClinicalTrials.gov (NCT03422120). For CRC patients, peripheral blood was collected preoperatively and on POD 1, 3, 5, 28, and 56. We assessed NKA, by production of IFNγ following whole blood cytokine stimulation; NKC, by standard 51Chromium release assay; and immune cell profiling by flow cytometry. Results: The mean reduction in NKA on POD1, as compared to baseline was 83.1% (s.d. 25.2%, CI: 75-91). The profound and universal suppression of NKA persisted with 65.5% (19/29) and 33.3% (4/12) of patients with levels measuring less than 75% of baseline on POD28 and POD56 respectively. The NKC was significantly reduced on POD1 but the degree was less pronounced (24.6%, p=0.0024). Immune cell profiling did not reveal differences in the absolute number of NK cells or the ratio of CD56(dim)-to- CD56(bright) subsets. Conclusion: Immediately following surgery in CRC patients, there is a significant decrease in NKC which is accompanied by a near complete loss of NK cell IFNγ production in all patients which persists for up to 2 months, a degree of surgery-induced immunosuppression far worse than previously reported. NKA is a more sensitive measure of postoperative NK cell dysfunction, as compared to NKC. Future work will study the effects of postoperative suppression of NKA on surgical outcomes and cancer recurrence.

Presenter: Dr. Andre Martel

Presenter Contribution: Co-First Author in writing the abstract and manuscript. Data analysis, created and analyzed the NK Vue database. Helped run some of the basic science experiments.

OR13

Intraoperative flash visual evoked potential recording and relationship to visual outcome

David A. Houlden, Chantal A. Turgeon, Nathaniel S. Amyot, Idara Edem, John Sinclair, Charles Agbi, Thomas Polis, Fahad Alkherayf

Division of Neurosurgery

Domain: Clinical Research

Introduction. Neurosurgery performed in areas involving the visual pathway are associated with varying levels of post-operative visual dysfunction. Intraoperative flash visual evoked potential (FVEP) recording has been used to monitor iatrogenic visual pathway injury and due to recent refinements in technical and anaesthetic methods, FVEP reproducibility has increased. We aimed to determine the relationship between intraoperative FVEP monitoring and post-operative visual function. Methods. Intraoperative FVEPs were recorded from electrodes placed in the scalp overlying the visual cortex (Oz; linked mastoid reference) after flashing light stimulation delivered by commercially available goggles, in 89 patients, between March 2012 and March 2017. Restrictive bandpass filtering, optimal reject window settings, mastoid reference site, total intravenous anaesthetic (TIVA) and stable retinal stimulation (ensured by concomitant electroretinogram (ERG) recording) were used to enhance FVEP reproducibility. The relationship between FVEP amplitude change and post-operative visual outcome was examined. Results. The relationship between FVEP amplitude change and visual outcome was determined from 179 eyes. One eye had a permanent intraoperative FVEP loss despite stable ERG and this eye had new, severe postoperative visual dysfunction. Seven eyes had transient significant FVEP change (>50% amplitude decrease that recovered by the end of surgery) but only one of those had a decrease in post-operative visual acuity. FVEP changes in all eight eyes were related to surgical manipulation. In each case the surgeon was promptly informed of the FVEP deterioration and took remedial action. The other eyes did not have FVEP changes and or new post-operative visual deficits. Conclusions. Our FVEP findings correlate strongly to visual outcome. New methods for rapidly acquiring reproducible FVEP waveforms allowed for timely reporting of significant FVEP change resulting in prompt surgical action and FVEP recovery in 7 of 8 eyes. This may have accounted for the low post-operative visual deficit rate (1%) in this series.

Presenter: Dr. Idara Edem

Presenter Contribution: I assisted with data collection and manuscript writing.

OR14

Epidural Nerve Blocks Increase Intraoperative Vasopressor Consumption and Delay Surgical Start Time Compared to General Anesthesia Alone in DIEP Free Flap Breast Reconstruction

Nicholas Cormier, Michael Stein, Tinghua Zhang, Haemi Lee, Jing Zhang

Division of Plastic Surgery

Domain: Clinical Research

Introduction: The use of epidural anesthesia (EA) as an adjunct to general anesthesia (GA) has been widely used in abdominal and thoracic surgeries, and recently shown efficacy in autologous breast reconstruction. While the utility of reducing postoperative narcotic consumption, nausea, and length-of-stay in hospital cannot be understated, concerns remain as to the whether these blocks reduce OR efficiency by delaying case start time and whether block-induced hypotension is associated with increased intraoperative vasopressor requirements. The purpose of this study was to examine the effectiveness of epidural blocks in patients undergoing deep inferior epigastric perforator (DIEP) flap breast reconstruction. Methods: A retrospective analysis from 2015-2017 of patients who underwent DIEP flap reconstruction under GA, with and without EA and no supplementary local anesthetic. Electronic records were analyzed for patient demographics, intraoperative data, and postoperative outcomes. Primary outcome was 48-hour narcotic usage. Secondary outcomes were intraoperative vasopressor consumption, surgical delay time, and safety. Results: Fifty-one patients underwent DIEP reconstruction, 40 (78%) underwent EA in addition to GA, and 11 (22%) underwent GA alone. There was a significant delay in OR start time in the EA/GA group (67min vs 43min, p=0.001.) Patients in the EA/GA group also had a statistically significant increase in vasopressor use (n=33 vs n=5, p=0.021). Postoperatively, patients who received an epidural block had a reduced average pain score (1 vs 2, p=0.05), but there was no difference in 48-hour narcotic usage. Conclusion: Epidural blocks improve average postoperative pain, while increasing intraoperative vasopressor use and delaying the start time of the case. The benefits of improved pain control must continue to be weighed against the potential for increased surgical complications, as well as increased costs to the health care system.

Presenter: Dr. Nicholas Cormier

Presenter Contribution: Designed/wrote research protocol, completed REB submission, gathered all clinical data from retrospective chart review, analyzed final results

OR15

Assessing decision-making skills in surgery: collecting validity evidence for the Script Concordance Test

Nada Gawad, Timothy Wood, Lindsay Cowley, Isabelle Raiche

Division of General Surgery

Domain: Education Research

Introduction: Most in-hospital adverse events are attributable to surgical care and of these, clinical decision-making (CDM) errors account for approximately half. The assessment of CDM is integral to establishing competence among surgical trainees. One proposed assessment tool is the script concordance test (SCT), but evidence demonstrating valid results is needed. This study's aim is to collect content and response process validity evidence for the assessment of CDM using the SCT. Methods: To gather content evidence, a Delphi technique was conducted with a panel of local general surgeons (n=15) consisting of the top decision-makers voted by staff and resident surgeons. Items achieving consensus were mapped on a Table of Specifications to determine the breadth of topics covered as defined by the Royal College competencies in general surgery. The final SCT was administered to 29 residents and 14 staff surgeons and results were analyzed. To gather response process evidence, cognitive interviews were then conducted with ten residents and five staff surgeons based on results of the final SCT. Data from the cognitive interviews were analyzed using a priori deductive codes. Results: The Delphi's first round yielded agreement ranging from 40-100% and consensus for 21 items, which encompassed 10 of the 19 general surgery topics. Cognitive interviews demonstrated variability in CDM among test-takers. Factors contributing to this variability included knowledge, personality, and experience. Issues related to the numerical rating scale demonstrated that for a given item, test-takers indicating different numerical ratings may have the same operative plan, and conversely, test-takers indicating the same numerical rating may have different operative plans. Conclusion: The Delphi technique, Table of Specifications, and cognitive interviews provide validity evidence supporting the SCT for assessing CDM of general surgery trainees. Substantial issues with respect to the numerical rating scale of the SCT suggests further revisions to the test format are required before consideration of its use in high-stakes examinations.

Presenter: Dr. Nada Gawad

Presenter Contribution: This project represents my Master's thesis, and thus my contribution consists of 1.5 years of full-time work including idea conception, methodology development, data collection, data analysis, interpretation, and preparation of dissemination materials (ex. monograph, presentations etc.)

OR16

An evaluation of the effectiveness and safety of total hip arthroplasty as an outpatient procedure

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Division of Orthopaedic Surgery

Domain: Clinical Research

Introduction: Outpatient primary hip and knee replacement is being performed across North America in order to provide the best care at the lowest cost, however safety remains a concern. The primary purpose of this study was to compare 90 day readmission and adverse events rate of outpatient total hip arthroplasty compared to a matched pair of inpatients. Methods: We examined 136 patients who underwent unilateral total hip replacement by one surgeon and were discharged on the same day as surgery. Using propensity matching, based on ASA score and age, 136 inpatients who received the same procedure, and were discharged on post operative day one or later, were identified. For each cohort of patients identified, 90-day occurrence of adverse events, readmissions, and ER visits were recorded and compared. Adverse events were graded using the Ortho-SAVES tool. A secondary objective was to assess potential barriers to same day discharge. Results: Within 90 days post-operatively, 12 outpatients (8.82%) and 14 inpatients (10.29%) developed at least one adverse event. There were no significant differences between rate or severity of adverse events between the two groups, and no serious adverse events in either group. The most common adverse event in both groups was superficial wound infection. Patients who did experience an adverse event in each group did not significantly differ in age, ASA score or BMI. There was a significant correlation in time spent in PACU and dosage of bupivacaine given in the spinal anesthetic. Conclusion: When comparing the two groups, there were no differences in adverse events at 90 days. At our center, in the correct patient population, outpatient total hip arthroplasty is a safe and cost effective option. A potential barrier to mobility post-operatively, and successful same day discharge is the time required to stay in PACU post-operatively, which was significantly correlated with an increased dose of spinal anesthetic given in our outpatient cohort.

Presenter: Dr. Megan Richards

Presenter Contribution: I completed the entirety of the chart review and data collection as well as wrote the manuscript. I had assistance from a statistician for methods and data analysis.

OR17

A Novel, Evidence-Based Smoking Cessation Program in an Outpatient Colorectal Surgery Clinic: 16 Month Outcomes

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Division of General Surgery

Domain: Quality Improvement Research

Introduction: Smoking cessation programs initiated as late as 4 weeks before surgery reduce perioperative morbidity and mortality, yet outpatient clinic smoking cessation interventions are rarely provided. Our aim was to develop a functional, evidence-based, outpatient smoking cessation program. Methods: A multidisciplinary team met regularly over twelve months to create a program addressing smoking cessation in our colorectal surgery clinic, including development of a novel protocol, consult form, and prescription. Two needs assessments identified baseline smoking statistics and current practices. Clinic intervention involved brief counselling, nicotine replacement therapy, quit booklet, and referral to a local cessation program through a novel “opt out” technique. Charts were audited and cessation data was collected through the local program. Staff were surveyed post-implementation. Results: Pre-implementation, 70 of 369 (19%) surgical patients were smokers. Less than 10% were asked about smoking, and none were offered any intervention. Of 1203 patients seen on 2108 visits over 16 months post-implementation, 955 (79.4%) were asked smoking status on their first visit and 1035 (86.0%) were asked on at least one visit. Of 169 smokers identified, 108 (63.9%) consults were sent with the “opt out” technique. Intention-to-treat quit rates at 1, 3, and 6 months were 19.5% (17/87), 18.1% (15/83), and 18.6% (11/59) respectively. Responder quit rates for the same periods were 26.6%, 30.6%, and 33.3%. All 10 staff surveyed post-implementation felt the program was easy to use, would use it again, and had positive patient responses. The average required time was 3-6 minutes. Conclusions: Our team has developed a fast, easy to use smoking cessation protocol for outpatient surgical clinics. Successful implementation in our colorectal surgery clinic has led to increased smoking identification, treatment, and cessation, with sustained quit rates even at 6 month follow up. The novel “opt out” technique doubled baseline retention rates. A systematic program addressing smoking cessation should be standard of care in The Ottawa Hospital outpatient surgical clinics.

Presenter: Dr. Joseph Sadek

Presenter Contribution: I was involved in every aspect of the project, from the initial meetings and planning to the actual rollout of the program and then the data collection and analysis.