Department of Surgery Research Day  
Wednesday April 10, 2019 – Halifax Convention Centre  
Convention Hall 1

8:00: AM: Arrive 

8:15 AM: Morning Announcements  
Morning Address  
Judges: Dr. Gwynedd Pickett, Dr. Ansar Hassan and Dr. David Hoskin

8:30 AM – Session One  
Chair: Dr. Jonathan Trites

Clinical Perspectives Big Data

8:30 AM: Connor McGuire, Medical Student  
“The Effect of Tranexamic Acid in Lowering Bleeding, Edema and Ecchymosis in Primary Rhinoplasty: A Systematic Review & Meta-Analysis”

8:35 AM: Ashley Rich, Undergrad Student  
“Awareness of the Cost Drivers Responsible for Variation in Isolated Aortic Valve Replacement does not Impact Future Behaviour Around Driver Utilization”

8:40 AM: Philippe Tremblay, PGY 5 Cardiac Surgery, CIP  
“Measuring Access to Cardiac Care for Visible Minorities and Indigenous Populations of Canada”

8:45 AM Patrick Theriault, PGY 3 Orthopaedic Resident  
“An Examination of the Association Between Surgical Wait Times and Hospital Length of Stay in Nova Scotia”

8:50 AM: Todd Dow, Medical Student  
“The Impact of Provincially Mandated Strict BMI Restrictions On Breast Reduction Outcomes Over the Past 10 Years: The Nova Scotian Experience”

8:55 AM: Panel Q & A

9:00 AM: Catherine Deshaies, PGY 5 Cardiac Surgery Resident, CIP  
“Thromboembolic Risk After Atriopulmonary, Lateral Tunnel, and Extracardiac Conduit Fontan Surgery: A Multicenter Study”

9:05 AM: Mark MacLean, PGY 1, Neurosurgery Resident  
“Epidemiology and Outcomes of Neck Pain Following Surgery For Cervical Radiculopathy”

9:10 AM: Abdullah Baghaffar, PGY5 Cardiac Surgery Resident  
“Prediction of Temporary Epicardial Pacing Wire Use in Cardiac Surgery”
9:15 AM: Ryan DeCoste, PGY 4 Pathology Resident
“Repeat Pleural Fluid Cytology and The Detection of Malignancy in Pleural Effusions”

9:20 AM: Ashley Drohan, PGY 3 General Surgery Resident, CIP
“Treatment Patterns in Surgically Resected Retroperitoneal Sarcoma- A Population-Based Analysis”

9:25 AM: Panel Q & A

9:30 AM: Alison Greene, PGY 2 Cardiac Surgery Resident
“Trends in Incidence, Microbiology, and Clinical Profile of Infective Endocarditis; A Ten-Year Single Centre Experience”

9:35 AM: Habibeh Naderi, PhD Computer Science Student, Department of Surgery
“Examining the Association between Surgical Wait Times and Hospital Length of Stay Using Machine Learning Algorithms”

9:40 AM: Richard Spence, Clinical Fellow, General Surgery
“Penetrating Abdominal Trauma in the Era of Selective Conservatism: A Prospective Cohort Study in a Level 1 Trauma Unit”

9:45 AM: Claudia Cote, PGY 3 Cardiac Surgery Resident
“Predictors of Mortality in Acute Type A Dissection”

9:50 AM: Ayoub Dakson, PGY 5 Clinical Fellow, Neurosurgery
“A Nation-Wide Prospective Multi-Centre Study of External Ventricular Drainage Accuracy, Safety and Related Complications”

9:55 Panel Q & A

10:00 – 10:30 AM BREAK

10:30 Session TWO

Chair: Dr. Margie Wheelock

**Cell Biology**

10:35 AM: Mark Hanes, Graduate Student in Pathology
“Bacillus Calmette-Guérin Promotes Immunogenic Cell Death of Melanoma”

10:40 AM: Antonios Diab, Graduate Student, Pharmacology
“NCK1 is an Important Regulator of Anxiety”

10:45 AM: Dylan Quinn, Postdoctoral Fellow, Pharmacology
“The Stability of Glutamatergic Synapses is Independent of Activity Level, but Predicted by Synapse Size”
10:50 AM: **Colton Boudreau**, Medical Student
“Effect of Compound 21, a Selective Angiotensin II Type 2 Receptor Agonist, in an Abdominal Adhesion Murine Model”

10:55 AM: **Q & A Panel**

**Decision Support /Medical Education**

11:00 AM: **David Forner**, PGY 2 Otolaryngology Resident
“Turn Analysis and Patient Centeredness in Pediatric Otolaryngology Surgical Consultations”

11:05 AM: **Alexander Bishop**, PGY 4 Orthopaedic Resident
“Establishing Validity of a Novel Competency Based Orthopaedic Objective Skills and Clinical Examination (OSCE) Using Convergent and Divergent Comparators”

11:10 AM: **Olga Bednarek**, PGY 1 General Surgery Resident
“There’s an App for That: ICU Orientation for Rotating Residents”

11:15 AM: **Devin Piccott**, PGY 3 Otolaryngology Resident
“Canadian Otolaryngology – Head & Neck Surgery Resident Caseloads: Does Competence by Design Change Operative Exposure?”

11:20 AM: **Panel Q & A**

11:25 AM: **Kaitlin Boehm**, PGY 3, Plastic Surgery Resident

11:30 AM: **Nathan Farias**, Medical Student
“Can an Automated Text Messaging System (Tonsil-Text-To-Me) Improve the Tonsillectomy Perioperative Experience for Parents?”

11:35 AM: **Alwalaa Althagafi**, PGY 3 Neurosurgery Resident
“Canadian Neurosurgeons’ Views on Medical Assistance in Dying (MAID): a cross-sectional survey of Canadian Neurosurgical Society (CNSS) members”

11:40 AM: **Panel Q & A**

BREAK: LUNCH

12:40 PM:

*The Department of Surgery in Partnership with the QE II Foundation are Proud to Present*

**Introduction:** **Dr. Michael Dunbar**
Chair, Department of Surgery Research

**The 2019 Dr. Bethune Visiting Professor**
**Dr. Leonard D’Avolio**

“Building the (Machine) Learning System”
1:30 PM Session Three

Chair: Dr. Andrew Glennie

Welcome OR Nurses!

Clinical Perspectives – Randomized Control Trials

1:35 PM: Bernard Brugesson, PGY 1 Orthopaedic Resident
“Clinical Outcome Results of Total Ankle Replacement and Ankle Arthrodesis: A Pilot Randomised Controlled Trial”

1:40 PM: Anjaneyulo PT Ravipati, Clinical Fellow, Orthopaedics
“Does Human Dermal Allograft Reconstruction of Massive Rotator Cuff Tears Delay Cuff Arthropy and Exhibit Better Healing Rates Compared to Conventional Maximal Repair? – A Prospective Randomized Controlled Trial”

1:45 PM: Ayham Al Afif, PGY 4 Otolaryngology Resident
“Injection Medialization Thyroplasty During Transoral Laser Microsurgery for Early Glottic Cancer: Outcomes of A Randomized Controlled Trial”

1:50 PM: Rakesh John, Clinical Fellow, Orthopaedics
“Can a Biopolymer Scaffold Injected Arthroscopically Restore Articular Cartilage and Delay Hip Osteoarthritis?”

1:55 PM: Michelle Arakgi, PGY 5 Orthopaedic Resident
“A Prospective Randomized Trial Comparing Standard Ligament Reconstruction Tendon Interposition (LRTI) VS LRTI with an Interference Screw for Thumb Carpometacarpal Arthritis – Pilot Study”

2:00 PM: Panel Q & A

Clinical Perspectives – Case Series

2:05 PM: Dennis Curry, Medical Student
“Transoral Laser Microsurgery for Treatment of T1a Glottic Squamous Cell Carcinoma”

2:10 PM: Mathew Oilfield, Medical Student
“Arthroscopic Iliac Crest Autograft Augmentation to Treat Shoulder Instability with Bone Loss: Safety Profile and Short-Term Outcomes”

2:15 PM: Deanna Lammers, PGY 1 Otolaryngology Resident
“Risk Assessment of Dry Eye Syndrome following Blepharoplasty in Halifax”

2:20 Panel Q & A
2:25 PM: Usman Khan, Medical Student
“Pathological Response Following Esophagectomy and Induction Chemoradiotherapy for the Treatment of Esophageal Cancer: A Retrospective Cohort Study”

2:30 PM: Jonathan Melong, PGY 3 Otolaryngology Resident
“The Effect of Tongue-tie Release on Speech Sound Articulation in Children Presenting with Speech Concerns”

2:35 PM: Kevin Morash, PGY 3 Orthopaedic Resident
“Radiographic Changes of the Proximal Femur Following in Situ Fixation with a Free-Extending Screw for Treatment of Slipped Capital Femoral Epiphysis”

2:40: Q & A Panel

3:00-3:30 PM BREAK

3:30 PM Session FOUR

Chair: Dr. Lucy Helyer

New Insights

3:35 PM: Jessica MacIntyre, Medical Student
“The Accuracy of FDG-PET for Re-Staging Esophageal Carcinoma”

3:40 PM: Liam Rappoldt, Graduate Student
“Developing an in vitro Human Brain Tumor Organotypic Slice Culture”

3:45 PM: Erika Leck, PGY 1 Neurosurgery Resident
“The Influence of Disease Lateralization in Parkinson's Disease on Tractography in DBS Patients”

3:50 PM: Christopher DeSutter, Clinical Fellow, Orthopaedics
“Efficacy of SPECT/CT in Diagnosing Ipsilateral Periarticular Arthritis And Predicting Clinical Outcome In Patients Treated With Ankle Arthrodesis For End Stage Ankle Arthritis”

3:55 PM Panel Q & A

FIN

4:00-4:30 PM – Wine and Cheese Social

4:30 PM: Announcement of Winners
The Effect of Tranexamic Acid in Lowering Bleeding, Edema and Ecchymosis in Primary Rhinoplasty: A Systematic Review & Meta-Analysis

Connor McGuire, Sean Nurmsoo, Osama A. Samargandi, Michael Bezuhly

Plastic Surgery

Background: Blood loss from surgical procedures is a major issue worldwide as demand for blood products is increasing. Tranexamic acid (TXA) is an antifibrinolytic agent commonly used to reduce intraoperative blood loss. The objective of this study is to systematically examine the role of TXA in reducing bleeding, edema, and ecchymosis among patients undergoing primary elective rhinoplasty.

Methods: A systematic review was undertaken using a computerized of MEDLINE, EMBASE, and Google Scholar from inception to June 30, 2018. The population of interest in this study consisted of adult patients undergoing primary elective rhinoplasty. The intervention considered was the use of TXA. The control group was comprised of patients receiving a placebo. The primary outcomes of interest were intraoperative bleeding and post-operative edema and ecchymosis. In vitro or animal studies were excluded and only English language articles were included. PRISMA guidelines were followed and articles were assessed using the Cochrane Collaboration risk of bias tool and the GRADE criteria. Random effects meta-analysis was performed to determine overall effect size.

Results: Five studies were included. All studies were randomized controlled trials published within the past five years. Mean patient age was 27 (range 16 to 42) while the mean sample size was 66 (range 50 to 96). Meta-analysis of four studies indicated that TXA treatment resulted in an average reduction in blood loss of 41.6 mL (95% confidence interval 13.4 mL to 69.8 mL) when compared to controls (p=0.004). Three studies indicated that edema and ecchymosis were reduced with TXA treatment compared to controls; however, there was no significant difference when compared to steroids. Four studies (80 percent) were considered of high methodological quality with a low risk of bias. The overall quality of evidence was high.

Conclusions: TXA has the ability to significantly reduce intraoperative blood loss, edema, and ecchymosis among patients undergoing primary elective rhinoplasty.
Awareness of the Cost Drivers Responsible for Variation in Isolated Aortic Valve Replacement does not Impact Future Behaviour Around Driver Utilization.

Ashley Rich, Claire Warren, Ryan Gainer, Greg Hirsch

Cardiac Surgery

Objective: We previously identified marked variation in the intraoperative costs of isolated aortic valve replacement (AVR) surgery and attributed this variation to key drivers, for example type of prosthesis; utilization of hemostatic aids; and OR time. In this study we sought to determine the impact of awareness of the cost drivers responsible for variation on future intraoperative choices and behaviors that could impact AVR costs.

Methods: We presented both overall intraoperative cost variation and the cost drivers responsible through combined rounds with surgeons, anesthetists, perfusionists and nursing in including physician-specific data. The previously identified driver costs (excluding Bioglue) ranged from $5,266.60 to $11,886.58 with an average of $9,068.43 (SD $1,650.18) for 24 cases. Intraoperative driver utilization was collected prospectively over the ensuing year for isolated AVR. Intra-operative consumables were collected directly from the OR during the procedure by nursing staff, while indirect costs were calculated post procedure using time based calculations and straight line depreciation. Cost drivers identified were: Snow; ROTEM; Bioglue; Blood; Fibrinogen; Platelets; Cardiotomy; Hemoconcentrator; OR time; and Valve type. Driver utilization was compared before and after the combined rounds event.

Results: There were 111 isolated AVR’s for which there was complete data capture during the study period. Cost driver utilization averaged $11,309.60(SD $2670.29) per case with a range from $5,943.47 to $21,240.09. There was no significant decrease in average driver utilization, nor on the variation between physicians.

Conclusion: The current study indicated the impact of awareness of cost drivers did not influence variation on intraoperative behavior. Further qualitative work may shed light on what further action would stimulate behavioural change around discretionary utilization of cost drivers in AVR.
Measuring Access to Cardiac Care for Visible Minorities and Indigenous Populations of Canada

Philippe Tremblay, Lynn Lethbridge, Christine Herman

Cardiac Surgery

**Background:** The Canada Health Act dictates that all should have equitable access to quality care and yet many groups continue to be underrepresented and underserved in our system. The reasons for this are multifactorial but, in order to address these inequities, we must first characterize and quantify our care delivery.

The purpose of this study was to examine access to cardiac care by capturing diagnostic rates of cardiac disease as well as procedure rates of CABG and PCI stratified by self-reported visible minority or Indigenous status.

**Methods:** Data from the 2006 long-form census was linked to the CIHI DAD for 2006, 2007, and 2008. Long-form census weights were used in all analyses. Diagnostic codes for cardiac disease (I20-I25+I50) as well as procedure codes for CABG (1.IJ.76) and PCI (1.IJ.50+1.IJ.57.GQ) were used to calculate rates for Canadians who reported belonging to a visible minority or Indigenous population compared to those who did not. Multivariate logistic regression was used to control for potential confounders.

**Results:** Cardiac diagnostic rates were statistically higher for the Canadian general population compared to visible minorities or Indigenous Canadians. Four provinces had statistically higher cardiac diagnostic rates for the general population but this was not seen in the province of Nova Scotia.

CABG rates were higher in Canada for the general population compared to visible minorities or Indigenous Canadians. Five provinces had statistically higher rates of CABG for the general population, including Nova Scotia. Similarly, PCI rates were higher in Canada for the general population compared to visible minorities or Indigenous populations and this was significant in individual provinces as well.

Diagnostic to procedure rates for both CABG and PCI were then calculated and revealed variation throughout provinces, most notably in the Maritime provinces.

Multivariate logistic regression suggested that Canadians who identified as belonging to a visible minority or Indigenous population were less likely to undergo CABG or PCI after controlling for confounders.

**Conclusion:** Cardiac diagnostic rates as well as procedure rates for CABG and PCI were found to differ by visible minority or Indigenous status both nationally and for many individual provinces. This variability in access to care should be further investigated by sub-groups in order to begin understanding the barriers to equitable cardiac care faced by many Canadians.
An Examination of the Association Between Surgical Wait Times and Hospital Length of Stay in Nova Scotia

Patrick Theriault, Shahriar Seddigh, Lynn Lethbridge, Jo-Ann Douglas, Michael Dunbar

Orthopaedics

Background: Currently 180 days is the target maximum wait time set by all Canadian provinces for elective joint replacement surgery. In Nova Scotia however, only 34% of Total Knee Arthroplasties (TKA) and 51% of Total Hip Arthroplasties (THA) met this benchmark in 2017. Surgery performed later in the natural history of disease is shown to have significant impact on pain, function and Health related Quality of Life at the time of surgery and potentially affect post-operative outcomes. The aim of this study is to describe the association between wait time and acute hospital LOS during elective hip and knee arthroplasty in province of Nova Scotia. Secondarily we aim to describe risk factors associated with variations in LOS.

Methods: Data from Patient Access Registry Nova Scotia (PAR-NS) was linked to the hospital Discharge Access Database (DAD) for primary hip and knee arthroplasty spanning 2009 to 2017. There were 23,727 DAD observations and 21,329 PARNS observations identified. Observations were excluded based on missing variables, missing linkages, revision status and emergency cases. Percentage difference in LOS, risk factors and outcomes were analyzed using Poisson regression for those waiting more than 180 days compared to those waiting equal or less than 180 days.

Results: For primary TKA, 11,833 observations were identified with mean age of 66 years, mean Wait Time of 348 days and mean LOS of 3.6 days. After adjusting for controls, patients waiting more than 180 days for elective TKA have a 2.5% longer acute care LOS (p < 0.028). Risk factors identified for prolonged LOS are advanced age, female gender, higher surgical priority indicator, required blood transfusion, dementia, peptic ulcer disease, cerebrovascular disease, heart failure, chronic kidney disease, malignancy, ischemic heart disease and diabetes. Factors associated with decreased length of stay are surgical year, use of local anesthetic, peripheral location of hospital and admission to hospital from home. For primary THA, 6626 observations were identified with mean age of 66 years, mean Wait Time of 267 days and mean LOS of 4.0 days. Patients waiting more than 180 days for THA did not show a statistically significant association with LOS. Risk factors and protective factors are the same with exception of CVD and use of local anesthetic.

Conclusion: Our findings suggest a positive and statistically significant association for patients waiting more than 180 days for TKA and longer acute care LOS. Longer LOS may be due to deteriorating health status while placed on a surgical waitlist and may represent a delayed and indirect cost to the patient and the healthcare system. Ultimately with projected increase in demand for elective joint replacement surgeries, our findings are aimed to inform physicians and policy makers in management of surgical waitlist efficiency and cost effectiveness.
The Impact of Provincially Mandated Strict BMI Restrictions On Breast Reduction Outcomes Over the Past 10 Years: The Nova Scotian Experience

Todd Dow, Emma Crawely, Tammy Selmen, Osama Samargandi, Sarah Al Youha, Richard Bendor Samuel, Jason Williams

Plastic Surgery

BACKGROUND: Breast hypertrophy may lead to physical and psychosocial health deficits. Government funded breast reduction surgery in Nova Scotia is available if you meet certain criteria, including a BMI of less than 27. No other province in Canada has such a stringent BMI cut-off. The primary objective of this study is to assess the impact of the BMI cut-off on postoperative complications following breast reduction surgery.

METHODS: A retrospective chart review of all patients who received bilateral breast reduction surgery in Nova Scotia over the past 10 fiscal years was performed. A total of 952 patients at 7 hospital locations who met the inclusion criteria were identified. Postoperative complications were stratified by patient BMI, smoking status, surgical technique and amount of tissue removed.

RESULTS: An inverted T technique (63.5%) with an inferior pedicle (57.7%) was the most common surgical procedure. The incidence of postoperative complications amongst the studied population was 41.6%. There was a significant difference in the incidence of infection, epidermal sloughing, fat necrosis and seromas when comparing patients across BMI categories of <22, 22 to 26.99, 27 to 31.99, and >32. Likewise, there was a significant difference in the incidence of infection and pain when comparing all patients with a BMI less than 27 with those of BMI's between 27 and 32. Furthermore, there was no significant difference in the incidence of overall postoperative complications, loss of nipple sensation, asymmetry, pain, erythema, wound dehiscence, unsightly, painful scars, nipple necrosis, hematomas, immediate or delayed revision surgeries between patients with a BMI <27 and those patients with a BMI between 27 and 32.

CONCLUSION: This study suggests that the BMI cut-off of 27 for provincially funded breast reduction in Nova Scotia should be reassessed. Our study demonstrated that postoperative complications in Nova Scotia are comparable to other locations despite the strict BMI cut-off.
Thromboembolic Risk After Atriopulmonary, Lateral Tunnel, and Extracardiac Conduit Fontan Surgery: A Multicenter Study

Catherine Deshaies, Robert Hamilton, Azadeh Shohoudi, Helen Trottier, Nancy Poirier, Paul Khairy, on behalf of the Alliance for Adult Research in Congenital Cardiology

Cardiac Surgery

Background: Thromboembolic events contribute greatly to morbidity and mortality following Fontan surgery for univentricular hearts. This study sought to evaluate the impact of type of Fontan surgery on thromboembolic risk.

Methods: A North American multicenter retrospective cohort study enrolled 522 patients with Fontan palliation consisting of an atriopulmonary connection (APC: 21.4%), lateral tunnel (LT: 41.8%) or extracardiac conduit (EC: 36.8%). Thromboembolic complications and new-onset atrial arrhythmia were reviewed and classified by a blinded adjudicating committee. Thromboembolic risk across surgical techniques was assessed by multivariable competing-risk survival regression. Estimated models were stratified by surgical decade and adjusted for sex, age at correction, residual fenestration, prior hematologic complications, and time-varying exposure to thromboprophylaxis and atrial arrhythmia.

Results: Over a median follow-up of 11.6 years, 10- and 20-year freedom from Fontan conversion, transplantation, or death was 94.7% and 78.9%, respectively. New-onset atrial arrhythmias occurred in 4.4, 1.2, and 1.0 case per 100 person-years with APC, LT, and EC, respectively. APC was associated with a 2.82-fold higher risk of developing atrial arrhythmias (P<0.001), with no difference between LT and EC (P=0.95). A total of 71 thromboembolic events, 32 systemic and 39 venous, occurred in 12.8% of subjects, for an overall incidence of 1.1 event per 100 person-years. In multivariable analyses, EC was independently associated with a lower risk of systemic (hazard ratio [HR] 0.20 versus LT; 95% confidence interval [CI]: 0.04-0.97) and combined (HR 0.34 versus LT; CI: 0.13-0.91) thromboembolic events. A lower incidence of combined thromboembolic events was also observed with antiplatelet agents (HR 0.54; CI: 0.32-0.92) but not with anticoagulation (P=0.53).
Epidemiology and Outcomes of Neck Pain Following Surgery for Cervical Radiculopathy

Mark MacLean, Ayoub Dakson, F. Xavier, Sean Christie

Neurosurgery

Background: Neck pain is a leading cause of disability. Degenerative cervical radiculopathy (DCR) is commonly associated with severe neck pain, in addition to arm pain and moderate levels of disability. Many studies have demonstrated improved arm pain following surgery, however axial neck pain is generally not felt to improve. The purpose of this study was to determine whether surgery for cervical radiculopathy improves axial neck pain.

Methods: This retrospective review of prospectively collected data from the Canadian Spine Outcomes and Research Network (CSORN) registry for patients who received surgery for degenerative cervical radiculopathy. Subgroups were comprised of patients that underwent 1-level, 2-level, 3-level ACDF or cervical disc arthroplasty (CDA). The primary outcome was 12-month post-operative reduction in Visual Analogue Scale for Neck Pain (VAS-NP). Secondary outcomes included: Neck Disability Index (NDI), Visual Analogue Scale for Arm Pain (VAS-AP), Short-Form Physical Health Composite Scale (SF-36-PCS) and Mental Health Composite Scale (SF-36-MCS).

Results: We identified 79 patients with cervical radiculopathy: 1-level ACDF (38%), 2-level ACDF (35%), 3-level ACDF (8%) and CDA (19%). Pre-operative clinical assessment scores were similar for all patients, regardless of procedure. Mean VAS-NP and VAS-AP improved by 3.6±2.7 and 4.4±3.2 points, respectively. Mean change in VAS-NP, VAS-AP, SF-36-MCS, SF-36-PCS and NDI were not statistically different across surgical groups (for all outcome measures, P>0.05). Although VAS-AP was significantly reduced in all surgical groups (P<0.05), only patients undergoing 2-level ACDF and CDA demonstrated significant improvement in VAS-NP (P<0.001). Mean change in VAS-NP was not significant for 1-level (P = 0.098) and 3-level ACDF (P = 0.132) groups, respectively.

Conclusion: Reduction in VAS-NP score was similar for all procedures. However, only patients that underwent a 2-level ACDF or CDA demonstrated a statistically significant 12-month post-operative improvement in VAS-NP. This study provides new information on the improvement in neck pain following surgery for cervical radiculopathy and may allow surgeons to more accurately prognosticate patient’s convalescence and aid surgical-decision making.
Prediction of Temporary Epicardial Pacing Wire Use in Cardiac Surgery
Claudia Cote, Abdullah Baghaffar (1), Philippe Tremblay, Christine Herman

Cardiac Surgery

Background: Placement of temporary epicardial pacing wires (TEPW) at the end of open heart surgery cases had been a routine practice for decades. While generally considered safe, there are complications associated with TEPW removal, mainly bleeding and tamponade, necessitating return to the operating room. There has been a trend toward omitting the placement of TEPW recently, given the risks of removal. Identification of which patients are at high risk of requiring pacing would be beneficial on deciding who needs TEPW placement. The purpose of this study was to identify predictors of requiring pacing immediately post cardiac surgery.

Methods: A retrospective analysis of patients undergoing cardiac surgery from 2005-present at the Maritime Heart Center (MHC) was conducted. Data was obtained from the MHC clinical registry. Patients who required pacing on arrival to the cardiovascular intensive care unit (CVICU) were compared to those who were not paced on the basis of baseline and intraoperative characteristics. Multivariable logistic regression was used to determine risk adjusted likelihood of pacing for each variable.

Results: A total of 11752 patient underwent surgery from the year 2000-present. 2051 (17.5%) required pacing on arrival to CVICU vs. 9701 (82.5%) who did not. Patients who required pacing were more likely to be older (69.5 ± 10.7 vs. 65.0 ± 11.3, p<0.01) and female (32% vs 25%, p<0.01), had more comorbidities, and were less likely to undergo isolated CABG procedure (38.2% vs 61.2%, p<0.01). After adjusting for age, sex and comorbidities, multivariable logistic regression showed older age, diabetes (OR 1.15, 95% CI 1.02-1.30, p=0.02), pre-op renal failure (OR 1.31, 95% CI 1.02-1.20, p<0.01), class 4 New York Heart Association heart failure symptoms (OR 1.35, 95% CI 1.10-1.66, p<0.01), pre-operative arrhythmia (OR 2.11, 95% CI 1.89-2.36, p<0.01), calcium channel blocker use (OR 1.27, 95% CI 1.13-1.44, p<0.01), and valve procedures (OR 1.83, 95% CI 1.56-2.14, p<0.01) to be predictors of pacing on leaving the operating room.

Conclusions: Identification of risk factors for pacing on arrival to CVICU will be useful in selective TEPW placement to avoid complications of TEPW. Future prospective studies on outcomes in patients in which TEPW were avoided will be needed to assess impact of selective TEPW placement.
Repeat Pleural Fluid Cytology and The Detection of Malignancy In Pleural Effusions

Ryan DeCoste, E.R. Filter, H. McIntyre, Danny French

Thoracic Surgery

Background: Pleural fluid cytology represents a minimally-invasive and specific method of diagnosis in patients with suspected malignant pleural effusion. The sensitivity, however, varies broadly in the literature from 49-92%. While it has long been taught that sending triplicate repeat pleural fluid specimens should be performed in cases of suspected malignancy to maximize sensitivity, a relative paucity of quality data exists to support this claim.

Methods: A NSHA REB waiver was obtained for this study as a quality assurance initiative. Using the NSHA Central Zone laboratory information system, patients who had 3 or more consecutive pleural fluid cytology specimens submitted were identified between January 2010-June 2018 (N=124). Data was retrieved from the cytology report. For patients with subsequent pleural biopsy, final pathologic diagnosis was obtained via the corresponding pathology report. Data was analyzed via descriptive statistics.

Results: A mean of 14.6 patients per year underwent triplicate specimen submission. A diagnosis of ‘Positive for Malignancy’ was rendered in 9.7% of initial specimens, which increased to 13.7% with two specimens, and 15.3% with three specimens. Repeat sampling resulted in a change in diagnosis in 32.3% of cases, while only 5.6% were clinically significant. Specificity for a malignant diagnosis was 100%, while sensitivity increased from 52.9% to 70.6% with triplicate sampling. A corresponding increase from 79.5% to 84.4% was observed in negative predictive value. More than half of cases (57.3%) remained negative over all samples.

Conclusions: Rates of ‘Positive for Malignant Cells’ diagnoses, sensitivity, and specificity at our centre are comparable to published literature. ‘Negative for Malignant Cells’ is the most commonly issued diagnosis. Repeat sampling resulted in the detection of 7 additional malignancies, with a corresponding increase in sensitivity and negative predictive value. However, the yield of new malignant diagnoses is reduced with each successive specimen. When there is a high suspicion of malignancy, the utility of sending additional pleural fluid specimens must be weighed against more invasive diagnostic methods that offer increased sensitivity (e.g. pleuroscopy with pleural biopsy).
Treatment Patterns in Surgically Resected Retroperitoneal Sarcoma: A Population-Based Analysis

Ashley Drohan and Geoff Porter

General Surgery

BACKGROUND: Although surgical resection remains the cornerstone of retroperitoneal soft tissue sarcoma (RPS) treatment, controversy remains regarding the use of adjuvant chemotherapy and radiation. The objective of this study was to examine treatment patterns in RPS, and specifically the use of adjuvant therapy. In addition, we sought to identify predictors of chemotherapy and/or radiation use and to estimate the association between adjuvant therapy and overall survival.

METHODS: The Surveillance, Epidemiology, and End Results (SEER) database, estimated to include 15% of all new cancer cases in the U.S., was used to identify patients with RPS from 1973-2015. Patients with metastatic/recurrent disease or who underwent a palliative surgical procedure were excluded. Factors associated with the use of adjuvant chemotherapy and/or radiation were examined using logistic regression. Cox proportional hazard was used to test the association between adjuvant therapy use and survival.

RESULTS: Among 5,923 patients diagnosed with RPS between 1973-2015, 4,333 (73.2%) underwent surgical resection. Radiotherapy was administered to 1,156 (27.1%) of surgically resected patients and was most often given postoperatively (888 patients, 76.8%). Only 198 (17.1%) and 66 (5.7%) of patients received pre-operative and intra-operative radiation, respectively. Adjuvant chemotherapy alone was used in 625 (14.4%) of patients and 226 (5.2%) patients received both chemotherapy and radiation. On multivariable analysis, younger age (OR 3.10, p<0.001), higher tumor grade (2.02, p<0.001), and complex mixed/stromal histology (OR 0.36, p=0.031) were associated with perioperative radiation use. Lipomatous tumors were less likely to be treated with chemotherapy compared to other tumors (OR 0.55, p=0.003); high-grade tumors (OR 5.43, p<0.001), complex mixed/stromal histology (OR 2.32, p=0.029) and young patient age (OR 13.7, p<0.001) were predictive factors of chemotherapy use. Controlling for age, sex, tumor grade, histology and year, patients who underwent radiation had improved survival compared to patients treated with surgery alone (HR 0.88, p=0.028) whereas adjuvant chemotherapy use was associated with an increased risk of death (HR 1.57, p<0.001).

CONCLUSION: Most patients with surgically resected RPS are not treated with adjuvant radiation and/or chemotherapy. These treatment modalities were used more often in younger patients, those with higher grade tumors, and in specific histologic subtypes suggesting significant selection in the use of adjuvant therapy. The higher risk of death in patients receiving adjuvant chemotherapy may be due to unmeasured tumor-related confounders.
Trends in Incidence, Microbiology, and Clinical Profile of Infective Endocarditis; A Ten-Year Single Centre Experience

Alison Greene, Sean Connors, Angela Hyde, Corey Adams, Greg Hirsch

Cardiac Surgery

Background: This study aimed to outline changes in epidemiology, microbiology, and etiology of infective endocarditis due to increasing surgical demand in the province of Newfoundland and Labrador.

Methods: A retrospective chart review and analysis was done using ICD codes for IE through the provincial EMR including all cases from January 2006-December 2016. A comparison of two cohorts (2006-2011, 2012-2016) was used for statistical analysis.

Results: There were 159 cases identified that fit the inclusion criteria. An increase in incidence was observed, with 9.72 per 100,000 people from 2006-2011 and 20.97 per 100,000 people from 2012-2016. The number of cases of IE due to Staphylococcus infection increased, from 21 cases (43.8%) in 2006-2011 to 49 cases (47.6%) in 2012-2016. Survival distributions comparing valve site were significant (log rank test 9.724, p=0.021) with isolated aortic being the most common. An increase in the number of patients undergoing surgery was identified with 62 patients (56.9%) in 2012-2016, and 24 patients (48%) in 2006-2011. There was a significant difference between self-reported IVDU found between 2006-2011 and 2012-2016, with more admissions in the later period, (N=5 and N=20, p=0.024).

Conclusions: The number of cases of IE in this province is increasing with more patients requiring surgery. Staphylococcus infection has become the most common microbe and is increasing in incidence over time. A significant difference was found for IE in IVDU during this time frame, with more admissions in 2012-2016.
Examining the Association between Surgical Wait Times and Hospital Length of Stay Using Machine Learning Algorithms

Habibeh Naderi, Lynn Lethbridge, JoAnne Douglas, Stan Matwin and Michael Dunbar

Faculty of Computer Science/ Surgery

Problem: The limited healthcare resources, particularly for treatments involving surgical procedures, inevitably entails prioritizing patients based on their existing health conditions. Therefore, it is crucial to understand the inherent interactions exist among the patient’s wait-time and its implications to the healthcare system. In this research, we investigate the association between LOS in acute care facilities and surgical wait-time through multivariate analysis. More specifically, we apply several machine learning algorithms to recognize the most important sources of variation in acute-care-LOS and discover any potential latent pattern exists between surgical wait-time and acute-care-LOS.

Method: We select the most distinctive subset of features by developing univariate regression analysis between different attributes in the dataset and target-value of acute-care-LOS and then, train our multivariate predictive analysis over this feature space. Even though univariate analysis gives us some insights about the data, multivariate analysis helps us to discover hidden interaction patterns between variables by considering a combination of features and leads to more accurate prediction. We train various machine learning algorithms such as Random-Forest (RF), Support Vector Machines (SVM), decision-tree, regularized linear algorithms (e.g. Lasso, Ridge), and boosting algorithms (e.g. AdaBoost, CatBoost) to predict acute-care-LOS.

Results: We evaluate our machine learning algorithms on a dataset of 11,833 knee and 6,626 hip arthroplasty surgeries carried out in Nova Scotia from 2010 to 2017 using 5-fold cross-validation technique to avoid over-fitting. Our random-forest ensemble method achieves the highest accuracy for acute-care-LOS prediction with averaged mean-absolute-errors of 0.87 and 1.14 days for knee and hip surgeries, respectively. The five most important features in acute-care-LOS prediction are wait-time (9.2%), age (8.2%), year-of-surgery (7.6%), diagnosis2-type (6.2%), facility location (5.7%) for knee and age (11.4%), wait-time (7.7%), diagnosis2-code (6.3%), year-of-surgery (5.9%), diagnosis5-type (5.3%) for hip surgeries. Moreover, random-forest significantly outperforms the averaged mean-absolute-errors obtained from the statistical baselines of mean and median with student’s t-test pvalues of 4.92×10−8 and 1.46×10−5 for knee, 3.75×10−5 and 1.42×10−3 for hip surgeries, respectively. As we expected, the statistical median is more reliable as a baseline in predictive analysis over our dataset since the median is more robust than mean regarding the outliers.

Conclusion: Our experimental results show that wait-time is an effective factor in determining the patient’s LOS in acute care facilities for both knee and hip arthroplasty surgeries. One intuition can be the extended wait-time may worsen the patient’s illness. We can predict acute-care-LOS for knee surgery more accurately than hip surgery using the same subset of variables which probably ingrained in the fact that our model for knee surgery has been trained over more samples of observations.
Penetrating Abdominal Trauma in the Era of Selective Conservatism: A Prospective Cohort Study in a Level 1 Trauma Unit

Richard T Spence, Anthony Sander, Marius Hoogerboord, Andrew Nicol, Pradeep Navsaria and James Ellsmere

**Background:** The current global trend for penetrating abdominal trauma (PAT) has seen management shift towards selective conservatism. The purpose of this study is to describe the presentation, management practices and outcomes of PAT in a level I trauma unit.

**Methods:** Prospective cohort study of all patients presenting with PAT to Groote Schuur Hospital, South Africa, from 01 May 2015 to 30 April 2017. All data was entered prospectively by attending clinicians. Comparisons were made between subgroups of patients managed operatively, both immediately and delayed (failed NOM), as well as non-operatively (NOM).

**Results:** During the 2-year study period, 805 patients with penetrating abdominal trauma were managed. There were 502 (62.4%) and 303 (37.6%) patients with gunshot (GSW) and stab wounds (SW), respectively. The majority were young men (94.7%), with a mean age of 28.3 years (95%CI 27.7-28.9) and median ISS 13 (IQR 9-22). Successful non-operative management was achieved in 300 (37.5%) patients and 501 (62.5%) were managed operatively; 477 (59.6%) underwent immediate laparotomy and 24 (3.0%) failed non-operative management. Patients managed by immediate laparotomy were more likely to have sustained a GSW, anterior abdominal wound and have higher median ISS. Rates of therapeutic laparotomy were achieved in 91.0% in the immediate and 85.3% in the failed NOM cohorts (Table 1). The mortality rate was 1.7% in the NOM, 10.9% in immediate laparotomy and 0% in the failed NOM subgroups. The rate of complications, ICU admission, reoperation and missed injuries were no different in the immediate and failed NOM cohorts.

**Conclusion:** Patients presenting with PAT in the absence of hemodynamic instability, peritonism, organ evisceration, unreliable clinical examination and positive radiological findings can be managed expectantly without increased morbidity or mortality.

Table 1: Positive Predictive Value (PPV) of Operative Indications for Therapeutic Laparotomy (truncated)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Immediate laparotomy n(%)</th>
<th>PPV (%)</th>
<th>Failed NOM n(%)</th>
<th>PPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemodynamic instability</td>
<td>44 (5.5)</td>
<td>93.2</td>
<td>2 (8.3)</td>
<td>100</td>
</tr>
<tr>
<td>Peritonism</td>
<td>298 (37.2)</td>
<td>93.3</td>
<td>14 (58.3)</td>
<td>85.7</td>
</tr>
<tr>
<td>Unreliable clinical assessment</td>
<td>21 (2.6)</td>
<td>66.7</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Radiological findings</td>
<td>54 (6.7)</td>
<td>87.0</td>
<td>10 (41.7)</td>
<td>87.5</td>
</tr>
<tr>
<td>Organ evisceration</td>
<td>29 (3.6)</td>
<td>89.7</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Concern of sepsis</td>
<td>8 (33.3)</td>
<td></td>
<td></td>
<td>87.5</td>
</tr>
</tbody>
</table>
Predictors of Mortality in Acute Type A Dissection

Claudia Cote and Christine Herman

Cardiac Surgery

Background: Patient’s geographic place of residence has been shown to be associated with worse health outcomes in patients with cardiovascular disease. Patients with acute type A dissections have similar risk profiles to those with cardiovascular disease and experience increased mortality for every hour that surgery is delayed. The purpose of this study was to examine how transport times and place of residence affect mortality in type A dissection.

Methods: All patients presenting with acute type A dissection from 2005-2015 were identified through both Health Data Nova Scotia administrative databases and Maritime Heart Center clinical database. Baseline characteristics and outcomes were collected. Urban and rural status was obtained from administrative databases. Data was linked to emergency health services (EHS) database to obtain transport times from first EHS contact to time of diagnosis and arrival at the tertiary treating center. Chart review was conducted to determine time to CT scan diagnosis and to operating room. The outcome of interest was survival to hospital discharge.

Results: 193 patients were identified, of whom 18 were excluded due to being misclassified as acute type A dissection. 175 patients formed the final population, of whom 74 (42.3%) survived and 101 (57.7%) died. Patients who died were more likely to be ≥70 years old (57.6% vs 19.4%, p<0.01), female (48.5% vs 21.6%, p<0.01), and to have coronary artery disease (21.8% vs 6.8%, p=0.006), compared to those who survived. Patients who died were less likely to have cerebrovascular or peripheral vascular disease (15.8% vs 47.3%, p<0.01). Among patients who died, the proportion of patients from urban areas was similar to patients who survived (60.0% vs 57.8%, p=0.9).

Chance of survival increased from 36.6% from the time the patient makes the 911 call, to 54.2% after EHS contact, to 64% after arrival to home hospital, and 84.2% after arrival to the operating theater. Estimated probability of mortality decreased with increasing transport time (c-statistic of 0.75).

Conclusion: Older age, female sex, and a history of CAD are risk factors for death in type A dissection. Urban and rural status does not appear to affect survival in type A dissections. Mortality decreases with increasing transport time suggesting patients may self-select for survival.
A Nation-Wide Prospective Multi-Centre Study of External Ventricular Drainage Accuracy, Safety and Related Complications

Ayoub Dakson, Michelle Kameda-Smith, Michael D Staudt, Pascal Lavergne, Matthew Eagles, Cameron Elliott, Christian Iorio-Morin, Serge Makarenko, Alwalaa Althagafi, Charles J. Touchette, Michael K.Tso, and Sean Christie

Neurosurgery

Background: Insertion of an external ventricular drain (EVD) is performed to treat elevated intracranial pressure. EVD catheters are associated with complications such as EVD catheter infection (ECI), intracranial hemorrhage (ICH) and suboptimal catheter placement. As part of the Canadian Neurosurgery Research Collaborative, we sought to investigate the national rate of such complications and their risk factors

Methods: respective study of 273 patients in eight academic Canadian neurosurgery centres. Adult patients requiring an EVD catheter urgently inserted at the bedside or operating room were included. All outcome measures were defined

Results: Infection rate was 6% and predicted by smaller incisions and not peri-procedure antibiotics, tunneling distance, type of antiseptic used or catheter flushing (p >0.05). The mean duration of EVD was 17.7±3.7 in ECI and ventriculitis group which was significantly higher than in patients without ECI (9.4±8.1) (p =0.045). Although the risk of developing ICH was 9.3%, symptomatic ICH was rare. Pre-procedure pharmacological DVT prophylaxis predicted EVD-related ICH(OR 4.73). The rate of suboptimal catheter location was 31% and predicted by the number of passes (p =0.02), but not image guidance, level of training or catheter placement in an operating room setting (p >0.05)

Conclusions: We reported EVD complication rates and their associated risk factors observed within an academic, multicentre Canadian cohort. This information will help to identify strategies to increase the safety of this common neurosurgical procedure.
**Pathology**

**Background:** Sequential biotherapy with interleukin (IL)-2 and Bacillus Calmette-Guérin (BCG) yields excellent clinical outcomes in a proportion of patients with advanced cutaneous melanoma. At our institution, 73.30% of patients with aggressive melanoma respond to intratumourally (i.t.) delivered IL-2 plus BCG. Moreover, this sequential approach produces a 60.60% complete response rate among responders, a 18.18% increase compared to i.t. IL-2 monotherapy. Of the patients with partial responses (26.7%), 75% experience an abscopal effect. We hypothesise that BCG promotes immunogenic cell death (ICD) of tumours, which may enhance immune cell recognition and clearance of primary and distant lesions.

**Methods:** B16-F10 melanoma cells were co-cultured in vitro with BCG or PBS and evaluated by flow cytometry or western blotting for correlates of immunogenic apoptosis such as annexin (ANX) A5, ANXA1, high mobility group protein B1 (HMGB1), and calreticulin (CRT).

**Results:** Viable BCG significantly drives B16-F10 melanoma apoptosis compared to cells exposed to PBS. Moreover, BCG (viable or not) increases expression of HMGB1 and ANXA1 compared to PBS-treated control cells. Similarly, viable BCG significantly increases extracellular CRT expression on B16-F10 cells compared to control cells.

**Conclusion:** IL-2 plus BCG combination biotherapy is more effective than IL-2 monotherapy for management of advanced melanoma. We report that BCG promotes expression of several well-accepted measures of ICD, which may explain our observed clinical findings.
NCK1 is an Important Regulator of Anxiety

Antonios Diab, Jiansong Qi, Crystal Milligan, James P. Fawcett

Pharmacology

BACKGROUND: Anxiety is an adaptive response to a potential threat, characterized by changes in limbic system function and output. Although anxiety disorders are considered to be heritable, specific genetic markers remain elusive. Here we examined whether NCK1, which has been implicated in human cognitive disorders, is an important protein involved in anxiety-like behaviours.

METHODS: Mice lacking Nck1 were and compared to their wildtype littermates in a series of behavioural tests for sensory, motor and anxiety-like behaviours. Mass spectrometry analysis was used to quantify stress hormone levels at baseline and during anxiety promoting tasks. Immunohistochemistry and immunofluorescence studies were used to identify the cell types and brain regions that expressed NCK1 and were activated during the anxiety promoting tasks. Golgi silver impregnation method was used to assess structural changes in the brain. Finally, the benzodiazepine diazepam was used to determine the anxiolytic effectiveness on this mouse model.

RESULTS: We find that mice lacking NCK1 have increased anxiety-like behaviours. Consistent with these behaviours, we find mice lacking NCK1 have higher levels of circulating corticosterone during these behavioural tests. Examination of CNS regions linked to anxiety, including the cortex (PFC) and the basolateral amygdala (BLA) reveal they express high levels of NCK1. Loss of NCK1 did not affect the development of these regions, nor did it affect axonal targeting into the amygdala. However, mice lacking NCK1 had a reduced dendritic spine density within the BLA. These structural changes were reflected in an overall decrease in activation of PFC neurons, and a reduction in the activity of inhibitory interneurons within the BLA. Pharmacological treatment with the anxiolytic diazepam rescued the anxiety phenotype.

CONCLUSION: Our data suggests that NCK1 functions in the development of the PFC/BLA axis by maintaining appropriate excitatory/inhibitory balance within the limbic system to regulate anxiety. Further, we suggest that mice lacking NCK1 provide a unique pre-clinical model for testing novel anxiolytic compounds to understanding anxiety behaviors.
The Stability of Glutamatergic Synapses is Independent of Activity Level, but Predicted by Synapse Size

Dylan P. Quinn, Annette Kolar, Sydney A. Harris, Michael Wigerius, James P. Fawcett and Stefan R. Krueger

Pharmacology

BACKGROUND: Neuronal activity is thought to drive the refinement of developing circuits. However, its precise function in the formation and elimination of glutamatergic synapses leading to circuit refinement has remained controversial.

METHODS: To clarify the role of activity in synapse refinement, we have assessed the effects of chronic attenuation or complete block of glutamate release from a sparse subset of cultured hippocampal neurons on synapse turnover.

RESULTS: Sustained chemogenetic attenuation of neurotransmission through presynaptic expression of a designer receptor exclusively activated by designer drugs (DREADD) had no effect on the formation or elimination rates of glutamatergic synapses. Sparse expression of tetanus neurotoxin light chain (TeNT-LC), a synaptobrevin-cleaving protease that completely abolishes neurotransmitter release, likewise did not lead to changes in the rate in synapse elimination, but reduced the rate of synapse formation. The stability of active and silenced synapses correlated with measures of synapse size.

CONCLUSION: While not excluding a modulatory role in synapse elimination, our findings show that synaptic activity is neither required for the removal nor the maintenance of glutamatergic synapses between hippocampal neurons. Our results also demonstrate that the stability of glutamatergic synapses scales with their size irrespective of their activity.
Effect of Compound 21, a Selective Angiotensin II Type 2 Receptor Agonist, in an Abdominal Adhesion Murine Model

Colton Boudreau, T. Levatte, A. Gareau, C. Jones, S. Legere and Michael Bezuhly

Plastic Surgery – Basic Science

Background: Abdominal adhesions are fibrous bands that form in response to surgical trauma which connect visceral and/or peritoneal surfaces and can lead to long-term complications. This study uses a murine model of abdominal adhesions to determine the anti-fibrotic effect of a novel selective angiotensin II type 2 receptor agonist, compound 21 (C21), in reducing abdominal adhesion formation.

Methods: Laparotomy was performed on female BALB/c mice and cecum and overlying parietal peritoneum was abraded with sandpaper. Mice were divided into systemic (oral gavage) or local (intraperitoneal injection) groups and treated with C21 (10 μg/kg) or saline (vehicle) daily for 7 days. Mice were sacrificed 8 days post-surgery, adhesions were graded by a blinded observer, and peritoneal fluid was obtained for TGFb quantification by ELISA. Laparotomy incisions were excised for CD31, CD68, and aSMA immunostaining, and picrosirius red staining. To study in vitro effects, parietal peritoneal fibroblasts and visceral mesothelial cells were isolated and scratch wound assays performed using C21 (10 mM), angiotensin II (AngII, 1 mM), or both.

Results: Systemic and local administration of C21 reduced the formation of abdominal adhesions in vivo. TGFb in peritoneal fluid was reduced in C21 treated mice. Histological analysis of surgical incisions revealed no difference in the number of CD31+ vessels or CD68+ cells, while aSMA expression was reduced in C21-treated animals. Picrosirius red revealed no difference in collagen I/III distribution, total collagen density, and dermis thickness in laparotomy scars between control and C21-treated animals. Migration of parietal peritoneal fibroblasts and visceral mesothelial cells in vitro was reduced with C21 compared to control or AngII.

Conclusions: C21 reduced or completely prevented adhesion formation both with local and systemic administration. These findings may be attributed to decreased levels of pro-fibrotic TGFb in vivo and decreased cell migration of parietal peritoneal fibroblasts and visceral mesothelial cell migration in the presence of C21. Importantly, C21 did not have histologically quantifiable effects on laparotomy wounds. This study suggests that C21 could reduce abdominal adhesions without impeding laparotomy healing.
**Turn Analysis and Patient Centeredness in Pediatric Otolaryngology Surgical Consultations**

David Forner, Ungar Gilanders, Jill Chorney, Jeremy Meier and Paul Hong

**Otolaryngology**

**Objectives:** Physician and patient/parent communication is of utmost importance in the informed consent and shared decision-making (SDM) process in pediatric otolaryngology. This study aimed to investigate SDM outcomes through turn analysis and an assessment of patient centered dialogue.

**Methods:** 59 parent/patient-physician interactions from two pediatric otolaryngology clinics were recorded. Turn analysis (sections of uninterrupted talk) was assessed via the Roter Interaction Analysis System (RIAS). Patient centeredness scores were also calculated with the RIAS (socioemotional statements /task oriented). Recordings were also coded for the presence of 6 informed consent elements. Oral literacy comparisons were made between groups. Parents completed a SDM questionnaire after the consultation.

**Results:** Turn density (number of statements per turn) was significantly higher for physicians than patient/family members (p<0.001), as was total statements (p<0.001), and total time talking (p<0.001). The opening statement was completed by the physician in 91.5% of interactions, and was significantly longer than family opening statements (p=0.003). The mean number of informed consent elements addressed per interaction was 4.5 out of 6. The mean patient centeredness score was 7.6 (1.79-52). There was a significant correlation between total time the family spent speaking and patient centeredness scores (p=0.049). There was no correlation in SDM questionnaire scores with turn analysis variables, informed consent elements, or patient centeredness.

**Conclusions:** Surgeons dominated the consultation in terms of talking. Many informed consent elements were discussed during the consent process. Patient centeredness did not correlate with perceived SDM from the parents’ perspective.
Establishing Validity of a Novel Competency Based Orthopaedic Objective Skills and Clinical Examination (OSCE) Using Convergent and Divergent Comparators

Alexandra Bishop, Megan Gillis, Glen Richardson, Bill Oxner, Luke Gautier, Andrew Hayward, Stephanie Scott and Andrew Glennie

Orthopaedics

Background: Objective evaluations of resident performance can be difficult to simulate. A novel competency based surgical OSCE was developed to evaluate surgical skill. The goal of this study was to test the construct validity comparing previously validated Ottawa scores (O-scores) and Orthopedic in-training evaluation scores (OITE).

Methods: An OSCE designed to simulate typical general orthopedic surgical cases was developed to evaluate resident surgical performance. Post-graduate year (PGY) 3-5 trainees have an encounter (interview and physical exam) with a standardized patient and perform a correlating surgery on a cadaver. Examiners evaluate all components of the treatment plan and provide an overall score on the OSCE and also provide an O-score on overall surgical performance. Convergent and divergent validity was assessed comparing OSCE scores to O-scores and OITE scores. SPSS was used for statistical analysis. ANOVA was used to compare PGY averages and Pearson correlation coefficients were calculated to compare OSCE versus O-score and OITE scores.

Results: A total of 96 simulated surgical cases were evaluated over a 3 year period for 24 trainees. There was a significant difference in OSCE scores based on year of training. (PGY3 - 6.06/15, PGY4 – 8.16/15 and PGY5 – 11.14/15, p<0.001). OSCE and O-scores demonstrated a strong positive correlation of +0.89 while OSCE and OITE scores demonstrated a moderate positive correlation of 0.68.

Conclusions: OSCE scores demonstrated strong convergent and moderate divergent correlation. A positive trajectory based on level of training and stronger correlations with established, validated scores supports the construct validity of the novel surgical OSCE.
There’s an App for That: ICU Orientation for Rotating Residents

Olga Bednarek and Samuel Minor

General Surgery

Background: Resident orientation has been identified through resident feedback as a weakness of the Intensive Care Unit (“ICU”) rotation at Dalhousie University. A smartphone application (“app”) was created to try and improve the resident’s orientation to the rotation. The aim of this study was to identify learner perceptions of the ICU orientation prior to release of the app, and to compare them to perceptions after the app’s launch.

Methods: A sample of convenience was chosen by surveying rotating residents and medical students after their first week of the medical/surgical ICU rotation at the QEII Health Sciences Centre. Prior to the launch of the app 66 learners were surveyed and after the app was made available 77 learners. 100% of learners approached completed the survey. Survey questions addressed satisfaction with orientation materials and resources used for learning essential ICU tasks. Satisfaction with orientation materials pre- and post-app launch was measured using a 5 point Likert scale, and results were compared in Stata using the Mann Whitney U test. Simple descriptive statistics were used to compare responses to the questions regarding resource use.

Results: There was an improvement in learner satisfaction with orientation materials following the app’s launch (p=0.0013). The app was the second most-frequently cited “most helpful resource” for orientation after “other residents in the ICU”. 75.3% of survey respondents reported trying the app, and overall it was perceived as useful.

Conclusion: An ICU orientation app resulted in increased satisfaction with ICU orientation materials. There is potential to improve the experience of medical learners with smartphone app technology.
**Canadian Otolaryngology – Head & Neck Surgery Resident Caseloads: Does Competence by Design Change Operative Exposure?**

Devin Piccott, David Forner and Paul Hong

**Otolaryngology**

**BACKGROUND:** With the onset of competency-based medical education (CBME), the traditional residency training framework has changed. Resident caseloads may provide a benchmark for operative exposure. Caseloads have not previously been studied in Canada. Little is known about CBME impact on operative exposures.

**METHODS:** A multi-center cohort study examining caseloads in Canadian Otolaryngology programs was completed. Participants from the 2021 (traditional framework) and 2022 (CBME framework) graduating cohorts submitted data anonymously via online survey. Caseloads were compared from the PGY-1 year of each cohort. Quantitative and qualitative methods were used.

**RESULTS:** Response rate was 49%. Median overall procedures for residents in the traditional framework was higher than the CBME cohort, albeit no statistically significant difference was observed. Respondents stated they are encouraged to log and have variable confidence in their accuracy.

**CONCLUSIONS:** Caseload analysis may offer an objective means of determining CBME impact on operative experience. Early analysis shows no difference between frameworks.
Nature and Nurture: How Learning Style and Environment Influence Plastic Surgery Training in Canada

Kaitlin Boehm, Connor McGuire, Colton Boudreau, D. Jenkins, Osama. Samargandi, Sarah Al-Youha and David Tang,

Plastic Surgery

Background: Optimizing medical education includes consideration of both learning style and environment. Understanding the predominate learning styles and the prevalence of damaging teaching methods, such as shame-and-blame (SBL) learning, can be used to guide curriculum and faculty improvement. This study set to identify the learning styles of plastic surgeons and trainees as well as quantify the prevalence and effects of SBL in Canadian Plastic Surgery programs.

Methods: An electronic survey was sent to all members of the Canadian Society of Plastic Surgeons. The Kolb Learning Style Inventory was used to identify each individual’s learning style (converging, accommodative, assimilative, divergent). SBL was assessed using a validated questionnaire.

Results: 98 responses (14.7%) comprising 63% staff and 37% residents/fellows were received. Convergent (46.9%) and accommodative (28.6%) learning styles predominated. Accommodative was the dominant female learning style whereas convergent lead males. With respect to SBL, 76% of staff and 67% of residents/fellows have experienced shaming as a learner. 85% have witnessed a colleague being shamed. All of the >10% of respondents felt shame is necessary have previously been shamed. The most common effect of SBL was loss in self-confidence.

Conclusion: 75% of the Plastic Surgery trainees and staff have learning styles that rely heavily on practical application and experiential learning. Shame-based teaching has detrimental effects on self-confidence and job performance, which can negatively impact learning and patient safety. In an era of program re-design, transitioning to a curriculum with a heavy emphasis on practical teaching strategies in addition to mitigating shame-based environments may optimize resident education.
Can an Automated Text Messaging System (Tonsil-Text-To-Me) Improve the Tonsillectomy Perioperative Experience for Parents?

Nathan Farias, L. Wozney, B. Rose-Davis and Paul Hong

Otolaryngology

Background: Tonsil-Text-To-Me (TTTM) is a text messaging system that sends out automated and timed texts to parents of children who are undergoing tonsillectomy. The objective of this study was to pilot test TTTM to assess for feasibility and usability.

Methods: Parents of pediatric patients who were being scheduled for tonsillectomy with or without adenoidectomy were prospectively enrolled. An exploratory qualitative study using a semi-structured interview guide was performed after parents received the automated texts 2 weeks before and after their child surgery.

Results: A total of 7 parents were interviewed (data saturation was reached). Participants were all of maternal relation to the patient. Overall, all parents felt that the TTTM service was an improvement to the current standard model of information delivery. Parents also reported that the text messages reduced their anxiety and improved their performance when caring for their children during the perioperative period. No parents expressed privacy concerns about receiving texts and regarding the information included in the messages. Service suggestions showed that parents were eager for more information and had a high threshold for message reception regarding their child’s surgical care.

Conclusion: All parents expressed enthusiasm for a text message service during their child’s tonsillectomy perioperative period. The care instructions and reminders provided to parents via an automated and timed text messages may be strategy to improve information delivery in a simple and accessible format, which could empower families in their own healthcare.


Neurosurgery

Background: The Supreme Court of Canada (SCC) removed the prohibition on physicians assisting in patients dying on Feb 6, 2015. Bill C-14, legalizing Medical Assistance in Dying (MAID) in Canada, was subsequently passed by the House of Commons and the Senate on June 17, 2016. As this remains a divisive issue for physicians, the Canadian Neurosurgical Society (CNSS) has recently published a position statement on MAID.

Methods: We conducted a cross-sectional survey to understand the views and perceptions among CNSS’ members regarding MAID to inform its position statement on the issue. Data were collected from May-June 2016.

Results: 89 respondents completed the survey, 71% of whom were attending neurosurgeons and 29% were neurosurgery residents. Most participants (74.2%) supported the right of physicians to participate in MAID with 7.8% opposing. 37% had current patients in their practice fitting the criteria for MAID. 23.6% had been asked by patients to assist with MAID, but only 11% would consider personally providing it. 84% of neurosurgeons surveyed supported the physicians’ right to conscientious objection to MAID while 21% thought they should be removed from the inquiry and decision-making process. 43.8% agreed that referral to a MAID service should be mandatory. Glioblastoma multiforme (65%), quadriplegia/quadriparesis secondary to spinal tumor/trauma (54%) and Parkinson’s disease (24%) were the most common suggested potential indications for MAID among the neurosurgical population.

Conclusions: Our results demonstrate that most neurosurgeons in Canada are generally supportive of MAID in select patients. They also strongly support the physicians’ right to conscientious objection.
Clinical Outcome Results of Total Ankle Replacement and Ankle Arthrodesis: A Pilot Randomised Controlled Trial

Bernard Burgesson, Mark Glazebrook, T. Daniels, M. Penner

Orthopaedics

Background: Ankle arthrodesis and replacement are the widely accepted options in managing end-stage ankle arthritis. Relative benefits of ankle replacement and arthrodesis remain a contentious topic. We conducted a multicenter pilot randomized controlled trial comparing the clinical outcomes of ankle arthrodesis and ankle replacement in managing ankle arthritis.

Methods: Patients recruited for this study were part of Canadian Orthopedic Foot and Ankle Society (COFAS) Database. Canadian orthopedic surgeons with extensive experience in surgical treatment of end-stage ankle arthritis determined whether patients met the inclusion criteria for randomization. Data was collected on patient demographics, complication rates, and Ankle Osteoarthritis Scale (AOS) and Short Form-36 (SF-36) scores. Analysis of clinical outcomes had two tiers: (1) comparison of pre and postoperative data for each cohort separately; and (2) comparison of outcome scores, and revision rates between both cohorts. We employed the Student’s t-test and calculated effect sizes in assessing improvements in AOS and SF-36 scores from baseline to latest follow-up within and between the two groups.

Results: Thirty-nine ankles were enrolled in the study with a mean follow-up of 5.1 ± 2.8 years. Ankle osteoarthritis scale scores improved significantly from baseline and last follow-up in both groups. The average baseline AOS total score for ankle replacement improved from 59.4 ±15.9 to 38 ±20 at last follow-up (p-value < 0.05) and 64.6 ±19.7 to 31.8 ±16.5 at last follow-up (p-value < 0.05) in the arthrodesis group. Slight improvements in SF-36 scores were not statistically significant. Differences in AOS scores (baseline to last follow-up) slightly favoured the arthrodesis group; AOS total absolute mean difference of 33.7 ±25.4 compared to ankle replacement’s 20.3 ±23.0. Two major complications (10.5%) were observed in the ankle replacement cohort while the ankle arthrodesis cohort saw four major complications (20%).

Conclusion: Clinical outcomes of ankle replacement and arthrodesis were comparable. The ankle arthrodesis cohort held a slight advantage over ankle replacement in improvement of AOS scores, though not statistically significant. Rates of major complications and reoperations were higher with ankle arthrodesis.
Does Human Dermal Allograft Reconstruction of Massive Rotator Cuff Tears Delay Cuff Arthropathy and Exhibit Better Healing Rates Compared to Conventional Maximal Repair? – a Prospective Randomized Controlled Trial

Anjaneyulu Purnachandra Tejaswi Ravipati and Ivan Wong

Orthopaedics

Purpose: To determine healing rate and progression of cuff arthropathy of massive rotator cuff tears treated with arthroscopic acellular human dermal allograft reconstruction compared with the gold standard arthroscopic maximal rotator cuff repair.

Materials and Methods: Thirty patients with a two-tendon chronic retracted rotator cuff tear were enrolled in the study and were randomly allocated (15) to each group. All the patients were evaluated for structural integrity and healing of repair using a 1.5T MRI at an average of 15 months after surgery. Progression of rotator cuff arthropathy (RCA) and acromio-humeral distance (AHD) were graded using Xrays. Western Ontario Rotator Cuff (WORC), Disabilities of the Arm, Shoulder, and Hand (DASH), Marx Activity Rating Scale (MARX) scores, range of motion (ROM) of shoulder were analyzed.

Results: The healing rate as determined by the re-tear in the reconstruction group was 13% (2 of 15 patients) compared to 73% (11/15) in the repair group (p=0.008). Progression of RCA was seen in 7.14% (1/15) and 35.71% (4/15) of patients in the reconstruction and repair group, respectively (p=0.006). The change in AHD (preop-postop) was significantly higher in the repair (reduced by 2.27 mm) than the reconstruction group (increased by 0.1 mm) (P=0.006). Both groups had significant improvements in patient reported outcome scores. The reconstruction group had statistically significant better forward flexion (p= 0.01) and scapular plane abduction (p=0.03) compared to the repair group.

Conclusions: Rotator cuff reconstruction with a dermal allograft demonstrated favorable structural healing and improved range of motion compared to maximal repair in the short term. The maximal repair group were more likely to progress to rotator cuff arthropathy than reconstruction group. Level of evidence: 1, prospective randomized controlled trial.
Injection Medialization Thyroplasty During Transoral Laser Microsurgery for Early Glottic Cancer: Outcomes of A Randomized Controlled Trial


Otolaryngology

Introduction – Transoral Laser Microsurgery (TLM) is the mainstay treatment for early glottic squamous cell cancer (SCC). Long term voice quality is an important postoperative consideration. Hyaluronic acid is a safe and commonly-used injectable. We report on the results of our single-blinded, randomized-controlled trial investigating the impact of hyaluronic acid injection during TLM on voice outcomes.

Methods – Patients with T1/T2 glottic SCC were randomized to the treatment group (14 patients) receiving hyaluronic acid injection to the unaffected cord during the time of TLM. The control group, received no injection (16 patients). All patients completed a Voice Handicap Index (VHI) and a Maximum Phonation Time (MPT) measurement preoperatively and at 3 months, 1 year and 2 years post-operatively. Pearson’s Chi-squared, Mann-Whitney U, and Fisher’s Exact tests were used to compare the groups. Mean change in VHI and MPT were compared using independent t-tests. Survival was estimated using Kaplan-Meier survival analysis.

Results – There were no demographic differences between the groups. There were no significant differences between the groups in the mean change in VHI scores between pre-operative values and those at 3 months, 12-months or 24 months post-operatively. Similarly, there were no significant differences between the groups in the mean change in MPT values between pre-operative values and those at 3 months, 12-months or 24 months post-operatively. Compared to mean pre-operative VHI scores, the whole cohort saw significant improvement in VHI scores at 3 months, 12 months, and 24 months post-operatively, as well as from 12 months to 24 months. There were no significant changes in mean MPT among any of the time points. Five-year overall survival for the cohort was 70%.

Discussion – Hyaluronic acid injection to the unaffected vocal cord during TLM did not result in a significant improvement in VHI or MPT compared to patients who did not receive an injection. Voice outcomes tended to improve over time in both groups. More studies are needed on the impact of intra-operative vocal cord augmentation during TLM.
Can a Biopolymer Scaffold Injected Arthroscopically Restore Articular Cartilage and Delay Hip Osteoarthritis?

Rakesh John and Ivan Wong

Orthopaedics

Background: Acetabular cartilage defect is considered a harbinger for early hip osteoarthritis. Bone marrow stimulation (microfracture), the standard of care, is recognized to be an incomplete solution for cartilage damage. BST-CarGel® is an injectable chitosan scaffold that is mixed with fresh, autologous blood and injected into the site of microfracture (MF) to physically stabilize the clot and enhance cartilage repair. It has been previously applied in the knee, with statistically significant greater lesion filling and superior repair tissue quality compared with MF alone. Purpose: To evaluate short-term clinicoradiologic outcomes of patients treated arthroscopically with BST-CarGel® for acetabular chondral defects in conjunction with MF compared to lesions treated with MF alone. Study Design: Retrospective cohort study (Level III evidence)

Methods: All patients who underwent hip arthroscopy and had MF +/- BST-CarGel® application for acetabular chondral defects between 2012 and 2016 with a minimum clinico-radiologic follow-up of 2 years were included. Intraoperative details (lesion size, grade, labral repair/reconstruction, associated pathologies) and postoperative complications were analysed. All patients filled out self-reported questionnaires, including the international Hip Outcome Tool (iHOT-33), Hip Outcome Score–Activities of Daily Living (HOS-ADL), and Hip Outcome Score–Sports Profile (HOS-SP) before surgery and at 6 months, 1 year, and annually thereafter. Serial plain radiographs were assessed by 2 blinded observers independently for measurement of joint space and objective measurement of osteoarthritis utilizing the Kellgren-Lawrence grading. A survival analysis was performed to identify the number of failures, defined as a conversion to total hip arthroplasty (THA), in both the groups which was in turn correlated with the cartilage defect size at the time of surgery.

Results: Eighty six patients (53 Cargel and 33 MF) were evaluated with a mean age of 38.3 years at the time of the index operation. There were 59 males (69%) and 49 (57%) procedures were performed on the right hip with p-values of 0.1 and 0.59, respectively. The mean duration of follow-up was 36 months. There were no major adverse events in both groups. There was statistically significant improvement in iHOT-33, HOS-ADL and HOS-SP scores in both groups with an increase from 40.15 to 59.96 for group A and 41.53 to 59.92 in group B (p=0.85). Survival analysis at 3 years showed that 30% of MF cases (n=10/33) progressed to a total hip arthroplasty; conversely, 5% of Cargel cases (n= 3/55) converted to THA (p= 0.0027). The mean defect size in the failure groups was significantly higher in the Cargel group compared to the MF group (8.8 cm² in Cargel group and 3.5 cm² in MF group). Mean joint space reduction over 3 years was 1.41mm and 0.21mm in the MF and Cargel groups respectively (p<0.0001) denoting a significant decrease in the rate of progression to hip osteoarthritis in the Cargel group.

Conclusions: Arthroscopic treatment of chondral acetabular defects with BST-CarGel demonstrated a significant decrease in the rate of progression to hip osteoarthritis and need for conversion to THA compared to MF as an isolated procedure. Short-term clinical results are promising in this difficult population of patients; this single-step, arthroscopic, cartilage repair technique does not burn any bridges and could prove to be a cost-effective option for the healthcare system.
A Prospective Randomized Trial Comparing Standard Ligament Reconstruction Tendon Interposition (LRTI) VS LRTI with an Interference Screw for Thumb Carpometacarpal Arthritis – Pilot Study

Michelle Arakgi, MC Perron, D Johnston and Andrew Trenholm

Orthopaedics

BACKGROUND: Carpometacarpal (CMC) arthritis is a common problem. LRTI is currently the gold standard for surgical treatment. There are several variations to this technique in practice. Introduction of an interference screw (IF) during the tendon interposition may provide ease for the surgeon in ensuring adequate tensioning and increased stability for the patient postoperatively. The purpose of this study was to compare stability and patient functional outcomes after undergoing a standard LRTI procedure versus an LRTI procedure with the addition of an IF fixation device. This study also acted as a pilot study to assess feasibility and sample size needed for a definitive randomized control trial (RCT).

METHODS: A study of 20 participants (10 per procedure) was undertaken. A single centre, RCT was completed. Patients with primary thumb CMC arthritis refractory to conservative treatments were randomized to standard LRTI or LRTI with IF screw. All patients followed the same post-operative protocol and were followed for 2 years. The primary outcome was thumb subsidence, measured by trapezial height loss, which correlates with stability. Secondary outcome measures were included pinch and grip strength, range of motion (ROM), DASH and VAS pain scores.

RESULTS: 20 patients were randomized to one of the two treatment groups. 16 patients (8 per group) had complete follow-up data at 2-years. Trapezial height loss at 2-years was 4.44mm for standard LRTI and 3.83mm for LRTI with IF, \( p=0.47 \). Grip strength was increased at 2-years for both groups, with a gain of 7.23kg for the standard LRTI group and 2.04kg for the IF group, \( p=0.10 \). Palmar ROM of the thumb was increased post-operatively for the standard LRTI and interference screw groups, 50° from 31° preoperatively and 48° from 31° preoperatively, respectively. Mean improvement in VAS pain scores was 4.00 in the standard group compared with 4.44 in the screw group. EQ5D Scale improvement, however, was slightly better in the screw LRTI group, 11.25 compared to 2.5, but not statistically significant \( p= 0.42 \).

CONCLUSION: LRTI with and without IF has shown comparable results with 2-year follow-up in terms of stability and functional outcomes. Projection analysis indicates that a larger randomized control trial may show statistical difference between the two groups.
Transoral Laser Microsurgery for Treatment of T1a Glottic Squamous Cell Carcinoma

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Otolaryngology

Background: There is a paucity of data surrounding the treatment of T1a glottic cancer with transoral laser microsurgery (TLM) outside of European centers. This study identified functional and oncological outcomes in a large Canadian cohort.


Results: In total, 52 patients were identified. The mean follow-up time was 71 months. Mean patient age at TLM was 69. The five year locoregional control rate was 77.6%. The overall five-year survival rate was 85.9%. The five-year disease-specific survival rate was 100%. Mean VHI-10 scores non-significantly improved between the pre-operative (11.85) and post-operative (8.38) periods (p=0.15). The overall laryngeal preservation rate was 96%.

Conclusions: This study highlights the positive functional and oncological outcomes for T1a glottic SCC treated with TLM. This study offers further evidence for its use as a preferred alternative to radiation therapy.
Arthroscopic Iliac Crest Autograft Augmentation to Treat Shoulder Instability with Bone Loss: Safety Profile and Short-Term Outcomes
Matthew Oldfield and Ivan Wong
Orthopaedics

Background: The primary objective of this study was to establish a safety profile for an all-arthroscopic anatomic glenoid reconstruction via autologous iliac crest bone graft to treat shoulder instability with significant bone loss. Short-term clinical and radiological outcomes are also evaluated.

Methods: This study involved a retrospective analysis of prospectively collected data for 14 patients (male 8, female 6) who were treated for shoulder instability with bone loss using arthroscopic autologous iliac crest bone graft between 2014 and 2018. Of 14 patients, 12 were available for follow-up. The safety profile was established by detective intra-operative or post-operative complications such as neurovascular injuries, infections, major bleeding, and subluxations. Assessment of pre-operative and postoperative Western Ontario Shoulder Instability (WOSI) index, radiographs, and CT scans comprised the evaluation of clinical and radiological outcomes.

Results: A favourable safety profile was observed, with no occurrence of intraoperative complications, neurovascular injuries, adverse events, or major bleeding. One patient did develop an infection in the treated shoulder post-surgery. There were no subluxations or positive apprehension tests on clinical examination post-operatively. Short-term clinical outcomes were seen to be favourable as post-operative WOSI scores at a mean of 12.44 (SD ± 11.68) months were significantly higher than pre-operative scores, with a mean increase of 38.2 ± 19.226 (p = 0.00055). The average follow-up for CT scan was 11.0 (SD± 14.63) months, where all patients showed bone graft union and only one patient (7.1%) was observed to have bone resorption.

Conclusion: Arthroscopic treatment of shoulder instability with bone loss via autologous iliac crest bone graft is shown to be a safe operative procedure that results in favourable short-term clinical and radiological outcomes. Further investigations must be done to evaluate the longevity of these positive health outcomes.
Risk Assessment of Dry Eye Syndrome following Blepharoplasty in Halifax

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Otolaryngology

**Background:** Blepharoplasty is one of the most common aesthetic procedures to combat the aging changes that occur in the eyelid region. Preoperative considerations and intraoperative care are required to avoid ocular complications such as dry eye syndrome. This study aimed to quantify the local patient risk of dry eye syndrome using preoperative and postoperative self-assessment questionnaires.

**Methods:** From October 2016 onwards, patients scheduled for blepharoplasty by surgeons in Otolaryngology and Ophthalmology each completed a 5 item Dry Eye Questionnaire (DEQ-5) prior to surgery, and at their first follow-up appointment which typically occurred at 3 months post-op. Patients assessed to have pre-existing dry eye symptoms prior to surgery were counselled regarding increased risk of ocular complications, but were not excluded from the study.

**Results:** Twenty-five participants have undergone blepharoplasty and completed DEQ-5 assessments. The vast majority did not experience dry eye symptoms prior to surgery, and this did not significantly change following blepharoplasty. Several more patients included in the study have completed a pre-operative DEQ-5 assessment, and are currently awaiting surgery.

**Conclusion:** Despite several research groups demonstrating dry eye syndrome to be a common complication following blepharoplasty, our preliminary results have been reassuring in showing our study population to have an overall low risk.
Pathological Response Following Esophagectomy and Induction Chemoradiotherapy for the Treatment of Esophageal Cancer: A Retrospective Cohort Study

Usman Khan, Daniel French and Madelaine Plourde

Thoracic Surgery

Background: The standard treatment for Stage II-III esophageal cancer is induction chemoradiotherapy (CR) followed by esophagectomy (CRE). The tumor response to CR is graded on a scale of 0-3 on final pathology after resection. Despite having a complete pathological response (CPR) with no residual cancer (grade 0), some patients will develop recurrence and/or distant metastasis. Patients with minimal cancer cells (grade 1) have a near-complete pathological response (nCPR) and are believed to be more susceptible to recurrence. We hypothesized that there is no difference in recurrence rates for patients with CPR (grade 0) and nCPR (grade 1).

Methods: A retrospective analysis was performed for all patients undergoing esophagectomy and induction chemoradiotherapy for the treatment of esophageal cancer from 2013 to 2018 at the QEII Health Sciences Center. Patient survival was analyzed using the Kaplan-Meier method and log-rank test. A multivariable cox-proportional hazards model was utilized to identify disease features that influence the risk of developing recurrence or distant metastasis.

Results: Out of a total of 149 patients who underwent esophagectomy for esophageal cancer, 115 patients (77%) completed induction chemoradiotherapy. The mean age was 63 and 74% of patients were male. The overall 5-year disease-specific survival was 59.5%. The 5-year survival rates were 75% and 64% for CPR and nCPR, respectively with no significant differences between the two groups (p=0.337). The 5-year survival rates were 69% and 45% for tumor response grades 0-1 (CPR and nCPR) and grades >1, respectively (p<0.001). The most common sites of distant metastasis were lung, liver and bone. Multivariable analysis demonstrated histological differentiation grade on tumor biopsy or final pathology as the only predictor of recurrence (p=0.019, HR=1.96, CI=1.12-3.45).

Conclusions: A pathological tumor response grade of 0 or 1 (complete or near-complete response) following induction chemoradiotherapy and esophagectomy is associated with an improved patient survival. There is no significant difference in patient prognosis for complete and near-complete response on final pathology. This is a novel finding and will help manage patient expectations following treatment for Stage II-III esophageal cancer.
The Effect of Tongue-tie Release on Speech Sound Articulation in Children Presenting with Speech Concerns

Jonathan Melong, E. Dellapina and Paul Hong

Otolaryngology

Background: The effect of ankyloglossia or tongue-tie on speech has been controversial as high-quality studies are lacking and results to date have been conflicting. Despite the lack of evidence however, many healthcare professionals believe that ankyloglossia is a common cause of speech problems and often recommend tongue-tie release. The purpose of this study was to objectively assess whether ankyloglossia effects speech in children and to determine the effect of tongue-tie release on speech articulation and intelligibility.

Methods: This was a prospective cohort study conducted at a tertiary level pediatric otolaryngology clinic. New pediatric patients (>2 years old) being referred for speech concerns due to ankyloglossia were assessed by a pediatric otolaryngologist and speech was formally assessed by a licensed speech language pathologist using the Goldman-Fristoe Test of Articulation 2 (GFTA-2). Following assessment, patients underwent a tongue-tie release procedure in clinic under local anesthesia. Patients were then seen in follow-up in 1 month to reassess speech articulation using the GFTA-2. All sessions were audio-recorded and were evaluated by five independent reviewers to assess speech intelligibility before and after tongue-tie release.

Results: Twenty-five participants were included in the final study. During initial assessment, the most common speech errors identified were phonological substitutions (80%) and gliding errors (56%). Seven children (28%) had abnormal lingual-alveolar and interdental sounds. Most speech sound errors (87.9%) were developmentally appropriate. All children underwent uneventful tongue-tie release procedures in clinic. GFTA-2 standard scores before and after tongue tie release were 85.61 (SD 9.75) and 87.54 (SD 10.21) respectively with no statistically significant difference (p = 0.5). Mean intelligibility scores before and after tongue tie release were 3.15 (SD 0.22) and 3.21 (SD 0.31) with no statically significant difference (p = 0.43).

Conclusion: The majority of children being referred to Otolaryngology for speech concerns secondary to ankyloglossia had age appropriate speech. Ankyloglossia was not associated with isolated tongue mobility speech articulation problems and there was no benefit of tongue-tie release in improving speech articulation or intelligibility. Additional research is required to provide insight into whether ankyloglossia is associated with speech and articulation issues and whether tongue-tie release can improve speech outcomes.
Radiographic Changes of the Proximal Femur Following In Situ Fixation with a Free-Extending Screw for Treatment of Slipped Capital Femoral Epiphysis


Orthopaedics

Background: Slipped capital femoral epiphysis (SCFE) is a common adolescent hip condition resulting in pain and limp. Left untreated, SCFE can lead to osteonecrosis of the femoral head. Traditionally, SCFE is treated with cannulated screw fixation, causing a growth arrest while stabilizing the femoral head. Recently, there has been interest in alternative treatments for SCFE, aiming to allow growth and remodelling postoperatively. One such option is the Free Gliding SCFE Screw (FG Screw; Pega Medical), which employs a telescopic design to avoid physeal compression. The purpose of this study is to evaluate radiographic changes of the proximal femur following in situ fixation using the FG Screw.

Methods: We retrospectively evaluated 28 hips in 14 patients who underwent in situ fixation using the FG Screw between 2014 and 2018. Initial postoperative radiographs were compared to last available imaging. Radiographic assessment included screw length, alpha angle, articulotrochanteric distance (ATD), head-neck offset (HNO) and posterior sloping angle (PSA). The primary study group included all hips treated with the FG Screw, while secondary analysis compared hips treated for SCFE versus contralateral hips treated prophylactically.

Results: Of the 28 hips, 17 were treated for SCFE and 11 prophylactically. Mean age was 11.7 years; mean follow-up 1.44 years. Among all hips, screw length increased by 2.3 mm (p < 0.001). Alpha angle decreased from 68.7 to 59.8 degrees (p = 0.004). ATD decreased from 25.4 to 22.2 mm (p < 0.001). There was no significant change in HNO or PSA. Screw length increased by 0.8 mm in SCFE hips (p = 0.002) and 4.6 mm in prophylactic hips (p = 0.004). Alpha angle decreased from 77.4 to 67.6 degrees in SCFE hips (p = 0.021) and 54.8 to 47.4 degrees in prophylactic hips (p = 0.049). Three complications were observed.

Conclusion: With use of the FG Screw, greater screw expansion was observed in hips treated prophylactically. However, SCFE hips did display postoperative remodelling. Further research is required to determine the functional impact of these changes, and to guide patient selection for this technology.
Developing an in vitro Human Brain Tumor Organotypic Slice Culture

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Neurosurgery

**Background:** Glioblastoma Multiforme (GBM) is the most prevalent primary malignant brain tumour, with a median survival of 14-16 months. GBM is hallmarked by the rapid and diffuse infiltration of surrounding brain areas, necrosis, microvascular proliferation, and extreme intratumoral heterogeneity. Research on GBM is primarily conducted using immortalized or primary cell lines due to their ease of use and reproducibility. However, stromal context of the tumour has been shown to be significant in GBM tumor microenvironment, and these cell lines do not effectively recapitulate the tumour microenvironment. Alternatively, mouse models address this shortcoming but are laborious and expensive.

**Methods:** Addressing these issues we have developed an organotypic culture model of patient-derived GBM. GBM tissue samples were obtained from the OR and sliced into 300μm sections and cultured, with viability being tested with SYTOX living cell dyes. To determine if these organotypic cultures are amenable to lentiviral manipulation, tissue sections were transduced with far-red (647nm) fluorescent lentivirus and efficiency determined by fluorescence microscopy and flow cytometry. Once conditions for effective lentiviral transduction have been confirmed, cultures will be transduced with lentivirus-mediated CRISPR knockout to allow for the exploration into the molecular basis of GBM pathology.

**Results:** An effective organotypic culture of not only GBM but also meningioma has been established. The cultures remain viable for two weeks and have been successfully transduced with far-red fluorescent lentivirus after 48 hours.

**Conclusion:** We have established an organotypic slice culture model, allowing us to analyze the effectiveness of lentiviral transduction and gene knockout to allow for future research to illucidate the complex pathobiology of GBM and other brain tumors.
The Influence of Disease Lateralization in Parkinson's Disease on Tractography in DBS Patients

Erika Leck, Michael Schmidt, Heather Rigby, and Lutz Weise

Neurosurgery

**Background:** Asymmetric motor symptoms are typical in Parkinson’s disease (PD), with side of predominance having potential implications on course of disease. Multiple imaging modalities (SPECT, PET) have demonstrated asymmetry in PD, with one study finding thinning of motor-related cortical areas in the contralateral hemisphere of the symptomatic side. The objective is to assess correlation between lateralized symptoms and Diffusion Tensor Imaging (DTI) characteristics of the pyramidal tract in Deep Brain Stimulation (DBS) candidates with PD compared to control group.

**Methods:** 34 PD patients and 30 controls were evaluated. Disease dominance was assessed by the UDPRS III. DTI was performed based on a 60 directional 3Tesla MRI protocol. A 1cm³ subcortical region of interest (ROI) was positioned underneath the motor cortex. Primary outcome was the difference in fibers between disease-dominant and non disease-dominant cortex. Furthermore, differences in fractional anisotropy, number of seed points, regions and the stimulation parameters such as threshold for stimulation-induced side effects (in mA) were assessed. For statistical analysis T-test and and Spearman correlation were used.

**Results:** There was a significantly higher number of fibers in the hemisphere corresponding to the disease dominance (p=0.0031). The same was true for the number of seeds (p=0.0032) and the fractional anisotropy (p=0.0427). Based on 23 patients that were operated the threshold for stimulation-induced side effects on the left side was inversely correlated with the number of fibers in the left ROI (Spearman -0.497, p=0.0158).

**Conclusion:** Based on the current literature we expected a reduction of fibers and fractional anisotropy in the corresponding hemisphere (contralateral) to the symptom dominant side in Parkinson’s disease. Surprisingly, DTI analysis showed an inverse correlation with the disease dominant hemisphere. The underlying pathophysiology remains unclear, with the possibility of a compensatory mechanism or compacting of fibers underneath a shrinking motor cortex. The increased threshold for side effects in relation to decreased fibers could have implications in DBS planning.
Efficacy of SPECT/CT in Diagnosing Ipsilateral Periarticular Arthritis And Predicting Clinical Outcome In Patients Treated With Ankle Arthrodesis For End Stage Ankle Arthritis

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Orthopaedics

Purpose: Hindfoot pain secondary to ankle arthritis often has multiple joint involvement making it challenging to diagnose and treat appropriately. Ankle fusion while successfully relieving the pain within the ankle joint, can shift motion stresses to the adjacent foot joints, which in time become arthritic and painful. Newly, single photon emission computed tomography (SPECT/CT) could potentially better aid in diagnosing and facilitating effective treatment options. The goal of our study was to assess the ability of SPECT/CT to evaluate ankle and periarticular arthritis/activity and see if it correlates with clinical pain and function scores.

Methods: Thirty-four patients were recruited into this prospective study. Patients underwent arthroscopic or open ankle fusion. XR and SPECT/CT imaging were obtained as well as completion of patient AOS (pain, disability and total scores) and SF-36 (physical component (PCS) and mental component (MCS) scores) questionnaires preoperatively and at six months postoperatively. Ankle, subtalar, talonavicular arthritis grading on XR and CT along with SPECT/CT activity were evaluated by two nuclear medicine radiologists. For statistical analysis, data was assessed for normality and analysed with the appropriate correlation or comparative test. P-value was set at <0.05.

Results: Thirty patients (31 ankles) completed follow up and were analysed. SPECT/CT activity in the ankle moderately correlated with CT (r=0.682) and XR (r=0.592) arthritis grading. SPECT/CT activity in the subtalar joint correlated with CT and XR (r=0.504). CT and SPECT/CT both were better able to assess periarticular joint arthritis/activity compared to XR. The SPECT/CT activity showed no significant difference in the ankle joint between pre and postoperative grading while periarticular joint activity significantly increased (p<0.05). Postoperatively, patients had significant improvements in their AOS and SF-36 PCS and MCS scores (p<0.05). SPECT/CT grading of all joints analyzed did not correlate with AOS or SF-36 PCS and MCS scores pre or postoperatively.

Conclusion: SPECT/CT imaging can be a useful diagnostic tool in foot and ankle arthritis to help guide treatments. In this study, preoperative and six month postoperative clinical scores did not correlate with SPECT/CT activity.
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