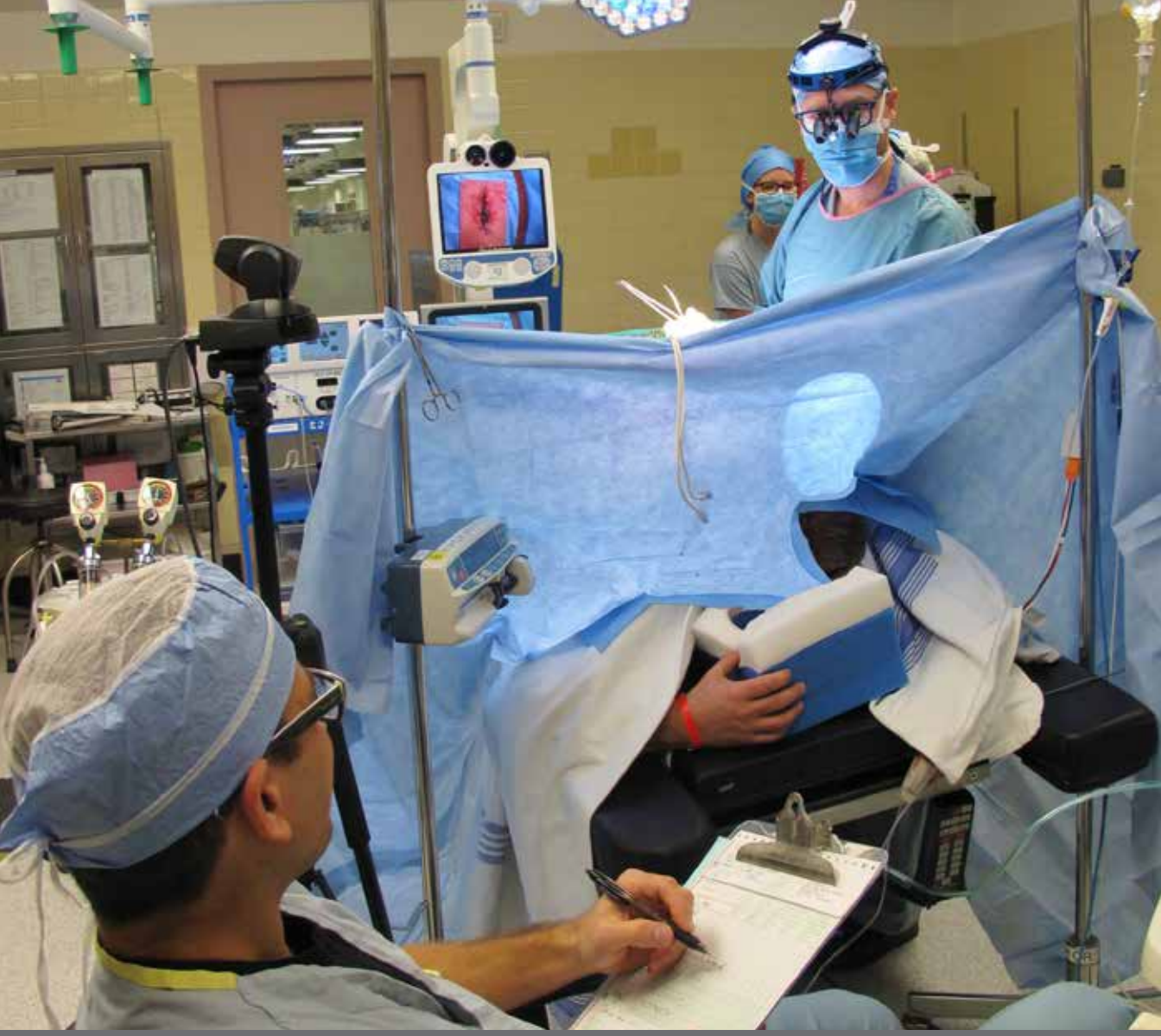

2015 RESIDENT RESEARCH DAY

SURGERY & ANESTHESIOLOGY

UNIVERSITY OF SASKATCHEWAN

Saskatoon Health Region

Regina Qu'Appelle HEALTH REGION

“The real voyage of discovery consists not in seeking new landscapes but in having new eyes”

- Marcel Proust

Dr. Preston Smith

Dean

College of Medicine
University of Saskatchewan

Dr. Preston Smith is Dean of the College of Medicine at the University of Saskatchewan, a role he assumed on June 1, 2014. Prior to this position, Dr. Smith was the Senior Associate Dean, Education at Dalhousie University's Faculty of Medicine. As such, he served the role of vice-dean, and led the Education Council, including each portfolio UGME, PGME, CPD and medical education research and scholarship. He was instrumental in starting four Family Medicine residency sites in the Maritimes and played a key leadership role in implementing the new Dalhousie complete undergraduate medical education program launched in New Brunswick in 2010. He also helped launch a research program that included a 15 million dollar fundraising campaign along with a Chair in Occupational Medicine.

Dr. Smith was Department Head of Family Medicine. He provided senior academic leadership for the delivery of undergraduate, postgraduate and continuing medical education, research and other scholarly endeavors at all Family Medicine Network sites in the Maritimes. In 2010, he completed a Master of Education in Curricular Studies with a focus on medical education.

Since commencing his role as Dean, he has been visiting the province's thirteen Health Regions, working with government and healthcare agencies, engaging with faculty, students and staff. He is excited to be part of the educational and research programs at the University of Saskatchewan. He widely articulates a vision of a highly successful College of Medicine serving as a key partner in a thriving healthcare system in a vibrant, growing Province of Saskatchewan.

Welcome to the inaugural combined Surgery and Anesthesiology Resident Research Day!

There is a firm commitment from both Departments to support research at all levels and especially to promote the involvement of residents in research both at the laboratory bench and at the bedside. The research committees from Surgery and Anesthesiology have received 64 abstracts this year and they were impressed by the quality of the research projects led by our residents and faculty.

We are convinced that research leads to better patient care and it is a priority to enhance research in our Departments. Dr Nael Shoman has been appointed as the new Director of Research in Surgery and we are looking forward to his leadership as we move the department to the future. Thanks to our previous director, Dr. Gary Groot, for his dedication and contributions to our research mission.

We want to warmly welcome our distinguish guest, Dr Vivian Mcallister, from Western University in London, Ontario who is the Editor of the Canadian Journal of Surgery. Dr McAllister will be giving the keynote address and will be a judge for the presentations.

The 2015 combined Surgery and Anesthesiology Resident Research Day promises to be an exciting event and we look forward to seeing all of you there.

Dr. Ivar Mendez

Fred H. Wigmore Professor and Unified Head

Department of Surgery
College of Medicine

University of Saskatchewan and Saskatoon Health Region

Dr. David Campbell

Unified Head

Department of Anesthesiology
College of Medicine

University of Saskatchewan and Saskatoon Health Region

Dr. Jon Gamble

Director of Research

Department of Anesthesiology
College of Medicine
University of Saskatchewan

I was born and raised in Regina, Saskatchewan. After high school I attended the University of Saskatchewan where I completed my undergraduate studies, medical school, and a residency in Anesthesiology. After residency I embarked to Edmonton and completed a combined Pediatric Anesthesiology and Pediatric Critical Care fellowships.

I joined the Department of Anesthesiology at the University of Saskatchewan in 2009.

In 2012 I became the Department of Anesthesiology's Director of Research. My areas of research include peditaric airway management, and hemodynamic monitoring.

Dr. Nael Shoman

Director of Research

Department of Surgery
College of Medicine
University of Saskatchewan

Dr. Shoman is a faculty member of the Division of Otolaryngology-Head and Neck Surgery. He is also an associate member of the Division of Neurosurgery.

He graduated from the College of Medicine at the University of Saskatchewan, before attending residency in Otolaryngology at the University of British Columbia, graduating in 2009. He then completed a two year fellowship in Otology and Neurotology at the University of Cincinnati and Cincinnati Children's Hospital.

He returned back to join the University of Saskatchewan in 2011, with an aspiration of advancing otologic surgery, developing programs for auditory rehabilitation, and expanding a skull base program. His clinical interests involve management of adult and pediatric patients with hearing loss, balance disorders, and skull base tumors.

2015 RESIDENT RESEARCH DAY

Surgery & Anesthesiology

April 10, 2015

CONTENTS

Introduction

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

09:00 - 09:15

WELCOME AND INTRODUCTIONS

Dr. Ivar Mendez
Fred H. Wigmore Professor of Surgery

Dr. David Campbell
Head, Department of Anesthesiology

OPENING REMARKS

Dr. Preston Smith
Dean College of Medicine
University of Saskatchewan

Session I

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

09:15 - 10:45

Break 10:45 - 11:00

Session II

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

11:00 - 12:00

Keynote Speaker

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

12:00 - 12:30

Topic:

Medical Memorialization

Dr. Vivian McAllister

Angus D. McLachlin Professor of Surgery

University of Western Ontario

Lunch
Room CLRC Atrium
2nd Floor, Health Sciences Building (E Wing)
12:30 - 13:15

Dr. Vivian McAllister

Angus D. McLachlin Professor of Surgery

University of Western Ontario

Dr. McAlister is the Angus D McLachlin professor of surgery at the University of Western Ontario. He is a member of the council of the Royal College of Physicians and Surgeons of Canada and chair of the regional advisory committee for Ontario and Nunavut (RAC 3). He also serves as the co-editor-in-chief of the Canadian Journal of Surgery and the editor of historyofsurgery.ca. Lieutenant Colonel Vivian McAlister is a regular force member of the Royal Canadian Medical Service of the Canadian Armed Forces. Dr McAlister is a director and honorary secretary (Canada) of the James IV Association of Surgeons. He is a fellow of American Surgical Association and a member of Harvey Club of London (Canada), the Surgeons Travel Club and the American Osler Society. Dr McAlister has been president of the Canadian Society of Transplantation, chairman of the Canadian Organ Replacement Registry and chairman of the research committee of the Canadian Association of General Surgeons.

Dr McAlister maintains an academic surgical practice at University Hosptial London within the Division of General Surgery and the Transplatation program. Academic surgery intergrates clinical care with teaching and research in order to achieve the best results for patients today.

Session III

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

13:15 - 14:30

Selected Poster Presentations

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

14:30 - 15:30

Session IV

University of Saskatchewan
Health Sciences Building
Les & Irene Dube Lecture Theatre, 1150

15:30 - 16:45

2015 RESIDENT RESEARCH DAY BANQUET

The Willows Golf and Country Club

RECEPTION

18:00

DINNER

19:00

Presentation of prizes.

Acknowledgements

The Departments of Surgery and Anesthesiology would like to thank the following individuals for serving as judges for the 2015 Resident Research Day.

Dr. Vivian McAllister

Angus D. McLachlin Professor of Surgery

University of Western Ontario

Dr. Gordon McKay

Acting Vice Dean, Research

College of Medicine
University of Saskatchewan

Dr. Nael Shoman

Clinical Assistant Professor
Director of Research

Department of Surgery, College of Medicine
University of Saskatchewan

Dr. Mike Rooney

Clinical Assistant Professor
Executive Director of Clinical Operations

Department of Anesthesiology, College of Medicine
University of Saskatchewan

2015

RESIDENT RESEARCH DAY ABSTRACTS

SURGERY & ANESTHESIOLOGY

Aluminum Content in Parenteral Nutrition Negatively Effects Bile Acid Transporters

Platform Presenter: Amanda Hall

Department of Surgery, Division of General Surgery
College of Medicine, University of Saskatchewan

Authors:
Hall AR, Zello GA, Arnold CJ, Alcorn J, Bertolo R, Brunton JA, Miller GG

Background:
Parenteral nutrition (PN) is an essential therapy available to hospitalized infants, but it is also hepatotoxic. The pathophysiology of parenteral nutrition associated liver disease (PNALD) is unclear, although aluminum (Al) may be one of the contributing factors. We are assessing the impact of Al contamination in PN to determine which bile acids transporters are effected and the extent of damage, thereby gaining a better understanding of the disease pathophysiology.

Methods:
A randomized control trial using a newborn Yucatan miniature pig parenteral nutrition model. Fourteen piglets were placed into 2 groups of 7 animals each. The control group received standard PN, (Al 38µg/kg/day). The treatment group received PN with a lower aluminum contamination (<2µg/kg/day). After 3 weeks, the piglet livers were collected for analysis. We chose four bile acid transporters (Mrp2, Bsep, Ntcp and Oatp), a stabilizer protein (radixin) and a nuclear receptor (FXR) as indicators of developing cholestasis. These targets are examined by real time polymerase chain reaction (qPCR) to evaluate mRNA expression, immunofluorescence confocal microscopy to evaluate the co-localization of the bile acid transporters and radixin and Western blot to determine final protein presence. Serum was collected to determine bile acid levels.

Results:
Initial qPCR for Mrp2 and Bsep has shown a fold difference of 1.8 (SD 0.8) and 4.3 (SD 2.7) respectively, in favour of the low aluminum vs the high aluminum group. qPCR for radixin has not shown any significant difference between the groups, with a fold difference of 0.75 (SD 0.20). Serum bile acid levels between the two groups were not significant different ($p=0.07$). Immunohistochemistry, Western blot and qPCR for the remaining bile acid transporters are ongoing.

Conclusions:
Aluminum has a negative effect on the bile acid transporters Mrp2 and Bsep. As our analysis continues, we will further characterize the contribution of Al to PNALD.

Can the use of dexmedetomidine for procedural sedation during total knee arthroplasty reduce postoperative pain? A randomized control study.

Platform Presenter: Ian Chan

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Ian Chan, Jurgen Maslany, Kyle Gorman, Jennifer O'Brien, Bill McKay

Background:
It remains unclear whether the opioid sparing effects of dexmedetomidine seen in patients undergoing general anesthesia are reproducible in patients undergoing spinal anesthesia. We hypothesized that the administration of dexmedetomidine for sedation during total knee arthroplasty under spinal anesthesia would decrease postoperative morphine consumption in the first 24 hours following surgery.

Materials and Methods:
In this prospective, double blinded randomized control trial, we enrolled 40 ASA 1-3 patients undergoing total knee arthroplasty with spinal anesthesia. Patients were randomized to receive either a dexmedetomidine loading dose of 0.5ug/kg over 10 minutes followed by an infusion of 0.5ug/kg/hr for the duration of the surgery, or a normal saline loading dose and infusion of equivalent volume. All patients received a standardized spinal anesthetic. The primary outcome was morphine consumption as measured by patient-controlled analgesia (PCA) for the first 24 hours. Secondary outcomes included time to first PCA request, VAS scores and opioid side effects.

Results:
The mean cumulative morphine at 24 hours in the dexmedetomidine group was 29.2 +/- 11.2mg compared to 61.2 +/- 17.2mg in the placebo group ($p<0.0001$). Time to first analgesic request was delayed in the dexmedetomidine group (239.5 mins [205.6-273.4](Dex) vs. 165.5mins [134.9-196.1](placebo); $p=0.002$). There were no significant pain score differences at 6, 12, or 24 hours. There was more vomiting in the placebo group (7 patients (placebo) vs. 1(Dex), $p = 0.005$) as well as more pruritus in the placebo group (6 placebo vs. 1Dex, $p=0.01$).

Conclusions:
Dexmedetomidine was associated with a significant decrease in morphine use in the first 24 hours following total knee arthroplasty. Our study demonstrates that an intraoperative infusion of dexmedetomidine for sedation in patients receiving spinal anesthesia can produce postoperative analgesic effects, offering another potential adjunct in the multimodal pain management of these patients.

The Role of Retrograde Repression in Limiting Axonal Regeneration in the Central Nervous System

Platform Presenter: Turker Dalkilic

Department of Surgery, Division of Neurosurgery
College of Medicine, University of Saskatchewan

Authors:
Turker Dalkilic, Syed Uzair Ahmed, Daryl Fourney, David Schreyer, Adam Wu

Introduction:
Understanding the mechanisms involved in the regulation of axonal regeneration may aid development of therapeutic interventions aimed at promoting regeneration. Growth Associated Proteins (GAPs) in the PNS are hypothesized to play an important role in axonal regeneration. Retrograde repression of GAP expression after axonal injury may inhibit axonal regeneration in the CNS.

Methods:
Retrograde labeling using a fluorescent marker was used to identify transcallosal neurons in a rat model. Osmotic minipumps (Alzet) were implanted bilaterally, and used to infuse anti-bFGF2 antibody in either or both hemispheres. A stereotactic anterior callosotomy was then performed in the ipsilateral hemisphere, and the animals were sacrificed after a 7 day incubation period. Quantification of GAP-43 mRNA expression was achieved using fluorescent microscopy.

Results:
An increase in GAP-43 mRNA expression was seen after bilateral FGF-2 signal blockade, but not after unilateral blockade. There was a trend towards higher GAP-43 expression in medial transcallosal neurons.

Conclusions:
Retrograde repression is an active mechanism in the adult mammalian CNS. This study provides multiple avenues of future investigation to expand knowledge of the time course, targets, and mechanism of retrograde repression.

A Vision of Mobile Medical Education: Developing A JURSI App Using Action Research

Platform Presenter: Lei Xia

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Lei Xia, Ben Lim

Introduction:
Smartphones have become the tool medical students use in day-to-day learning and practice. Smartphones have been shown to improve patient safety and benefit learners with just-in-time learning at the patient bedside. In Saskatchewan, most JURSI resources are provided in paper format, which are easily lost, forgotten, or not up to date. The information is highly valuable to the learners for a successful transition from classroom to clinical setting. The objective of this action research is to develop a JURSI app, and learn how to improve it to best serve JURSIs through the demanding leap from classroom to clinical medicine.

Materials/Methods:
This project uses action research to create and evaluate a mobile app to improve clinical learning tools for JURSIs in Saskatchewan. All 100 students in the class of 2015 based at three sites were invited to participate. Two pre-app focus groups evaluated the strengths and weaknesses of the print version of the JURSI handbook versus a digital app. Next, we will present and demonstrate the JURSI app. Finally, post-app focus groups will evaluate the strengths and weaknesses of the app, and determine how to improve it for the next cycle of action research. Qualitative data from the focus groups will be analyzed by a reflexive and iterative process. Quantitative data will be collected from the app usage, and compiled using descriptive statistics.

Results:
Themes that emerged from the pre-app focus groups showed strong desire for usability and portability of the app, relevancy of clinical content, location specific information, and practical resources and advice not found in traditional handbooks.

Conclusion:
Medical students are excited and engaged about the improvement to clinical learning with the JURSI app, and identified many desired features. This level of engagement will help to improve the JURSI app with future cycles of action research.

3D MRI Quantification of Glenoid Bone Loss is Equivalent to 3D CT Quantification: Cadaveric Study

Platform Presenter: Jason Shin

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Jason J. Shin, Adam B. Yanke, Nikhil N. Verma

Purpose:
Glenoid bone loss in the setting of shoulder instability has a significant impact on the success of soft tissue stabilization and surgical planning. Clinicians order both an MRI and CT scan in these patients to evaluate the soft tissue and bone loss, respectively. Eliminating the need for CT scans in these patients would reduce their radiation exposure and also decrease associated cost of care. The purpose of this study is to assess the ability of 3D MRI to quantify glenoid bone loss in a cadaveric model compared to the current gold standard, 3D CT. The hypothesis is that 3D MRI will provide data equivalent to that of 3D CT.

Methods:
An extended deltopectoral approach was utilized to expose the glenohumeral joint. The anteroposterior (AP) dimension of the glenoid was measured with a digital caliper at the glenoid equator (bare area) and a gross photograph (P) was recorded. The soft tissue layers were subsequently closed and the specimen underwent scanning (CT, 1.5 Tesla (T) MRI, and 3T MRI) without defect creation. Dissection was carried out again to create sequential glenoid defects correlating to 10% and 25% glenoid bone loss. This protocol was repeated for a total of three photographs, three CT scans, three 1.5T MRIs, and three 3T MRIs per shoulder. Using raw axial data from the CT, 1.5T, and 3T MRI (gradient T1) scans, the scapula was segmented using manual mask manipulation and reconstructed utilizing software to obtain a 3D en face glenoid view. Using calibrated images, the diameter of the glenoid at the equator and the area of the glenoid defect was measured on all imaging modalities.

Results:
Anteroposterior measurements demonstrated a strong ($R^2 = 0.988$) and significant ($p<0.05$) correlation between the digital caliper, 3D CT, and 3D 1.5T MRI. There was no statistical difference between the correlation of the actual defect size with CT ($R^2 = 0.95$), 1.5 T ($R^2 = 0.93$), and 3 T ($R^2 = 0.90$).

Conclusion:
Both 1.5T and 3T based 3D MRI of glenoid bone loss correlate with measurements from 3D CT scan data in a cadaveric model. Continuing studies are currently underway to determine automated implementation of MRI segmentation. Demonstrating the validity of 3D MRI in the setting of shoulder instability could obviate the need for CT scans, decreasing cost and radiation exposure.

A Cross-Sectional Survey of Resident Wellness Curricula in Canadian Anesthesiology Programs

Platform Presenter: Breanna Balaton

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Breanna Balaton, Mateen Raazi, Jennifer M. O'Brien, Anita Chakravarti

Introduction:
Resident physicians experience high levels of stress, burnout, and depression. Integrating wellness curricula into residency training may be the best solution to combat resident distress. Two reasons exist that make a national wellness curriculum necessary. First, recent research shows physician health impacts patient health. Second, the RCPSC is including Physician Health under the CanMEDs Professional Role and will require that competency milestones be met. The purpose of this research was to determine what Canadian anesthesia residency training programs are doing about resident wellness as a first step towards developing a wellness curriculum to address CanMEDS 2015.

Methods:
After local research ethics board approval, pre-testing, and pilot-testing, a cross-sectional survey of 18 Program Directors (PDs) from all Canadian anesthesia residency training programs was distributed via FluidSurveys. Qualitative and quantitative analyses of the survey responses were performed. A focus group was conducted with the PDs to discuss survey results.

Results:
The response rate was 56%. PDs agreed that resident wellness directly affects patient health. PDs value resident wellbeing. 30% of responding Canadian programs include resident wellness in their formal academic curriculum. 80% of responding PDs would include a module based resident wellness curriculum in their educational program if it were available.

Conclusion:
Few programs currently include resident wellness in their academic curriculum. The results obtained through the survey and focus group with anesthesia PDs will contribute to the development of a wellness curriculum to address CanMeds 2015 and accreditation.

A Prospective Randomized Double Blinded Control Trial Using Ketamine or Propofol for Electroconvulsive Therapy: Improving Treatment-Resistant Depression

Platform Presenter: Grahme Weisgerber

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Grahme Weisgerber, Henry Bi, Jonathan Gamble, Rudy Bowen, Renuka Prasad

Introduction:
Antidepressants form the core of treatment for major depressive disorder (MDD); however, their delayed onset of action and side effects are significant limitations. A well-established therapy for treatment resistant depression is electroconvulsive therapy (ECT). Propofol is the most commonly used induction agent for ECT. Ketamine has been shown to induce rapid and persistent antidepressant effects.
The purpose of this study is to investigate ketamine as an anesthetic agent for ECT in the treatment of medication resistant MDD. We hypothesize that a) ketamine based anesthesia for ECT when used for treatment resistant MDD will lead to significantly fewer required treatments to achieve a 50% reduction in depressive symptoms; and that b) the side effects of ketamine will be limited to the immediate anesthesia recovery period.

Methods:
We will recruit 72 patients with moderate to severe treatment-resistant MDD in this prospective blinded randomized controlled trial with intention to treat analysis. The control group will receive propofol 1 mg/kg and the study group will receive ketamine 0.75 mg/kg in addition to standard induction medication. Patients will be enrolled for a total of eight ECTs. The primary outcome is the number of ECT treatments required to reach a 50% reduction in baseline MADRS score. The secondary outcomes are the change in depression scores with time, the ECT energy settings and seizure duration, and the incidence of post-procedural adverse events.

Results:
Twenty patients have been enrolled to date.

Discussion:
Early remission from MDD carries significant benefits to the quality of life for patients and has the potential to drastically reduce utilization of hospital resources by way of earlier hospital discharge.

Hip Fracture Wait Time Improvements at a Single Center: The Effect of Local Audits and Administrative Support

Platform Presenter: Shandy Fox

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Shandy Fox, Mark Abou-Ghaida, Elliot Pally

Introduction:
In 2005, Canadian health ministers dictated 48 hours as the national standard of care for wait time for surgery to treat hip fracture in the elderly. A 2008 investigation at our center found less than half of medically optimized patients received surgery within 48 hours. Patients residing outside of Saskatoon waited significantly longer. Our center's policy has since changed to allow immediate patient transfer and to increase the urgency for patients waiting longer than 24 hours. Our objective was to re-examine wait times from fall to assessment, admission, and surgery for patients with hip fractures.

Methods:
Prospective observational studies with retrospective chart reviews on patients admitted with proximal femur fractures from January 6th to March 28th of 2008 and 2014. Exclusion criteria were age less than 60, medical delays, and those who did not proceed to surgery. 87 patients in 2008 and 90 in 2014 met inclusion criteria. Time of fracture, medical assessment, admission, and treatment was gathered from patients and/or collateral sources. Chi Square analysis was used to compare the wait times of 2008 to 2014, urban versus rural patients, and the different urban centers to each other.

Results:
Patient populations from 2008 and 2014 were similar. Compared to 46% of patients in 2008, 75.6% of patients received operative fixation within 48 hours of assessment in 2014. The greatest area of improvement was time from assessment to admission, with rural patients no longer waiting more than urban patients.

Conclusion:
The 2008 survey identified poor performance in achieving the goal of surgery for hip fracture within 48 hours. This investigation demonstrates the importance of local performance audits and the impact of simple administrative changes on patient care. These changes resulted in a dramatic improvement in hip fracture wait times and equalized care for rural and urban patients.

Survey of Pediatric Anesthesiologists Regarding the Use of Peri-operative High Dose Steroids for Children with Adrenal Insufficiency

Platform Presenter: Hardave Gill

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Hardave Gill, : Jennifer O'Brien, Kristine Urmson

Background:
Adrenal insufficiency is a disorder of the adrenal glands where they do not produce enough of certain hormones, mainly cortisol and aldosterone. Management of patients with adrenal insufficiency presenting for surgery in regards to steroid supplementation remains unclear. Congenital adrenal hyperplasia (CAH), one form of adrenal insufficiency, is a disorder involving a deficiency of an enzyme involved in the synthesis of cortisol, aldosterone, or both. Current guidelines are clear that high dose steroids are recommended for children with CAH undergoing anesthesia. High dose steroids have potential risks such as bradycardia, hypotension and asystole, increased risk of infection, blood glucose disorders, liver & gastrointestinal effects, and psychiatric syndromes. Given the risks identified, it is important to examine if current recommendations reflect clinical practice in providing optimal care for patients.

Methods:
Local research ethics board approval was obtained prior to study commencement. A cross-sectional survey was distributed following pretesting and pilot-testing. Invitation to participate in the survey was distributed via the Canadian Pediatric Anesthesia Society members' email list. The initial email invitation was followed with two additional invitations to complete the survey. Responses were analyzed using standard tabulations.

Results:
55% of respondents would not provide stress-dose steroids for a cystoscopy and 21% would not do so for a laparotomy, despite the Endocrine Society Clinical Guidelines on CAH.

Discusssion:
Our results demonstrate variation in clinical anesthetic practice regarding stress dose steroids in children with CAH undergoing anesthesia. Even when guidelines are provided, many respondents indicated they would not follow them. Our data also highlight that the decision to provide stress dose steroids is related to the proposed procedure. Finally, given the significant variation of practice, a need for future research is identified with an eye to change current practice recommendations.

Intra-operative Culture Positive Allograft Bone and Subsequent Post-operative Infections: A Retrospective Review

Platform Presenter: Laura Sims

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Laura Sims, Paul Kulyk, Allan Woo

Introduction:
Obtaining intra-operative culture of allograft bone prior to its use in orthopedic procedures is common, however its' utility in predicting post-operative infection is unknown. Objectives of this study were to describe the prevalence of intra-operative culture positive allograft bone and associated post-operative infection, to determine if the organism isolated in cases of post-operative infection is the same as primary allograft culture, and to perform a cost assessment.

Methods:
Data was obtained on patients receiving bone allograft from Jan 1 2009 to Dec 31 2012. Those who received intra-operative culture positive allograft bone were reviewed, identifying cases of significant surgical site infection and comparing newly cultures organisms to the original allograft culture. An assessment of costs associated with performing intra-operative allograft bone cultures, prescribing prophylactic antibiotic treatment for positive results, and treatment of post-operative infection was carried out.

Results:
From 2009-2012, 996 allograft bone grafts were used in the Saskatoon Health Region. Of these, 4.3% had positive intra-operative cultures. Five were excluded based on predefined criteria leaving 37 subjects for final analysis. Men represented 46%. Prophylactic antibiotics were prescribed in 24%. Thirteen different organisms were isolated, with Staphylococcus epidermidis isolated most commonly (22% of cases). Two subjects developed significant post-operative infections requiring re-operation. In each case, cultures differed from the original allograft culture. Neither patient received prophylactic antibiotic therapy; however, one patient was on intravenous antibiotics for a separate infection. The cost of performing 996 allograft bone cultures was $169,320.

Conclusions:
Rates of positive intra-operative bone allograft culture are low and rates of subsequent infection are rare. Further, in cases where infection occurred, primary allograft culture and secondary tissue cultures isolated different organisms. The utility of allograft culture for infection in this series was low. Costs associated with performing intra-operative allograft cultures are high, raising questions about the value of this test.

Prevalence of osteoporosis, low and normal bone density in women fifty years and older who recently sustained a distal radius fracture, and their relationship to clinical features and radiographic outcomes.

Platform Presenter: Alexander Perreault

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:

Alexander Perreault, Samuel A. Stewart, Geoffrey H.F. Johnston

Purpose:

It is estimated that one in four women over 50 years of age has osteoporosis - but how can we easily predict whom it will affect? Given that distal radial fractures (DRFs) are one of the most common fractures sustained by adult women, the purpose of this analysis was to determine the prevalence and distribution of three bone densities (osteoporosis (OP), normal (NBD), and low (LBD)) in a cohort of women 50 years and older who had sustained a DRF, and to evaluate the role that bone density might play in eventual outcomes. Establishing a clear link between DRF and incidence of OP would allow for the use of DRF as an event that should prompt bone mineral density testing.

Methods:

Clinical and radiographic data for 523 women 50 years and older who had sustained a DRF were collected prospectively. All 523 of these women had DEXA scan bone mineral density tests. Clinical outcomes of grip strength and range of motion (ROM), and Patient Related Wrist Evaluation (PRWE) scores were measured at nine, 12, 26 and 52 weeks post fracture. Radial inclination (RI), ulnar variance (UV), radial tilt (RT) were measured up to 12 weeks post-fracture from serial radiographs. Relationships between DEXA scan results and clinical and radiographic outcomes were explored for any statistically significant correlation.

Results:

Overall amongst all patients 41.1% had OP, 50.5% had LBD, and 8.4% had NBD. In the 50-60 year age group the proportion of OP, LBD and NBD was 27%, 57% and 16%; in the 61-70 year age group 35%, , 56% and 9%; in the 71-80 year age group 52%, 46% and 2%; and in the 81+ year old group 72%, 26% and 2%, respectively. Post closed reduction the degree of correction of RI was significantly less in OP patients, but the amount of correction lost over treatment did not significantly vary between the two groups. Correction of radial tilt post-reduction was lowest in the OP group, but difference in final tilt did not reach statistical significance. And while initial ulnar variance did not differ statistically between bone density groups, the final ulnar positive variance was greater in OP. Grip strength measurements of both the injured and uninjured limbs in patients with osteoporosis were significantly lower at 9, 12, 26 and 52 weeks post-fracture. Although PRWE scores were not influenced by BMD at nine and 12 weeks post-fracture, scores were significantly higher in patients with osteoporosis at both six and twelve months post-fracture.

Conclusions:

Over 40% of all women over 50 who sustained a DRF in our series had osteoporosis, with the proportion rising as age increased; the rate of osteoporosis was 27% in the 50-60 year old group, over 50% in the 71-80 year old group, and almost 75% in those over 80. In those patients with osteoporosis restoration of radial inclination and volar tilt by closed reduction was least successful, and the final ulnar variance, as a measure of radial axial shortening, was greatest in osteoporosis. Given these findings, a DRF in a woman 50 years or older should be considered a sentinel event. Bone density evaluation and appropriate management is advised.

Massive Transfusion Protocol: A Retrospective Assessment of Morbidity and Mortality Pre- and Post-Introduction in the Saskatoon Health Region

Platform Presenter: Derek Boechler

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Derek Boechler, Andrea Todd, Dr. Karen Dallas, Jennifer O'Brien

Introduction:
The management of massively transfused patients has evolved due to an increased understanding of early trauma-induced coagulopathy (ETIC) and implementation of massive transfusion protocols (MTPs). Experience gained from the American military suggests that a more protocol based transfusion strategy that approximates whole blood (damage control resuscitation) significantly reduces mortality. On July 1st, 2011, the Saskatoon Health Region (SHR) implemented a MTP to guide massive transfusion efforts in hopes to reduce both mortality and morbidity. The primary and secondary outcomes for this quality assurance study were immediate and 24 hour mortality, and ETIC between pre- and post-MTP cohorts respectively.

Materials/Methods:
This retrospective cohort study compared the year prior to SHR MTP introduction to the second year following implementation. Data were collected via chart review. The pre-MTP cohort included any patient that received >10 units of red blood cells (RBCs) in the first 24 hours from any mechanism of injury. All activations in the post-MTP group were included. ETIC was compared between the two groups via aPTT, INR, and fibrinogen. Also, a quantitative comparison of RBC, platelets, plasma, and cryoprecipitate was made.

Results:
No significant differences between the two groups were observed for immediate ($p = 0.285$) and 24 hour mortality ($p = 1.00$) or ETIC [aPTT ($p = 1.00$), INR ($p = 0.265$), fibrinogen ($p = 0.655$)]. In addition, no significant difference existed for transfused RBCs ($p = 0.443$), platelets ($p = 0.307$), plasma ($p = 0.732$), and cryoprecipitate ($p = 0.221$) between cohorts.

Conclusion:
The incidence of mortality and ETIC did not significantly change following MTP implementation. Regardless, protocol-based delivery of multiple blood products seems logical.

Postoperative vomiting in children: Is dextrose an effective prophylactic anti-emetic? A Non-inferiority, randomized control trial.

Platform Presenter: Andrea Vasquez

Department of Surgery, Division of General Surgery
College of Medicine, University of Saskatchewan

Authors:
Andrea Vasquez, Jonathan Gamble, Kelly Fedoruk, Grant Miller

Introduction:
Post-operative vomiting (POV) in children is a frequent (8.9-42%) indication for unexpected hospital admission. Studies using Intravenous (IV) fluids containing dextrose in the perioperative period have shown improvement of POV in adults. Similar studies have not been done in paediatric patients.

Objective:
To investigate the efficacy of intraoperative IV dextrose for antiemetic prophylaxis in children undergoing ambulatory surgery.

Methods:
This was a double-blinded randomized control trial on 290 healthy children (3-9 years old) with low risk of POV undergoing ambulatory dental surgery. Patients were randomized into two groups. The control group received dexamethasone (0.15 mg/kg IV) and ondansetron (0.05 mg/kg IV); the intervention group received dexamethasone (0.15 mg/kg IV) and intravenous 5% Dextrose in 0.9% normal saline (D5NS) maintenance fluid.
The primary outcome, emesis in the post anaesthetic care unit (PACU), was compared using Chi-Square. The secondary outcomes were analysed by T-test and non-parametric analysis where appropriate. Non-inferiority analysis of intraoperative IV dextrose relative to ondansetron was conducted with $\delta = 10$ % as the non-inferiority limit.

Results:
Data from 289 patients were analyzed (intervention group 144, control group 145). Demographics and intraoperative anaesthetic management were similar. Emesis in PACU was not different between groups ($p = 0.11$) The 95% CI upper limit of the POV proportion was below the non-inferiority margin (9.94 vs 11.33), demonstrating that intraoperative IV dextrose was non-inferior compared to ondansetron. Patients who vomited in the PACU were 6.2 times more likely to vomit at 24 hours ($p=0.015$). POV within 24 hours of surgery occurred in 36 participants (12.4%).

Conclusion:
This study demonstrates that IV dextrose is not less effective than ondansetron in preventing POV. The effectiveness, different mechanism of action, and safety profile of IV dextrose may lead clinicians to consider this as an alternative, or additional therapy for POV prophylaxis.

Ultrasound Guided Fascia Iliaca Block for Postoperative Analgesia After Elective Total Hip Arthroplasty

Platform Presenter: Churao Yang

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Churao Yang, Jacelyn Larson, Dennis Ong

Introduction:
Total hip arthroplasty (THA) can be associated with moderate to severe acute postoperative pain, which can lead to significant complications. Fascia Iliaca Blocks (FIB) have been used effectively for analgesia in hip fracture injuries in the emergency department. However, there has been limited exploration into their use for analgesia after elective THA. This study investigated whether preoperative ultrasound guided FIBs conferred any additional analgesia and/or reduction in opioid side effects when used in conjunction with current standard analgesic strategies after elective THA in the Saskatoon Health Region.

Materials/Methods:
In this double blinded pilot RCT, all patients received the same analgesic regimen, including standardized spinal anesthetic doses, and a combination of opioids and oral adjuncts. Patients were randomized into 2 groups preoperatively. Group 1 received a single shot ultrasound guided FIB with 40mL of 0.2% ropivacaine. Group 2 received the same block, but with 40mL normal saline as placebo. The primary outcome was cumulative opioid consumption at 12 and 24 hours post-surgery. Secondary outcomes included cumulative opioid consumption at 4, 8, and 48 hours, as well as opioid side effects, sedation score, and patient satisfaction. Data collection involved nurse and patient data sheets, as well as retrospective chart reviews.

Results:
We recruited 42 patients undergoing elective THA at Saskatoon City Hospital. Data are in the analysis phase.

Conclusion:
The potential benefits of this regional block include better analgesia and less opioid use and side effects. If the results are positive, the relative ease in performing the FIB, combined with its low risk profile, can make it a valuable tool for improving pain experience for patients undergoing elective THA.

To CT, or not to CT? The influence of computed tomography on the diagnosis of appendicitis in obese pediatric patients.

Platform Presenter: Haven Roy

Undergraduate Medical Education, Department of Surgery
College of Medicine, University of Saskatchewan

Authors:
Haven Roy, Brent Burbridge

Background:
Suspected appendicitis is a common pediatric presentation that usually requires imaging for aid in diagnosis. However, obesity often obscures first-line imaging, resulting in non-diagnostic ultrasound, and increased likelihood of abdominal CT. Concern regarding radiation exposure led the Canadian Association of Radiologists to recommend foregoing CT when ultrasound is non-diagnostic and clinical suspicion is high. We evaluate this recommendation by quantifying CT's influence on the diagnosis of pediatric appendicitis.

Methods:
We performed a 2-year, retrospective case series of children ≤18 years presenting with suspected appendicitis. We stratified subjects by weight (obese (O) and non-obese (NO)) and Pediatric Appendicitis Score (PAS) and examined how often they received abdominal CT, why they received it, and its influence on diagnosis.

Results:
Of 223 subjects (O = 84, NO = 139), 54 received CT. Obese patients received CT's more frequently (29%) than NO patients (22%). The most common reason for CT was non-diagnostic ultrasound (O = 75%; NO = 80%). 65% of CT's following non-diagnostic ultrasound confirmed the initial diagnosis, but that becomes 80% when only obese patients are considered (NO = 50%). Obese patients were four times more likely to have a CT confirming their initial appendicitis diagnosis.

Conclusion:
Since CT confirms suspected appendicitis in only 65% of cases, surgeons should continue to use it judiciously. They should also recognize that obese patients are more likely than NO patients to have a CT that confirms appendicitis. Therefore, when treating an obese pediatric patient with suspected appendicitis and a non-diagnostic ultrasound, surgeons with a high clinical suspicion should strongly consider foregoing CT and proceeding with treatment.

Efficacy of Opioid-free Anesthesia in Optimizing Postoperative Pain Control in Chronic Pain Patients Undergoing Back Surgery: A Pilot Study

Poster Presenter: Calvin Lo

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Calvin Lo, Ben Lim

Introduction:
Modern day anesthesia employs 'opioid-sparing' techniques, in which a balanced anesthetic with multimodal analgesia reduces opioid consumption and minimizes opioid-related adverse effects. There has been recent interest in studying 'opioid-free anesthesia,' in which intraoperative opioids are substituted completely by agents such as ketamine and dexmedetomidine.1 This technique may reduce opioid associated side effects and opioid-induced hyperalgesia. Randomized controlled trials of opioid-free anesthesia in obese patients undergoing bariatric surgery have demonstrated a reduction in pain scores, morphine consumption and post-operative nausea compared to traditional techniques.2,3 Unfortunately, efficacy studies of opioid-free anesthesia in other populations are lacking. Patients suffering from chronic pain are often opiate-dependant with increased acute postoperative pain, difficult pain control, and elevated opioid needs. Given these unique challenges, our research aims to investigate the efficacy of an opioid-free anesthetic technique on reducing postoperative opioid consumption and pain scores compared to a traditional balanced general anesthetic in opiate-dependant chronic pain patients undergoing back surgery.

Materials/Methods:
This will be a comparative open-label pilot study involving opiate-dependent chronic pain patients undergoing lumbar and thoracic spine surgery. Patients will be allocated to receive either a traditional balanced anesthetic, or an opioid-free anesthetic utilizing ketamine and dexmedetomidine. Postoperatively, standard multimodal analgesia will be offered. Study period will span from recovery in the post-anesthetic care unit (PACU) until 24 hours postop. Primary outcome will be quantification of opioid consumption. Secondary outcomes will include visual analogue scale pain scores, discharge time from PACU, patient satisfaction, and incidence of adverse effects.

Results:
Pending.

Discussion:
Research ongoing.

Complications of Elbow Arthroscopy: A Systematic Review

Poster Presenter: Mark Abou-Ghaida

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Mark Abou-Ghaida, Jason Shin, Jake Choi, David Sauder

Purpose:
The purpose of this systematic review was to evaluate the literature to determine complications during and after elbow arthroscopy, with a secondary focus on how to minimize complications and risks of surgery.

Method:
A PubMed search for articles was done on September 13, 2014. The search algorithm used was: elbow[Title/Abstract] AND arthroscopy[Title/Abstract] AND English[lang]. Levels I, II, III, and IV evidence studies published in English-language were eligible for inclusion in this review. The search was limited to articles published in last 25 years (after 1989). Medical conference abstracts, basic science studies, anatomic studies, review articles, technique papers and studies including non-arthroscopic procedures were excluded. All clinical outcome studies that reported the presence or absence of complications and/or re-operations were eligible for inclusion. Complication and re-operation rates were extracted from each study.

Results:
To date 66 studies (3651 elbows; 2500 males, 1151 females) were examined. Most were Level IV evidence studies (93.7%) with an average of 36.9 months follow-up. The mean age was 37 years. A total of 312 complications were reported, for an overall rate of 8.5%. There were three permanent neurologic deficits (0.1%) and 94 transient neuropathies (2.5%). There were 15 deep infections (0.4%) requiring irrigation and debridement. There were 61 superficial infections (1.7%) which were successfully treated with antibiotics. There were 42 synovial fistulas (1.1%) which resolved spontaneously. The overall reported re-operation rate was 2.1%.

Conclusion:
Overall, elbow arthroscopy is a successful procedure with low rate of complications. The re-operation rate was 2.1% with the most common reason for re-operation being failure of the initial procedure. Our reported results suggest that complications after elbow arthroscopy are higher than what's been reported in previous reviews. The number of minor complications is related to technical aspects of the procedure and therefore decreases with surgeon experience and improvement in instrumentation.

The Use of Oral Methadone as a Preoperative Analgesic for Patients Undergoing Sternotomy

Poster Presenter: Tim Bolton and Sarah Chomicki

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Tim Bolton, Sarah Chomicki, WP McKay

Introduction:
Sternotomy is a painful surgery with 30% likelihood of developing non-cardiac chronic pain postoperatively and uncontrolled acute pain is the predominant risk factor. The most effective way to decrease pain is with a combination of preoperative and multi-modal analgesia. Preoperative IV methadone is effective for reducing postoperative pain as well as postoperative opioid consumption.1-3 However, no clinical trials to date have explored the utility of oral methadone as a preoperative analgesic. We hypothesize that preoperative oral methadone can reduce postoperative opioid consumption in patients undergoing sternotomy for cardiac surgery.

Methods:
Following research ethics board and Health Canada approvals, 55 patients, aged 18-80 years, who are scheduled for cardiac surgery will be randomized to receive either 20 mg of oral methadone or placebo. Standard care will be otherwise provided. Postoperatively, patients will be transferred to the ICU with patient-controlled analgesia (PCA) morphine. Patients' PCA morphine consumption will be recorded for 72 hours in addition to their Visual Analogue Scale (VAS) pain scores every 12 hours.

Results (anticipated):
We anticipate that oral methadone will reduce PCA morphine consumption at all time points. We further expect that VAS scores and incidence of nausea and vomiting will be reduced in the methadone group throughout the entire postoperative observation time.

Conclusion:
Single dose preoperative oral methadone may produce a statistically significant reduction in postoperative pain for adults undergoing cardiac surgery and a reduction in the incidence of nausea and vomiting. Some limitations of this study include variations in the amount and type of intraoperative analgesic administered and the study's small sample size. This pilot study may show that preoperative oral methadone could be used as an effective, low cost, preoperative medication for cardiac surgery patients.

Time to recurrence as marker for tumor aggressiveness in colorectal cancer

Poster Presenter: Angela Schellenberg

Department of Surgery, Division of General Surgery
College of Medicine, University of Saskatchewan

Authors:
Angela Schellenberg, Francis Christian

Introduction:
The pathological characteristics of colorectal cancer, such as tumor-node-metastasis (TNM) stage, which influence prognosis are currently well established. However, tumor pathology has not been well correlated with the specific time to disease recurrence. Our aim is to correlate specific pathological tumor characteristics of colorectal cancer with subsequent time to recurrence following surgical resection with intention to cure.

Methods:
A retrospective study of patients diagnosed with colorectal cancer who subsequently underwent curative resection from 2000-2005 was completed. A total of 226 medical charts from the Royal University Hospital in Saskatoon, Canada were reviewed. Demographic data, adjuvant treatments, tumor characteristics and follow up data, including the time of local recurrence or metastasis were recorded. Patients who received pre-operative chemotherapy or radiation or demonstrated pre-operative evidence of metastatic disease were excluded.

Results:
The mean age of the patients in the study was 68.5 years with 52% male and 48% female patients. In univariate analysis, advanced T stage, N stage, and the presence of vascular invasion and lymphatic invasion had significantly higher odds of disease recurrence. In the multivariate Cox model, T3 stage had a significantly lower hazard ratio (HR) relative to T4 stage (HR=0.36, $p<0.05$). N0 stage (HR=0.15, $p<0.001$) and N1 stage (HR=0.10, $p=0.05$) had significantly lower hazard ratios relative to N2. Mean number of years to first recurrence for T3 and T4 stage were 3.3 and 1.1 years respectively and N0, N1 and N2 stage were 6.3, 3.3 and 1.9 years respectively and mean number of years to first recurrence for the presence of vascular and lymphatic invasion were 2.3 and 2.5 years respectively.

Conclusion:
Time to recurrence is a good surrogate marker of tumor aggressiveness and can advantageously be correlated with specific pathological markers and TNM stage.

Effects of Cooling Ambient Temperature and Shivering on Mecahnomyography of Resting Quadriceps Muscle

Poster Presenter: Jimmy Lam

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
J Lam, A Peeling, WP McKay, BL Daku

Introduction:
Previous work by our team found that with ambient cooling of humans, resting muscle mechanical activity (RMMA) as measured by surface accelerometer mechanomyography (MMG) amplitude increases throughout exposure to the cold stimulus (McKay et al. 2013). What was not determined was whether this increase in RMMA was simply low level shivering by the participant or if the increased RMMA was due to neurologically different phenomenon prior to the act of shivering taking place. The purpose of this study was therefore to examine the signal properties of the MMG to localize differences in neurological properties between RMMA and shivering.

Materials/Methods:
Participants were subjected to isothermal conditions and allowed to acclimatize. They were subsequently presented conditions of temperature lowering by 1° per minute from 30°C to 0°C and kept there until visible shivering was observed. Continuous recording of electrocardiography (ECG), electromyography (EMG), mechanomyography (MMG), room temperature and axillary temperature (every 5 minutes) were made.

Results:
This study examined this question using EMG and MMG monitoring on 22 human participants (11 males and 11 females) in a controlled temperature environment. Our study demonstrated 3 main findings. Firstly, this study affirms the findings of our previous study's observation that RMMA amplitude increases with cooling. This is followed by a further dramatic increase with shivering. Secondly, while there is no change in mean frequency of RMMA with cooling, mean frequency decreases significantly with shivering. Lastly, kurtosis increases modestly with cooling, then dramatically increases with shivering.

Conclusion:
The finding of decreased mean frequency with shivering is strongly suggestive that RMMA and shivering originate from different neural pathways. Furthermore, the increase in kurtosis is indicative of shivering arising from an anatomically more localized site. Collectively, these two findings infer the presence of significant differences between neuronal properties of RMMA and shivering.

Palisade Cartilage Tympanoplasty Under Local Anesthetic in an Office Setting

Poster Presenter: Kelsey Hinther

Undergraduate Medical Education, Department of Surgery
College of Medicine, University of Saskatchewan

Authors:
Kelsey Hinther, Nael Shoman

Introduction:
A tympanic membrane perforation is one of the most commonly encountered ENT visits. Various tympanoplasty techniques have been proposed to restore the integrity of the tympanic membrane, the most common techniques involving either an underlay or an onlay approach. Both techniques require ear canal skin incisions, and are typically done under general anesthetic.
In 1998, Eavey proposed an in-office cartilage graft tympanoplasty technique perforations in the pediatric population. This was modified in 2000 to include adult patients. In 2013, we further modified this technique in our institution to use a palisading cartilage graft technique, combined with hyaluronic acid biosynthetic graft (EpiDisc), to close tympanic membrane perforations of any size, under local anesthetic in the office setting.

Methods:
Patients with a tympanic membrane perforation opting for surgical closure were offered this novel technique, along with the traditional approach under general anesthetic. Exclusion criteria included age under 12 years, inability to lie supine for 45 minutes, inability to see the entire perforation margin with the microscope, and a degree of conductive hearing loss larger than would be expected based on perforation size alone. Perforation size was not an exclusion factor.

Results:
From March 2013 to March 2015, eighty patients underwent the local procedure. Fifty- five were females. Age ranged from 12 to 89 years. Eleven (13.8%) were revision cases. Seventy- three (91.2%) had complete perforation closure at the six week follow up visit. The most common complication was immediate postoperative nausea (8, 10%).
Twenty- two (90%) had significant air bone gap closure at the three month post operative hearing assessment.

Conclusion:
The modified palisade cartilage tympanoplasty technique offers distinct advantages including an in office setting,significant cost saving to the system, shorter wait times, avoidance of general anesthetic, minimal morbidity and postoperative recovery, high success rate, and low complication rate.

A Randomized Pilot Study to Determine if Sevoflurane is Neuroprotective for Patients with Thromboembolic Stroke Treated by Intravascular Thrombectomy under General Anesthesia.

Poster Presenter: Todd McDonald & Peter Hedlin

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Todd McDonald, Peter Hedlin, Brian Brownbridge, Michael Kelly

Introduction:
Stroke is a leading cause of adult disability in the developed world. Endovascular thrombectomy improves outcomes in patients with acute ischemic stroke caused by a proximal intracranial arterial occlusion and has shown to be beneficial in addition to intravenous thrombolysis. This procedure can be performed under a range of anesthetic techniques, from local anesthetic and sedation to a general anesthetic using a variety of maintenance agents. Extensive animal research has demonstrated the neuroprotective effects of volatile anesthetics in reducing neuronal ischemia/reperfusion injury. Contradicting this, retrospective trials have suggested that procedures performed under sedation have better outcomes. To date there has been no prospective randomized trials to address the impact of anesthetic agents on outcomes of intravascular thrombectomy for acute ischemic stroke. We hypothesize that by comparing patients receiving a general anesthetic with either sevoflurane or a total intravenous technique during intravascular thrombectomy for acute ischemic stroke, neuroprotection by sevoflurane will be demonstrated by a decrease in the serum marker of reperfusion injury, n-acetyl-aspartate, a reduced infarct volume, and a decrease in the Modified Rankin score at 90 days.

Materials/Methods:
This will be a single-centre randomized two-armed pilot study comparing sevoflurane to propofol for the maintenance of general anesthesia during intravascular thrombectomy for acute ischemic stroke. Analysis will include a measurement of the biochemical, radiological, and clinical outcomes.

Results:
Pending.

Conclusion:
To be determined.

Incidence of Hemorrhage in a Cohort of Patients with Unruptured Intracranial Aneurysms

Poster Presenter: Syed Uzair Ahmed

Department of Surgery, Division of Neurosurgery
College of Medicine, University of Saskatchewan

Authors:
Syed Uzair Ahmed, Michael Kindrachuk, Evan Barber, Kotoo Meguro, Lissa Peeling, Michael E. Kelly

Introduction:
Natural rate of aneurysm rupture remains controversial, especially for small aneurysms. Centres frequently choose to follow rather than treat aneurysms < 7 mm. We aim to study the safety of observation in patients with small UIAs followed in Saskatchewan.

Methods:
We conducted a retrospective review of all patients in a prospective database presenting between July 2008 and February 2014 with unruptured aneurysms. Aneurysm characteristics recorded included size, location, presentation, and follow-up imaging. Multiple aneurysms in a single patient were considered independently. Patients with no follow-up were excluded from the analysis, including those still awaiting initial follow-up.

Results:
Of the 203 UIAs < 7 mm, 25 were treated, while mean follow-up time was 12.3 months for followed aneurysms, with two incidences of rupture.
Of the 88 UIAs ≥ 7 mm, 42 (48%) were treated. Mean follow-up time for followed aneurysms was 8.2 months, and there was one incidence of rupture during follow-up.

Conclusions:
Treatment decision paradigms used in our centre showed low rates of rupture in untreated aneurysms less than < 7 mm.

Dynamic Markers to Guide Intraoperative Fluid Management for Improving Clinical Outcomes: A Systematic Review and Meta-analysis

Poster Presenter: Edmond Li & Stephen Lee

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Edmond Li, Stephen Lee, Jonathan Gamble

Introduction:
Dynamic indices (DI) are used to guide intraoperative fluid management (IOFM), as they accurately predict a fluid responsiveness in certain situations.1 Whether this strategy improves clinical outcomes remains uncertain. Previous meta-analyses in this area included additional measurements of intraoperative fluid responsiveness.2 To study the potential clinical benefit of IOFM guided by DI, we plan to conduct a systematic review and meta-analysis.

Methods:
Our search strategy will identify all adult randomized controlled trials comparing IOFM guided by DI versus other methods for any surgical procedure. The primary outcome will be mortality. Secondary outcomes will include post-operative complications, and hospital and intensive care unit length of stay. The comprehensive search strategy will include MEDLINE, EMBASE, CENTRAL, other relevant databases, reference lists of relevant reviews, and clinical trial registries without language or date restriction. Study authors will be contacted for missing data. Data will be initially meta-analyzed using a fixed-effects model. Where heterogeneity is detected using the Cochran Q test and I2 statistic, sensitivity analysis with a random effects model will be performed. Heterogeneity will be investigated with pre-specified subgroup analyses. The Cochrane Collaboration's tool for assessing risk of bias will be used to evaluate each included study for risk of bias. Publication bias and small study effects will be investigated by funnel plot if enough studies are identified.

Results/Conclusion:
Pending

Aluminum Contamination in Parenteral Nutrition Remains a Concern for Infants

Poster Presenter: Amanda Hall

Department of Surgery, Division of General Surgery
College of Medicine, University of Saskatchewan

Authors:
Hall AR, Zello GA, Arnold CJ, Miller GG.

Background:
Aluminum (Al) toxicity is associated with anemia, impaired bone metabolism, neurologic defects, and possibly parenteral nutrition associated liver disease. This element is a ubiquitous contaminant of parenteral nutrition (PN) components, but the highest concentrations per kg are found in infant PN formulations. We assessed the current levels of Al contamination in infant PN in a Canadian neonatal intensive care unit (NICU) and compared these to the maximum suggested exposure of 5µg/kg/day (FDA, 2004).

Methods:
Thirty samples of PN prepared for infants less than 30 days of age (mean weight 1.54kg, SD 0.71) were collected from discarded solution in the NICU. Each sample was analyzed for Al content via mass spectrometry. The components of PN (from label) and measured Al content were then compared using linear regression and one-way ANOVA.

Results:
The mean Al contamination of infant PN was 14.0 (SD 6.5) µg/kg/day. Only three samples were under 5µg/kg/day. Al levels and infant weight were not associated. Linear regression revealed a significant correlation between Al and calcium gluconate ($p < 0.0001$) and a trend between Al and both potassium and phosphate ($p = 0.07$ and $p = 0.05$ respectively).

Conclusions:
Al contamination in infant PN remains three times higher than the suggested maximum level of exposure. However, it has decreased in this NICU since our previous study performed by Li et al (2005), where the mean Al contamination was 21.6 (5.2) µg/kg/day. Unexpectedly, an association between infant weight and Al exposure was not apparent. In addition, isolating the source of Al contamination is difficult, as multiple components appear to be involved. Calcium gluconate may still be a major contributor, but its minimal variability between PN samples makes interpretation of results challenging. Therefore, further investigation into individual components is warranted to achieve the goal of reducing aluminum contamination in infant PN solutions.

Subcutaneous Ketamine for Post Operative Pain Relief in Rwanda: A Randomized Control Trial

Poster Presenter: Calen Sacevich

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Calen Sacevich, William McKay, Jon Tuchscherer, Shefali Thakore, T. Twagirumugabe

Introduction:
Pain relief is a fundamental patient right. In developing countries, postoperative pain management is often inadequate. Limited resources, cultural beliefs and political barriers often contribute to poor postoperative pain management. This study aims to examine the safety and efficacy of subcutaneous ketamine for the treatment of postoperative pain in these settings.

Methods:
This randomized, double blind control trial is a partnership between the University of Saskatchewan and the National University of Rwanda with ethics approval from each institution. Forty-eight patients undergoing upper abdominal, thoracic, gynecologic or orthopaedic surgeries at the Centre Hospitalier Universitaire de Kigali, Kigali, Rwanda will be randomized to receive either 1mg/kg subcutaneous ketamine or equivalent placebo, administered immediately after surgery, the evening after surgery, and every 12 hours thereafter for a total of 5 injections. The primary outcome will be a reduction in mean pain scores measured using an 11-point numerical rating scale. Secondary outcomes will be the presence of significant side effects.

Results:
Data collection is anticipated in June 2015.

Conclusion:
To be determined.

Renal Cell Carcinoma Metastatic to the Spine: A Systematic Review of Prognostic Features and Treatments

Poster Presenter: Zane Tymchak

Department of Surgery, Division of Neurosurgery
College of Medicine, University of Saskatchewan

Authors:
Zane Tymchak, Justine D. Pearl, Adam Wu, Daryl R. Fourney

Introduction:
Surgical treatment of undifferentiated spinal metastasis is relatively well-defined the literature. Although some scoring systems take into account the histological diagnosis of spinal metastasis, updated histologyspecific prognostic factors are lacking. Renal cell carcinoma (RCC) involves bony metastases in up to 50% of cases with the spine being involved in 15% of these. Prognostic markers specific to RCC metastatic spinal disease however are largely unreported in the spine literature.

Methods:
A systematic search by 2 independent reviewers was conducted to answer the following questions: 1) are there any features of metastatic RCC that affect life expectancy or local control, and 2) what is the optimal treatment of metastatic spinal RCC? Non-English and non-clinical publications, review articles and reports with less than 10 patients were excluded. To answer question 1 we included all studies assessing prognostic or therapeutic factors for metastatic RCC between January 1, 2009-December 31, 2014. To answer question 2 we included all studies after 1990 addressing any form of treatment for metastatic RCC to the spine.

Results:
The most significant prognostic factors were the Memorial Sloan-Kettering Cancer Center (MSKCC) criteria, Heng's criteria, hyponatremia, visceral fat average and C-reactive protein (CRP). There were no comparative studies addressing radiation therapy, stereotactic body radiation therapy (SBRT), vertebral augmentation, intralesional surgery or en bloc surgery.

Conclusion:
We highlight the need for controlled studies comparing treatments for spinal RCC. An understanding of prognostic factors specific to metastatic RCC may help the development of evidence-based guidelines for spinal metastases.

Tracheal Palpation of Sliding Cuff to Assess Endotracheal Tube Location in Trachea or Esophagus – Pilot Study

Platform Presenter: Jimmy Lam

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Jimmy Lam, Andrew Peeling, William McKay

Introduction:
Proper endotracheal tube (ETT) placement is paramount to care during general anesthesia, resuscitation, and intensive care services. Improper placement can lead to hypoxemia and death if left uncorrected. Proper ETT position entails the distal tip of the tube being mid trachea while the head is in neutral position. This experiment was a proof-of-concept study of the efficacy of a specific palpation maneuver to detect proper ETT placement in comparison to current standards of measurement alignment with upper incisors.

Materials/Methods:
Patients who were physiologically stable, not involved with rapid sequence induction, not in respiratory distress and were safe in the attending anesthesiologist's opinion were recruited. Attending anesthesiologists, who had choice of anesthetic and intubation equipment, were instructed to intubate the trachea to the depth of their choice. They inflated the cuff on the ETT and allowed investigators to palpate the trachea while the tube was advanced another 2 cm. If the cuff was not felt, the anesthesiologist slowly withdrew the ETT until the cuff was palpated midway between the crico-thyroid membrane and sternal notch. Bronchoscopy was used to measure intubation depth.

Results:
Our study affirmed the ability to palpate the cuff of the ETT within the crico-thyroid membrane to sternal notch area as the cuff was strongly felt by investigators 97% of the time. No significant differences, using our criteria of correct placement, were found between our palpation method (right:wrong 30:1) and the current measurement (right:wrong 26:4; $P = 0.19$) methods. No significant saves from endobronchial placements were observed.

Conclusion:
This study demonstrates the ability of the proposed palpation maneuver to match those of current methods. Although there were no significant saves from endobronchial placements, the ease of palpability and demonstrated efficacy makes this a valuable tool for tube placement verification and education of tracheal surface anatomy.

Retrospective Analysis of Distal Ulna Fractures Associated with Distal Radius Fractures in Women 50 years and Older: Clinical, Radiographic, and Patient Related Outcomes.

Platform Presenter: Laura Sims

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Laura Sims, Samuel Stewart, Geoffrey Johnston

Introduction:
The effect of distal ulna fracture (DUF) on outcomes of distal radius fracture (DRF) is not known. Our purpose was to determine incidence of DUF associated with DRF; to classify DUFs by location; and to determine whether presence, location, or union of DUFs influences radiographic, clinical, and patients' self-reported outcomes in DRF treatment.

Methods:
Data for 781 women 50 years and older with a DRF was collected. Grip strength, range of motion (ROM) and Patient Related Wrist Evaluation (PRWE) scores were measured at nine, 12, 26 and 52 weeks post fracture. Radial inclination (RI), ulnar variance (UV), radial tilt (RT) were measured up to 12 weeks post-fracture and were reviewed to determine frequency, type, and union of associated DUFs.

Results:
The rate of DUF associated with DRF was 74%. DUFs by location were: 19% Type 1A (styloid apex), 39% Type 1B (styloid body), 33% Type 2T (transverse - proximal to fovea), 11% Type 2O (oblique - proximal to fovea), 0.3% Type 3 (head) and 10% Type 4 (distal shaft). DUF rates did not vary with age, although type did. DUF union rate was 35%, influenced by type and age. Significant associations included: Type 1A with younger age, lower union rates and higher RI; Type 1B with lower union rates; Type 2T with lower RI; Type 2O with older age, higher union rates, and lower RI; Type 4 with older age, higher union rates, and higher RI; united DUFs with higher RI. DUFs had no effect on grip strength or ROM.

Conclusions:
Rates of DUF associated with DRF were higher than previously reported. We have classified DUFs by location, with each type having significant distinct features. DUF union is low but more likely with older age and results in improved radiographic outcomes. Presence and type of DUF helps predict behavior of the healing DRF.

Does Altering the Magill Forceps Angle by 45° Affect Nasal Intubation Time in Pediatric Dental Surgery Patients?

Platform Presenter: Farrukh Munshey

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Farrukh Munshey, Jonathan Gamble, William McKay

Introduction:
Magill Forceps (MF) are frequently used during nasal-tracheal intubation (NTI) in all patients, although the design has never been altered to account for pediatric anatomical differences.1 The pediatric larynx and trachea are angled posteriorly. We hypothesized a +45° change to the MF tip would facilitate nasal intubation.2

Materials/Methods:
Following ethics approval, 100 patients were randomized to either the aMF or MF groups. Subjects between the ages of 0-15yrs with an American Society of Anesthesiologists (ASA) ≤ 2 and no risk factors for aspiration or upper airway abnormalities were included.

Results:
Data from 48 patients in the MF group and 52 patients in the aMF group were analyzed using non-parametric tests. Using intent to treat analysis, the median time to intubate (TTI) and interquartile ranges for the MF and aMF were 8.89s (6.52s - 12.51s) and 10.48s (7.07s - 14.29s) respectively ($p = 0.23$). Subset analysis excluding subjects using the corkscrew technique showed the median TTI for the aMF to be less than the MF, although not statistically significant.

Conclusion:
NTI of pediatric patients using an aMF compared to a traditional MF resulted in equivalent TTI. Several pediatric anesthesiologists perceived benefit to using the aMF as an alternative in certain patients. All participants had mastery of the conventional MF; most felt there was a learning curve to using the aMF. This may have contributed to the inability to show a reduction in TTI. Further studies comparing the aMF with the conventional MF in novice laryngoscopists may be warranted.

Suture Locking of Interference Fit Knotless Suture Anchors Are Affected by Bone Quality

Platform Presenter: Graeme Matthewson

Department of Surgery, Division of Orthopedic Surgery
College of Medicine, University of Saskatchewan

Authors:
Graeme Matthewson, Ian Lo, Jarret Woodmass, Aaron Bois, Richard Boorman, Gail Thornton

Purpose:
The purpose of this study was to evaluate the mechanical performance of different suture locking mechanisms including: (i) interference fit between the anchor and the bone (e.g. 4.5 mm PushLock, 5.5 mm SwiveLock), (ii) internal locking mechanism within the anchor itself (e.g. 5.5 mm SpeedScrew), or (iii) a combination of interference fit and internal locking (e.g. 4.5 mm MultiFIX P, 5.5 mm MultiFIX S).

Methods:
Anchors were tested in foam blocks representing normal (20/8 foam) or osteopenic (8/8 foam) bone, using standard suture loops pulled in-line with the anchor to isolate suture locking. Mechanical testing included cyclic testing for 500 cycles from 10 N to 60 N at 60 mm/min, followed by failure testing at 60 mm/min. Total displacement after 500 cycles at 60 N, number of cycles at 3 mm displacement, load at 3 mm displacement and maximum load were evaluated.

Results:
Comparing 8/8 foam to 20/8 foam, load at 3 mm displacement and maximum load were significantly decreased ($p<0.05$) with decreased bone quality for anchors that, even in part, relied on an interference fit suture locking mechanism (i.e. 4.5 mm PushLock, 5.5 mm SwiveLock, 4.5 mm MultiFIX P, 5.5 mm MultiFIX S). Bone quality did not affect the mechanical performance of 5.5 mm SpeedScrew anchors which have an internal suture locking mechanism.

Conclusions:
In this model, knotless suture anchors which rely, even in part, on an interference fit between the anchor and the bone to lock the sutures were affected by bone quality. However, the mechanical performance of a knotless suture anchor which has an internal suture locking mechanism was not.

Clinical Relevance:
In osteopenic bone, a knotless suture anchor that does not rely on an interference fit but has an internal suture locking mechanism may be advantageous for secure tendon fixation to bone.

Low Dose Subcutaneous Ketamine for Postoperative Pain Management in Sub-saharan Africa: A Pilot Dose Finding Study

Platform Presenter: Jon Tuchscherer

Department of Anesthesiology
College of Medicine, University of Saskatchewan

Authors:
Jon Tuchscherer, William McKay, Theo Twarigumurabe

Introduction:
Ketamine's role in postoperative analgesia is documented, yet its use in sub-Saharan Africa has not been well studied.1,2 The purpose of our study was to determine a subcutaneous (SC) dose of ketamine for use in a future randomized control trial (RCT) that reduced postoperative pain scores without significant side effects.

Materials/Methods:
Patient consent, and University of Saskatchewan, National University of Rwanda, and Central University Hospital of Kigali research ethics board approvals were obtained. Thirty-one subjects undergoing major abdominal, orthopedic, or gynecologic surgery were recruited. In addition to standard postoperative care, subjects received five SC doses of ketamine at scheduled intervals: on arrival in recovery room, again that evening, the morning and evening on postoperative day one, and in the morning of postoperative day two. Pain scores were recorded using a zero to ten point numerical rating scale in the recovery room, and on the mornings of postoperative days one and two. Patients received 50 mg of ketamine for both the first and second doses, with the subsequent three doses adjusted according to pain and side effects. We considered a significant reduction in pain to be a change of 3 or more points on a numerical rating scale within a 24-hour period.

Results:
Mean pain scores in the recovery room and on postoperative days 1 and 2 were 9.39, 5.07, and 2.41, respectively. The mean ketamine dose efficacious in pain reduction was 0.89 mg/kg. Most patients received 100 mcg of fentanyl in the operating room, followed by occasional doses of acetaminophen, NSAIDs, or meperidine.

Conclusion:
The addition of ketamine resulted in drastic decreases in patients' postoperative pain scores. We plan an RCT for determining the efficacy of subcutaneous ketamine in reducing postoperative pain, using a dose of 1.0 mg/kg twice a day.

Notes

UNIVERSITY OF SASKATCHEWAN

Departments of Surgery and Anesthesiology