



2024 RESEARCH DAY DEPARTMENT OF SURGERY



Dr. Michael Kelly

Professor &
Provincial Department
Head

Department of Surgery,
Division of Neurosurgery

University of
Saskatchewan &
Saskatchewan Health
Authority

Thank you for attending our new combined Surgery Research Day. As the Provincial Head of Surgery, I am committed to clinical excellence, teaching, and research. We will continue to build a culture of research that empowers and motivates our faculty and residents to engage and excel in research. I would like to recognize the excellence of all the members of our department including faculty, residents, graduate students, medical students, undergraduate students, and all other staff for your hard work this year. Your dedication helped us reach our goals.

Our 2024 Research Day is a testament of the dedication and commitment of the members of our department to research and our academic mission. It also gives me an opportunity to show my appreciation for all the people that work outside of the limelight to make our department run smoothly. I would also like to thank our Research Director Dr. Daryl Fourney, the Department of Surgery Research Committee and our Research Coordinator, Karen Mosier, for their leadership in the Department's research initiatives this past year.

Our guest speaker this year is Dr. Ahmer Karimuddin, Clinical Associate Professor, from the University of British Columbia. I would like to thank him for coming to Saskatoon to participate in our Research Day and for sharing his experience, expertise, and stories with us.

I am looking forward to an exciting day to highlight all the amazing research that is being conducted in our department.

Welcome to our 2024 Department of Surgery Research Day! It is inspiring to showcase the ongoing research efforts of our faculty, residents, graduate students and medical students. For the first time since the pandemic, we are back with a full day program that includes 22 podium presentations and a new poster session.

Evidence-based research is essential to improving patient outcomes and the quality of healthcare. It helps us to understand what works, what doesn't work, and why. Research also enables us as clinicians to address emerging health challenges. In alignment with the strategic plan of the University of Saskatchewan, the Department of Surgery research executive is starting a new effort in 2024-2025 to pair our faculty with established Sask-based research programs and scientists. Research collaborations are important because they allow researchers and clinician scientists to tackle complex problems together. They also encourage sharing of resources that they would not otherwise have, like time, funding, equipment, and other people's expertise.

Today we have the great honour of highlighting only a small fraction of some of the incredible surgical research in our Department. Please take a moment to reach out to your colleagues, ask questions and to collaborate! This is how we continue to build our academic community in Sask surgery.

I wish to thank all the presenters, session chairs and judges. I would also like to thank the Research Committee for facilitating such a remarkable scientific program. I particularly want to thank our invited guest, Dr. Ahmer Karimuddin from the University of British Columbia. And finally, I would like to thank the Department of Surgery staff for coordinating and promoting such an impressive event, in particular our Surgery Research Coordinator, Karen Mosier.



Dr. Daryl Fourney

Professor &
Director of Research

Department of Surgery,
Division of Neurosurgery

University of
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SURGERY RESEARCH AWARDS



2023 Award Recipients

Surgery Faculty Research Day

Platform Presentations:

1 st Prize	Dr. Paul Mick
2 nd Prize	Dr. Josie Conacher
3 rd Prize	Nicole Sylvain

2022 Award Recipients

Surgery Faculty Research Day

Platform Presentations:

1 st Prize	Dr. Nathan Ginther
2 nd Prize	Dr. David Sauder
3 rd Prize	Elisabet Jakova (Dr. Francisco Cayabyab)
Kloppenburg Award	Dr. Emily Chan
Anne Dzus Student Surgical Award	Barzany Ridha
Surgical Foundations Award	Dr. Eva Liu

2021 Award Recipients

Surgery Faculty Research Day

Platform Presentations:

1 st Prize	Elisabet Jakova/Dr. Michael Zaki (Dr. Francisco Cayabyab)
2 nd Prize	Dr. Michael Moser
3 rd Prize	Dr. Jonathan Norton
Honourable Mention Presentation	Dr. Gary Groot

2024

RESEARCH DAY

DEPARTMENT OF SURGERY

May 16, 2024

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INTRODUCTION

Research Day
Department of Surgery

08:00 AM - 08:10 AM

WELCOME & OPENING REMARKS

Dr. Michael Kelly

Professor & Provincial Department Head
Department of Surgery
University of Saskatchewan & Saskatchewan Health Authority

Dr. Daryl Fourney

Professor & Director of Research
Department of Surgery
University of Saskatchewan & Saskatchewan Health Authority

SESSION I

Research Day
Department of Surgery
MODERATOR: Dr. Nick Peti
08:10 AM - 09:30 AM

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10 Minute Break 9:30 AM - 9:45 AM

SESSION II

Research Day
Department of Surgery
MODERATOR: Dr. Amanda Hall
09:45 AM - 10:55 AM

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KEYNOTE SPEAKER

Department of Surgery
Research Day

MODERATOR: Dr. Nathan Ginther

11:00 AM - 12:00 AM

UNVEILING DISPARITIES:

EXPLORING IMMIGRANTS' ACCESS AND OUTCOMES
IN SURGICAL CARE IN BRITISH COLUMBIA, CANADA

Dr. Ahmer Azhar Karimuddin

Associate Professor (Clinical), Department of Surgery
University of British Columbia

LUNCH & Poster Presentation 12:00 PM - 1:00 PM

Dr. Ahmer Karimuddin is a Clinical Associate Professor in the Division of General Surgery and the current UBC General Surgery Residency Program Co-Director. Additionally, he represents the 17,000 physicians of British Columbia as the President of Doctors of BC. He has also served as President of the General Surgeons of BC and the BC Surgical Society, and is the current Program Chair of the Canadian Surgical Forum.

As a practicing colorectal surgeon at Vancouver's St. Paul's Hospital, his clinical focus has been on colorectal cancer, inflammatory bowel disease, laparoscopic colorectal surgery, transanal surgical techniques and anorectal diseases. Dr. Karimuddin's research, with over 100 peer-reviewed publications, has focused on his clinical interests, along with patient reported outcomes, surgical education and health policy.

Dr Ahmer Karimuddin completed medical school at the University of Western Ontario, followed by General Surgery training at the University of Saskatchewan, including a year spent doing research on graduate medical education. He completed a fellowship in Colorectal Surgery at the University of Toronto.



Dr. Ahmer Azhar Karimuddin

**Specialist in General &
Colorectal Surgery**

**Director, General Surgery
Residency Program**

**University of British
Columbia**

President, Doctors of BC

**St. Paul's Hospital,
Providence Health**

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Research Day
Department of Surgery
MODERATOR: Dr. Richard Bigsby
1:00 PM - 2:10 PM

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CLOSING REMARKS

Department of Surgery
Research Day

2:10 PM - 2:30 PM

Dr. Daryl Fourney

Professor & Director of Research
Department of Surgery
University of Saskatchewan & Saskatchewan Health Authority

The 1st, 2nd and 3rd podium presentation winners will be announced at the Department of Surgery Celebration dinner.

ACKNOWLEDGMENTS

The Department of Surgery would like to thank the following individuals for serving as judges and moderators for the 2024 Research Day.

JUDGES

Dr. Nathan Ginther

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

Dr. David Kopriva

Clinical Associate Professor, Department of Surgery
Division of Vascular Surgery
College of Medicine, University of Saskatchewan

Dr. Erick McNair

Assistant Professor, Department of Surgery
Division of Cardiac Surgery
College of Medicine, University of Saskatchewan

Dr. Paul Mick

Associate Professor, Department of Surgery
Division of Otolaryngology - Head & Neck Surgery
College of Medicine, University of Saskatchewan

Dr. Ahmer Karimuddin

Assistant Professor (Clinical), Department of Surgery
Division of General Surgery
College of Medicine, University of British Columbia

MODERATORS

Dr. Richard Bigsby

Associate Professor, Department of Surgery
Division of Thoracic Surgery
College of Medicine, University of Saskatchewan

Dr. Amanda Hall

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

Dr. Nick Peti

Assistant Professor, Department of Surgery
Division of Vascular Surgery
College of Medicine, University of Saskatchewan

2024

DEPARTMENT OF SURGERY

RESEARCH DAY

PODIUM PRESENTATION ABSTRACTS

The Saskatchewan Universal Congenital Cytomegalovirus Screening Program: Initial Results

Platform Presenter: Dr. Paul Mick

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

Team Members/Affiliations:

Rupeena Purewal (Pediatric Infectious Diseases, University of Saskatchewan), Nick Antonishyn (Roy Romanow Provincial Laboratory, Saskatchewan Health Authority), Jessica Pappin (Department of Pediatrics, University of Saskatchewan), Cailey Turner (Department of Pediatrics, University of Saskatchewan), Halen Panchyk (Hearing Health Services, Saskatchewan Health Authority).

Rationale:

Congenital cytomegalovirus (cCMV) affects 1/200 newborns, leading to long-term health problems in 20%. Screening may improve outcomes by facilitating prompt treatment. Saskatchewan was the second large jurisdiction (after Ontario) to implement a universal cCMV screening program. Our study assessed viral epidemiology and program quality using data from the first 21 months of the program.

Methods:

Data were obtained for babies born in Saskatchewan between February 2022 and October 2023. The following proportions were calculated: Newborns screened; screen-positive babies with confirmatory urine culture by 21 days; positive predictive value (PPV) of the screening test; cCMV prevalence; losses to follow-up; infected babies with signs of infection; and infected babies treated with anti-virals. Side effects were also calculated.

Results:

Screening was performed after 23,973 of 24,138 live births (99.3%); 55 babies screened positive (0.23%). Eight babies were lost to follow up before their confirmatory urine culture; one more was lost to follow-up later (total 9/55=16.4%). Seven babies who screened positive had urine culture performed after the recommended 21 days of age (7/47=14.9%). The PPV was 38/40 (95%). Fourteen (14/38=37%) had head imaging abnormalities that were possibly caused by cCMV but none had hearing loss. Ten (10/38=26%) went on to receive anti-virals; 4 had side effects.

Conclusion:

cCMV prevalence in Saskatchewan is lower than published rates. Nearly all newborns are now being screened, but more work is needed to reduce losses to follow-up and speed up investigations for babies who screen positive. Longer-term studies are needed to assess developmental benefits.

Funding Sources:

None

Validation of Virtual Wrist Range of Motion Measurements Using Video Coaching

Platform Presenter: Dr. Cole Elaschuk

Undergraduate Medical Student
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

John Perverseff (College of Medicine, University of Saskatchewan), Dr. Matthew Getzlaf (Department of Surgery, University of Saskatchewan), Dr. David Sauder (Department of Surgery, University of Saskatchewan), Dr. Laura Sims (Department of Surgery, University of Saskatchewan).

Rationale:

Wrist range of motion (ROM) is an important assessment in patients with wrist pathology. In-person intra-rater reliability of this has been found to be high. Studies evaluating the ability to assess wrist ROM virtually are less conclusive. The purpose of this study was to determine the validity, intra-rater, and inter-rater reliability of virtual wrist ROM measurements.

Methods:

We performed a prospective cohort study assessing wrist flexion, extension, pronation, and supination in healthy volunteers. Three assessors - medical student, research assistant, and upper extremity surgeon - measured participant wrist ROM with a long arm goniometer at an in-person, same-day virtual, and repeat virtual visits with a one-week washout period. A prior power analysis and inter-class correlations were used to assess reliability using 95% confidence intervals.

Results:

Fifty-three wrists were enrolled with complete data available on 45. For all raters and for all ROM measures, ICC values for in-person measurements were >0.75 , suggesting good inter-rater reliability. This was also seen for same-day and repeat virtual measures for all ROM measurements and raters (ICC >0.75) suggesting similar inter-rater reliability to in-person measurements. Intra-rater reliability for in-person, same-day virtual, and repeat virtual was at least good (ICC >0.75) for all raters and all ROM measurements.

Conclusion:

Virtual wrist ROM assessments showed good inter-rater and intra-rater reliability, with ICC scores that were comparable to in-person measures using video coaching. This was true for raters of all levels of experience. Virtual wrist ROM assessment by this method offer a reliable alternative to in-person assessment.

Funding Sources:

None

Improving Quantitative Hyperspectral Imaging for the Next Decade of Stroke Research in the UofS Stroke Research Program

Platform Presenter: Dr. Jake Pushie

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

Team Members/Affiliations:

Nicole Sylvain (Department of Surgery, University of Saskatchewan), Huishu Hou (Department of Surgery, University of Saskatchewan), Dr. Lissa Peeling (Department of Surgery, University of Saskatchewan), Dr. Michael Kelly (Department of Surgery, University of Saskatchewan).

Rationale:

Characterizing stroke models and treatments is challenging due to biological variability and differences between the stroke models. Occurrences like post-stroke hemorrhagic transformation further complicate analysis and represent uncontrollable confounding variables inherent to ischemic stroke models. Our team has made significant improvements to automate image segmentation to aid identification of hemorrhagic transformation, quantify white matter loss, and differentiate subtle metabolic changes around the stroke lesion to correlate with neurobehavioural and functional assessments.

Methods:

We employ a combination of Fourier transform infrared spectromicroscopy, synchrotron based X-ray fluorescence imaging, and conventional histology to generate hyperspectral datasets for characterizing mouse models of stroke; which include the photothrombotic model, the middle cerebral artery occlusion model, hypoxic ischemia, and intracerebral hemorrhage. Pre- and post-stroke assessments include functional and behavioural testing.

Results:

Our team's latest imaging protocols allow us to identify ion dysregulation as early as 5-minutes post-stroke, track the changing metabolic state of the tissue over time as the stroke event progresses, and quantify white matter loss with unprecedented spatial resolution and sensitivity. Automated segmentation is also effective at identifying small multi-focal hemorrhages, which are easily missed and confound ischemic stroke model data.

Conclusion:

Identifying regions of ion dysregulation after stroke onset is a sensitive probe of underlying metabolic disruption and allows regions of compromised tissue to be differentiated from otherwise "normal" tissue. Identifying metabolically compromised tissue and quantifying its degree of dysregulation and response to treatment is the holy grail for linking cell-level physiology with functional outcomes in pre-clinical stroke research.

Funding Sources:

Dr. Michael E. Kelly is supported by the Knight Family Enhancement Chair in Neurological Surgery. Portions of this work was supported by multiple University of Saskatchewan, College of Medicine Research Awards (CoMRAD).

A Selective Approach to Feeding Tube Placement at the Time of Pancreaticoduodenectomy: An NSQIP Analysis

Platform Presenter: Bardia Khun Jush

Undergraduate Medical Student
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Dr. Jubayer Biswas (Department of Community Health & Epidemiology, University of Saskatchewan), Dr. Prosanta Mondal (Department of Community Health & Epidemiology, University of Saskatchewan), Dr. June Lim (Department of Community Health & Epidemiology, University of Saskatchewan), Dr. Mike Moser (Department of Surgery, University of Saskatchewan).

Rationale:

The utilization of feeding tubes post-Whipple surgery has been a subject of debate, with most studies suggesting feeding tubes are unnecessary (for all patients). Following our current selective practice, we revisited the question with NSQIP data, comparing outcomes with and without feeding tubes in patients with and without preoperative nutritional deficiencies.

Methods:

A propensity score matching analysis was used to equate the likelihood of feeding tube placement among 16,780 patients from the NSQIP database who underwent Whipple resections between 2018 and 2021. This method simulated the random allocation of patients with poor (more than 10% weight loss or albumin less than 30 g/L) or 'non-poor' nutrition into groups receiving feeding tube placement or not at the time of surgery.

Results:

Patients with poor preoperative nutrition exhibited fewer serious complications when a feeding tube was placed than those with poor nutrition who did not receive a feeding tube. Conversely, well-nourished patients showed an increased incidence of complications without improved outcomes when a feeding tube was used.

Conclusion:

Our findings suggest the benefits of using a selective approach to feeding tube placement post-Whipple surgery. Patients with poor nutrition may benefit from the placement of a feeding tube, while those with adequate preoperative nutrition may avoid additional risks by foregoing tube placement.

Funding Sources:

None.

Comparison of Outcomes Between Resurfaced and Unresurfaced Patellae in Total Knee Arthroplasty Using Medial Congruent Liners: A Retrospective Study

Platform Presenter: Dr. Jans van der Merwe

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

Team Members/Affiliations:

Dr. Nebojsa Kuljic (Department of Surgery, University of Saskatchewan), Dr. Michael Thatcher (College of Medicine, University of Saskatchewan), Dr. Wyatt Tyndall (College of Medicine, University of Saskatchewan), Michaela Nickol (Department of Surgery, University of Saskatchewan).

Rationale:

Total knee replacements are becoming more prevalent. There is still a lot of controversy regarding patellar resurfacing. Surgeons advocating for resurfacing state reduced risk for anterior knee pain and need for revision surgery. Our goal was to determine if patients will have similar outcomes if the patella is left unresurfaced or resurfaced with the newer liner design.

Methods:

A multi-surgeon retrospective chart review was conducted in Saskatoon, to identify all patients who received a total knee arthroplasty utilizing a medial congruent (MC) polyethylene liner between January 1, 2020 to December 31, 2020. All included patients were subsequently sent a survey package via ground mail to complete. Patients in whom no mail package was returned were then contacted via phone.

Results:

We included 188 patients in the final analysis. There was no statistical difference between the groups in regards to age ($p=0.77$), sex ($p=0.075$), BMI ($p=0.22$), hospital stay ($p=0.86$), laterality ($p=0.51$), ASA score ($p=0.52$), Kellgren Lawrence medial compartment OA score ($p=0.33$) and Kellgren Lawrence lateral compartment OA score ($p=0.49$). There was a statistical significant difference in favour of the treatment group (patella resurfacing) with the KOOS JR score ($p=0.045$). This difference was not observed with the Kujala score ($p=0.98$) and the Oxford score (0.89).

Conclusion:

There might be a role to perform a patella resurfacing, even in newer total knee designs. We only observed a statistical difference in the KOOS JR score and therefore further high-quality research is warranted to determine if there is a true difference between the control and treatment group.

Funding Sources:

Saskatchewan Orthopedic Research Funding Allocation Committee.

Breast Milk Uniquely Enhances Bowel Adaptation in the Developing Intestine: Exploring Lipid Transport Using an Intestinal Organoid Model

Platform Presenter: Dr. Nolan Hunka

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

Team Members/Affiliations:

Dr. Amanda Hall (Department of Surgery, University of Saskatchewan), Dr. Gary Groot (Department of Surgery, University of Saskatchewan), Dr. Dean Chamberlain (Division of Oncology, University of Saskatchewan), Farinaz Ketabat (College of Engineering, University of Saskatchewan).

Rationale:

Adequate intestinal function is essential to neonatal growth and development. Human breast milk (HBM) provides essential nutrients and decreases the risk and severity of diseases related to intestinal failure. The ex-vivo human stem cell-derived intestinal organoid (hSIO) model simulates and facilitates study of the gut's natural three-dimensional microenvironment. Lipid transporters are heavily implicated in bowel adaptation as fats in HBM contribute to the majority of neonatal growth and metabolism.

Methods:

Using an established hSIO model, HBM, infant formula (Enfamil A+), and vehicle control (D-PBS) are introduced to mature hSIO culture media at various concentrations (1:10, 1:100, 1:1000) over 4 days. RT-qPCR, and Western blotting compare intestinal transporters implicated in absorption and transport of lipids. Statistical analysis compares fold gene expression and protein concentration using $\Delta\Delta C_t$ and ANOVA.

Results:

Preliminary RT-qPCR investigation reveals at highest concentration (1:10), HBM uniquely upregulates lipid transporter genes FABP1 (14-fold vs. 3-fold), FABP2 (81-fold vs. 8.6-fold), SCARB1 (5.3-fold vs. 1.6-fold), and FATP4 (17-fold vs. 1.5-fold) compared to formula (Enfamil A+), normalized to control (D-PBS) groups. Replicate experimental groups are ongoing. Western Blotting will validate transporter protein concentration changes in keeping with gene expression from RT-qPCR.

Conclusion:

Human intestinal organoids are a powerful tool to further scientific understanding of human disease, developmental processes, and markers of bowel adaptation. By demonstrating differences in functional transporter genes, we have gained new understanding of the unique effects of HBM on the human gut. These may become novel targets of therapeutic interventions to improve bowel adaptation in intestinal failure.

Funding Sources:

New Faculty Start-Up Funds, University of Saskatchewan - Dr. Amanda Hall; Department of Surgery Resident Research Grant – Dr. Nolan Hunka.

Causative Factors Associated with Varus Subsidence of the Tibial Component in Primary Total Knee Arthroplasty

Platform Presenter: Dr. Mars Zhao

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

Team Members/Affiliations:

Cole Elashuk (College of Medicine, University of Saskatchewan), Thomas Goldade (College of Medicine, University of Saskatchewan), Evan Parchomchuk (College of Medicine, University of Saskatchewan), Samuel Girgis (College of Medicine, University of Saskatchewan), Aafia Maqsood (College of Medicine, University of Saskatchewan), Janan Ashique (College of Medicine, University of Saskatchewan), Mason Beaulieu (College of Medicine, University of Saskatchewan), Gavin King (College of Medicine, University of Saskatchewan), Dr. Jans van der Merwe (Department of Surgery, University of Saskatchewan).

Rationale:

Fracture of the tibial component after total knee arthroplasty (TKA) leads to high rates of morbidity and mortality. Aseptic varus tibial baseplate subsidence (VTBS) is not well described. We investigated pre- and post-operative patient and surgical factors including a novel Coronal Plane Alignment of the Knee (CPAK) classification on the effect on aseptic VTBS.

Methods:

This retrospective review included 146 patients with aseptic VTBS from 840 identified patients requiring TKA revisions between April 2013 – March 2023. We excluded loosening secondary to infection and trauma. We compared pre- and post-operative CPAK classification alongside patient and surgical factors against a control group of 52 patients.

Results:

There was no statistical significance difference in patella resurfacing ($P=0.108$) between VTBS and control groups. VTBS group had higher rates of medial tibial undersize and overhang ($P<0.001$), non-medial congruent polyethylene liners ($P<0.001$), and lower rates of tibial stems ($P<0.001$). VTBS had higher rate of pulmonary diseases ($P<0.001$) and higher Charlson Comorbidity Index ($p<0.001$). Other medical comorbidities had no statistical difference. Both groups' pre-operative CPAK classifications had majority in group 2 (VTBS, control: 33.3%, 30.8%) followed by group 1 (25.5%, 26.9%). Both groups' post-operative CPAK classifications had majority in group 5 (70.2%, 84.6%) followed by group 2 (21.9%, 11.5%).

Conclusion:

Our results suggest aseptic VTBS may not relate to pre-op CPAK classification but have higher rates when not placed in post-op group 5 CPAK classification. VTBS group had higher rates of medial tibial baseplate undersize and overhang and pulmonary comorbidity, and lower rates of tibial stem usage.

Funding Sources:

None.

Monosynaptic Spinal Reflex Modulation in Children and Adolescents

Platform Presenter: Sarah S. Dalkilic

Department of Health Sciences
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Dr. Maryam Mohebi Rad (Department of Cellular, Physiological and Pharmacological Sciences, University of Saskatchewan), Dr. Krista Metz (Department of Surgery, University of Saskatchewan), Dr. Jonathan A. Norton (Department of Surgery, University of Saskatchewan).

Rationale:

In children with developmental disorders, impairments in spinal reflex development have a wide range of implications. Cerebral Palsy (CP) and Down Syndrome (DS) typically present motor impairments at two ends of the spectrum: spasticity and hypotonia. Adults with traumatic spinal cord injuries with spasticity show impairments in presynaptic modulation of motor activity, but studies investigating these reflex properties have yet to be conducted in children and adolescents whose peripheral nervous systems are still highly plastic. Spinal reflexes in healthy children and teenagers need to be characterized relative to adults before studying differences in children with developmental conditions like CP and DS.

Methods:

To investigate how nervous systems still under development respond to conditioning of the primary afferents in monosynaptic reflexes, we compared neurologically healthy adults against children. Experiments involved modulating GABA-A mediated primary afferent properties that are known to undergo malfunction following traumatic injury to the adult nervous system, namely H-reflex facilitation following tonic PAD induction via cutaneous stimulation, post-activation depression from flexor-afferent conditioning and from rate-dependent depression.

Results:

The results thus far suggest that children and adolescents have higher levels of reflex excitability under specific conditions of repeated activation and show less robust reflex suppression effects.

Conclusion:

Future directions for the study include continuing to recruit typically developing children from the ages of 4 to 18 for further comparisons between developmental stages, and to recruit children with DS and CP to investigate how properties of their sensory axons compare against typically developing peers of similar ages..

Funding Sources:

CIHR Canada Graduate Scholarship, Masters Program, College of Medicine Graduate Student Award (CoMGRAD) – Sarah Dalkilic.

Long-Term (>24 Months) Duration of Symptoms Negatively Impacts Patient-Reported Outcomes Following Anterior Cervical Discectomy and Fusion for Cervical Radiculopathy

Platform Presenter: Dr. Eva Liu

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

Team Members/Affiliations:

Dr. Amit Persad (Department of Surgery, University of Saskatchewan), Nathan Baron (Department of Radiology, University of Saskatchewan), Dr. Daryl Fourney (Department of Surgery, University of Saskatchewan).

Rationale:

ACDF is an effective treatment to relieve symptoms of cervical radiculopathy. This retrospective cohort study investigates the impact of long symptom duration (>24 months) on patient self-reported outcomes for pain, function, and quality of life following anterior cervical discectomy and fusion (ACDF) for cervical radiculopathy.

Methods:

This study included consecutive patients who underwent ACDF for cervical radiculopathy from May 1, 2012, to Dec 1, 2019 by a single surgeon. Patients were stratified by short (≤ 24 months) and long (>24 months) duration of symptoms.

Results:

111 consecutive patients were included in our study, including 59 patients in the short symptom duration group and 52 patients in the long symptom duration group. The mean age of the patients was 51.4 ± 9.4 and 41 (36.9%) were female. The baseline VAS neck and arm, NDI, EQ-5D and EQ-VAS were similar between groups. Patients in both long and short symptom duration groups had clinical improvement following surgery. However, patients with short symptom duration had better VAS Neck and EQ-5D outcomes, and were more likely to meet MCID for NDI, EQ-5D or any outcome. Multivariate analysis confirmed symptom duration < 24 months as an independent predictor for better patient-reported outcomes.

Conclusion:

We demonstrate better clinical outcomes in patients undergoing ACDF for cervical radiculopathy with shorter symptom duration. Based on this data, we would advocate for prompt treatment of cervical radiculopathy to avoid long-term impairment.

Funding Sources:

None.

Does Addition of a Longer-Acting Local Anesthetic Improve Post-Operative Pain After Carpal Tunnel Release? A Randomized Controlled Trial

Platform Presenter: Dr. David Sauder

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

Team Members/Affiliations:

Dr. Emily Chan (Department of Surgery, Dalhousie University), Dr. Laura Sims (Department of Surgery, University of Saskatchewan), Dr. Churao Yang (Department of Anesthesiology, University of Saskatchewan).

Rationale:

Carpal tunnel release (CTR) is a simple and effective treatment for carpal tunnel syndrome in patients who have failed conservative management. In Canada, this surgery is often performed in the ambulatory clinic under local anesthesia, with lidocaine (a short-acting agent) as the drug of choice. Few studies have investigated the use of longer acting agents (such as bupivacaine) for outpatient CTR. Therefore, the aim of our study was to compare the post-operative pain experience after CTR with the use of either our standard lidocaine solution (control) or a mixture consisting of lidocaine and bupivacaine in equal amounts (intervention).

Methods:

Patients undergoing CTR were randomized into control or intervention groups. Post-operative pain severity and numbness were recorded at several timepoints within the first 72 hours. The timing and quantity of post-operative analgesic use (Acetaminophen and/or Ibuprofen) were also documented. Both patients and assessor were blinded to allocation.

Results:

Our study cohort included 139 patients: 67 in the control group and 72 in the intervention group. Post-operative pain scores were significantly lower in the intervention group at 6 hours (2.29 vs. 3.19, $p=0.01$) and 8 hours (2.92 vs. 3.87, $p=0.02$). Additionally, patients in the intervention group reported longer time to first analgesic use than those in the control group (5.2 hours vs. 3.7 hours, $p=0.02$). A greater proportion of patients in the intervention group reported post-operative numbness at nearly all time points, compared to the control group.

Conclusion:

Our study shows that a mixture of bupivacaine and lidocaine improves early post-operative pain but causes prolonged numbness when compared to lidocaine alone. While both anesthetics are effective and feasible for outpatient CTR, it is our current practice to use lidocaine with epinephrine and sodium bicarbonate. We have found that this mixture provides the optimal balance of post-operative pain control and numbness resolution.

Funding Sources:

SCH Orthopedic Advancement Fund.

The Use of Sentinel Lymph Node Biopsy in Prophylactic Mastectomy: A Retrospective Cohort Study

Platform Presenter: Dr. Aiya Amery

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

Team Members/Affiliations:

Dr. Nicole Labine (Department of Surgery, University of Saskatchewan), Dr. Kyle Irvine (Department of Surgery, University of Saskatchewan), Dr. Gladys Bruyninx (Department of Surgery, University of Saskatchewan), Dr. Ray Deobald (Department of Surgery, University of Saskatchewan).

Rationale:

The prophylactic mastectomy plays a crucial role in mitigating the risk of breast cancer, particularly in high-risk individuals. During breast cancer surgery, a sentinel lymph node biopsy (SLNB) is often conducted to gather staging data and inform subsequent treatments. The incidence of incidental occult malignancy during prophylactic mastectomy ranges from 0.5% to 6%, leading to variations in surgical practice regarding SLNB completion. This study aims to ascertain the occult disease rate in prophylactic mastectomy patients, identifying characteristics and risk factors associated with occult malignancy, including preoperative imaging.

Methods:

A retrospective chart review of prophylactic mastectomy cases from 2011 to 2021 at the Saskatoon Breast Health Center was conducted. Data analysis utilised SPSS v.29 (IBM Corp, Armonk, NY), employing Pearson's Chi-squared Test where applicable, with significance set at $p < 0.05$. Primary outcomes encompassed SLNB rates and descriptive data of prophylactic mastectomy recipients, while secondary outcomes included occult pathology and malignancy rates, as well as risk stratification for patients with gene mutations, lobular carcinoma in situ (LCIS), and prior MRI.

Results:

SLNBs were performed in 56.7% of prophylactic mastectomies. The incidence of occult pathology and malignancy were at 5.37% and 2.68%, respectively, with no positive SLNB among occult malignancy cases. The rate of occult malignancy in patients with a preoperative MRI < 12 months before prophylactic mastectomy with BiRADS ≤ 4 was 0.08. A history of LCIS did not correlate with malignancy or occult pathology. Known gene mutations correlated with occult pathology ($p=0.005$), however, not with malignancy ($p=0.129$). Furthermore, having a first-degree relative or multiple relatives with breast cancer was not significantly associated with occult pathology or malignancy ($p=0.565, 0.058, 0.982, 0.612$, respectively).

Conclusion:

This research will inform the care of future patients by risk stratifying those who can forgo a sentinel lymph node biopsy and its associated complications.

Funding Sources:

None.

Does Intra-Operative Range of Motion at the Time of Scaphoidectomy and Four-Corner Fusion Predict Post-operative Range of Motion?

Platform Presenter: Dr. Matthew Getzlaf

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

Team Members/Affiliations:

Dr. Laura Sims (Department of Surgery, University of Saskatchewan), Dr. David Sauder (Department of Surgery, University of Saskatchewan).

Rationale:

Range of motion radiographs are routinely taken intra-operatively during scaphoidectomy and four corner fusion surgery (S4CF). It is not known if the range of motion observed at that time predicts post-operative range of motion. We hypothesize that patients with a greater intra-operative motion arc would have an improved post-operative ROM at one year, but that this arc would be less than that achieved intra-operatively.

Methods:

Intraoperative range of motion was measured from fluoroscopic images taken in flexion and extension at the time of surgery. Range of motion was measured using a goniometer during video interview. T-test was used to determine whether there was difference between intra-operative and post-operative ROM. Pearson Correlation was used to measure association, and linear regression was conducted to assess whether intra-operative ROM predicts post-operative ROM.

Results:

Nineteen patients, two of whom had bilateral surgery, agreed to participate. The mean age was 54. There were a total 15 male and 6 female wrists in the study. In most cases the indication was scapholunate advanced collapse, with two cases of scaphoid nonunion advanced collapse. No difference was observed between intra-operative and post-operative flexion. On average there was an increase of seven degrees of extension and 12 degrees of arc of motion post operatively with p values of 0.97 and 0.96 respectively. Correlation between intra-operative and post-operative ROM did not reach statistical significance for flexion, extension, or arc of motion.

Conclusion:

Intraoperative ROM radiographs are not useful at predicting post-operative ROM. Post-operative ROM did increase from that measured intra-operatively.

Funding Sources:

Department of Surgery Resident Research Award.

Optimizing CO₂ Based Contrast Agents for Use in Pig Hindlimb Angiography

Platform Presenter: Dr. David Kopriva

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

Team Members/Affiliations:

Dr. Muhammad Raj (Department of Medical Imaging, University of Saskatchewan), Dr. James Carmalt (Department of Large Animal Clinical Sciences, University of Saskatchewan), Lael Alva (Department of Surgery, University of Saskatchewan).

Rationale:

Iodinated contrast is the gold standard agent for catheter angiography. It is however associated with the risk of contrast nephropathy, particularly in patients with pre-existing kidney disease. Digital subtraction angiography (DSA) using carbon dioxide gas has been used as a substitute, but it is associated with poor image quality. We test CO₂ bubble mixtures against CO₂ gas angiography.

Methods:

Hind limb catheter-based DSA was performed on three anesthetized pigs comparing Iovue-300 (iodinated contrast agent) with CO₂ gas, CO₂ bubble mixtures made by agitation of CO₂ with pig blood, 10% albumin, and 25% albumin. Qualitative assessments of image quality were confirmed with quantitative counts of proximal and distal arterial branch points.

Results:

The gold standard technique with iodinated contrast demonstrated a mean of 7.7 + 1.5 (mean + SD) proximal arterial branch points and 5.5 + 0.7 distal branch points. Blood foam and 25% albumin produced image quality inferior to the gold standard, demonstrating 6.0 + 1.4 and 5.3 + 1.5 proximal arterial branch points respectively, 3.0 + 1.4 and 3.5 + 0.7 distal arterial branch points respectively. Carbon dioxide gas, the current alternative to iodinated contrast administration visualized 4.0 + 1.0 proximal and 4.0 + 1.4 distal branch points.

Conclusion:

Blood and albumin bubble mixtures with carbon dioxide show promise to improve the quality of diagnostic digital subtraction angiography over carbon dioxide gas in a live animal model. Similar benefits may translate to patients in whom it is prudent to avoid the nephrotoxicity of iodinated contrast.

Funding Sources:

Continuous Research Funds.

A Comparison of Thrombolysis with Either tPA or TNK in Large Vessel Occlusion Patients Undergoing Transport to a Comprehensive Stroke Centre for Mechanical Thrombectomy

Platform Presenter: Dr. Braeden Newton

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

Team Members/Affiliations:

Dr. Amit Persad (Department of Surgery, University of Saskatchewan), Dr. Eva Liu (Department of Surgery, University of Saskatchewan), Dr. Gary Hunter (Department of Medicine, University of Saskatchewan), Dr. Regan Cooley (Department of Medicine, University of Saskatchewan), Dr. Sanchea Wasyliw (Department of Medicine, University of Saskatchewan), Dr. Brett Graham (Department of Medicine, University of Saskatchewan), Ruth Whelan (Department of Medicine, University of Saskatchewan), Dr. S. Uzair Ahmed (Department of Surgery, University of Saskatchewan), Dr. Lissa Peeling (Department of Surgery, University of Saskatchewan), Dr. Michael E. Kelly (Department of Surgery, University of Saskatchewan).

Rationale:

Evidence suggests that patients with large vessel occlusions (LVOs) treated with tenecteplase (TNK) have higher rates of recanalization compared to tissue plasminogen activator (tPA). We compared patients in the periphery treated with tPA or TNK transferred to the comprehensive stroke centre (CSC) for mechanical thrombectomy (MT) and recanalization rates.

Methods:

We performed a retrospective review of patients between January 1, 2022 and December 31, 2023 with LVOs transferred to the CSC with intention for MT. Baseline demographics, stroke characteristics, rates of MT, and reasons for no MT were compared. Parametric continuous data, non-parametric continuous data, and categorical data were compared by Student's t-test, Mann-Whitney U-test, and chi-squared test, respectively.

Results:

214 patients were included, 92 of which received tPA and 122 received TNK. 64 (30%) of the 214 did not receive MT, including 27 (29%) tPA patients and 37 (30%) TNK patients. There was no significant difference in baseline demographics or stroke characteristics between the thrombolytic populations. Reasons for no MT for the tPA and TNK populations include recanalization (12 (44%) vs 13 (35%)), symptom improvement (7 (26%) vs 8 (21%)), evolution of stroke (8 (29%) vs 15 (40%)) and anatomy (0 vs 1 (3%)). There was no statistical difference in the reasons for not receiving MT between the populations ($p=0.715$).

Conclusion:

Despite evidence suggesting superiority of TNK over tPA for early recanalization of LVOs, we did not observe the same trend. Our study also supports that patients treated with thrombolysis in the periphery should continue to be transferred for consideration of MT.

Funding Sources:

None.

Be Kind to Your Behind: A Randomized Controlled Trial on Bidet Use in the Treatment of Perianal Disease

Platform Presenter: Dr. Zarrukh Baig

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

Team Members/Affiliations:

Dr. Nawaf Abu-Omar (Department of Surgery, University of Saskatchewan), Dr. Carlos Verdiales (Department of Surgery, University of Saskatchewan), Rubia Ahmed (College of Medicine, University of Saskatchewan), Dr. Nathan Ginther (Department of Surgery, University of Saskatchewan), Dr. Dilip Gill (Department of Surgery, University of Saskatchewan).

Rationale:

Perianal conditions of fissures and hemorrhoids affects up to 50% of North Americans during their lifetime. These patients suffer from pain, bleeding, and itching resulting in significant morbidity and financial cost. Treatments include sitz-baths, fiber, and topical agents. Anecdotally, water bidets may offer some benefit for hemorrhoidal and fissure symptoms.

Methods:

This was a randomized-controlled trial. Patients presenting to general surgeons suffering from either hemorrhoids or fissures, of any grade, were randomized to either bidet or no-bidet use for 12 weeks. Patients' symptoms were measured at baseline (0 weeks), 6 weeks, and 12-weeks through a self-reported proctological symptom score (PSS) and a SF-12 quality of life survey, which measures a physical component score (SF-12-PCS) and a mental component score (SF-12-MCS). A linear regression model was used to assess PSS and SF-12 scores at 12 weeks with bidet use, followed by a multivariate regression model adjusting for compliance, and a sensitivity analysis for hemorrhoids only or fissures only. Finally, a longitudinal regression model was used to assess the rate of symptom improvement. The study was powered for 120 patients to show a 20% improvement. 35/120 patients were enrolled with follow-up data for 24 patients.

Results:

After 12-weeks, bidets offered no improvement in PSS scores (19.33 vs 8.87, $p=0.66$), SF-12-PCS scores (48.80 vs 47.11, $p=0.69$), or SF-12-MCS scores (42.89 vs 43.67, $p=0.87$). A multivariate analysis adjusting for compliance also found no difference in any outcomes. A longitudinal analysis found PSS scores improved faster at the 6week mark for bidet users ($p=0.02$).

Conclusion:

The preliminary analysis does not identify any significant differences in outcomes.

Funding Sources:

HelloTushy.Com offered bidets at a subsidized rate, but they have no influence in the analysis and distribution of the results. There were no stipends received from the company. The authors have no conflicts of interest.

Comparative Diagnostic Value of Serological and Synovial Tests for Periprosthetic Joint Infections: A Comprehensive Analysis

Platform Presenter: Dr. Mars Zhao

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

Team Members/Affiliations:

Evan Parchomchuk (College of Medicine, University of Saskatchewan), Dr. Jans van der Merwe (Department of Surgery, University of Saskatchewan).

Rationale:

Prompt diagnosis of periprosthetic joint infections (PJIs) is crucial to provide optimal care. Currently, there are no gold standard tests. An ideal test would be simple to implement, cost effective and readily available. We aimed to determine the best single or combined serological or synovial markers for diagnosing PJIs.

Methods:

One-hundred and seventy-seven out of 313 patients with PJIs between April 2012 – March 2023 and a control group of 60 patients were included in this retrospective review. Serum (C-reactive protein (CRP), white blood-cell (WBC) count, neutrophil-lymphocyte ratio (NLR), percent polymorphonuclear neutrophil (%PMN)) and synovial fluid (WBC, NLR, %PMN) parameters were compared between the two groups. We determined the sensitivity, specificity, area under the curve (AUC), cut-off values (COV) for each marker. We determined the best combination of markers to diagnose PJIs.

Results:

There was no statistical significance between the demographic data of the control and treatment group. S-CRP had the highest AUC 0.912 with COV of 16.15 mg/dl (sensitivity 79.6%, specificity 97.8%). The combination of tests, S-CRP, SF-WBC and S-NLR demonstrated the highest AUC of 0.946 (sensitivity 93%, specificity 90.9%). The COV for SF-WBC is 5.75 cells/ul (AUC 0.803; sensitivity 70.3%, specificity 97.1%); S-NLR COV is 3.659 (AUC 0.803; sensitivity 67.3%, specificity 88%).

Conclusion:

We found the combination of S-CRP, SF-WBC and S-NLR to be a valuable in diagnosing PJI with high sensitivities and specificities. It can be easily implemented by clinicians without additional cost or equipment. It is important to use this with a thorough clinical and physical examination and other modalities.

Funding Sources:

None.

BMI as a Predictor of Recurrence in High-Grade Meningioma: A Single-Center Retrospective Cohort Study

Platform Presenter: Dr. Patrick Toyota

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

Team Members/Affiliations:

Dr. Amit Persad (Department of Surgery, Stanford University), Dr. Eva Liu (Department of Surgery, University of Saskatchewan), Dr. Jasleen Saini (Department of Surgery, University of Toronto), Dr. Viktor Zhrebetskiy (Department of Pathology and Laboratory Medicine, University of Saskatchewan). Dr. Roland Auer (Department of Surgery, University of Saskatchewan), Dr. Luke Hnenny (Department of Surgery, University of Saskatchewan).

Rationale:

Elevated BMI has been proposed as a risk factor for the development of meningioma. The relationship between body mass index (BMI) and disease control in high-grade meningioma has not yet been examined. A retrospective cohort study was performed to assess the relationship between high-grade meningioma recurrence and BMI.

Methods:

This is a retrospective cohort study of patients with Grade 2 or Grade 3 meningioma at a single tertiary care center between 2008 and 2017. We collected clinical data including age, sex, BMI, location, Simpson grade, brain invasion, and radiation treatments. Disease control was monitored on follow up MRI scans. We stratified patients by BMI greater than or less than 25.

Results:

A total of 45 patients were included. The mean age at presentation was 66 years old. In our series, there were 26 female patients (57.8%) and 19 male patients (42.2%). Recurrence was observed in 15 patients (33.3%). There were 32 (71.1%) patients with BMI >25, and 13 (28.9%) patients with normal BMI. The mean time to recurrence was 24 months. Patients with elevated BMI had higher risk of recurrence ($p=0.04$). Multivariate analysis identified BMI as an independent predictor of recurrence.

Conclusion:

Our results suggest that overweight patients with a Grade 2 or Grade 3 meningioma are at a higher risk of recurrence than patients with normal BMI. The explanation for this association is as yet unknown. Further research is suggested to confirm and better characterize this association.

Funding Sources:

None.

Can We Prevent a Nephrectomy? The Efficacy and Safety of Irreversible Electroporation in Treating Challenging Small Renal Cancers

Platform Presenter: Sergey Kens

Undergraduate Medical Student

College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Dr. Trustin Domes (Department of Surgery, University of Saskatchewan), Dr. Chris Wall (Department of Diagnostic Imaging, University of Saskatchewan), Dr. Kunal Jana (Department of Surgery, University of Saskatchewan).

Rationale:

Irreversible electroporation (IRE) is a novel ablation procedure used for treating small renal masses such as renal cell carcinomas (RCC). This prospective case series explores IRE's effectiveness and 6-year outcomes in patients with difficult-to-treat RCC. We report the tumour-free survival (TFS), document complications and renal function changes.

Methods:

IRE was offered to patients with a biopsy-confirmed RCC in a solitary kidney, von Hippel Lindau syndrome, or a difficult-to-treat RCC that was deemed amenable only to radical nephrectomy for tumour control. Follow-up protocol at 3, 12, 24, 36, 48, 60 and 72 months post-IRE included creatinine, eGFR, and gadolinium-enhanced MRI to monitor for residual or recurrent disease. 27 biopsy-proven RCC were treated in 27 patients. The median follow-up time was 42 months (range 3-72).

Results:

Post-IRE, 6 patients experienced immediate adverse events (AE): 4 transient hematuria (Clavien-Dindo grade (CD) 1), 1 hematoma requiring transfusion (CD 2), 1 PE (CD 2). 1 patient received a ureteral stent for a delayed ureteral stricture (CD 3a). At 3 months, residual tumours were found in 5 patients, making a treatment success rate of 81.5%. 4 patients were managed with salvage thermal ablation (3 microwave(MWA), 1 radiofrequency) and 1 patient underwent laparoscopic nephrectomy (LN). 4 patients with recurrent RCC (mean time of 21 months) were managed with surveillance, MWA, and LN. No patient developed metastasis. The 6-year TFS rate was 79.3% with no deaths due to RCC. The average eGFR decline at 12 and 72 months was 9 and 6.3 mL/min/1.73m².

Conclusion:

This study demonstrates that patients with difficult-to-treat RCCs can be treated with IRE safely and effectively.

Funding Sources:

None.

Institution Specific Rates and Current Trends in Treatment of Delayed Gastric Emptying Post Pancreaticoduodenectomy in Saskatchewan

Platform Presenter: Dr. Melanie Elhafid

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

Team Members/Affiliations:

Dr. Katlin Mallette (Department of Surgery, University of Ottawa), Dr. Fiza Noor (Department of Medical Education, University of Saskatchewan), Dr. John Shaw (Department of Surgery, University of Saskatchewan).

Rationale:

Pancreaticoduodenectomy is a common procedure for resection of pancreatic cancer that has significant morbidity and mortality. Delayed gastric emptying (DGE) is a known complication from this surgery. Rates of DGE post pancreaticoduodenectomy in previous studies were reported at 10-45%. The aim of this study is to determine the actual rates of DGE, complications and outcomes at our center.

Methods:

This is a single institution, retrospective study. Eligible patients underwent pancreaticoduodenectomy between January 2014 and June 2022. Patients were excluded if they had incomplete resection, or a pre-operative diagnosis of DGE. Data was evaluated using standard statistics. Groups were compared using a two-sided t-test with a 95% confidence interval.

Results:

A total of 212 patients were included in our study, and 31% developed DGE. These patients had a significantly longer post-operative length of stay (LOS), by a mean of 16.6 days (11.3 vs. 27.9, $p < 0.05$). Median time to resolution of DGE was 13 days. Patients also experienced higher rates of pancreatic fistulas (12.3% vs. 0%, $p < 0.05$) and surgical site infections (15.8% vs. 1.8%, $p < 0.05$). DGE patients required transfer to home hospital or a rehabilitation center more frequently when compared to those without DGE (17.6% vs. 5.3%).

Conclusion:

DGE remains a common complication post pancreaticoduodenectomy at our institution. Patients experience significantly longer LOS, more post-operative complications and longer post-operative recovery. Improving management of DGE would benefit patient well-being and hospital costs. We plan to move forward with a clinical trial aimed at decreasing our local rates of this complication.

Funding Sources:

None.

Inclinometer Use in Primary Total Hip Arthroplasty Does Not Improve Acetabular Component Positioning: A Control Trial

Platform Presenter: Dr. Kyle Goldstein

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

Team Members/Affiliations:

Dr. Wyatt Tyndall (College of Medicine, University of Saskatchewan), Michaela Nickol (Department of Surgery, University of Saskatchewan), Dr. Jans van der Merwe (Department of Surgery, University of Saskatchewan).

Rationale:

Total hip arthroplasty (THA) is a common surgical procedure that aims to relieve pain, improve function, and increase mobility in patients with hip joint pathology. One of the most challenging aspects of THA is determining the correct angle of the acetabular component's placement. Intraoperative inclinometers have emerged as a promising tool to obtain accurate measurements of the acetabular component's inclination. The primary objective of this study was to evaluate the accuracy and efficacy of using intra-operative inclinometers for THA.

Methods:

This non-randomized control trial evaluated patients undergoing primary THA. Patients in the inclinometer group had an inclinometer used intra-operatively to measure acetabular component inclination, and patients in the control group had no inclinometer. Inclination and anteversion of the acetabular component were measured on post-operative radiographs.

Results:

A total of 223 patients were included in the study. Mean inclination angle of the acetabular cup was statistically significantly higher in the inclinometer group (43.9° vs 41.5°, $P < 0.001$). This difference was not clinically significant. There was no significant difference in anteversion. There were not significant differences in number of patients within the safe zones for inclination or anteversion, or in number of patients experiencing a dislocation. There was no correlation between inclinometer measurement and acetabular inclination. Inclinometer use and body mass index were the sole statistically significant factors in determining acetabular component inclination.

Conclusion:

This study indicates no current benefit to inclinometer use during primary THA, as measured by inclination, anteversion, and dislocation rate. However, this is likely confounded by subtle variations in patient positioning, which may be a strong area of study in the future.

Funding Sources:

None.

Utility of Neurophysiology in the Diagnosis of Tethered Cord Syndrome (TCS)

Platform Presenter: Dr. Nicole Pendleton

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

Team Members/Affiliations:

Dr. Eva Liu (Department of Surgery, University of Saskatchewan), Dr. Amit Persad (Department of Surgery, Stanford University), Dr. Aleksander Vitali (Department of Surgery, University of Saskatchewan), Dr. Julia Radic (Department of Surgery, University of Saskatchewan), Dr. Jonathan Norton (Department of Surgery, University of Saskatchewan).

Rationale:

Tethered cord syndrome (TCS), a condition in which the spinal cord stretches as a child grows, can cause clinical symptoms. It is typically associated with radiographic features of occult spinal dysraphism. Rarely, occult TCS (OTCS) is a condition where a child displays some or many clinical symptoms of TCS, but no radiographic abnormality confirms the presence of a tethered cord.

Diagnosis is typically based on clinical exam and imaging findings. However, in OTCS or in complex cases with confounding potential alternative causes of the clinical symptoms, confirmatory diagnostic tests are often needed to confirm a neurogenic/spinal cord etiology of the symptoms, such as urodynamic testing for bladder symptoms or transcranial electric stimulation (TES) motor evoked potentials (MEPs)/somatosensory evoked potentials (SSEPs) under general anesthesia for motor/sensory symptoms.

We have developed and used a simple awake, outpatient diagnostic test to test MEPs using transcranial magnetic stimulation (TMS), to obviate the need for general anesthesia in these patients and make MEP testing more accessible.

Methods:

We have a case series of children at our center who have undergone TMS. We characterized the children who have TCS and suspected OTCS and detail the children's current diagnosis methods and outcomes in a technical note. We will then compare their pre-operative and post-operative data.

Results:

We have conducted TMS on 8 children to help diagnose occult TCS. We ruled out TCS in 5 children and 3 children have had surgery/pending OR.

Conclusion:

The next step is to do a prospective study assessing children with known occult spinal dysraphism on imaging who are at elevated risk of developing TCS with TMS MEPs in coordination with their surveillance clinic visits, to verify that clinical deterioration is concordant with MEP deterioration.

Funding Sources:

None.

Initiation of a Novel Text Messaging System in Total Knee and Hip Replacements

Platform Presenter: Dr. Jans van der Merwe

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

Team Members/Affiliations:

Michaela Nickol (Department of Surgery, University of Saskatchewan).

Rationale:

This study aims to compare the effectiveness of a novel text messaging system with standard care in improving patient experience following total knee arthroplasty (TKA) or total hip arthroplasty (THA).

Methods:

We enrolled 246 patients in this non randomized controlled trial. One hundred thirty-one patients (76 males; 55 females) did not receive text messages (conventional group) while 115 (79 males; 36 females) patients did receive text messages (text messaging group). The intervention group received text messages perioperatively in addition to standard of care, while the control group only continued on with standard of care practices. Questionnaires were filled out at the 6 weeks mark.

Results:

There was no difference in satisfaction rates between the two groups ($p=0.644$). There was a statistically significant difference in favour of the text messaging group with telephone calls to the surgeon's office ($p=0.029$). No difference was found in emergency department visits ($p=0.065$) or duration of narcotic usage ($p=0.185$). Subgroup analysis comparing the TKA and THA separately demonstrated no statistical difference between the primary and secondary objectives except for telephone calls to the surgeons office which favoured the TKA group ($p=0.046$).

Conclusion:

Instituting a novel text messaging system can be very useful in reducing the work burden by decreasing telephone calls to the surgeon's office. Even though there wasn't a statistically significant difference in satisfaction rates, duration of narcotic usage, range of motion of total knee replacements between the intervention and control group, all patients would recommend it to friends or family.

Funding Sources:

Saskatchewan Orthopedic Research Funding Allocation Committee.

2024

DEPARTMENT OF SURGERY

RESEARCH DAY

POSTER SESSION ABSTRACTS

Anatomical Patterns in Partial Distal Biceps Tendon Tears

Poster Presenter: Mason Beaulieu

Undergraduate Medical Student
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Dr. Laura Sims (Department of Surgery, University of Saskatchewan), Dr. Haron Obaid (Department of Radiology, University of Saskatchewan).

Rationale:

Evaluating partial distal bicep tear patterns, ruptures and their correlates would augment our understanding and guide treatment.

Methods:

MRI studies of partial distal biceps tendons tears evaluated with FABS protocols were reviewed. Tear patterns (long head vs short head) and size were mapped and anatomical risk factors (radial tuberosity length and thickness, radioulnar space, radial tuberosity-ulnar space, presence of enthesophytes) for tearing were evaluated and correlated with tear patterns.

Results:

Twenty-nine MRI studies from 2013-2023 were included in the final analysis. Five (17.2%), 14 (48.3%), and 10 (34.5%) images were reported as low, middle, and high grade tears respectively. Sixteen (55.2%) had isolated short head tears, 4 (13.8%) had isolated long head tears, and 9 (31%) had components of both. The most common type of tear was a partial tear of the short head with sparing of the long head in the setting of trauma 10 (34.5%). Enthesophytes were observed in 9 (31%) of reports. No significant differences were noted in tuberosity thickness, radioulnar space, nor radial tuberosity ulnar space between traumatic and atraumatic mechanisms.

Conclusion:

Distinct partial distal bicep tear patterns exist. Further research with standardized imaging protocols and larger sample sizes are needed to determine whether anatomical risk factors are correlated with tear patterns.

Funding Sources:

None.

Racial and Ethnic Disparities in Health Outcomes after Surgery in Canada

Platform Presenter: Dr. Corey Blushke

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

Team Members/Affiliations:

Dr. Nolan Hunka (Department of Surgery, University of Saskatchewan), Dr. Dilip Gill (Department of Surgery, University of Saskatchewan).

Rationale:

The impact of social determinants on health has been well studied in the literature. A paper recently looked at racial and ethnic outcomes after surgery in the US, highlighting the disparities in surgical outcomes between races. Research from the General Surgery program here at the University of Saskatchewan has investigated disparities in surgical outcomes in oncological surgery, finding that overall mortality was higher for Indigenous patients than all other patients in the available literature. However, any disparities in surgical outcomes generally have not been investigated at a national level. Our objective with this scoping review is to summarize the evidence looking at racial and ethnic disparities in surgical care and outcomes in Canada.

Methods:

This research is being conducted as a scoping review. A database search strategy was developed with a clinical librarian to include RCTs, observational studies, case series, case reports, review articles and systematic reviews related to racial and ethnic outcomes after surgery in Canada. These articles were then reviewed independently by two reviewers to determine which were appropriate to include within the study. Summarization of the papers as well as themes will be generated from this as results for the study.

Progress | Interim Results:

Currently all papers included in the initial search have been reviewed independently and are now being reviewed together to determine the final list of papers to be included in this study. Many thanks to Rubia Ahmed (CC4) and Dr. Zarrukh Baig for sharing their work in disparities in oncological surgery outcomes.

Funding Sources:

None.

Inhaled Xenon as a Vascular Contrast Agent in Dual-Energy Computed Tomography

Platform Presenter: Zakhar Kanyuka

Undergraduate Medical Student
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Hallie Halldorson (Reginal General Hospital), Jeannette Bigelow (Regina General Hospital), Dr. Kunal Goyal (Radiologist, Saskatchewan Health Authority), Dr. David Kopriva (Department of Surgery, University of Saskatchewan).

Rationale:

Dual energy computed tomography (DECT) facilitates imaging at lower doses of vascular contrast agents by improving the signal-to-noise ratio. We hypothesize that the signal-to-noise benefits of DECT may now make imaging feasible with non-nephrotoxic contrast agents such as xenon (Xe). We investigate the feasibility of 30% inhaled Xe as a vascular contrast agent in a DECT scanner.

Methods:

A volunteer inhaled a mixture of 30% Xe and 70% oxygen for approximately 10 minutes to assess the attenuation of her thoracoabdominal aorta on CT. Throughout this time, we obtained time-resolved images of the area with attenuation measured in a region of interest (ROI) in the aorta. Thus, we acquired a data set demonstrating attenuation in the ROI over time. We then acquired an abdominal DECT scan from which we generated images at 50, 70, and 120 keV using monochromatic imaging reconstruction and created iodine and Xe maps using material decomposition.

Results:

The participant reported a lowering of the audible pitch of her voice but no other side effects after inhaling the Xe. The lumen of her thoracoabdominal aorta was not significantly enhanced from baseline. None of the reconstructed images, the iodine map, nor the material decomposition renderings exhibited sufficient luminal enhancement of the thoracoabdominal aorta to distinguish it from the vascular tissue.

Conclusion:

We conclude that 30% inhaled Xe does not provide sufficient blood enhancement to facilitate vascular imaging using a DECT scanner. Despite known solubility of Xe in blood, the resulting enhancement is below the detection limit of currently available DECT scanners.

Funding Sources:

College of Medicine Research Award (CoMRAD) – Dr. David Kopriva.

Global Training Program in Orthopedic Trauma Surgery

Platform Presenter: Dr. Colleen Nesbitt

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

Team Members/Affiliations:

Dr. Peterly Philippe (Hôpital Citymed de Petion-Ville), Dr. Huw Rees (Department of Surgery, University of Saskatchewan), Dr. Scott Willms (Department of Surgery, University of Saskatchewan).

Rationale:

Educators have suggested that providing advanced training to surgeons from low- and middle-income countries (LMICs) strengthens the quality of surgical care in these nations. With this intention, a post-graduate training program for orthopedic surgeons from LMICs has been created by the Division of Orthopedic Surgery. The aim of this study is to evaluate this training program, including the impact of the training on surgeons' practices when they return home.

Methods:

To understand the impact of the teaching and environment on their surgical skills, LMIC surgical trainees' will maintain a surgical case log and participate in regular survey questionnaires and interviews. Follow-up surveys after the surgeons have returned home will evaluate training adaptation. Successful integration of the program will be evaluated by interviews with local orthopedic surgeons and residents at the conclusion of the one-year program.

Results:

This program is currently hosting one trainee from Haiti, and results are forthcoming. Through case load repetition, teaching, and mentoring, this training program seeks to instill confidence in the management of common orthopedic presentations. Ultimately, the goal is to build surgical capacity and expertise in LMIC's through a sustainable educational partnership. Evaluation of the program's impact for the trainees, as well as the host institution's staff and residents is essential for adaptation and relevance of the program.

Conclusion:

This is the first program of its kind in Canada and seeks to successfully demonstrate support of LMIC surgeons in their development of sustainable surgical systems within their home .

Funding Sources:

Team Broken Earth.

Closing the Gap in Vein Conduit Access Inequities by Implementing the First Non-Mechanical, Maintenance Free, Remotely Monitored Freezer Program Worldwide

Platform Presenter: Hannah Strinholm

Undergraduate Medical Student
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Team Members/Affiliations:

Dr. Jennifer Culig (Department of Surgery, University of Saskatchewan).

Rationale:

Autologous vein is the preferred revascularization conduit but may be unusable in certain patients. Cryopreserved vein allografts are an alternative found for vascular reconstruction. It can take 24-48 hours for a cryopreserved vein to arrive at a rural and remote centre. Saskatoon, Saskatchewan is the first center to utilize the non-mechanical, maintenance-free, remotely monitored freezer program in the world.

Methods:

Saskatoon has a catchment area of 700,000. St Paul's Hospital is one of the highest use cryopreserved allografts centers in Canada, using them when autologous venous conduits are unusable. Installation of the new Hair Biomedical Smart Series has now allowed for access to vascular cryo-tissue for planned and emergent options. The freezer was installed adjacent to our operating theatre for easy access.

Results:

Using the freezer program allows the option to use cryopreserved allografts from decision to implementation in under 30 minutes. The freezer stores various sizes of allografts enabling surgeons to select the conduit specifically required for their case. It is an aluminum constructed no power freezer with low consumption rate. It is automatically monitored remotely for accurate storage temperature and liquid level. Real time monitoring is completed, and alarms are transmitted via email, IM and WeChat.

Conclusion:

By implementing the freezer program, St. Paul's Hospital in Saskatoon is actively closing the gap in vein conduit access for vascular patients requiring the cryopreserved vein option. The freezer provides equal access to rural and remote centers across the country enabling surgeons to use the conduit of their choice..

Funding Sources:

None.

Flow Diversion of Ophthalmic Artery Aneurysm Causing Visual Deficit: a Case Report and Review of Literature

Platform Presenter: Dr. Hsuan Ming (Jack) Su

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Team Members/Affiliations:

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Rationale:

Ophthalmic artery aneurysms arise from the ophthalmic segment of the internal carotid artery. Due to its relative anatomic location, visual deficits may uncommonly occur secondary to optic nerve compression. Although various treatment modalities are available, the current literature remains limited when comparing the different treatment modalities and the long-term visual outcomes.

Methods:

A comprehensive literature search was conducted through the MEDLINE and EMBASE databases with Specific Medical Subject Headings and keywords for (ophthalmic artery aneurysm or ophthalmic ICA aneurysm) and (vision or visual). A total of 34 studies were identified.

Results:

We describe a case of a 31-year-old female presenting with 1 month of progressive left-sided visual deficit, secondary to optic nerve compression from a 10 x 8 mm left ophthalmic artery aneurysm. A pipeline embolization device was employed over the clinoid and ophthalmic segments of the internal carotid artery. A repeat angiogram at 6-months demonstrated completed exclusion of the aneurysm with preservation of visual function. Review of the literature revealed 34 observational studies and systematic reviews which included 3558 patients. Various treatment techniques were described including surgical clipping, endovascular coiling, and flow diversion. A systematic review comparing these techniques noted that although not statistically significant, flow diversion may be associated with higher rate of visual improvement (71% with flow diversion, 58% with clipping, 49% with coiling).

Conclusion:

Flow diversion is a promising treatment for ophthalmic artery aneurysms, with early studies demonstrating a trend towards higher rates of visual improvement when compared with surgical clipping or coiling.

Funding Sources:

None.

Optimizing Patient Engagement for Assessing Total Joint Arthroplasty Outcomes

Platform Presenter: Dr. Jans van der Merwe

Division of Orthopedic Surgery, Department of Surgery
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Team Members/Affiliations:

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Rationale:

Patient reported outcome measures are now routinely collected in the office but periodically patients have to be contacted via mail or telephone to obtain these questionnaires. This study aims to assess what is the best method of reaching patients successfully.

Methods:

Patients were randomized into one of three "incentive-groups" – (1) A \$10 gift-card included directly in the package with no obligation to fill in the questionnaire, (2) The promise to be mailed a \$10 gift-card upon mail-in return of the filled in questionnaire package, and (3) No financial incentive to be provided at all. Patients were contacted via telephone to request participation and complete questionnaires over the phone if the questionnaires were not returned by mail.

Results:

We included 188 patients in the final review. 124 patients returned the mailed in packages. Group 2 had the highest mail back percentage of 56.2% (45/80) followed by group 1, 54% (44/81) and group 3, 39% (32/82) ($P=0.056$). There was no correlation between participation by mail or phone calls and age or sex (Pearson $R=0.015$, Cramer's $V = 0.074$). There was a higher correlation between a higher KOOS JR score and total participation (Kendall's Tau = 0,249; $p<0,001$).

Conclusion:

While no statistically significant difference was observed among the incentive groups in terms of mail-back response rates, the study sheds light on the importance of strategies including incentives and utilizing telephone follow-ups. Further research could delve into refining methods for maximizing patient engagement and optimizing data collection processes in orthopedic practice.

Funding Sources:

Saskatchewan Orthopedic Research Funding Allocation Committee.

Wrist Fusion Surgery Alters Shoulder Kinematics During Functional Tasks Compared to Non-Fusion Side

Platform Presenter: Alexander Waslen

Undergraduate Medical Student
College of Medicine, University of Saskatchewan

Team Members/Affiliations:

Dr. Laura Sims (Department of Surgery, University of Saskatchewan), Dr. Angelica E. Lang (Canadian Centre for Rural and Agricultural Health, University of Saskatchewan), Dr. David Sauder (Department of Surgery, University of Saskatchewan).

Rationale:

Wrist fusion surgery is a commonly used treatment for late-stage rheumatoid arthritis that decreases pain but eliminates mobility at the wrist. Total wrist fusion patients report having difficulties with several tasks of daily living including reaching high shelves and perineal care. The purpose of this investigation was to determine whether total wrist fusion surgery causes kinematic changes in the upper limb compared to the non-wrist fusion arm during functional tasks.

Methods:

Seven participants who had undergone unilateral total wrist fusion surgery more than six months ago were recruited. All participants completed a series of eight functional tasks while their upper limb kinematic data was recorded with the Vicon motion capture system. Scapular and humeral angles were calculated and compared between wrist fusion and non-wrist fusion arms in each participant.

Results:

Wrist fusion resulted in increased scapular upward rotation during the forward transfer and wash axilla tasks, as well as increased humeral rotation and scapular protraction during the hair comb task when compared to the non-wrist fusion arm.

Conclusion:

Knowing that total wrist fusion may contribute to these kinematic changes could allow for rehabilitation strategies to prevent long term injury at the shoulder as a result of this procedure.

Funding Sources:

None.



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