UNIVERSITY OF SASKATCHEWAN
UNIVERSITY OF MANITOBA

COMBINED ORTHOPEDIC RESIDENT RESEARCH DAY

October 27, 2023

Asher Auditorium
Saskatoon City Hospital

Guest Speaker
Maryse Bouchard, MD, MSc

Paediatric Orthopaedic Surgeon
The Hospital for Sick Children

Assistant Professor Department of Surgery
University of Toronto

Associate Program Director
Orthopedic Surgery Residency Program

Dr. Maryse Bouchard is assistant professor in the Department of Surgery at the University of Toronto and pediatric orthopedic surgeon at The Hospital for Sick Children. She is fellowship trained in pediatric orthopedics, adult foot and ankle surgery and lower limb reconstruction. She is the associate program director for the University of Toronto Orthopedic Surgery Residency Program with a portfolio of wellness and equity, diversity, and inclusion.

Dr. Bouchard began her career at Seattle Children's Hospital in 2015 and returned to Sick Kids in January 2019. Her research focuses on clinical and patient-reported outcomes of pediatric foot and ankle conditions, innovations in orthopedic medical devices and surgical techniques, and equitable access to orthopedic care. She is active in volunteer organizations that provide training and care in pediatric foot and ankle surgery to children globally.

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SASKATCHEWAN ORTHOPEDICS

TEREBRO ET REPLEO

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Research Director

Drew Mulhall, PGY5
Melinda Joye Fowler-Woods, PGY4
Riley Hemstock, PGY4
Jasmine Lyng, PGY4
Rohit Bansal, PGY3
Nikita Sarangal, PGY3
Andrew Fast, PGY2
Nicholas Steiner, PGY2
Darren Van Essen, PGY1

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Dr. Matthew Getzlaf, PGY5
Dr. Nebojsa Kuljic, PGY5
Dr. Liz Quon, PGY4
Dr. Alexander Le, PGY2
Dr. Kyle Goldstein, PGY2
Dr. Zach Oleynik, PGY2
Dr. Omar Alkhateeb, PGY1
Dr. Colleen Nesbitt, PGY1
Dr. Nordan Flaaten, PGY1
Dr. Mars Zhao, PGY1
Dr. Peterly Philippe,
Global Fellow

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2023 Resident Research Day Program

8:30	Breakfast	
8:45	Opening remarks - Dr. Sims	

SESSION I
Dr. David Sauder, Moderator

9:00	Inclinometer Use in Primary Total Hip Arthroplasty Does Not Improve Acetabular Component Positioning: A Control Trial	Kyle Goldstein
9:10	Incidence and Pattern of Metaphyseal Debonding in Cementless Design Stem in Different Bearing Types: A Case-Control Series Study	Rohit Bansal
9:20	Mid-term Survival Rate and Post-operative Patient Function and Satisfaction with a Guided-motion Hinged Knee Replacement	Nicholas Steiner
9:30	THA Infections: The Saskatoon Experience	Nebojsa Kuljic
9:40	Pharmacological Components of Intraoperative Periarticular Infiltration: A Review	Alexander Le
9:50	"Still a Grey Area in My Practice" Use of Body Mass Index Thresholds for Total Joint Arthroplasty: A Qualitative Study with Orthopedic Surgeons in the Canadian Health Care System	Andrew Fast (Pre-recorded)
10:00	Coffee Break	

SESSION II
Dr. Brad Pilkey, Moderator

10:10	Does Time of Year Affect Time to Surgery in Patients Requiring ORIF of Acetabular Fracture? An Interim Analysis	Nikita Sarangal
10:20	Traumatic Scapular Fractures: A Rural Australian Perspective	Nordan Flaaten
10:30	A Cost-Analysis of Orthopedic Care in Methamphetamine Users at a Canadian Level 1 Trauma Center	Drew Mulhall
10:40	The Impacts of a Night Float Call System within an Orthopedic Residency Program: A Prospective Analysis on Resident Wellness, Satisfaction, and Education (Study Proposal)	Zach Oleynik
10:47	EOS® Biplanar Imaging vs. X-ray for Accurate Measurements of Common Foot and Ankle Parameters (Study Proposal)	Liz Quon
10:54	Orthopedic Trauma on the Weekend: Longer Surgical Wait Times and Increased After-hours Surgery	Darren Van Essen (pre-recorded)

GUEST LECTURE
Dr. Maryse Bouchard

11:10	Dr. Maryse Bouchard: The Path to Becoming an Orthopedic Surgeon Introduction by Dr. Alex Mortimer	
11:45	Group Photo	
12:00	Lunch Break	

SESSION III
Dr. Kristi Billard, Moderator

12:45	The Impact of an Opioid Restriction Protocol Implemented at a Canadian Sports Orthopaedic Surgery Institution	Riley Hemstock
12:55	Inter-rater and Intra-rater Reliability of Virtual Wrist Range of Motion Using Video Coaching	John Perverseff
13:05	Equity of Access to Anterior Cruciate Ligament Reconstruction and Rotator Cuff Repair for Indigenous Peoples: A Provincial Cohort Study	Melinda Joye Fowler-Woods
13:15	Wrist Fusion Alters Shoulder Kinematics	Alexander Waslen
13:25	Standardized Multimodal Analgesia Management Protocol Reduces Total Opioid Intake Following ACL Reconstruction Surgery	Jasmine Lyng (pre-recorded)
13:35	Judges Deliberation	
14:00	Reception & Awards Presentation	

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Combined Resident Research Day

ABSTRACTS

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

Kyle Goldstein, PGY2

Introduction: 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 intraoperative 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.

Conclusions: 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.

Incidence and pattern of Metaphyseal debonding in cementless design stem in different bearing types: A case-control case series study

Rohit Bansal, PGY3, C. Righolt, T. Gascoyne, E.Bohm, T.Turgeon

Background: Radiological loosening has been linked to an increase in revision total hip arthroplasty (THA) despite the otherwise excellent performing Hydroxyapatite (HA) coated Corail stem. One failure mode, identified through implant retrieval analysis, is debonding of the HA coating. This study aimed to investigate the potential causes and associated risk factors for stem loosening.

Methods: We conducted a review of more than 5000 primary THA patients who attended a high-volume center (2006-2021) that had received the primary Corail stem and later required revision THA. Patients with stem delamination were included in the study and were matched (1:5) for the type of stem, age, gender, and BMI. Demographic data, patient-reported outcome measures (PROMs) and implant design specifications were collected for comparison. Stem radiolucency was evaluated using Gruen's classification, and explanted stems were analyzed.

Results: Our case-control analysis included 184 patients with 32 revision hip surgeries identified alongside 152 matched subjects (60±3 years, 55% Males). Over, 70% of the patients were classified as overweight/obese. Aseptic loosening accounted for 53% of revision cases. Among the controls, 58% had collared stems, compared to 62% without collars in the revision group. Over time, PROMs exhibited significant deterioration in the cases compared to the control group. 50% of revision patients had metal-on-polyethylene liners, in contrast to the use of metal-on-metal implants in other series. Moreover, more than 70% of the cases received smaller-sized stems (< 11), whereas the controls predominantly received larger stems (>11) with standard offset being most routinely used across both the groups.

Conclusion: This study highlights the heightened risk of mid-term loosening in HA-coated stems that were initially well-integrated. This risk may be more prominent when metal-on-polyethylene bearings are used, especially in conjunction with smaller stems.

Mid-term Survival Rate and Post-operative Patient Function and Satisfaction with a Guided-motion Hinged Knee Replacement

Nicholas Steiner, PGY2, Christiaan Righolt, Thomas Turgeon

Background: Hinged total knee replacements (HTKR) have been used increasingly for revision and primary knee arthroplasty, in addition to salvage procedures. There is no long-term data published regarding the Legion HK Hinge Knee replacement prosthesis. A previous study had established early survival rates of this cohort comparable to other similar prostheses in the literature. The objective of this study was to establish the mid-term survival rate of this HKTR model in a larger series at a single institution, and to investigate postoperative patient function and satisfaction levels.

Methods: A retrospective database review included all patients who received the Legion HKTR between October 2011 and February 2020 at a tertiary care center in Manitoba, Canada. Demographic and comorbidity information was collected from chart review. Preoperative and postoperative functional scores on the Oxford Knee Score were compared and postoperative patient satisfaction scores were assessed. A survivorship analysis was performed after 5 years of follow up.

Results: Sixty-nine HKTR implantations (68 patients) were included in this study, with 19 being primary and 50 revision cases. Eight revision surgeries were noted at a mean follow up of 15 months postoperatively. The 5-year survivorship of the HTKR system was 87.9% (95% CI 77.3-93.8%). Postoperative Oxford Knee Scores were significantly improved at the 5-year follow up at 31 compared to preoperatively at 18.25 (p=0.01). The majority of patients (63.8%) reported being satisfied or very satisfied with their outcome at their most recent follow up visits.

Conclusion: The mid-term survival rate of this modern guided-motion HTKR prosthesis is similar to the described survival rates of other hinged prostheses published in the literature. This prosthesis continues to demonstrate significantly improved functional outcomes at 5 years of follow up. This study demonstrates that this prosthesis is an appropriate implant for use in complex primary and revision total knee replacement

THA Infections: The Saskatoon Experience

Nebojsa Kuljic, PGY5, Scott Willms, Matthew Mastel, Anthony King

Background: Prosthetic joint infections (PJI) remain a devastating complication. There are direct and indirect costs to a healthcare system, patients, and society. Minimizing PJI begins with an understanding of the problem itself. A periodic review of the state of one's practice, or the outcomes of a department, serves to remind practitioners of the importance of high-quality surgery and striving for immaculate outcomes. The purpose of this project was to quantitatively assess the burden of PJI following primary Total Hip Arthroplasty (THA) in Saskatoon.

Methods: A Saskatchewan Health Authority patient-record keyword database search was performed, using the words Total Hip Arthroplasty, Total Hip Replacement, Arthroplasty, and Infection, for the years 2009-2018. Five reviewers poured through physical charts and electronic medical records to collect data patients who had a primary THA in Saskatoon that succumb to PJI.

Results: 269 patients were flagged for review, 94 meeting inclusion criteria. Mean age was 66.1; 57% were females. 76% of patients presented to care for PJI within 6 weeks of primary surgery, 86.4% with superficial evidence of infection, and 14.2% with signs of sepsis. Staph species dominated the pathogens identified; an average of 1.35 microbial species were cultured per patient. Procedures required for care included hip I+D in 94.5% of cases, excision arthroplasty for 31.2% of patients, and ultimately a 17% rate of 2nd stage revision within the study period. Hospital length of stay (LOS) following infection was triple that of the primary THA. Antibiotic regimes were 6+ weeks in 89.3% of cases, at an average cost of $985.75. The average all-in-care cost for a patient with suspected THA PJI is at least $11,796.57.

Conclusions: PJI remains a devastating and costly complication following primary THA, for the patient, healthcare system, and society. Every effort must be made to minimize the burden of infection.

Pharmacological Components of Intraoperative Periarticular Infiltration: A Review

Alexander Le, PGY2 , Gavin King, Michaela Nickol, Bianca Sarkis, Johannes van der Merwe

Background: Periarticular infiltration following total knee and hip arthroplasty has been demonstrated to be equivalent to peripheral nerve blocks for postoperative pain management. The ideal cocktail has yet to be established and can have significant variability even within institutions.

Methods: We have conducted a literature search on PubMed and Embase. Our search criteria included randomized controlled trials (RCTs) and systematic reviews (SR). If insufficient RCTs and Systematic reviews (SRs), the search was broadened to include other specialties utilizing local infiltration following surgery. Our search terms included: dexmedetomidine; Presedex, liposomal ketorolac, ketorolac, Toradol, tranexamic acid, morphine, glucocorticosteroids, triamcinolone acetate, methylprednisolone, betamethasone, ropivacaine, epinephrine, total knee arthroplasty, total knee replacement, periarticular infiltration, local anesthetic, peripheral block in combination with Boolean operators.

Results: Dexmedetomidine – The use of dexmedetomidine in a periarticular block may improve postoperative sleep, reduce opioid usage, prolong analgesia, and decrease postoperative delirium and nausea.
Epinephrine – No clear statistically significant evidence supports using epinephrine as a component of periarticular infiltrations.
Glucocorticosteroids – Glucocorticoid inclusion in periarticular infiltrations may decrease postoperative pain scores in the immediate postoperative period and decrease the length of hospital stay.
Ketamine – There is limited evidence for the use of ketamine or racemic ketamine S(+) for periarticular infiltration.

Conclusion: There is good evidence that dexmedetomidine, ketorolac, and ropivacaine can decrease postoperative pain when included in a periarticular infiltration. There is also evidence that periarticular tranexamic acid can reduce bleeding-related complications without increasing the risk of venous thromboembolic events. Recent articles have shown limited evidence favouring the inclusion of epinephrine, glucocorticosteroids, ketamine, liposomal bupivacaine, or morphine in a periarticular infiltration. Clinical judgement must be executed for each components of the pharmacological cocktail chosen for patients and should take into account the history/preference of the patient and consultation with other members of the care team.

"Still a Grey Area in My Practice" Use of Body Mass Index Thresholds for Total Join Arthroplasty: A Qualitative Study with Orthopedic Surgeons in the Canadian Health Care System

Andrew Fast, PGY2, Kristine Godziuk, Christiaan Righolt, Nicholas J. Giori, Alex H.S. Harris, Eric Bohm

Background: Body mass index (BMI) thresholds are used as criteria to reduce risk in total joint arthroplasty (TJA). Prior survey of orthopedic surgeons in the United States (USA) identified complex health system and surgeon factors that influence BMI considerations. To understand whether similar factors also influence surgeons in a different health system setting, we investigated Canadian surgeons' views and use of BMI thresholds for TJA access.

Methods: A cross-sectional online qualitative survey was conducted among currently practicing members of the Canadian Arthroplasty Society (CAS) and Canadian Orthopedic Association (COA) via email. The survey included open-ended short answer format and questions using a Likert grading scale. Responses from surgeons were anonymous with some demographic information gathered. A multistep, iterative process was used to analyze survey responses. Inductive analysis began with open coding then text was aggregated and arranged. Two authors independently analyzed responses and assigned codes to the raw data. Coded data was sorted into health system origin categories based on an established framework.

Results: Respondents (N=69) were aged 49.0±11.4 years, practicing in 10 different provinces, with mean surgical experience 15.7±11.4 years. Surgeons reported variable use and thresholds of BMI in practice. Interconnected personal, technical, and normative factors that influence BMI considerations were identified including variation in the evidence and surgeon interpretation, surgical challenge, surgeon and societal beliefs and biases, and local surgical or anesthetist group and hospital norms.

Conclusions: Complex, factors influence Canadian surgeons use of BMI restrictions for TJA eligibility. With TJA practice guidelines advising against hard BMI criterion, attention regarding access to resources, surgical training, and innovations to address TJA complexity in large BMI patients are needed. This study may influence surgeon behaviours regarding BMI cut-offs for TJA and encourage critical thought about surgical eligibility as well as stimulate further research to clarify current evidence.

Does Time of Year Affect Time to Surgery in Patients Requiring ORIF of Acetabular Fracture? An Interim Analysis

Nikita Sarangal, PGY3 Ted Tufescu, Bradley Pilkey

Introduction: Time to definitive fixation of acetabular fractures has been shown to be a predictor of quality of reduction and patient outcome. An interim analysis of a retrospective review of acetabular fractures treated at our institution was performed to understand whether time of year affects time to surgery.

Methods: Patients with acetabular fractures that presented after the causative event and underwent acetabular ORIF between 2016 and 2021 by two of our fellowship-trained orthopedic trauma surgeons were included. Chart review was performed to note time of injury, fracture complexity, concomitant traumatic injuries, patient comorbidities, complications in hospital, length of admission, length of follow-up, and conversion to total hip arthroplasty. Number of cases were divided into a quarterly calendar, based on month of surgery.

Results: A total of 228 patients were identified during the time period, 104 charts have been reviewed thus far, and 92 patients were included. 18 surgeries were performed in Quarter 1 (Q1; Jan-Mar), 29 surgeries were performed in Quarter 2 (Q2; Apr-Jun), 27 surgeries were performed in Quarter 3 (Q3; Jul-Sep) and 18 surgeries were performed in Quarter 4 (Q4; Oct-Dec). Time to surgery was 2.39 days in Q1, 3.21 days in Q2, 3.56 days in Q3, and 4.89 days in Q4. Total length of stay was 11.60 days in Q1, 20.36 days in Q2, 20.23 days in Q3, and 13.87 days in Q4.

Conclusion: Results of this interim analysis demonstrate peak incidence of acetabular fractures in Q2 and 3, longest delay in time to surgery in Q4, and longest lengths of hospital stay in Q2 and 3. While the number of presenting surgical cases may not be a controllable factor, several logistical considerations can be optimized during the most affected time of year, such as availability of surgeons, OR access, and adequate support staff.

Traumatic Scapular Fractures: A Rural Australian Perspective

Nordan Flaaten, PGY1, Huissan Moslin, Ruth Varrall

Background: Scapular fractures (SFs) have historically been associated with severe trauma and multiple injuries. This reputation has developed from studies conducted decades ago and in large urban tertiary trauma centres. The aim of this study was to assess whether an association still exists between SFs and global trauma scores, mortality rates and to identify commonly associated injuries in an Australian regional trauma centre.

Methods: This study examined prospectively collected data from patients who presented to the Rockhampton Hospital with a traumatic scapular fracture between 2012-2021. Patient demographics, mortality rate, method of injury and associated injuries sustained were compiled. The Injury Severity Score (ISS) was utilized to calculate the global trauma score for each patient. Statistical analysis was conducted to determine associations between trauma scores and SFs.

Results: There were 105 patients with a SF. Median age was 49 years. Ninety-three (89%) were male. Most fractures were in the body of the scapula (80%). The most common cause of injury were motorbike accidents (36%), falls (24%) and motor vehicle accidents (22%). Two patients died from their injuries (1.9%). Thirty-four percent demonstrated mild trauma scores, with 36% moderate, 28% severe and 1.9% critical. Commonly observed associated injuries were chest wall fractures, vertebral fractures, thoracic injuries, brain injury and abdominal trauma.

Conclusion: A smaller than expected proportion of SFs were associated with severe or critical trauma scores. The low mortality was expected since recently published data suggesting that scapular fractures have a low mortality. These findings suggest that patients from regional and rural areas have similar outcomes to those who are from a tertiary trauma centre. A re-examination of SFs being a reliable marker of severe trauma should be considered. Clinicians should be mindful of the associated injuries seen with SFs and for the potential for severe trauma when treating patients with SFs.

A Cost-analysis of Orthopedic Care in Methamphetamine Users at a Canadian Level 1 Trauma Center

Drew Mulhall, PGY5, Roxana Dragan, Scott McCulloch, Ted Tufescu, Nathan Nickel

Background: Methamphetamine (meth) is an addictive stimulant that puts users at risk of trauma and infections. Manitoba experienced a 20-fold increase in meth-related emergency department (ED) visits from 2013 to 2018. This study aims to identify the economic impact meth use exerts on emergent orthopedic care.

Methods: The meth user cohort was identified using the Manitoba Centre for Health Policy (MCHP) database and compared to a matched non-user control group based on age, sex, income quintile and an orthopedic diagnosis within one week of ED visit date (between 2015-2019). Healthcare spending during the first year following injury was calculated with medical claims and hospitalization costs (resource intensity weights multiplied by the cost per weighted case), inflation adjusted using the Statistics Canada monthly Consumer Price Index and converted to 2020 dollars.

Results: A total of 111 meth users were identified and 54 meth users (24 male (44.4%), 30 female (55.6%)) comprised orthopedic diagnoses with unsuppressed data (n>5), including septic arthritis (18), forearm fractures (15), vertebrae fractures (8), tibia fractures (7) and spine infections (6). Forty-five (83.3%) meth users were classified as low-income (Q1-2), while 9 (16.7%) were above low-income (Q3-5). Thirty-four (63.0%) meth users were in the 18-39 age range, while 20 (37.0%) were in the 40-64 age range. The mean difference in healthcare costs for meth users over one year were: septic arthritis + $10,702.98 (p=0.089), forearm fractures +$8,226.74 (p=0.0453), vertebrae fractures -$3,359.80 (p=0.617), tibia fractures + $5,830.60 (p=0.089) and spine infections -$3359.80 (p=0.584).

Conclusion: There were increased costs for forearm fracture management in meth users and other orthopedic conditions may be prone to increased costs of care. Given the ongoing rise of meth use in Manitoba, healthcare providers and policymakers must prioritize development and implementation of strategies aimed at harm reduction to minimize adverse patient outcomes and healthcare spending.

The Impact of a Night Float Call System within an Orthopedic Residency Program: A Prospective Analysis on Resident Wellness, Satisfaction, and Education

Zachary Oleynik, PGY2, Liz Quon, Mars Zhao, David Sauder

Background: The University of Saskatchewan orthopedic program has historically utilized a 24-hour call system to cover the orthopedic trauma service. The high number of resident post call days lead to significant disruption from clinical and academic duties. Additionally, resident wellness and quality of life is largely impacted by work hours and call burden. Some Canadian orthopedic programs have successfully implemented a night float alternative and reported improved resident quality of life and satisfaction. Other programs have made a similar switch and reported worse health-related quality of life. As of July 2023, our program transitioned from traditional 24-hour call to a night float system. The purpose of this study is to analyze the impacts of a night float on resident wellness, satisfaction, and education.

Methods: This is a prospective study that began data collection in May 2023. Orthopedic residents began taking surveys at the end of every rotation. These surveys assess health status, educational outcomes, and resident satisfaction. As data collection began prior to the initiation of the night float, we will compare survey results between three groups: 24-hour call system residents, the night float, and non-night float residents working within the night float system. Following approximately 1 year of data collection we intend to complete a semi-structured interview to gather qualitative data to further contextualize our quantitative findings. Our findings will help contribute to either supporting or discouraging the continuation of a night float call system within our orthopedic trauma service.

EOS® Biplanar Imaging vs. X-ray for Accurate Measurements of Common Foot and Ankle Parameters

Liz Quon, PGY4, Paul Kulyk

Background: EOS® Biplanar Imaging (EOS) is an imaging system that takes AP and lateral images simultaneously in orthogonal planes using a linear beam. These images can be used to create a 3D reconstruction using calculations based on average population data. The 3D reconstruction in spine imaging is comparable to CT and can be used for diagnosis, and operative planning as it allows measurement of 3D angles, dimensions, and torsion angles. This cannot be determined from conventional 2D X-rays. Our study aims to determine the accuracy of EOS compared to XR for the measurement of medial clear space, talocrural angle, tibiofibular clear space, talar tilt, lateral distal tibia angle, calcaneal pitch angle, lateral talocalcaneal angle, lateral talo-first metatarsal angle (Meary's angle), and medial cunieform fifth metatarsal height (arch height). EOS has been shown to be accurate in other studies the spine, pelvis, and lower extremity.[1–11] However, as EOS takes 2 views simultaneously, this superimposes both feet making interpretation difficult. Thus, there is still some question regarding positioning to obtain imaging that can yield the most valuable views.

Methods:. For our study, volunteers with normal foot morphology will undergo weight-bearing EOS in the position of one foot opposing the other in a 90 degree configuration. This would allow for evaluation and comparison of each foot individually without them being superimposed. The above noted parameters will be measured on EOS imaging and XR and then compared.

Conclusions: If EOS is demonstrated to be comparable to XR it could be used as an alternative weight bearing imaging modality for the evaluation and operative planning of adult foot deformities. EOS when compared to XR and CT has a significantly lower radiation dose[12] and is more accessible for weight bearing imaging in some centers. Many foot and ankle conditions require weight bearing imaging for diagnosis and planning and could provide streamlining of operative management.

Orthopedic Trauma on the Weekend: Longer Surgical Wait Times, and Increased After-Hours Surgery

Darren Van Essen, PGY1, Martina Vergouwen, Eric C Sayre, Neil J. White

Background: Some evidence suggests a "weekend effect" exists in orthopedic trauma care, but it remains understudied. This study investigated fluctuations in trauma volumes, after-hours surgery, and wait times for orthopedic trauma patients on weekdays versus weekends. Understanding these patterns could inform resource allocation throughout the week and weekend to improve the efficiency of trauma care thereby reducing the "weekend effect".

Methods: All unscheduled surgical orthopedic trauma cases presenting to one level I and three level IV urban adult trauma centers between 2008 and 2018 were retrospectively reviewed. Effects of weekends on orthopedic trauma volumes and after-hours surgery were investigated using Multivariable Poisson regression. Effects of weekends on patient wait times were investigated using linear regression.

Results: The dataset included 41,421 orthopedic trauma surgeries, with hip (25.1%) and ankle fractures (22.6%) being prevalent. Weekends were associated with increased surgical wait times (8.9%, $p<0.001$) despite decreased trauma volumes (-9.1%, $p<0.001$). Daily patterns revealed increasing trauma volumes throughout the week, peaking on Thursday (7.4%, $p=0.001$) and Friday (5.5%, $p=0.017$). More after-hours surgeries were performed from Thursday to Saturday with most occurring on Friday night (26.6%, $p<0.001$). Surgical wait times increased mid-week and remained high through Saturday.

Conclusions: Despite efforts to diminish weekday workload by increasing after-hours surgeries, and despite lower surgical volumes, patients still wait longer for surgery on weekends. Our results demonstrate after-hours surgery is not sufficient to manage high volumes. After-hours surgery is a sub-optimal management strategy that leads to substantial issues from patient care, staffing, efficiency, and financial standpoints. Therefore, we suggest the consideration of a dedicated weekend orthopedic trauma room or adaptable orthopedic trauma operating time during increased caseloads. These resource allocations could reduce the backlog of weekday cases, after-hours surgeries, hospital expenditure, staff burnout, and improve patient care.

The Impact of an Opioid Restriction Protocol Implemented at a Canadian Sports Orthopedic Surgery Institution

Riley Hemstock, PGY4, Sheila McRae, Ian Laxdal, Thomas Mutter, Kevin Friessen, Heather Prior, Peter MacDonald, Jarret Woodmass

Background: The opioid epidemic is a complex issue and efforts have been made by orthopedic surgeons to reduce opioid prescribing. Patient education and restrictive prescription protocols have shown promise, although there is a scarcity of literature evaluating these strategies at an institutional level. The purpose of this study is to evaluate the effectiveness of a multimodal opioid restriction protocol implemented at an outpatient Canadian sports orthopedic surgery institution.

Methods: This was a retrospective pre-post intervention study using deidentified data housed by the Manitoba Centre for Health Policy. All opioid naïve patients that underwent outpatient shoulder or knee surgery at our institution between January 2013 and March 2022 were included with the exception of those during the implementation period, from January 2019 to June 2020 (n = 10,257). The intervention included an educational pamphlet, perioperative messaging around opioid use and a restricted prescription protocol. The primary outcome was morphine milligram equivalents (MME), calculated using prescriptions filled in the post-operative period and compared using a t-test. A binary variable was generated indicating if a patient filled an opioid prescription after 180 days post-surgery to evaluate chronic use. A multivariable logistic regression was performed evaluating the effect of all independent and dependent variables.

Results: Average MME per patient decreased 20% (±SD 325 to 263; $p<0.001$). The proportion of patients filling opioid prescriptions at 180 days post-surgery decreased from 5.3 to 3.1% ($p<0.001$). The odds of continuing to fill opioid prescriptions were higher before implementation of the restriction protocol (OR 1.72, 95%CI 1.33 – 2.22, $p<0.001$).

Conclusion: The volume of opioids and number of chronic opioid users were reduced for outpatient shoulder and knee surgery patients following implementation of a multimodal opioid restriction protocol. This protocol could help other practitioners adopt effective strategies to decrease opioid dependency resulting from early post-operative pain management.

Validation of Virtual Wrist Range of Motion Measurements Using Video Coaching

John Perverseff, MD Candidate 2025, Cole Elaschuk, Matthew Getzlaf, David Sauder, Laura Sims

Background: Wrist range of motion (ROM) is an important assessment in patients with wrist pathology. It is most commonly assessed using a manual long-arm goniometer. 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 using a video coaching method developed by the authors.

Methods: We performed a prospective cohort study assessing wrist flexion, wrist extension, pronation, and supination in healthy volunteers. Three assessors - medical student, research assistant, and upper extremity surgeon - measured participant wrist ROM at an in-person, same-day virtual, and repeat virtual visits with a one-week washout period. Measurements were made with a long arm goniometer. Virtual assessments were done over zoom so that the assessor could coach the volunteer on correct wrist positioning for accurate measurement. A prior power analysis was 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. Supination had the highest intra-rater reliability, with all raters having ICC values graded as excellent (ICC>0.9).

Conclusions: Virtual wrist ROM assessments showed good inter-rater and intra-rater reliability, with ICC scores that were comparable to in-person measures using a video coaching method. 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.

Equity of Access to Anterior Cruciate Ligament Reconstruction and Rotator Cuff Repair for Indigenous Peoples: A Provincial Cohort Study

Melinda Joye Fowler-Woods, PGY4, Sheila McRae, Peter B. MacDonald, Heather Prior, Marc Morissette, Jarret Woodmass

Background: For decades there have been repeated calls to address health inequities experienced by Canada's Indigenous peoples (First Nations, Inuit, and Metis). In 2015, the Truth and Reconciliation Committee (TRC) stated that closing the health gap between Indigenous and non-Indigenous people is critical to reconciliation. The purpose of this study was to evaluate access to care for anterior cruciate ligament reconstruction (ACLR) and rotator cuff repair (RCR).

Methods: Approvals were obtained from the First Nations Health & Social Secretariat of Manitoba, Manitoba Inuit Association, and Manitoba Metis Federation. This was a retrospective population-based (MCHP 2015-2020) cohort study. Operative (ACLR, RCR) versus non-operative management, time from diagnosis to consultation, and time from consultation to surgery were compared between Indigenous and non-Indigenous peoples using logistic regressions and survival curves.

Results: The odds of an Indigenous patient undergoing ACLR compared to a non-Indigenous patient was 0.64 ($p<0.001$) and RCR 0.85 for undergoing RCR ($p=0.08$). The odds of Indigenous patients having their surgical consult for ACLR within 1 year of diagnosis (ACL tear) by a primary care provider (PCP) was 0.71 ($p=0.02$) and for RC tear was 0.78 ($p=0.010$). The odds of Indigenous patients having ACLR surgery within 1 year of their consult was 0.89 ($p=0.29$) and 0.83 ($p=0.097$) for RCR. For ACLR, survival curves differed for time to consult ($p>0.001$) but not surgery ($p=0.50$). For RCR, survival curves differed for time to consult ($p>0.02$) but not surgery ($p=0.08$).

Conclusion: Indigenous patients experience longer wait times to see a surgeon and are less likely to undergo surgery than non-Indigenous patients. Limited access to care for Indigenous patients is pervasive throughout the Canadian health care system and this evidence could guide planning that aligns with the health-care related TRC calls to action.

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

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Background: Total 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: Total wrist fusion altered shoulder kinematics. 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.

Standardized Multimodal Analgesia Management Protocol Reduces Total Opioid Intake Following ACL Reconstruction Surgery

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Background: With the current opioid epidemic, efforts to implement multimodal analgesia management is essential for an optimal therapeutic approach. The objective of this study was to compare pain and analgesic use pre- and post-implementation of a standardized postoperative analgesia management protocol in those undergoing ACL reconstruction (ACLr).

Methods: Patients were part of a larger prospective cohort study comparing two-year outcomes of three autografts for ACLr. A standardized multimodal analgesia management protocol was initiated in January 2020 to compare analgesia use and pain before (PRE group) and after implementation (POST group). This protocol included education of patients and a standardized discharge prescription. Prior to this implementation, postoperative analgesics were left to the surgeon's discretion. Patients recorded pain on a 10-cm VAS scale and medication use in a logbook for 14 days postoperative. Opioids were converted to oral morphine milligram equivalents (MME) for comparison purposes. Magnitude of pain was compared for PRE versus POST controlling for graft-type using a General Linear Model. MME and mean total number of NSAID, and acetaminophen tablets recorded were compared between groups using t-tests.

Results: 88 patients underwent surgery prior to (PRE) and 161 after implementation (POST) of the multimodal analgesia management protocol. There was a significant reduction in opioid consumption (MME) following the implementation of the standardized protocol, 219.9±144.7 PRE versus 174.8±167.9 POST ($p=0.035$). There was a converse shift in NSAIDS mean tablets, 10.8±23.1 PRE versus 30.0±24.9 POST ($p<0.001$). Acetaminophen use did not change with 49.9±28.5 PRE and 46.6±33.4 POST ($p=0.431$). We found no differences in pain scores before and after implementation of the protocol in the first 14 days post-operative. There was no interaction with respect to graft type.

Conclusion: The implementation of a multimodal postoperative analgesic management protocol reduced opioid consumption taken at 14-days post ACLr without having an impact magnitude of pain.

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to the

Saskatchewan Orthopedic Research Fund Allocation Committee

We acknowledge that we live and work on Treaty 6 Territory and the Homeland of the Métis. We pay our respect to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.