UNIVERSITY OF SASKATCHEWAN
UNIVERSITY OF MANITOBA

VIRTUAL COMBINED ORTHOPEDIC RESIDENT RESEARCH DAY

NOVEMBER 19, 2021

Guest Speaker
Dr. Allan E. Gross

Division of Orthopaedic Surgery
Mount Sinai Hospital
University of Toronto

Dr. Gross received his MD from the University of Toronto in 1962, interned at Mount Sinai Hospital in Toronto, and then entered the Surgical Training Program at the University of Toronto. As part of his orthopaedic training, he did one year of research under the supervision of Dr. Robert B Salter, developing an animal model for cortisone arthropathy. He was the Duncan Fellow at the Toronto General Hospital working under Dr. F.P. Dewar. During this year, he developed an interest in bone and cartilage transplantation. In September 1970, he went to the Royal National Orthopaedic Hospital in Stanmore, England, where he continued his work on the immunogenicity of cartilage. He returned to the Orthopaedic Division of the University of Toronto, Mount Sinai Hospital in July 1971, where he along with Dr. Fred Langer developed a clinical and research program in bone and cartilage transplantation. The first osteochondral allograft was performed on New Year's Day in 1972, for a traumatic defect of a knee. A limb salvage tumour program was initiated a few years later and a Bone Bank was then established at Mount Sinai so that preserved tissue could be used for the tumour surgery.

Dr. Gross became Head of the Division of Orthopaedic Surgery at Mount Sinai in 1973 and Chief of Surgery in 1975. He became Head of the Combined Orthopaedic Unit of the Toronto General Hospital and Mount Sinai Unit in 1982, and the A.J. Latner Professor and Chairman of the Division of Orthopaedic Surgery, University of Toronto, from July 1, 1986 to July 1996.

Presently, he is a full time orthopaedic surgeon in the Division of Orthopaedic Surgery at Mount Sinai Hospital and continues to speak internationally at conferences and invited lectureships. He holds the Bernard I. Ghert Family Foundation Chair in Lower Extremity Reconstructions Surgery. Dr. Gross served as team doctor for the Toronto Blue Jays for 30 years and has two World Series rings from the Jays Championships in 1992 and 1993.

University of Manitoba

Dr. Peter MacDonald
Section Head

Dr. Ted Tufescu
Residency Program Director

Dr. Dan Ogborn
Research Director

Dr. Ian Laxdal, PGY5
Dr. Sophie Zhu, PGY3
Dr. Jasmine Lyng, PGY3
Dr. Drew Mulhall, PGY3
Dr. Monther Abuhantash, PGY2
Dr. Melinda Fowler, PGY2
Dr. Riley Hemstock, PGY2
Dr. Jessica Littmann, PGY2
Dr. Rohit Bansal, PGY1
Dr. Madison Price, PGY1
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Dr. Kristi Billard, PGY5
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Dr. Emily Chan, PGY4
Dr. Jefferson Scott, PGY4
Dr. Matthew Getlaf, PGY3
Dr. Nebojsa Kuljic, PGY3
Dr. Justin Lishchynsky, PGY2
Dr. Liz Quon, PGY2
Dr. Lauren Ready, PGY1
Dr. Bianca Sarkis, PGY1

BE WHAT THE WORLD NEEDS

2021 Resident Research Day Program

SESSION I
8:00- 9:00
Moderator: Dr. Paul Kulyk

08:00 Does Addition of Longer-acting Local Anesthetic Improve the Post-operative Pain after Carpal Tunnel Release? Preliminary Results of a Randomized Controlled Study

EMILY CHAN, PGY4, UofS

08:10 Does Intra-operative Range of Motion at the Time of Scaphoidectomy and Four-Corner Fusion Predict Post-operative Range of Motion?

MATTHEW GETZLAF, PGY3, UofS

08:20 Trapeziectomy with and without Ligament Reconstruction for the Treatment of Thumb Carpometacarpal Arthritis

MICHAEL THATCHER, Med 3, UofS

08:30 An Examination of Function, Strength and Muscle and Tendon Morphology in Patients Following Operative or Non-operative Management for Achilles Tendon Rupture

JOSH GAROFALO, Med 2, UofM

08:40 The Influence of Pre-season versus In-Season Play on Achilles Tendon Injuries in the NFL

LAUREN READY, PGY1, UofS

SESSION II
9:15 – 10:00
Moderator: Dr. Trevor Loback

09:15 The Effectiveness of a Resident-based Teaching Program for Orthopedic Technologists

IAN LAXDAL, PGY5, UofM

09:25 Non-surgical Treatment of Osteoarthritis Prior to Hip and Knee Arthroplasty

SAMANTHA SKEBO, Med 2, UofS

09:35 Assessment of Risk Factors for Early-Onset Deep Surgical Site Infection Following Primary Total Hip Arthroplasty for Osteoarthritis

ROHIT BANSAL, PGY1, UofM

09:45 Gross Trunnion Failure in Total Hip Arthroplasty: A Case Report and Review Article

JEFFERSON SCOTT, PGY4, UofS

09:55 Wearable Sensor Assessment of Neuropathic Physiological Impairments and Sensory Reweighting Caused by Lumbar Spinal Stenosis and Diabetic Peripheral Neuropathy

SPENCER FERBERS, Med 2, UofM

GUEST LECTURE I
Dr. Allan E. Gross

10:30–11:30 Fresh Osteochondral Allografts for Post-traumatic Knee Defects

11:30 – 12:20 Lunch Break

SESSION III
12:30 – 13:30
Moderator: Dr. Jarret Woodmass

12:30 Postoperative Weight Bearing Restrictions and Rehabilitation Protocols after Hip Arthroscopy: A Systematic Review Proposal

RILEY HEMSTOCK, PGY2 UofM

12:40 Does Clinical Approach in the Management of Anterior Glenohumeral Instability Vary with Clinical Experience, Surgical Volumes and Use of the ISIS Scale? A Survey of Canadian Orthopedic Surgeons

MICAH SOMMER, Med 4, UofM

12:50 An Epidemiological Profile of Pickleball Athletes

MATTHEW GETZLAF, PGY3 UofS

13:00 The Impact of COVID-19 on National Hockey League Players' Return-To-Play

JASMINE LYNG, PGY3, UofM

13:10 Return to Sport and Functional Performance Following Surgical Intervention for Anterior Glenohumeral Instability (AGHI)

JESSICA LITTMAN, PGY2, UofM

SESSION IV
13:45 – 14:45
Moderator: Dr. Eric Bohm

13:45 A Cost-analysis of Orthopedic Trauma Care in Methamphetamine Users at a Canadian Level 1 Trauma Center
DREW MULHALL, PGY3, UofM

13:55 Can Time of Year Affect Time to Surgery in Patients Requiring ORIF of Acetabular Fracture?
NIKITA SARANGAL, PGY1, UofM

14:05 Open Reduction & Internal Fixation of Midshaft Clavicle Fractures: Outcomes from a Single Surgeon Case Series
BIANCA SARKIS, PGY1, UofS

14:15 Identifying Spine Care Needs and Perceived Barriers to Accessing Evidence-based Spine Care in Northern Manitoba: A Global Spine Care Initiative Implementation Project
MELINDA FOWLER, PGY2, UofM

14:25 Pediatric Trauma During the Pandemic
MONTHER ABUHANTASH, PGY2, UofM

GUEST LECTURE II
Dr. Allan E. Gross

14:45 – 15:45 Revision Arthroplasty of the Acetabulum with Restoration of Bone Stock

15:45 – 16:15 Judges Deliberation - Dr. Allan Gross, Dr. William Dust, Dr. Peter MacDonald

16:30 – 17:00 Awards Ceremony

University of Saskatchewan
University of Manitoba

Combined Resident Research Day

ABSTRACTS

Does addition of longer-acting local anesthetic improve the post-operative pain after carpal tunnel release? Preliminary results of a randomized controlled study

Emily Chan (PGY4), Laura Sims, Churao Yang, Kristi Billard, Yanzhao Cheng, David Sauder

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. Post-operative pain is a concern for many patients, and a previous study at our institution found that maximal pain was experienced 8 hours after surgery. Although use of a longer-acting anesthetic, such as bupivacaine, should theoretically prolong the post-operative pain blockade, few studies have investigated its use for 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 (L) or a longer-acting mix of lidocaine and bupivacaine (LB).

Methods: Patients undergoing CTR were randomized into L or LB groups. Post-operative pain severity at several timepoints within the first 72 hours was recorded. The timing and quantity of post-operative analgesic use (Tylenol and/or Advil) were also determined. Both patients and assessor were blinded to allocation.

Results: To date, 34 patients have been recruited; 64.7% were female and 55.9% had right-sided involvement. Post-operative pain and amount of pain medication used was lower in LB patients at nearly all timepoints, however the differences were not significant. Similarly, LB patients reported longer time to first analgesic use, without statistical significance.

Conclusion: Preliminary results suggest that use of LB for CTR may improve the post-operative pain experience, however a greater number of patients is likely needed to show a true difference.

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

Matthew Getzlaf (PGY3), David Sauder, Laura Sims

Background: 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 1 year, but that this arc would be less than that achieved intra- operatively. We performed a retrospective review of patients who have undergone S4CF surgery. The review included clinical information found in the patients' electronic charts as well as radiographic information.

Methods: Using a retrospective design, we identified 56 patients that had undergone S4CF at our institution in the past ten years. Patients less than 18, those who underwent the procedure for reasons other than arthritis, those less than one year from surgery, and those that had since undergone wrist arthrodesis were excluded. 19 patients agreed to participate that met criteria. Intraoperative range of motion was measured from fluoroscopic images taken in flexion and extension at the time of surgery. Patients that met criteria were then invited to take part in a virtual visit and their range of motion was checked using a goniometer.

Results: 19 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 all but one case the indication was scapholunate advanced collapse, with one case of scaphoid nonunion advanced collapse. No difference was observed between intra-operative and post-operative flexion. On average an increase of 7 degrees of extension and 12 degrees of arc of motion was post operatively with p values of 0.97 and 0.96 respectively

Conclusions: Intraoperative range of motion radiographs are useful in predicting post-operative extension and arc of motion. Flexion achieved intraoperatively does not have a statistically significant relationship with post-operative flexion.

Trapeziectomy with and without Ligament Reconstruction for the Treatment of Thumb Carpometacarpal Arthritis

Michael Thatcher (B.Sc. Med 3), Zachary Oleynik, Min Young Kim, Laura Sims, David Sauder

Background: Trapeziectomy with ligament reconstruction and tendon interposition (LRTI) with the flexor carpi radialis (FCR) tendon is one of the most common procedures for the treatment of thumb carpometacarpal (CMC) arthritis. An alternative method involves trapeziectomy alone (TA). The trapeziectomy with LRTI procedure was developed to theoretically improve biomechanical strength and hand function when compared to TA, which leaves an anatomical void proximal to the first metacarpal. The LRTI procedure takes longer to perform and includes an autologous tendon graft. The goal of this retrospective cohort study was to evaluate the clinical outcomes of trapeziectomy with or without LRTI at a minimum follow-up of 1 year.

Methods: A total of 43 patients who had underwent a total of 58 (TA=36, LRTI=22) surgical procedures for CMC arthritis participated in the study. The patients were evaluated subjectively (The Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire) and objectively (hand/thumb strength, pre/post-operative hand radiographs).

Results: Both the TA and LRTI procedures provided good pain relief, motion, strength, and stability without any severe complications. Radiography showed that compared to the preoperative status, the trapezial space decreased similarly between the two groups.

Conclusions: The TA procedure had similar outcomes to LRTI and has the advantages of shorter surgical time, less incision length, and lower surgical complexity. TA provided equivalent trapezial space to LRTI after the operation. Future study should investigate these two procedures in a head-to-head comparison rather than longitudinally where both surgeon experience and time since procedure at follow-up may have impacted results.

Achilles Tendon Ruptures – An examination of function, strength and tendon morphology in patients following operative or non-operative management for Achilles tendon rupture

Josh Garofalo (BSc Med 2), Sophie Zhu, Sheila McRae , Peter MacDonald, Robert Longstaffe, and Dan Ogborn

Introduction: While debate remains as to the relative benefit of operative and non-operative management of Achilles tendon ruptures (ATR), few studies have considered dynamic performance tests (i.e. hopping, jumping). The purpose of this study was to compare functional performance and muscle and tendon morphology in patients following operative or non-operative management for acute ATR.

Methods: Patients aged 18-65 years with an ATR who were treated (operative or non-operatively) within three weeks of injury and were a minimum one-year post injury were eligible for participation. Gastrocnemius muscle thickness and Achilles tendon length and thickness were assessed with ultrasound. Functional performance was completed with single-leg hop tests and isokinetic plantar strength at 60^{o}/s and 120^{o}/s.

Results: 24 participants completed testing (12/ group). Medial (operative: 2.2 **±** 0.4 cm vs 1.9 **±** 0.3 cm, non-operative 2.15 **±** 0.5 cm vs 1.7 **±** 0.5 cm; p = 0.002) and lateral (operative 1.8 **±** 0.3 cm vs 1.5 **±** 0.4 cm, non-operative 1.6 **±** 0.4cm vs 1.3 **±** 0.5 cm; p =0.008) gastrocnemius thickness were reduced on the affected limb. The Achilles tendon was longer (operative: 19.9 **±** 2.2 cm vs 21.9 ± 1.6 cm; non-operative: 19.0 ± 3.7 cm vs 21.4 ± 2.9 cm; p = 0.009) and thicker (operative: 0.48 ± 0.16 cm vs 1.24 ± 0.20 cm ; non-operative: 0.54 ± 0.08 cm vs 1.13 ± 0.23 cm; p < 0.001) on the affected limb with no differences between groups. Affected limb plantarflexion torque at 20^{o} plantarflexion was reduced at 60^{o}/s (operative: 55.6 ± 20.2 nm vs 47.8 ± 18.3 nm; non-operative: 59.5 ± 27.5 nm vs 44.7 ± 21.0 nm; p = 0.06) and 120^{o}/s (operative: 44.6 ± 17.9 nm vs 36.6 ± 15.0 nm; non-operative: 48.6 ± 16.9 nm vs 35.8 ± 10.7 nm; p = 0.028) with no group effect. There were no differences in single leg hop performance.

Conclusion: There was no difference in tendon length between treatment groups and deficits in gastrocnemius thickness and strength are persistent. Hop test performance is maintained and may be the result of compensatory movements at other joints despite persistent plantarflexion weakness.

The Influence of Pre-season versus In-Season Play on Achilles Tendon Injuries in the NFL

Lauren V Ready (PGY1), Neill Y Li, Samantha Worobey, Nicholas Lemme, Daniel S Yang, JaeWon Yang, Michael Krill, Brett D Owens

Rationale: A ruptured Achilles tendon (AT) can sideline a player for 6-12 months and reduce their power rankings by over 50%. Given a minimal amount of research on AT ruptures in the National Football League (NFL), the purpose of this project was to determine environmental and physiological risk factors for AT tears.

Methods: NFL players with a diagnosed AT tear between 2009 and 2016 were the study population for this retrospective analysis. NFL injury data was collected from an established database of publicly available information. Player profiles were employed to determine player and game statistics at time of injury.

Results: Between 2009 and 2016, there were 101 documented AT tears. Sixty-four percent (65/101) occurred before the official season, including preseason games. Of the 36 that occurred in-season, 34 were during games. Twenty-nine percent (19/65) of the preseason tears occurred in rookie and 100% (36/36) of the in-season tears affected non-rookies. Of the rookies with AT ruptures, 42.11% returned to play in the NFL, while 62.20% of the non-rookies came back to partake in future seasons.

Conclusion: This is the first article to specifically compare AT rupture rates in rookies and non-rookies. While previous studies have assessed risk factors for AT tears, there is a scarcity assessing the relationship between player experience and risk of injury. In this way, new NFL players were identified as an at-risk population for AT tears and a possible target for injury prevention.

The Effectiveness of a Resident-based Teaching Program for Orthopedic Technologists

Ian Laxdal (PGY5), Riley Hemstock, Denis Escobar, Dan Ogborn, Ted Tufescu

Background: Orthopedic technologists traditionally assist orthopedic surgeons in the care of musculoskeletal patients. In many educational centers they provide essential support to orthopedic surgery residents throughout their training. The purpose of this study was to evaluate the effectiveness of a resident-based teaching program for orthopedic technologists.

Methods: An 8-week course of high-yield orthopedic topics was designed by orthopedic surgery residents. This was a self-study, online, case-based learning module. Objective (multiple choice test) and subjective (self-perceived stage of competency) evaluations of knowledge were completed before and after the educational intervention. Pre- and post-intervention data were compared with an independent t-test (multiple choice scores) and the Mann-Whitney U test (competency scale). The course was completed by 15 orthopedic technologists at our tertiary hospital.

Results: Multiple choice test scores increased following the educational intervention from 55.83 ± 16.95 % to 85.52 ± 12.87 % ($T_{(25)}$ = -4.996, p =<0.0001). Perceived competence increased from a median of 2 (2-4) to a median of 3 (3-4), (U = 36, Z = -2.962, p = 0.003)

Conclusion: A resident-based teaching program for orthopedic technologists can improve their self-perceived stage of competency and knowledge of high-yield orthopedic topics. Improved working relationships between orthopedic residents and technologist have also been subjectively reported by participants.

Non-surgical Treatment of Osteoarthritis Prior to Hip and Knee Arthroplasty

Samantha Skebo, (Med 2), Bindu Nair, Regina Taylor-Gjevre, Anthony E King

Background: Osteoarthritis is a chronic, irreversible joint disorder frequently affecting hip and knee joints. This study looks to identify the non-surgical treatments that individuals with osteoarthritis have explored prior to joint arthroplasty, and to highlight any care gaps that may exist in accessing treatment.

Methods: From the hip and knee arthroplasty waitlist, 215 people were invited to participate in a structured, telephone interview. Information on participant characteristics, pharmacologic management and non-pharmacologic therapies was collected. Participants were also asked about any difficulties in accessing healthcare services.

Results: 47 participants with hip or knee osteoarthritis completed the interviews. Commonly tried pharmacologic treatments included acetaminophen (83%) and, topical NSAIDs (83%). All participants reported trying at least one physical intervention such as exercise (100%) and weight loss (70.2%). Mind-body management approaches were tried by 36.2% of participants and fewer (4.2%) explored psychosocial approaches. Identified barriers to care included cost, unavailable services, decreased awareness of treatment options, and unrecognized disease severity.

Conclusion: Participants with hip or knee osteoarthritis reported varied use of both pharmacologic and non-pharmacologic treatments. Significant concerns for participants in accessing care included treatment affordability, availability of services, lack of knowledge about treatment options and underappreciation of the impact of osteoarthritis.

Assessment of Risk Factors for Early-Onset Deep Surgical Site Infection Following Primary Total Hip Arthroplasty for Osteoarthritis

Rohit Bansal (PGY1), J Bourget-Murray, S Piroozfar, A Soroceanu , K Johnston, A Johnson, J Powell

Introduction: The purpose of this study was to determine the incidence and perioperative outcomes of early-onset (≤ 90 days) deep surgical site infection (dSSI) following primary total hip arthroplasty (THA) for osteoarthritis (OA) and to define any associated risk factors. The diagnosis of infection was determined based on the criteria outlined by the Centre for Disease Control, which is closely adapted from the MSIS's definition.

Methods: We performed a retrospective population-based cohort study using prospectively collected patient-level data from provincial repositories between January 2013 to March 2020. We used the Mann-Kendall Trend Test to detect monotonic trends in deep SSI rates over time. Outcomes of interest were 30-, 60-, and 90-day readmission and mortality. Outcomes were adjusted by age, sex, BMI, co-morbidities, and American Society of Anesthesia (ASA) score. Multiple logistic regression was used to determine the effect of different surgical and patient factors on the risk of developing a dSSI within 90-days of surgery.

Results: A total of 22,685 patients underwent primary THA for osteoarthritis with 46 having a confirmed dSSI within 90-days of surgery. The cumulative incidence for early-onset dSSI was 0.2%. Annual infection rate decreased over the 7-year period ($p = 0.026$). Developing an infection within 90-days of surgery was associated with increased odds ratios for 30- ($p < 0.001$), 60- ($p < 0.001$), and 90-day ($p < 0.001$) readmission but was not associated with increased mortality. Risk factors associated with an increased early-onset dSSI were elevated BMI (OR, 3.42 [95% CI 1.75-7.20]; $p<0.001$), chronic renal disease (OR, 3.52 [95% CI 1.17-8.59]; $p = 0.011$), cardiac illness (OR, 2.47 [1.30-4.69]; $p = 0.005$) and hospital volume (OR, 1.02 [1.01-1.03]; $p = 0.003$).

Conclusion: This work establishes a baseline rate of infection for early dSSI after THA in patients with OA. Risk factors including elevated BMI, chronic renal disease, hospital volume and cardiac illness are potentially modifiable and could be amenable to targeted intervention serving to reduce the incidence of early-onset dSSI.

Gross Trunnion Failure in Total Hip Arthroplasty: A Case Report and Review Article

Jefferson Scott (PGY4), Johannes van der Merwe

Rationale: Total Hip Arthroplasty (THA) is a very successful and popular surgical solution for severe hip arthritis leading to pain and disability. Gross Trunnion Failure (GTF), which is dissociation at the implants stem/head interface, is a rare but serious complication.
We reported on one such case of aseptic, gross dissociation at the trunnion in a seventy six year old female several years after the index procedure. In addition, we performed a review to analyze relevant case studies in which GTF occurred with metal on polyethylene (MoP) components. Our goal with this review was to inform on the subject and elucidate variables which may contribute to an increased risk of GTF. We looked at multiple factors including; gender, age, BMI, smoking status, and several relevant component factors in our review.

Methods: PubMed database was searched. A secondary search was performed by utilizing the references of all relevant articles.

Results: Our literature search identified 47 relevant cases of GTF, of these 41 of those cases, including ours, had a stem made by one company (Stryker Accolade TMZF/I), and were thus the only ones included in our paper.
We tabulated the data that was available. The time from index procedure was on average 7 years + 2 months. Patient factors; 39/41 (95%) were male, age range was 83 to 49 years old with an average age of 51.6; average BMI was 28.9. For the component factors; there was a femoral head size of >= to 36mm in 97.5% of cases (40/41) and all heads were made of cobalt chromium, for the stems an offset of >= 5mm was seen in 72.5% of cases (29/41). Acetabular component size and material was seldom reported.

Conclusion: GTF is rare but a serious complication. It is important to identify patients at risk so that they can be monitored closely. This can lead to earlier intervention which could decrease the morbidity associated with larger revisions. Our review highlights some potential risks, however more research is needed.

Wearable Sensor Assessment of Neuropathic Physiological Impairments and Neuropathy

Spencer Ferbers (BSc Med 2), Steven Passmore, Christy Tomkins-Lane, Michael Johnson, Corinna Zygourakis, John Ralston, Jared Fletcher, Pamela Katz, Chris Leung, Michael Johnson

Background: Lumbar spinal stenosis (LSS) and diabetic peripheral neuropathy (DPN) are highly prevalent, with similar symptomatology, but different etiology. Intermittent leg pain and weakness are characteristic of LSS while DPN may present as burning, tingling and general weakness in the limbs that may progress if not addressed. Symptoms of LSS are commonly misdiagnosed as DPN in patients with diabetes. An inexpensive wearable sensor (PROTXX – "phybrata") detects patterns in physiological vibration acceleration signals used in balance stabilization, and may be useful in the quantification of differences in balance between LSS and DPN patients.

Hypothesis: The study is exploratory with the purpose of determining directionality between the LSS, DPN, and control group.

Methods: The study utilizes a cross-sectional design. Participants (N=90) will be assigned to 3 groups: 1) LSS; 2) DPN; and 3) control group. The LSS group inclusion criteria are 1) clinical symptoms of LSS; 2) magnetic resonance imaging confirming LSS; and 3) no history of diabetes. The DPN group inclusion criteria are: 1) diagnosis of DPN with abnormal A1C; 2) symptoms of DPN; and 3) no history of LSS. The control group will include participants with no history of diabetes or LSS and exclude those with comorbidities that impact balance. Participants will complete the balance assessment using the phybrata sensor protocol. The primary outcome will assess differences in the phybrata sensor data between groups. Participants will complete the following questionnaires related to their function and symptoms: 1) Visual Analogue Scale for pain; 2) the 36-Item Short Form Survey; 3) the Swiss Spinal Stenosis questionnaire; 4) the Oswestry Disability Index; 5) the Walking Impairment questionnaire; and 6) the Intermittent Claudication questionnaire. Results: An analysis of variance (ANOVA) will test for between-group differences in postural sway. Pearson correlations will be used to assess relationships between the phybrata sensor data and the questionnaire outcomes.

Conclusions: An inexpensive way to differentiate DPN and LSS symptoms using wearable sensors could ensure timely diagnosis and referral to appropriate care. If differences are seen, the data generated could warrant larger prospective clinical trials.

Postoperative Weight Bearing Restrictions and Rehabilitation Protocols after Hip Arthroscopy: A Systematic Review Proposal

Riley Hemstock (PGY2), D Mulhal, D Ogborn, D Lemmex

Introduction: While post-operative rehabilitation contributes to the overall success of hip arthroscopy for the treatment of femoroacetabular impingement (FAI), there is little consensus beyond expert opinion and case series to guide post-operative management. Despite an explosion of interest in hip arthroscopy in recent years, there remains no consensus on post-operative weight bearing restrictions, or rehabilitation protocols, with the most recent high-quality systematic review published in 2015. The objectives of this study are: 1) To determine if sufficient evidence exists in the literature to recommend weight bearing as tolerated (WBAT) or partial weight bearing (PWB) restrictions in the immediate post-operative period for hip arthroscopy patients, 2) To determine what parameters are commonly described in rehabilitation protocols, and 3) To describe the variability amongst patient reported outcome measures (PROM) and clinical outcomes reported.

Methods: This study was registered with PROSPERO (CRD42021247741). Per PRISMA guidelines, PubMed, MEDLINE and Embase were searched on May 5, 2021**.** Level I-IV evidence clinical studies using patients over the age of 18 years, with a minimum of 1 year of follow up, reporting of weight bearing status, at least one PROM and one clinical outcome will be included. Non-English language, reviews, technical papers, grey literature sources, studies of bilateral surgical intervention or those with follow-up less than one year will be excluded. Data extraction will be completed blinded in duplicate for the following primary outcomes: clinical outcomes (re-injury, reoperation), weigh bearing status parameters, included PROMs with scores. Study methodological quality and risk of bias will be assessed using the Methodological Index for Non-Randomized Studies (MINORS).

Results: A random-effects proportional meta-analysis will be completed on re-injury and reoperation rates between WBAT and PWB. Secondary analysis will be completed with descriptive statistics for available PROMS and clinical outcomes. Descriptive analyses will be completed on components of the provided rehabilitation programs.

Conclusion: The findings of this study are critical to establishing the utility of a proposed randomized controlled trial exploring the effect of weight-bearing status post-operatively, as well as forming rehabilitation guidelines following hip arthroscopy.

Does Clinical Approach in the Management of Anterior Glenohumeral Instability Vary with Clinical Experience, Surgical Volumes and Use of the ISIS scale? A Survey of Canadian Orthopedic Surgeons

Micah Sommer (BSc Med 4), Riley Hemstock, Josh Garofalo, Sheila McRae, Peter MacDonald, Jarret Woodmass, Dan Ogborn

Introduction: Despite the high rate of surgical intervention for anterior glenohumeral instability (AGHI), consensus regarding optimal treatment approaches is lacking. The goal of this study was to characterize the responses of Canadian Orthopedic Surgeons to a standard case series of varying Instability Severity Index Scores (ISIS), determining whether use of the ISIS in practice, years of clinical practice, or annual volumes of completed procedures influenced clinical approach.

Methods: An electronic survey including three cases of differing ISIS scores was distributed to members of the Canadian Orthopedic Association and Canadian Shoulder and Elbow Surgeons group via Survey Monkey. Statistical comparisons were completed with a Chi-square analysis with responses stratified using the ISIS scale in practice (yes/no), years of practice (<5, <10, <15, 15+ years) and surgical volumes (greater or less than 25 cases annually).

Results: 80 responses were received with varying response rates by question. 64% (44/69) identified using the ISIS scale in daily practice, 49% (39/80) were identified as completing greater than 25 cases per year, and 16%, 15%, 23% and 46% were in each experience group (5, 10, 15 and 15+ years respectively). Responses to the cases were consistent amongst surgeons regardless of use of the ISIS scale, years of experience and clinical volume. There was variability in the use of open latarjet versus non-operative management in a patient with a first-time dislocation returning to a contact sport based on the use of the ISIS score ($\chi^2 = 6.524$, $p = 0.089$) and surgeon volume ($\chi^2 = 6.969$, $p = 0.0703$).

Conclusion: The majority of Canadian Orthopedic Surgeons manage AGHI in a consistent manner, despite variability in the use of the ISIS scale, case volume and the number of years in practice.

An Epidemiological Profile of Pickleball Athletes

Matthew Getzlaf (PGY3), Jason Shin

Background: Pickleball is a racquet sport played on a tennis court combing elements of tennis, table tennis, and badminton. As the popularity of pickleball rapidly grows, as do the number of injuries seen by orthopedic surgeons sustained while playing the sport. Pickleball tends to be a sport adopted by athletes later in life, and as it is a newer sport, very little is known about the injury profiles and risk factors. The purpose of this study is to investigate the prevalence, characteristics, and risk factors of pickleball injuries.

Methods: An online survey was administered to Canadian pickleball athletes using Survey Monkey, a common online survey platform. It was open from February 1 until March 31 2021. Responses from 304 athletes from across Canada were collected for analysis. Univariate and Multivariate logistic regression analysis was performed.

Results: Overall 78% of the 304 participants reported an injury in their pickleball career. 71% of athletes sustained soft tissue injuries, 7.9% fractures, and 6.9% lacerations. Shoulder and knee injuries were the most common each suffered by 31.9 % of injured athletes, followed by elbow (29.1%), ankle (25.9%), and foot (18.1%). 55% of injuries were sustained in the practice setting, with the other 45% being in competition. Athletes participating in other sports were at higher risk of sustaining an injury in pickleball (OR 4.58; P = 0.009). Injured athletes sought physio therapy the majority of the time (94.0%), with 13.8% receiving injections, and 10.9% receiving surgery.

Conclusions:
Most pickleball athletes report sustaining an injury while playing the sport. Knee and shoulder injuries are the most common followed by ankle and elbow.. 55 % of injuries were sustained in competition as opposed to practice. Physiotherapy was the most commonly sought treatment modality. A history of playing other sports in addition to pickleball was found to increase the odds of injury.

The Impact of COVID-19 on National Hockey League Players' Return-To-Play

Jasmine Lyng (PGY3), Dan Ogborn, Marc Morissette, Jeff Leiter, Peter MacDonald, and Robert Longstaffe

Background: The COVID-19 pandemic has impacted sports around the world, leading to the implementation of new health and safety protocols for players and staff. Return-to-play (RTP) guidelines can be difficult to navigate when it comes to the novel Coronavirus, particularly due to its infectiousness and effects on the cardiorespiratory system. The objective of this study is to investigate the negative health-related outcomes of COVID-19 in elite-level athletes, specific to its impact on on-ice performance, to assist in the development safe RTP guidelines.

Hypothesis: There will be no difference in the on-ice metrics for NHL players and goaltenders pre- and post-COVID-19 diagnosis or COVID-19 diagnosed players against matched controls with no COVID-19 diagnosis.

Methods: A retrospective cohort study using publicly accessible online media sources to identify NHL players/goaltenders with a COVID-19 diagnosis during the 2021 season will be completed. On-ice metrics, including time on ice (TOI) for players and save percentage and goals against average for goaltenders will be compiled using the NHL's online statistics website. A matched group of NHL players based on age, position and average TOI per game that did not receive a diagnosis of COVID-19 during the 2021 season will serve as a control group. A similar process will be used for NHL goaltenders, however, age, save percentage and goals against average will be used as matching variables.

Results: Player/goaltender characteristics including age and position will be compared between NHL players with COVID-19 diagnosis and those with no COVID-19 diagnosis. On-ice metrics, including average time on ice per game and average shift length for players and save percentage and goals against average for goaltenders, will be compared between the two groups and time points using a two-way, mixed model ANOVA (time (pre/post), group (COVID-19/Control). Results will be reported as means ± standard deviations and with significance set at $p < 0.05$.

Conclusions: The impact of COVID-19 on elite ice-hockey players remains to be determined. Understanding the true impact of COVID-19 will better inform players, team staff, and medical professionals in their decision making around safe RTP.

Return to Sport and Functional Performance Following Surgical Intervention for Anterior Glenohumeral Instability (AGHI)

Jessica Littmann (PGY2), Jamie Dubberley, Peter MacDonald, Jon Marsh, Greg Stranges, Jarret Woodmass, Sheila McRae, Jason Old, Dan Ogborn

Background: Treatment for anterior glenohumeral instability (AGHI) when bony defects do not meet the threshold of 20% of glenoid anteroposterior width is widely debated. Currently accepted surgical options include Bankart Repair with Remplissage or Latarjet Coracoid Transfer, yet there is no consensus as to optimal surgical management in these situations. Furthermore, AGHI in athletes may lead to reduced performance yet little attention has been given to functional criteria that can be used to determine safe timing for return to sport (RTS). The aims of this project are to compare efficacy between open Latarjet and Bankart with Remplissage, and to validate functional testing criteria to better inform RTS decisions.

Hypothesis: There will be no difference between groups at 24 months post-operative.

Methods: A single-blinded prospective cohort will be completed with 36 patients per group followed for 24 months post-operative. Patients aged 18-50 years, with two or more dislocations (one documented reduction of the study shoulder), reproducible symptoms on exam and less than 25% glenoid bone loss will be eligible for participation. Efficacy of the procedures will be compared with the Western Ontario Shoulder Instability Index (WOSI) questionnaire. Patients who desire to RTS will undergo additional muscular strength and dynamic performance testing. The Subjective Patient Outcome for Return to Sports (SPORTS) and Shoulder Instability Return to Sport after Injury (SIRSI) outcomes will be used to define the relationship between performance and perceived RTS readiness.

Results: Mixed-effects, linear modelling (interpolative intention-to-treat) will be used and a two-way, repeated measures ANOVA ($\alpha = 0.05$) will be completed where appropriate for the primary and patient-reported outcomes (WOSI). Functional performance tests with unilateral values will have a limb symmetry index calculated and bilateral tests will use raw scores to compare between surgical procedures. Multiple, stepwise regressions will test the relationship between functional performance and psychological readiness to RTS.

Conclusions: We anticipate no significant difference in complication rates, functional outcomes or rates of RTS at 24 months demonstrating both procedures are appropriate for the management of AGHI. Functional testing will find comparable deficits in function at the commonly recommended RTS timepoint of six months regardless of procedure.

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

Drew Mulhall (PGY3), Roxana Dragan, Scott McCulloch, Ted Tufescu, Nathan Nickel

Introduction: Methamphetamine is an addictive stimulant that puts users at risk of trauma and injection-related infections. Increasing rates of methamphetamine use in Manitoba is reflected by an approximate 20-fold increase in monthly methamphetamine-related emergency department (ED) visits from 2013 to 2018. While current evidence speaks to a burdensome effect of methamphetamine use on the healthcare system, there remains a paucity of research investigating the economic impacts of methamphetamine use in orthopedic trauma patients. This study aims to identify the economic impact methamphetamine use exerts on emergent orthopedic care. We hypothesize methamphetamine users will demonstrate a continual increased use of the orthopedic trauma service over the study period, and, compared to non-meth users, will accumulate higher health care costs and have significantly greater costs associated with specific orthopedic injuries.

Methods: A retrospective financial analysis using resource intensity weights will be conducted on two patient groups: methamphetamine users and non-methamphetamine users. The study will explore costs associated with hospital (ED visits, specialty consultation, and peri-operative care) and post-hospital services (follow-up appointments, prescriptions, and ED re-presentations) between 2013-2021. The methamphetamine user cohort will be identified using de-identified health data from the Manitoba Centre for Health Policy database. Methamphetamine users will be compared with a matched control group of non-methamphetamine users based on age, sex, income quintile, and date of ED visit. Healthcare spending during the first year after the initial ED visits will be calculated based on medical claims and hospitalization costs (resource intensity weights multiplied by the cost per weighted case).

Results: A generalized linear model will be used to distinguish differences in cost between the two groups. We will adjust for confounding between the two groups using propensity score methodology.

Conclusion: Understanding the economic impact of methamphetamine use in orthopedic patients may alter treatment plans among orthopedic surgeons. This study may also demonstrate significant resource utilization among methamphetamine users, necessitating the development and implementation of strategies aimed at methamphetamine harm reduction.

Can Time of Year Affect Time to Surgery in Patients Requiring ORIF of Acetabular Fracture?

Nikita Sarangal (PGY1), Ted Tufescu, Bradley Pilkey

Introduction: Orthopedic trauma surgeons routinely choose operative fixation of displaced acetabular fractures to reestablish a stable and congruent joint, restore pain-free function and reduce post-traumatic arthritis. Time to surgery has been shown to be a significant predictor of quality of reduction and patient functional outcomes for both elementary and associated displaced acetabular fractures. The primary objective of this retrospective review is to determine whether time of year impacts time to surgery for operative acetabular fractures treated at our institution. The secondary objectives are to document occurrence of complications in the hospital and track total length of hospital stay.

Hypothesis: We hypothesize that time to primary fixation will be longer during the summer months, when the orthopedic surgery service at our institution experiences a surge of operative orthopedic trauma cases, despite controlling for conflicting variables including patient geography, comorbidities and injury severity.

Methods: All patients that underwent acetabular ORIF between 2017 and 2021 by two fellowship trained orthopedic trauma surgeons at a tertiary-level Canadian hospital will be included. A chart review will be completed to note time of injury, patient geography, acetabular fracture classification, based radiographs and computed tomography (CT), concomitant traumatic injuries, patient comorbidities, operative procedure notes, complications occurring while in hospital, and length of hospital admission. Time of year will be categorical months. Patient geography will be defined categorically as per the provincial Regional Health Authorities. Comorbidities and severity of injury will be documented using the validated scores, adapted Charlson comorbidity index (CCI) and Injury Severity Score (ISS), respectively.

Results: Patient and case characteristics will be summarized as frequencies or means with standard deviations where appropriate. Multiple, stepwise regression will be completed to define the relationship between time of year and time to primary fixation, with subsets including the variables patient geography, CCI, and ISS.

Conclusion: Understanding the resource requirements to treat acetabular fractures is essential in order to be prepared to provide appropriate surgical management. While the number of presenting surgical cases may not be a controllable factor, several logistic considerations can be optimized during the most affected time of year, such as availability of surgeon, access to OR, and adequate support staff.

Open Reduction & Internal Fixation of Midshaft Clavicle Fractures: Outcomes from a Single Surgeon Case Series

Bianca Sarkis (PGY1), Tousief Hussain

Background: Midshaft clavicle fractures are commonly occurring injuries. Their treatment is controversial, as mixed evidence currently exists regarding indications for operative fixation. The decision for surgery presently rests on patient preference, activity level and degree of displacement and shortening on fracture imaging. There is also no current standard for operative technique, as multiple approaches and fixation constructs remain available.

Methods: 99 patients were treated operatively for midshaft clavicle fractures by a single surgeon using identical operative technique and approach from 2007 to present. In each case, an anterior approach to the clavicle and a 3.5 mm pelvic reconstruction plate were used to achieve fixation. The patients' individual charts and radiographs both pre and post-operatively were retrospectively reviewed.

Results: The primary outcome of this study is rate of union. Secondary outcomes include rate of complications, symptomatic hardware and re-operation. Outcomes will be stratified based on radiographic fracture characteristics, patient demographics, and mechanism of injury (polytrauma versus isolated injury).

Conclusion: We believe that the present case series supports operative management of displaced clavicle fractures, demonstrating high rates of union with the use of 3.5 mm pelvic reconstruction plates from an anterior approach. Additionally, the lower cost of this plating technique compared to others may result in significant savings to the healthcare system when applied on a broader scale. Future study will seek to compare outcomes from this case series to a larger group of patients treated operatively by the orthopaedic trauma group at a single centre (the Royal University Hospital) for quality review.

Identifying spine care needs and perceived barriers to accessing evidence-based spine care in northern Manitoba: A Global Spine Care Initiative implementation project

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Background: To optimize spine care and reduce spine-related disability and costs, World Spine Care (WSC) established a four phase Global Spine Care Initiative to focus on underserved communities. Phase Two of this project will explore the readiness of implementing an evidence-based model of spine care (MoC) in a northern Manitoba community (Pimicikamak [Cross Lake First Nation]) from the perspective of stakeholders (decision-makers, clinicians, spine care patients and community residents). The primary objective is to expand our knowledge regarding individual and collective experiences of spinal disorders in Pimicikamak. The secondary objective is to determine the cultural appropriateness of the MoC triaging system and provision of care whether it meets the needs of the Pimicikamak population.

Methods: A mixed methods participatory approach will be utilized including chart review (demographic, reason for consultation, care provided), community surveys (social determinants of health (SDOH), spine condition, satisfaction with community-based care), and semi-structured interviews/focus groups (level of awareness & prioritization of care, factors limiting use of MoC).

Results: Quantitative collection of data will consist of completing community needs assessment surveys and chart reviews. Qualitative collection of data will include focus groups with clinicians and semi-structured interviews with managers and spine patients. Qualitative & quantitative data collection will reveal the communities need, interest, and usefulness of implementing the MoC within the community. Descriptive statistics for participant demographics, clinician construct indicators (knowledge and self-efficacy), assessment of acceptability, appropriateness, and clinical measures (pain, function, disability, quality of life) will be prepared. Content analysis and thematic coding of survey and focus group data will identify key barriers and facilitators of MoC implementation.

Conclusion: Working with the Indigenous patients and their community will help ensure culturally appropriate approaches are central to the implementation of the MoC. It will help tailor a MoC specific to the communities needs and therefore lead to a sustainable clinical approach to spine care. This will help to address current gaps and barriers faced in spine care and will build capacity within the community to implement Phase 3 of the project.

Pediatric Trauma During the Pandemic

Monther Abuhantash (PGY2), Tracie Afifi, Ashley Stewart-Tufescu, James McCammon

Introduction: Many countries have adopted lockdown measures and social distancing strategies to mitigate the catastrophic impact caused by the COVID-19 pandemic. Similar stress-inducing states have been shown to be associated with higher rates of pediatric trauma due to the restricted access to child-serving medical and social services. In pediatric trauma, fractures are practical injuries to study as they typically cause significant pain requiring medical attention and could be accurately diagnosed using imaging. This study aims to examine how pediatric fractures and their management were altered by the pandemic in Manitoba. We will also study how the rates of non-accidental injuries (NAI) have changed, particularly during the lockdown period.

Hypothesis: We hypothesize that the pandemic is associated with a change in the etiology and characteristics of pediatric fractures, with an increase in fracture severity and their association with NAI.

Methods: A retrospective medical chart review will be conducted of pediatric patients (0-18 years of age) referred for fracture management to a level I trauma center. Using this cohort, data will be collected from April 1st, 2020 to September 30th, 2021 (pandemic period, April 1, 2020 province wide lockdown) as well as from April 1st, 2018 to September 30th, 2019 (pre-pandemic period). For each patient in the “pandemic” and “prepandemic” cohorts, various demographics and fracture-specific data will be collected. The cohorts will be compared with a two-sample t-test for continuous variables and chi-square test for categorical variables. The incidence, etiology, severity (using the Injury Severity Score system) and management of the fractures will be compared between the groups, as well as the rate of patient admission and length of hospital stay.

Conclusion: Preliminary studies suggest there is a decreased incidence but increased severity of pediatric trauma during the pandemic. This is thought to be due to underreporting of minor injuries and delay in seeking treatment for more serious injuries. This study would define patterns in pediatric fracture rates and severity throughout the pandemic. This may allow for the identification of risk factors for pediatric trauma and NAI that could be amenable to focused preventive measures.

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to the

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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.