University of Manitoba
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Combined Orthopedic Resident Research Day

October 28, 2022

Ambassador A Banquet Room Canad Inns (HSC) Winnipeg

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TRADITIONAL TERRITORIES ACKNOWLEDGEMENT

The University of Manitoba campuses are located on original lands of Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

PROGRAM

Friday, October 28, 2022

Session (1) - Moderator: Dr. Eric Bohm

8:55 – 9:00	Welcome Remarks	Dr. Ted Tufescu
9:00 – 9:10	Pregnancy and Parental Leave Policies in Canadian Orthopaedic Training Programs: Perceptions from the Program Directors	Dr. Sophie Zhu
9:10 – 9:20	Does Addition of Longer-Acting Local Anesthetic Improve the Post-operative Pain After Carpal Tunnel Release? A Randomized Controlled Study	Dr. Emily Chan
9:20 – 9:30	Comparison of Construct Design and Fixation Technique for Anterior Cervical Fixation	Dr. Drew Mulhall
9:30 – 9:40	Socioeconomic Status Affects the Likelihood of Surgery in Anterior Cruciate Ligament Reconstruction and Rotator Cuff Repair	Dr. Melinda Fowler-Woods

Session (2) - Moderator: Dr. Laura Sims

9:40 – 9:50	Surgeon's Prediction of Patients' Postoperative 1-year SANE Score Following Rotator Cuff Repair Surgery	Dr. Monther Abuhantash
9:50 – 10:00	Ankle Fractures with Syndesmotic Disruption: A Novel Surgical Technique Using Suture Tape to Address Syndesmotic Instability Without Rigid Fixation	Dr. Lauren Ready
10:00 – 10:10	Post-operative Weight Bearing Restrictions and Rehabilitation Protocols After Hp Arthroscopy: A Systematic Review	Dr. Riley Hemstock
10:10 – 10:20	Medial Congruent vs Cruciate Retaining Total Knee Replacement: A Randomized Controlled Research Trial	Dr. Bianca Sarkis
10:20 – 10:30	Patient Reported and Clinical Outcomes of Minimally Invasive Chevron/Akin (MICA) Procedure for Correction of Hallux Valgus Compared to Lapidus Procedure: A Randomized Trial	Dr. Nikita Sarangal
10:30 – 10:45	**Health Break**	

Session (3) - Moderator: Dr. Jarret Woodmass

10:45 – 10:55	Allograft Augmentation for Multidirectional Shoulder Instability Refractory to Previous Surgical Intervention	Dr. Madison Price
10:55 – 11:05	Does Simulated Learning with 3D Printed Models Improve Residents' Understanding and Planning of Acetabular Fractures?	Dr. Rohit Bansal
11:05 – 11:15	Major Complications in Patients Undergoing Total Hip Arthroplasty with the Direct Anterior Approach: A Study at a High-Volume Ontario Tertiary Care Center	Dr. Nicholas Steiner
11:15 – 12:00	Guest Speaker Presentation: What They Never Teach You About Nailing	Dr. Matthew Menon
12:00 – 1:10	**Lunch Break**	

Session (4) - Moderator: Dr. David Sauder

1:10 – 1:20	Tranexamic Acid Administration in Arthroscopic Surgery is a Safe Adjunct to Decrease Postoperative Pain and Swelling: A Systematic Review and Meta-analysis	Dr. Kyle Goldstein
1:20 – 1:30	Prevalence of Radiographic Markers of Femoroacetabular Impingement Among Patients Who Have Undergone ACL Reconstruction	Dr. Andrew Fast
1:40 – 2:25	Guest Speaker Presentation: How Am I Going to Make This a Career? What I Really Need to Know About How Healthcare Works.	Dr. Matthew Menon
2:25 – 2:35	Conclusion of Academic Program	Dr. Ted Tufescu
2:35 – 2:55	**Health Break**	
2:55 – 3:25	Judges Deliberation	
3:25 – 4:00	Awards Presentation	

GUEST SPEAKER

Matthew RG Menon MD, FRCSC, MHSc

Matthew Menon is an Associate Professor of Surgery at the University of Alberta. Matt's practice is focused on Trauma Surgery including multiple trauma, fractures of the pelvis and acetabulum and complex periarticular injuries.

Matt completed his Orthopaedic Surgery Residency at the University of British Columbia followed by a Fellowship in Trauma Surgery at the Royal Infirmary of Edinburgh. He has been an attending Trauma Surgeon at several Level 1 centres including the Royal Infirmary of Edinburgh, Royal Columbian Hospital in New Westminster, BC, Vancouver General Hospital and at the University of Alberta since 2009.

His current roles include Undergraduate Medical Education, Residency Training in Trauma Surgery and the Trauma Fellowship program at the University of Alberta. He is the section head of Trauma Surgery in the Division of Orthopaedics and Medical Director of the Orthopaedic Consult Line. The University of Alberta is a centre for several multicenter randomized trials in Orthopaedic Trauma. Matt holds a Master's degree in Health Sciences - Epidemiology and Research Methodology from the University of British Columbia and a Master's degree in Health Economics and Policy from the London School of Economics.

ORTHOPEDIC SURGERY
FACULTY AND RESIDENTS

University of Manitoba

Dr. Brad Pilkey
Section Head

Dr. Ted Tufescu
Residency Program Director

Dr. Dan Ogborn
Research Director

Dr. Sophie Zhu, PGY 4
Dr. Drew Mulhall, PGY 4
Dr. Monther Abuhantash, PGY 3
Dr. Melinda Fowler, PGY 3
Dr. Riley Hemstock, PGY 3
Dr. Nikita Sarangal, PGY 2
Dr. Rohit Bansal, PGY 2
Dr. Madison Price, PGY 2
Dr. Andrew Fast, PGY 1
Dr. Nicholas Steiner, PGY 1

University of Saskatchewan

Dr. Anthony King
Division Head

Dr. David Sauder
Residency Program Director

Dr. Laura Sims
Research Director

Dr. Emily Chan, PGY 5
Dr. Lauren Ready, PGY 2
Dr. Bianca Sarkis, PGY 2
Dr. Kyle Goldstein, PGY 1

ABSTRACTS

Dr. Sophie Zhu
PGY4 Department of Orthopaedic Surgery
University of Manitoba

Pregnancy and Parental Leave Policies in Canadian Orthopaedic Training Programs: Perceptions from the Program Directors

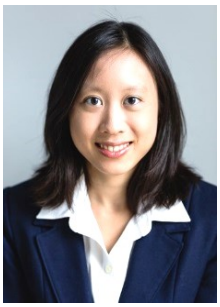
Sophie Zhu, Heather Barske

Background: Much of the literature on gender disparity and parenthood in orthopaedic surgery comes from the United States with Canadian data lacking. Combating bias about pregnancy during residency can encourage women to pursue orthopaedic careers. Program directors (PDs) are uniquely positioned to influence and enact change within each program. The purpose of this study is to 1) determine current Canadian PDs perceptions of pregnancy and parenthood during orthopaedic surgery residency and 2) to evaluate the availability and characteristics of parental leave policies and supports.

Methods: An anonymous survey will be distributed to all Canadian PDs listed on The Canadian Resident Matching Service. Survey questions will address the effect of parenthood on training, the availability of written parental leave policies, lactation support, and availability of structured mentorship and/or coaching programs. Websites of each province's College of Physicians, Resident Associations and Post-Graduate Medical Education will be reviewed for parental leave policies, lactation supports, call restrictions during pregnancy and structured mentorship programs.

Results: Demographics of the PDs (gender, parent status, marital status) and the associated program will be reported (program size, gender ratio, number of residents who had children during residency in the last 10 years, and the availability of a formal parental leave and return to work policy, return to work supports (i.e. lactation support) and mentorship). PD perceptions on the impact of parental leave and parenthood on clinical activities, scholarly activities, the burden on other residents, and the best time to have children will be queried separately by trainee gender. Fisher's exact test ($p < 0.05$) will be used for differences in PD response by trainee gender. For program policy review, proportions will indicate the number of programs with written and available parental leave policies alongside descriptive statistics considering available financial support, time allotment, call restrictions and return to surgery requirements.

Conclusion: It is important to document the availability and comprehensiveness of program parental leave policies and reconcile these with the attitudes of residency PDs to support resident family planning and the creation of a just and equitable learning environment.



Dr. Emily Chan
PGY5 Division of Orthopaedic Surgery
University of Saskatchewan

Does Addition of Longer-Acting Local Anesthetic Improve the Post-operative Pain After Carpal Tunnel Release? A Randomized Controlled Study

Emily Chan, Laura Sims, Churao Yang, Kristi Billard, David Sauder

Introduction: 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 mixture consisting of lidocaine and bupivacaine in equal amounts (LB).

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

Results: A total of 145 patients were recruited. After exclusions, 139 remained: 67 (48.2%) in the L group and 72 (51.8%) in the LB group. Mean age of patients in the L group (56.9 years) and was significantly lower than that of the LB group (63.0 years) (p=0.02). Baseline carpal tunnel severity scores were similar between groups. Compared to the L group, post-operative VAS scores were significantly lower in the LB group at 6 hours (2.3 vs 3.2, p=0.02) and 8 hours (2.9 vs 3.9, p=0.02). Additionally, patients in the LB group reported longer time to first analgesic use than those in the L group (5.2 hours vs. 3.7 hours, p=0.02).

Conclusion: Our results suggest that patients anesthetized with a mixture of lidocaine and bupivacaine for CTR experienced less postoperative pain at 6 and 8 hours, compared with those who received lidocaine alone. In our experience, this mixture is a feasible alternative to lidocaine for CTR performed under local anesthesia.

Dr. Drew Thomas Mulhall
PGY4 Department of Orthopaedic Surgery
University of Manitoba

Comparison of Construct Design and Fixation Technique for Anterior Cervical Fixation

Drew Mulhall, Monther Abuhantash, Mary Ragasa, Mark Xu, Jon Tan, Sara Parashin, Trevor Gascoyne, Michael Goytan

Background: Anterior cervical fixation is routinely performed with plate and screw constructs to achieve fusion and counteract graft settling and kyphotic deformity. Although outcomes are generally satisfactory, hardware failure can result in complications including non-union and esophageal erosion. Rates of hardware failure are greater with anterior cervical corpectomy and fusion compared to discectomy and fusion. Establishing optimal construct design is necessary to reduce complications and improve patient outcomes. This study aims to determine the ideal construct design for short versus long plating and to quantify the stability added by posterior fixation for cervical discectomy.

Hypothesis: Longer screws or posterior fixation will improve overall construct fixation.

Methods: Two bone blocks will be used to simulate adjacent cervical vertebral bodies. A moderate osteoporotic bone-type model will be employed with foam densities of 30 lbs/ft^3 (PCF) for cortical and 5 lbs/ft^3 PCF for cancellous bone. An anterior cervical plate will be fixed by two pairs of bilateral cervical screws. The construct will be tested in a load frame apparatus (Instron) to quantify implant fixation. An axial load will be applied to the upper bone block at a controlled displacement until bone block or implant failure. Implant fixation will be determined by load (N) and overall construct displacement (mm).

Tests will be performed on two screw lengths (14 mm, 16 mm) and two plate lengths (22mm, 37mm) for 6 replicates per group (N=6). A third test group will consist of a short (22mm) anterior plate and 14mm bilateral screws with additional posterior fixation using four 4.0mm lateral mass screws and two lateral cervical rods.

Results: The number of cycles, displacement and peak loads at failure will be compared with a two-way analysis of variance (comparing screw and plate length) and an independent t-test comparing short plate and short screw lengths with and without additional posterior fixation. Statistical significance will be considered at $p < 0.05$.

Conclusions: Quantifying the effects of screw and plate length as well as additional posterior fixation of the cervical spine will determine an optimal construct that allows both adequate loading of the spine and resistance to forces to achieve bony fusion.

Dr. Melinda Fowler-Woods
PGY3 Department of Orthopaedic Surgery
University of Manitoba

Socioeconomic Status Affects the Likelihood of Surgery in Anterior Cruciate Ligament Reconstruction and Rotator Cuff Repair

Melinda Fowler-Woods, Peter MacDonald, Jarret Woodmass, Sheila McRae, Marc Morrissette

Background: A tenant of the Canadian health care model is equal access to care. This study compares the socioeconomic status (SES) and other demographics between those that undergo surgery for anterior cruciate ligament (ACL) rupture and rotator cuff (RC) tears to those that do not.

Objective: The objective of this study was to compare SES and other demographics between those that undergo surgery for ACL and RC tears versus those that do not.

Methods: The study design was a retrospective population-based cohort study. It utilized data captured through the Manitoba Centre for Health Policy from 1990 to present. The operative group consisted of all patients coded as having undergone ACL reconstruction (ACLr) or RC repair (RCR), and the non-operative group consisted of all those with the same diagnostic codes but that did not undergo surgery. Socioeconomic Factor Index-2 (SEFI-2) operationalized SES. Other demographic variables included age, sex, Charlson Comorbidity Index (pre-existing medical conditions), and geographic location (urban versus rural). Chi-square was calculated to compare distributions and odds ratios were calculated to determine odds of patients of different demographics undergoing surgery or not.

Results: 8184 ACLr cases and 66,070 non-surgical controls with the same diagnostic codes were included in the analyses. The odds of undergoing ACLr were higher for those with higher SEFI scores, and those that were younger, male, and living in an urban setting ($p<0.001$ for all). 7465 RCR cases and 120163 non-surgical controls with the same diagnostic code were included in the analyses. The odds of undergoing RCR were higher for those that were younger, with fewer comorbidities, that were male, and living in an urban setting. SEFI was not associated with undergoing surgery or not ($p<0.001$ for all).

Conclusion: It is important to identify factors affecting access to healthcare in order to be able to address inequities, funding programs, policies and quality improvement. The study findings suggest inequities in access may exist, although, limitations of drawing conclusions using population-based data must be taken into consideration. The next step to this study is to examine access to surgery based on Indigenous status in Manitoba.

Dr. Monther Abuhantash
PGY3 Department of Orthopaedic Surgery
University of Manitoba

Surgeon's Prediction of Patients' Postoperative 1-year SANE Score Following Rotator Cuff Repair Surgery

Monther Abuhantash, Sheila McRae, Jarret Woodmass, Jamie Dubberley, Jon Marsh, Jason Old, Greg Stranges, Peter MacDonald

Background: Previous studies have found that preoperative patient expectations are associated with patient outcome following rotator cuff repair (RCR). The relationship between surgeon expectations, patient expectations, and actual surgical outcomes is a complex one. The purpose of the present study is to determine the surgeon's accuracy in predicting patient's outcome following RCR, and how these expectations align with and influence the patients' expectation of their own recovery.

Hypothesis: It is hypothesized that the surgeon's predicted 1-year outcome will be significantly predictive of the patient's actual 1-year outcome following RCR, as measured by the Single Assessment Numeric Evaluation (SANE) score.

Methods: This is a retrospective cohort study. All patients undergoing primary or revision rotator cuff repair by a fellowship-trained upper extremity surgeon at Pan Am Clinic between April 2022 and March 2023 will be considered for this study. Patients will be excluded if English is not their primary language, or if predicted or achieved outcomes were not reported by surgeon or patient. The primary outcome measure is the SANE score. Patients will complete a predicted 1-year SANE score pre-operatively and actual SANE score at 1-year post-operative. The surgeon will assign their predicted SANE score immediately post-surgery after evaluating cuff tendon quality, tear size and quality of repair. A series of step-wise linear regressions will be performed with actual 1-year SANE score as the dependent variable and surgeon- and patient-predicted SANE score as the independent variables.

Results: It is expected that the surgeon's predicted SANE score will be significantly predictive of the patient's actual 1-year outcome. In addition, we anticipate that some patients' predictions will not align with their surgeon's and will not correlate with their achieved outcome.

Conclusion: It is important for surgeons to be able to predict which patients are likely to have poor long-term outcome after RCR. This will allow for early intervention and patient counselling to modulate patient expectations and rehabilitation which may improve their long-term prognosis.

Dr. Lauren Ready
PGY2 Division of Orthopaedic Surgery
University of Saskatchewan

Ankle Fractures with Syndesmotic Disruption: A Novel Surgical Technique Using Suture Tape to Address Syndesmotic Instability Without Rigid Fixation

Lauren Ready, Hussain T.

Background: Ankle fractures and sprains are one of the most common orthopaedic injuries. When repairing these bony injuries, it is essential to also address the soft tissue to regain joint stability. With syndesmosis repair, the common techniques are tightrope or screw placement. The former is gaining in popularity as screws provide rigid fixation in a region that used to have flexibility. Here, we evaluate a novel syndesmosis repair technique in comparison to the established procedure options.

Methods: Between 2019 and 2022, seventeen patients underwent an open reduction internal fixation of their ankle with one surgeon at one of two facilities (RUH, SCH). Inclusion criteria were patients who underwent a syndesmotic repair by this surgeon after experiencing an ankle fracture with syndesmotic instability. Patients were excluded if they did not undergo this procedure or had a different surgeon. All clinic, admission and operative notes were examined for each patient to determine operative and hospital course.

Results: Our length of post-operative follow-up ranged from 18 to 824 days. The patient ages ranged from 13 to 83 years of age and was 47% male (8/17).

Surgical Technique: It is essential to achieve anatomic reduction, especially addressing rotational deformity. Initially the anterior talo-fibular ligament (ATFL) was identified, then drilled through, exiting along the anterior aspect of the medial malleolus. The drill was used to create another path through to the medial malleolus, exiting posterior to the first hole. A Heuson suture passer was then used for the passing of Alter tape in double loop fashion to reestablish the fibular alignment.

Conclusion: This is the first manuscript identified describing this novel technique for syndesmosis repair. Furthermore, our results demonstrate that stability can be established in formats other than the most common procedures that have been accepted as the repair of choice. This technique offers a quality option that produces good outcomes with less hardware. This also makes it economically beneficial, as the overall price of the repair was less than a typical syndesmosis repair with screws or a suture button. We propose the suture loop as a successful alternative to the current syndesmotic repair techniques performed.

Dr. Riley Hemstock
PGY3 Department of Orthopaedic Surgery
University of Manitoba

Post-Operative Weight Bearing Restrictions and Rehabilitation Protocols After Hp Arthroscopy: A Systematic Review

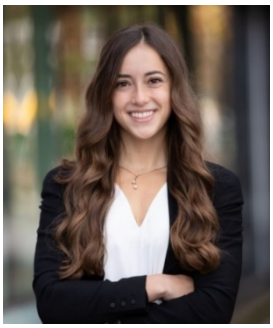
Riley Hemstock, Drew Mulhall, Dan Ogborn, Devin Lemmex

Introduction: Despite increased interest in hip arthroscopy for management of femoroacetabular impingement (FAI) in recent years, there is little evidence beyond expert opinion and case series to guide post-operative rehabilitation. The objectives of this study are: 1) To determine if sufficient evidence exists to recommend specific weightbearing restrictions in the immediate post-operative period, and 2) To describe the variability amongst patient reported outcome measures (PROM), clinical outcomes and rehabilitation protocols reported.

Methods: This study was registered with PROSPERO (CRD42021247741). PubMed, MEDLINE and Embase were searched on September 14, 2022 for Level I-IV studies including patients over the age of 18 years, with a minimum 1-year follow-up, reporting of weightbearing status, with at least one patient reported outcome measure (PROM) and one clinical outcome were included. Non-English language, reviews, technical papers, grey literature and bilateral interventions were excluded. Data extraction was completed blinded in duplicate and meta-analysis was precluded due to heterogeneity in the included studies. Methodological quality and risk of bias were assessed with the Methodological Index for Non-Randomized Studies (MINORS).

Results: Twenty-four studies including 2231 patients who underwent hip arthroscopy for treatment of FAI were included with a follow-up interval of 33.58 +/- 25.19 months. There were no RCTs included, with the majority (42%) being case series. There were seven terms describing weightbearing recommendations post-operatively, with 83% of studies describing some variation of “partial weightbearing”. The paucity of detail in reporting and heterogeneity in included studies precluded the ability to determine a relationship between specific weightbearing status recommendations and outcomes. There were eight PROMs reported, with 83% using the modified Harris Hip Score. 87.5% of studies reported reoperation rates, with 75% reporting revision arthroscopy rates and 71% reporting rate of conversion to THA. Only 62.5% reported complications, with the most common being neuropraxias. Only 62.5% of studies reported rehabilitation protocols and only 21% had detailed 4-stage protocols. Average MINORs score was 11.23 +/- 1.25 out of 16.

Conclusion: The reporting of post-operative rehabilitation parameters, including weightbearing status, clinical outcomes and PROMs, remains poor. At present, sufficient comparative evidence does not exist to recommend specific weightbearing restrictions post-operatively.



Dr. Bianca Sarkis
PGY2 Division of Orthopaedic Surgery
University of Saskatchewan

Medial Congruent vs Cruciate Retaining Total Knee Replacement: A Randomized Controlled Research Trial

Bianca Sarkis, W. Dust, A. King, T. Loback, I. Lutz, J. Mckerrell, J. Van der Merwe

Background: Total knee arthroplasty is a successful treatment for knee osteoarthritis; however, 10-15% of are dissatisfied with the outcome and have persistent pain, for reasons undetermined. One approach has been to modify the components used. Presently, the Persona Cruciate Retaining and Medially Congruent designs are commonly used in Canada, with little knowledge as to which offers greater long-term benefits. The purpose of the study is to compare the results of the two surfaces in order to improve surgical outcomes and assist in indicating future implant designs.

Methods: Participants will be recruited amongst patients consented for total knee arthroplasty at the time of their preadmission clinic visits amongst the Saskatoon arthroplasty group. The mainstay of evaluation will be by Patient Reported Outcome Measures (PROMS). Pre-operatively, patients will complete the Oxford 12 Knee score and the VR-12 Quality of Life score. An envelope containing a randomly allocated implant will be opened once the patient and surgeon are in the Operation Room. Follow-up will occur at 12 and 24 months post-op. At these visits, patients will once again complete the Oxford and VR-12 questionnaires, as well as the Forgotten Joint Score and New Knee Society Satisfaction Score. The 12-month questionnaires may be completed remotely. The 24-month follow-up is an in person visit with a different research group surgeon to preserve blinding, and includes a range of motion assessment. Routine pre and post-operative x-rays will be used to assess the degree of arthritis and final positioning of implants.

A bilateral total knee replacement sub-study will be conducted within the same study group. This may occur in a simultaneous or staged fashion. The initial knee will be included in the randomization, and the second knee will receive the other implant, in order to analyze both in the same patient.

Results/Conclusions: We are hoping to recruit 360-400 participants in 12-18 months. The duration of the study is likely to be 3-4 years.

Dr. Nikita Sarangal
PGY2 Department of Orthopaedic Surgery
University of Manitoba

Patient Reported and Clinical Outcomes of Minimally Invasive Chevron/Akin (MICA) Procedure for Correction of Hallux Valgus Compared to Lapidus Procedure: A Randomized Trial

Nikita Sarangal, Dan Ogborn, Heather Barske

Introduction: There is growing interest in the MICA procedure for hallux valgus correction. The MICA procedure has the following proposed advantages; smaller incisions, less pain, and earlier weightbearing. There is uncertainty around the MICA procedure's association with non-union and failure to achieve the desired deformity correction. Despite the proposed advantages of the MICA procedure, it is not widely used in Canada. Our group is proposing conducting a prospective clinical trial implementing the MICA procedure in patients that match the radiographic deformity criteria for the open Lapidus procedure. The primary objective of this trial is to compare the MICA procedure against the Lapidus procedure using three patient reported outcome measures. Secondary objectives are to compare the hallux valgus correction with radiographic measurements and record the incidence of complications.

Hypothesis: We hypothesize that there will be no difference in patient reported outcomes or in complications between the MICA and the Lapidus surgery groups. We hypothesize that the Lapidus procedure will demonstrate a greater degree of radiographic hallux valgus correction.

Methods: Patients will be selected based on radiographic criteria of hallux valgus deformity (Hallux Valgus Angle (HVA) >30 degrees and <50 degrees, and Intermetatarsal Angle (IMA) >15 degrees) and prospectively randomized into the MICA or Lapidus groups. Patient follow-up visits will be at 2 weeks, 3 months, 6 months and 1 year post op. Patient reported outcomes will be measured using the Foot and Ankle Ability Measure (FAAM), Foot Function Index (FFI) and the 12-item Short Form Survey (SF-12) patient questionnaires. Pre- and post-operative radiographic HVA, IMA, foot width, and distal metatarsal articular angle (DMAA) will be recorded. Patient charts will be reviewed at the end of the follow-up period to record incidence of complications including infection, delayed union, nerve irritation, and hardware prominence. A two-way analysis of variance (ANOVA) will be performed on the primary and patient reported outcomes (group, time) and the chi-square test will be used to compare proportions for complications.

Conclusion: Near-equal clinical outcomes between the MICA procedure and the Lapidus procedure supports MICA's use in patients who may desire a minimally invasive approach.

Dr. Madison Price
PGY2 Department of Orthopaedic Surgery
University of Manitoba

Allograft Augmentation for Multidirectional Shoulder Instability Refractory to Previous Surgical Intervention

Madison Price, Dan Ogborn, Sheila McRae, Randy Mascarenhas, Peter MacDonald

Background: Multidirectional shoulder instability (MDI) refractory to previous surgical stabilization poses surgical management challenges. It can cause pain and disability, and frequently occurs in patients with connective tissue disorders (CTDs), most commonly Ehlers Danlos syndrome. CTDs affect surgical outcomes due to soft tissue-associated failure rates. Glenohumeral ligament complex arthroscopic allograft reconstruction for refractory MDI may be ideal for patients with CTD, relying less on patients' own connective tissues for stabilization. Little data exists on the effectiveness of this procedure due to the rarity of arthroscopic surgery for this condition.

This case series will describe the impacts of allograft augmentation shoulder stabilization surgery in patients with refractory MDI based on post-operative subluxations, dislocations, and further surgeries. Secondly, it will assess their shoulder pain and function using patient reported outcome measures (PROMs), and physical exam.

Methods: A retrospective chart review of past medical and surgical history will be followed by a prospective clinical assessment. All patients that underwent shoulder allograft augmentation stabilization by a fellowship trained orthopedic surgeon, following any previous unsuccessful surgical stabilization will be included (estimated n = 15). The primary assessment is a questionnaire about further subluxations, dislocations, surgeries, time to these events, and whether they would undergo the surgery again, retrospectively. Additional outcomes will include the Western Ontario Shoulder Instability Index, American Shoulder and Elbow Surgeons Shoulder Score, Constant-Murley Score, Single Assessment Numeric Evaluation (SANE) score, a memory-recall pre-operative SANE score, and a physical exam testing shoulder stability, mobility, strength, and Beighton Score.

Results: Statistics including proportions (subsequent operations, subluxations/dislocations) and means (PROMS, functional outcomes) will be generated for all outcomes alongside patient demographics.

Conclusions: Refractory MDI is both rare and difficult to treat. Currently, the largest study on this surgery for recurrent MDI was prospective and included eight patients. This case study will have the largest sample size, to date. This will inform orthopedic surgeons on the results of surgical intervention for recurrent MDI that may improve pain, function, and avoid or prolong the time before they require more invasive procedures, including shoulder arthroplasty or arthrodesis.

Dr. Rohit Bansal
PGY2 Department of Orthopaedic Surgery
University of Manitoba

Does Simulated Learning With 3D Printed Models Improve Residents' Understanding and Planning of Acetabular Fractures?

Rohit Bansal, Trevor Gascoyne, Brad Pilkey, Ted Tufescu

Background: Orthopedic residents have difficulty interpreting the clinical and radiological aspects of acetabular fractures due to complex three-dimensional anatomy. Classification of acetabular fractures is not intuitive, and 3D-printed models may facilitate teaching and improve learner confidence. Although the clinical benefits of 3D-printing are established, their use as educational tools has not been evaluated.

Purpose: To compare the impact of adding a 3D-printed pelvic model to standard teaching methods of complex acetabular fractures on residents' understanding of complex acetabular fractures considering anatomy, fracture classification, and operative planning.

Methods: This will be a prospective, randomized trial of the use of 3D-printed models in orthopedic surgery resident education at the Universities of Manitoba and Saskatchewan. Prior to the intervention, participants will have access to a self-administered standardized teaching module focused on pelvic anatomy, the Judet-Letournel classification system and surgical management, and complete a pre-intervention questionnaire. Three weeks after the pre-intervention questionnaire, residents will be randomized into two groups who will complete standardized surgical cases with either access to radiologic investigations (AP and Judet views, selected CT axial cuts, coronal cuts and 3D reconstructions; Group-1) or the use of a 3D printed pelvic model in addition to the materials of group one (Group-2). Immediately following the intervention, participants will repeat the multiple-choice questionnaire. 3D-models of the pelvis with a fractured acetabulum will be printed using Standard Tessellation Language (STL) images. Those randomized to the 3D printed group will complete an additional subjective assessment of the utility of 3D printed models for teaching and surgical planning.

Results: Test scores will be compared between groups and over time (pre/post) with a two-way analysis of variance (ANOVA, $p < 0.05$). Linear regression analysis will be performed to define the relationship between test scores and resident PGY level.

Conclusion: This study not only will identify the supplemental role of 3D print technology in teaching and learning of complex injuries like acetabular fractures but also augment surgical planning of these fractures. It will also facilitate incorporation of modern technology into the resident curriculum

Dr. Nicholas Steiner
PGY1 Department of Orthopaedic Surgery
University of Manitoba

Major Complications in Patients Undergoing Total Hip Arthroplasty with The Direct Anterior Approach: A Study At A High-Volume Ontario Tertiary Care Center

Nicholas Steiner, Kristen Barton, Kevin Boldt, Olawale Sogbein, Stephen Tsioros, James Howard, Brent Lanting

Background: A recent study in Ontario demonstrated a small increased risk of major surgical complications with the direct anterior approach (DAA) for total hip arthroplasty (THA), compared with a posterior or lateral surgical approach. The purpose of this study was to investigate the rate of major surgical complications for THA using a DAA in experienced orthopaedic surgeons at a high-volume Ontario tertiary care center.

Methods: A retrospective cohort review of all consecutive primary THA with the DAA between 2012-2019 was conducted. All patients followed for a 1-year period were included. To avoid adverse events due to surgeon learning curves, we excluded the first 100 cases. The primary outcome was rates of surgical complications (intraoperative events, postoperative periprosthetic fractures, dislocation, implant failure, early infection, and wound complications) within 1 year of THA. A chi-square test was used to identify patient factors associated with complications, with significant factors then included in a multivariable logistic regression for all surgical complications.

Results: 875 patients were included with one-year follow-up after primary DAA THA. The rate of surgical complications for a DAA was 3.2% for wound complications, 1.5% for postoperative periprosthetic fractures, 0.9% for intraoperative events, 0.8% for implant failure, 0.8% for wound infection and no dislocations. The rate of revision for implant failure within 1 year was 0.1%. Male sex was associated with implant failure ($p = 0.01$). Higher BMI was associated with increased rates of surgical complications (OR 1.09 (95%CI 1.04-1.16) driven by increased rates of infection ($p < 0.01$) and wound complications ($p < 0.01$).

Conclusions: The cumulative incidence for return to the operative room for a major complication following DAA THA in experienced orthopaedic surgeons at a high-volume Ontario tertiary care centre was 0.9%, with lower rates of dislocation, deep wound infection, and revision surgery within 1 year compared with previously reported data in Ontario. Controlling for increased complication rates during surgeon learning curves, rates of major complications from DAA THA are comparable with other surgical approaches.

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Tranexamic Acid Administration in Arthroscopic Surgery Is a Safe Adjunct to Decrease Postoperative Pain and Swelling: A Systematic Review and Meta-analysis

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Purpose: Systematically screen the literature to critically examine the effect of tranexamic acid (TXA) in patients undergoing arthroscopic surgery, specifically pertaining to pain, blood loss, length of surgery, and both major and minor complications.

Methods: In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses and Revised Assessment of Multiple Systematic Reviews guidelines, 3 databases were searched April 2020 and screened in duplicate using inclusion and exclusion criteria for studies on the given subject. Study findings were reviewed, and meta-analysis was then performed on sufficiently congruent data using a random-effects model.

Results: There were 7 eligible randomized controlled trials, with 724 total patients, undergoing anterior cruciate ligament reconstruction (4 studies, 537 patients), meniscectomy (1 study, 45 patients), femoroacetabular impingement (1 study, 70 patients), or rotator cuff repair (1 study, 72 patients). There were significantly lower visual analog scale scores at 2 weeks postoperatively in the TXA groups. Furthermore, there was a significant decrease in the number of patients requiring joint aspiration in the TXA groups. The drainage output in TXA groups was also significantly decreased. Furthermore, there was a statistically significant decrease in hemarthrosis grade (Coupens & Yates) at 2 weeks postoperatively. Finally, there was no significant difference in operating time, across all studies. The use of TXA showed no increased incidence of deep vein thrombosis, infection, arthrofibrosis, or other major complications or adverse reactions between the TXA and control groups.

Conclusions: This systematic review and meta-analysis of randomized controlled trials found that the use of TXA significantly improves pain scores up to 6 weeks postoperatively, decreases drainage output, decreases the need for joint aspirations, decreases incidence of hemarthrosis, increases visual clarity and technical ease, and has no increased incidence of other complications, at no loss to operative time. These findings indicate that TXA may be a useful adjunct in arthroscopic knee and shoulder surgery.

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Prevalence of Radiographic Markers of Femoroacetabular Impingement Among Patients Who Have Undergone ACL Reconstruction

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Background: Bony overgrowths around the femoral head (cam and pincer lesions) are associated with femoroacetabular impingement (FAI) and decreased hip internal rotation. Limited evidence suggests that hip morphology may be associated with non-contact anterior cruciate ligament (ACL) injury. Existing work has focused on primary ACL injury and not reinjury following ACL reconstruction. The purpose of this study is to 1) determine the prevalence of radiographic markers of FAI in patients with ACL injury, and 2) determine if these patients are at a higher risk of reinjury than those without radiographic makers of FAI.

Hypothesis: We hypothesize that the prevalence of radiographic markers of FAI will be greater than published values of the general population and there will be a higher risk of reinjury in those with hip pathology following primary unilateral ACL reconstruction at 6-, 12- and 24-months post-operative.

Methods: 297 patients will be recruited and included if they have a confirmed, primary, unilateral ACL rupture, are between the ages of 14 – 50 years, and are skeletally mature. All patients will have received one of three graft types in equal numbers (n = 99 per bone-patellar-tendon-bone, semitendinosus/gracilis, quadriceps tendon). Patients will have radiographs taken in weight-bearing AP and Dunn Lateral views, with the following parameters measured: lateral center edge angle, Tonnis angle, maximum alpha angle, and femoral head-neck offset. Additional markers of FAI including the crossover, posterior wall, and ischial spine signs will be observed. Measures will be taken in duplicate by blinded, independent assessors. Reinjury will be assessed at 6-, 12- and 24-months post-operative with a questionnaire, and confirmed on clinical exam and MRI.

Results: The prevalence of radiographic markers of FAI will be reported. Hip morphological measures will be compared between ACL reinjured and non-reinjured groups with an independent t-test and signs compared with the Chi-square test. Logistic regressions will be completed on the presence of these radiographic features and ACL reinjury to define odds ratios.

Conclusions: If epidemiologic and radiographic data extracted from this study demonstrate increased risk of ACL rupture or reinjury among those with FAI, further investigation to develop effective screening tools may be beneficial.

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