



**University of Vermont**

**Larner College of Medicine**

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**Department of Orthopaedics and Rehabilitation  
McClure Musculoskeletal Research Center**

***Annual Research Day  
Wednesday, June 5, 2024***

**Patrick Leahy  
Room 102**

**via Zoom**

**<https://uvmcom.zoom.us/j/108497630>**

**6:30-7:00 am Continental Breakfast**

**7:00 am Research Program Begins**

**Visiting Professor:**

**William C. Eward, DVM, MD**

**Frank H Bassett Associate Professor of Orthopaedic Surgery**

**Chief Orthopaedic Oncology**

**Department of Orthopaedic Surgery and Duke Cancer Institute**

**Durham, NC**

***UVM LCOM Alumni 2006-2010***

# Program

**7:00 AM**     **Keynote Presentation: William C. Eward, DVM, MD**  
**Introduction: Claude E. Nichols, MD**

7:05 – 7:35     Title: “Animal Stories & Creative approaches in Orthopaedic Surgery”  
7:35 – 7:45     Questions

**SESSION 1**     **PGY 5 Final Research Project Presentations**  
**Moderator: Bruce Beynnon, PhD**  
**Lead Discussant: William C. Eward, DVM, MD**

7:45 – 8:00     Title: “Risk Factors for Concomitant Meniscal Injury with Sport-Related Anterior Cruciate Ligament Injury”     3  
By: Hailee Reist, MD; PGY-5 (Bruce Beynnon, PhD)  
8:00 – 8:10     Questions  
8:10 – 8:25     Title: “Non-urgent surgical management of adult both bones forearm fractures does not result in a high rate of complications”     4  
By: Luke Seeker, MD; PGY-5 (Michel Benoit, MD and Kevin Lutsky, MD)  
8:25 – 8:35     Questions  
8:35 – 8:50     Title: “Integrating Robotic Assisted Arthroplasty into Orthopedic Education: The Fellow’s Perspective”     5  
By: Michael Danaher, MD; PGY-5 (Michael Blankstein, MD; Mark Haines, MD and Nathaniel Nelms, MD)  
8:50 – 9:00     Questions  
9:00 – 9:10     10 Minute Break

**SESSION 2**     **PGY 3 Research Presentations**  
**Moderator: James Michelson, MD**

9:10 – 9:20     Title: “Intraarticular Corticosteroid Injection at the Time of Manipulation Under Anesthesia: A Retrospective Review”     6  
By: Brandon Cushman, MD, PGY3 (Nathaniel Nelms, MD)  
9:20 – 9:25     Questions  
9:25 – 9:35     Title: “TBD”     7  
By: Seth Moffatt, MD, PGY3 (? , MD)  
9:35 – 9:40     Questions  
9:40 – 9:50     Title: “Systematic Review(s) on Biomechanical Evidence Supporting Modern Lateral Extraarticular Tenodesis in ACL Reconstruction”     8  
By: Warren Nielsen, MD, PGY3 (Andrew Geeslin, MD)  
9:50 – 9:55     Questions  
9:55 – 10:05     10 minute break

**SESSION 3    *Research Presentations***  
**Moderator:    *Patrick Schottel, MD***

10:05 – 10:20	Title: “Arthrokinematics and Compositional Measurements with qMRI 1-2 Years Following ACL Reconstruction with Meniscal Surgery” By: Sadegh Khodabandelloo, MS (Niccolo Fiorentino, PhD)	9
10:20 – 10:30	Questions	
10:30 – 10:45	Title: “Utilizing qMRI for Morphological Assessment of Knee Articular Cartilage Thickness” By: Aaron Dees, MS1 (Bruce Beynnon, PhD)	10
10:45 – 10:55	Questions	
10:55 – 11:10	Title: “Can we empower patients for joint surgery? Assessing the impact of a telemedicine coaching intervention” By: Chris Lin, MS3 (Michael Blankstein, MD and Nathaniel Nelms MD,	11
11:10 – 11:20		
11:20 – 11:35	Title: Safety and Efficacy of Gardner-Wells Tongs for Intraoperative Positioning and Spine Surgery (UVM) By: Hikmat (Matt) Chmait, MS3 (Chason Ziino, MD)	12-13
11:35 – 11:45	Questions	
11:45 – 12:00	Title: "Systematic Review of Surgical Techniques and Clinical Outcomes in Patients with a Meniscal Cyst Undergoing Meniscus Surgery" By: Sarah Tran, MS3 (Andrew Geeslin, MD)	14
12:00 – 12:10	Questions	
12:10 – 12:25	Title: “Femoral Component Flexion in Robotic-Assisted Total Knee Arthroplasty Increases Sagittal Angle Trajectory for Retrograde Intramedullary Nailing” By: Jason Brant, MD, PGY 3 (Michael Blankstein, MD)	15
12:25 – 12:35	Questions	
12:35	Lunch –Patrick Leahy Cafe	

***Raymond F. Kuhlmann, MD Resident Research Award***  
*- Awarded to the Outstanding Presentation by a Chief Resident*

***McClure Musculoskeletal Research Award*** - *Awarded to the Outstanding Presentation by a Researcher (non-faculty)*

## **Title: Risk Factors for Concomitant Meniscal Injury With Sport-Related Anterior Cruciate Ligament Injury**

**Hailee Reist, MD**, Pamela M. Vacek, PhD, Nathan Endres, MD, Timothy W. Tourville, ATC, MEd, PhD, Mathew Failla, PT, MS, PhD, Andrew Geeslin, MD, Matthew Geeslin, MD, Andy Borah, BS, ATC, Mickey Krug, BS, ATC, Rebecca Choquette, BS, ATC, Mike Toth, PhD, and Bruce D. Beynnon, MS, PhD

Investigation performed at the Larner College of Medicine, University of Vermont, Burlington, Vermont, USA

**Background:** Previous studies of concomitant meniscal injury in athletes with anterior cruciate ligament (ACL) injury have examined age, sex, body mass index (BMI), injury mechanism, and time from injury to surgery as potential risk factors.

**Purpose:** To identify additional risk factors for concomitant meniscal injury, including preinjury joint laxity and lower extremity alignment, in athletes with sport-related ACL injury.

**Study Design:** Cross-sectional study; Level of evidence, 3.

**Methods:** This study included 180 participants aged 13 to 26 years who underwent ACL reconstruction (ACLR) after a first-time ACL injury sustained during participation in sport. Contralateral lower extremity alignment and joint laxity were used as surrogate measures for the injured knee before trauma. Concomitant meniscal tear patterns were identified at the time of ACLR. Sex-specific analyses were conducted.

**Results:** Concomitant meniscal injury was observed in 60.6% of the subjects. The prevalence of concomitant injury was higher in male than female participants (69.9% vs 54.2%;  $P = .035$ ) due to a higher prevalence of lateral meniscal injuries (56.2% vs 38.3%;  $P = .018$ ). Among male patients, there was a significant difference in the prevalence of concomitant lateral meniscal tear according to sport participation (9 vs 19 h/week: 67.4% vs 35.7%;  $P = .032$ ). Among male patients, the likelihood of concomitant injury to both the lateral and medial menisci increased by 28.8% for each 1-mm decrease in navicular drop. Among female patients, the likelihood of concomitant injury to the lateral meniscus increased by 15% per degree increase in genu recurvatum and 14% per degree decrease in standing quadriceps angle, with similar effects on the likelihood of concurrent injury to both the lateral and medial menisci.

**Conclusion:** Measures of lower extremity alignment and genu recurvatum previously identified as risk factors for ACL injury were also associated with concomitant meniscal injury in female patients while other risk factors, including BMI and joint laxity, were not. Increased time spent participating in sport and navicular drop were associated with concomitant meniscal injury in male patients.

**Keywords:** anterior cruciate ligament; knee; meniscus; risk factors; trauma

## **Non-urgent surgical management of adult both bones forearm fractures does not result in a high rate of complications**

**Luke Seeker**

### **Hypothesis:**

Adult both bones forearm fractures (aBBFF) are often treated surgically within 24-48 hours of injury to decrease risk of complications. In our institution, these are often treated with initial reduction, irrigation/debridement if needed, splinting and delayed fixation within 1-2 weeks. The purpose of this study is to assess rate of complications in patients with aBBFF treated in delayed fashion, compared with a cohort of patients treated acutely.

### **Methods**

Institutional Review Board approval was obtained. A retrospective chart review was performed of patients who underwent surgical treatment of a BBFF at a single, level 1 tertiary-care center over a 12-year period (2010-2022). Inclusion criteria were skeletal maturity and isolated diaphyseal fractures of the radius and ulna. Exclusion criteria were ipsilateral upper extremity injury, peri-implant fracture, or lack of follow-up. Charts and radiographs were reviewed for complications including re-operations, delayed or non-union, or synostosis. Patients were divided into group 1 (<24 hours) and group 2 (>24 hours).

### **Results**

There were 146 aBBFF identified in 144 patients and 80 fractures met the inclusion criteria. There were 58 men and 22 women, with a mean age of 37 years (range: 16-82 years). There were 24 patients in group 1 and 56 in group 2. The mean time to fixation in group 2 was 6.8 days (range: 3-18 days).

In group 1, 20/24 were open fractures. Mean tourniquet time (TT) was 105 minutes (range: 63-170 minutes). Major complication rate was 12.5% (n=3). There was 1 compartment syndrome requiring fasciotomy, and 2 non-unions.

In group 2, 16/56 were open fractures (11 type I, 1 type II, 4 type III). Mean TT was 103 minutes (range: 64-150). The major complication rate was 7% (n=4). One patient required fasciotomy prior to definitive fixation. There were 2 infections requiring reoperation. One patient developed a synostosis. There was no significant difference between groups 1 and 2 in TT, incidence of fasciotomy, or development of synostosis.

### **Summary Points**

Patients with aBBFF can be treated in subacute fashion. Delay beyond 24 hours does not appear to increase risk of complication. We continue to support an initial closed reduction and delayed surgical treatment for most patients with this injury. Patients with poly-trauma, or severe soft tissue injury should be treated as appropriate based on the nature of their wound and overall clinical picture.

## **Integrating Robotic Assisted Arthroplasty into Orthopedic Education: The Fellow's Perspective**

**Michael Danaher, MD<sup>1</sup>** ; Nathaniel Nelms, MD, FAAOS<sup>1</sup>; Mark Haimes, MD, MS<sup>1</sup>; Ran Schwarzkopf, MD<sup>2</sup>; William G. Hamilton, MD<sup>3</sup>; Michael Blankstein, MD, MSc, FRCSC<sup>1</sup>

<sup>1</sup> University of Vermont Medical Center, Orthopedics and Rehabilitation Center, and the Department of Orthopaedics and Rehabilitation, The Robert Larner, M.D., College of Medicine at The University of Vermont, Burlington, VT.

<sup>2</sup> Department of Orthopedic Surgery, Division of Adult Reconstruction, NYU Hospital for Joint Disease, NYU Langone Medical Center, New York, NY 10003, United States

<sup>3</sup> Anderson Orthopedic Research Institute, Alexandria, VA; Inova Joint Replacement Center Mt. Vernon Hospital, Alexandria, VA

### **Introduction**

Robotic-assisted technology (rTJA) is being used as a potential solution to address patient dissatisfaction, implant survivorship, and reduced need for revision surgery faced by conventional total joint arthroplasty techniques (cTJA). As rTJA has grown in popularity, it raises the question whether orthopedic surgery residents are being adequately trained on these procedures, or undertrained in cTJA.

### **Objective**

To provide baseline information of current robotic training in orthopedic resident education to better understand the current and future trends regarding expansion or reduction of this surgical technique into the standardized orthopedic resident curriculum.

### **Methodology**

Current Orthopedic Arthroplasty Fellows from the AAHKS FOCAL (Fellows Orthopaedic Continued AAHKS Learning) database as of February 1<sup>st</sup> 2024 were polled with an anonymous Red Cap survey regarding their experiences during residency training in rTJA and cTJA, how this informed their fellowship selection, and plans for using rTJA in practice. A subsequent email was sent to improve response rate. Means and standard deviations were calculated from Likert scale questions, and univariate statistics were used to compare results.

### **Results**

46 individuals participated in the study. There was good geographical distribution of respondents who did residency and fellowship in the survey. 76%, 56.5%, and 50% were exposed to rTKA (robotic total knee arthroplasty) rUKA (robotic uni knee arthroplasty) and rTHA (robotic total hip arthroplasty) in residency. 80.4% were satisfied with their cTKA (conventional total knee arthroplasty) training. None were dissatisfied with their cTHA (conventional total hip arthroplasty) training. 52%, and 26% were satisfied with their rTKA and rTHA training. 89.1%, 23.9%, and 93.5% felt prepared to perform a complete primary cTKA, cUKA, and cTHA at the end of residency. 52%, 32.6%, and 23.9% felt the same regarding rTKA, rUKA, and rTHA. 96.2% felt either neutral or agreed that the use of robotics improved their overall understanding and performance of the procedure. 69.6% were looking for a fellowship with a balance of robotic and manual experience. In the first five years of practice, 52.2%, 76%, and 21.7% anticipate doing rTKA, rUKA, and rTHA.

### **Conclusion**

With the numbers available, arthroplasty fellows were satisfied with their residency exposure to cTJA and fewer felt that way about robotics. With the rising popularity of rTJA, we should consider supplementing the arthroplasty experience with robotics into standardized residency training. To our knowledge this is the first study specifically evaluating current arthroplasty fellow's perspectives of fundamental education of conventional and robotic arthroplasty procedures.

# **Evaluating the Safety and Efficacy of Intraarticular Steroid Injections During Manipulation Under Anesthesia of Total Knee Arthroplasty**

**Brandon Cushman**

## **Background**

Arthrofibrosis occurs in 2.5-4.5% of primary total knee arthroplasties (TKAs). Arthrofibrosis occurs secondary to a pathologically overactive inflammatory response causing myofibroblasts to lay down excessive collagen and other ECM proteins leading to intraarticular adhesions and scar tissue after surgery limiting postoperative range of motion (RoM). The resulting loss of RoM can be functionally limiting and decrease satisfaction after TKA. Treatment of arthrofibrosis after TKA includes manipulation under anesthesia (MUA) if early aggressive physical therapy is unsuccessful. It remains unclear from the literature if administration of intraarticular steroid during MUA is effective at improving RoM.

## **Methods**

We will retrospectively review all TKA that underwent MUA at our institution from 2019 to 2024 to compare pre-manipulation knee RoM and post-manipulation RoM at 3 months and 1 year. We will also obtain the rates of revision TKA and prosthetic joint infection after MUA.

## **Hypothesis**

We hypothesize that RoM will significantly improve after MUA with administration of intraarticular corticosteroid injection.

**TBD**  
**Seth Moffatt**



## TITLE

**Compared to Recent Biomechanical Studies, Historic Studies Report Greater Overconstraint with Lateral Extra-articular Tenodesis Due to Variations in Technique**

## AUTHORS:

**Warren W Nielsen MD**, Tayler Drake BBA, Donna L O'Malley MLS, Max C. HoddWells BA MS, Gilbert Moatshe MD PhD, Andrew Geeslin MD

**PI:** Andrew Geeslin MD

## ABSTRACT

**Purpose:** The purpose of this systematic review was to present a comprehensive review of biomechanical cadaveric studies investigating the influence of lateral extra-articular tenodesis (LET) on knee kinematics when combined with anterior cruciate ligament (ACL)-reconstructed knees.

**Methods:** An electronic systematic review following PRISMA guidelines was performed using the PubMed, Medline, Embase, and Cochrane databases between January 1, 2012 and April 8, 2024. The inclusion criteria were in vitro kinematic studies of lateral extra-articular tenodesis using the iliotibial band. In vivo and clinical studies, as well as studies using a free graft such as anterolateral ligament reconstruction, were excluded.

**Results:** 26 studies were included for review. 8 historic LET studies from 1980 to 2015 from a prior review were included and compared to 21 recent studies from 2015 to 2024 performing reconstruction with ITB autograft for augmentation of ACLR. Modified Lemaire was the most common augmentation procedure in recent studies as opposed to Müller in historic studies. 6/18 recent studies demonstrated overconstraint, defined as a statistically significant decrease in tibial internal rotation compared to native or anterior cruciate ligament intact state. Most studies demonstrated LET with ACL reconstruction led to restoration of knee intact ACL or native knee state.

**Conclusions:** Historic studies demonstrated increased overconstraint due to variation in techniques, larger graft sizes, and method of graft passage. Modern modified Lemaire LET technique does not lead to significant constraint. Further study is needed to determine clinical manifestations and long term repercussions of overconstraint with modern LET techniques.

**Clinical Relevance:** This systematic review clarifies discrepancies found between historical literature on LET and modern literature regarding biomechanical function of LET when added to ACL reconstruction.

# **Arthrokinematics and Compositional Measurements with QMRI 1-2 Years Following ACL Reconstruction with Meniscal Surgery**

**Sadegh Kohdabandeloo, MS**

Post-traumatic osteoarthritis (PTOA) is a common complication following anterior cruciate ligament reconstruction (ACLR), especially when combined with a meniscal lesion and surgery (ACLR+M). Little is known about the mechanical and biochemical side-to-side differences and their roles in the onset of PTOA. This study aimed to investigate the early effects of ACLR+M on joint arthrokinematics and cartilage composition. Twelve participants underwent ACLR+M and were assessed 1-2 years post-surgery. An arthrokinematics analysis was performed using dual-fluoroscopy combined with model-based tracking. Participants performed two dynamic activities, walking and jogging, to quantify the 3-dimensional arthrokinematics of common physical activities. A quantitative magnetic resonance imaging (qMRI) analysis was performed by measuring T1 $\rho$  relaxation times in the weight-bearing region of tibial and femoral cartilage in both medial and lateral compartments. The surgical knee showed an anterior tibial transition during walking and jogging. There was a posterior shift in the tibial contact point in the medial and lateral compartments during walking. Contact overlap area was increased in the medial compartment during walking in the reconstructed knee compared to the contralateral knee. qMRI analysis revealed higher T1 $\rho$  relaxation times in the femoral cartilage in the lateral compartment compared to the contralateral side. A trend towards a decrease in T1 $\rho$  relaxation times was observed in the tibial cartilage in the lateral compartment. There was no correlation between arthrokinematics and cartilage composition. This study demonstrates that anterior cruciate ligament reconstruction combined with meniscal surgery (ACLR+M) leads to side-to-side differences in joint arthrokinematics and cartilage composition as early as 1-2 years post-surgery. This relationship will provide us with better understanding of the mechanical and biological interactions and their roles in the initiation of osteoarthritis. The findings highlight the need for future research to understand the relationship between arthrokinematics differences with longitudinal changes in cartilage composition.

## Utilizing qMRI for Morphological Assessment of Knee Articular Cartilage Thickness

*Authors: Aaron Dees, MS, MS1, Mack Gardner-Morse, MS, Andrew Borah, MS, Mickey Krug, BS, Michael DeSarno, MS, Pamela Vacek, PhD, Niccolo Fiorentino, PhD, Bruce Beynnon, PhD*

**Background:** The onset of Post traumatic Osteoarthritis (PTOA) is common following severe knee trauma such as anterior cruciate ligament injury and reconstruction. PTOA can be identified by changes in the morphology and the matrix composition of articular cartilage and bone in injured and reconstructed knees.

**Purpose:** While separate MRI sequences individually can identify these changes, this study explored the possibility of a single MRI sequence capable of measuring both morphology and matrix composition simultaneously during acquisition.

**Methods:** In this study, ten healthy participants underwent three MRIs, a morphological sequence (T1FFE) and two quantitative sequences (T1 $\rho$  and T2\*), with the aim of determining if similar morphological data can be obtained between the three techniques. The resulting images underwent segmentation of the cartilage surface and underlying subchondral bone, followed by analysis and subsequent development of tibial and femoral articular cartilage 3-dimensional thickness maps which were compared between the different MRI sequences.

**Results:** The tibial and femoral thickness maps developed from the qMRI sequences were found to be negligibly different from our morphological sequence with a high intraclass correlation. These differences between our cartilage thickness maps were found to be below the pixel resolution of our reconstructed images further reinforcing the similarities.

**Conclusion:** These findings suggest that our qMRI techniques can be used for both quantitative and morphological data in assessing cartilage thickness.

## **Can we empower patients for joint surgery? Assessing the impact of a telemedicine coaching intervention**

**Christopher Q. Lin**, MSc<sup>1</sup>, Jordan Conroy, MD<sup>1</sup>, Hikmat R. Chmait, MSc<sup>1</sup>, Nathaniel Nelms, MD<sup>1</sup>, Michael Blankstein, MSc, MD<sup>1</sup>

*Department of Orthopaedics and Rehabilitation<sup>1</sup>*

*University of Vermont, Burlington, Vermont, USA*

*Purpose:* Optimizing patient health before surgery results in fewer complications and higher patient quality of life following surgery. We implemented a Joint Health Coaching (JHC) program in 2020, adapted to a telemedicine format due to the COVID-19 pandemic to address modifiable risk factors in patients who were otherwise candidates for hip or knee arthroplasty. The aim of the study was to evaluate the results of our three-year program.

*Methods:* Patients presenting at our Total Joint Arthroplasty (TJA) clinic for hip or knee pain between January 2020 and March 2023 were offered enrollment in the telemedicine JHC program. Patients who failed to attend at least one coaching session were excluded. Certified joint health coaches then provided monthly counseling on nutrition, exercise, and smoking cessation. Patients were then assessed by changes in BMI, HbA1c, hip/knee disability outcome scores (HOOS/KOOS), and the PROMIS Global-10 quality of life outcome measure and compared to their initial enrollment values.

*Results:* Of the 323 enrolled patients, 292 patients had a goal involving weight management. 134 experienced a decrease in BMI, with 17% achieving clinically significant weight loss (>5%). 52% of patients targeting smoking cessation succeeded, and those addressing diabetes saw an average decrease in HbA1c by 0.24 points with the numbers available for study. Patient-reported outcome measures revealed an improvement in quality-of-life score for knee patients ( $p < 0.001$ ). Regression analysis highlighted predictors promoting weight loss, which included prior physical therapy, hip involvement, and lower HbA1c; while opioid use, smoking, and absence of glucocorticoid injections were associated with less weight loss.

*Conclusion:* A telemedicine-based approach to optimization offered modest yet significant health improvements in a subset of patients. With continued refinement, telemedicine may offer a cost-effective, convenient approach to pre-surgical optimization for patients with a limited ability to attend in-person appointments.

## **Title: Gardner-Wells Tongs are a Safe Alternative for Intraoperative Positioning and Spine Surgery.**

Authors: Hikmat Ramen Chmait, MS<sup>1</sup>, Dhiraj Patel, BS<sup>1</sup>, Greg Roy, MD<sup>1</sup>, Chason Ziino, MD<sup>1</sup>

<sup>1</sup>Department of Orthopedics, Larner College of Medicine, University of Vermont

**Background:** Gardner-Wells Tongs (GWT) are a traction device commonly utilized in stabilization and reduction of the spine in the non-operative setting; however, they are less commonly employed in non-traumatic spine surgery.<sup>1</sup> There is an extreme paucity in the literature regarding the incidence of complications associated with the use of GWT.<sup>2-4</sup> Previously documented complications associated with GWT include perforation of pin through the skull, loss of pin attachment, brain abscess, neurovascular complication, and vascular injury.<sup>5</sup> For many of these complications rates are not well described and are documented through case reports.<sup>6,7</sup> The objective of this study is to elucidate the incidence of major and minor complications associated with the use of GWT in traumatic and non-traumatic spine surgeries performed by a single surgeon at a single tertiary care academic institution.

**Methods:** 322 adult patients who underwent traumatic or non-traumatic spinal surgery with the utilization of GWT between October 2020 and May 2023 met inclusion criteria for this retrospective case series. EPIC chart review was conducted to assess for rates of major and minor complications. Major complications were defined as medial table breach, deep infection/abscess, pin pull out, neurovascular injury, and vision disturbances (increased intraocular pressure) at any time point. Minor complications were defined as pin loosening, minor bleeding requiring staples, and superficial infection at any time point.

**Results:** A total of 322 patients, including 151 (46.9%) females and 171 (53.1%) males, were reviewed. The average age at the time of surgery was 57 years. The incidence of medial table breach, deep infection/abscess, pin pull out and neurovascular injury was 0%. One patient (0.31%) suffered vision disturbance (blurry vision with spontaneous resolution). The overall incidence of total minor complications was 15/322 (4.66%). 14 (4.35%) patients demonstrated minor bleeding requiring staples, one of which was in the setting of pin loosening (0.31%).

**Discussion:** The findings of this study elucidate the safety of GWT in both the traumatic and non-traumatic setting. These results may serve to expand the viability of GWT as a traction device in multi-level non-traumatic spine surgery.

**Conclusion:** The utilization of GWT in a variety of traumatic and non-traumatic spine surgery was found to be safe alternative within this single-surgeon, single-institution study cohort. One patient developed a major complication of blurry vision, and the incidence of total minor complications was less than 5%.

<b>Complication Type</b>	<b>Incidence (%)</b>
<b>Major Complications</b>	
Medial Table Breach	0% (0)
Deep infection/abscess	0% (0)
Neurovascular injury	0% (0)
Vision disturbance	0.3% (1)
Pin pull out	0% (0)
<b>Minor complications</b>	
Pin loosening	0.3% (1)
Minor bleeding requiring staples	4.35% (14)
Superficial infection	0% (0)

**Title**

**There is wide variability in surgical techniques and clinical outcomes for patients with meniscal cysts: A systematic review.**

**Authors**

Sarah Tran  
Christina Winburn  
Andrew Geeslin MD

**Abstract**

Purpose: The purpose of this study was to systematically review the typologies of meniscal lesions and the effectiveness of surgical techniques used for the treatment of meniscal cysts with associated meniscal tears.

Methods: A systematic review was performed according to the PRISMA guidelines using the clinical studies available in PubMed, Cochrane Database, and ScienceDirect. The search terms “parameniscal cyst” and “meniscal cyst” were applied. Articles in the English language about human studies on the clinical outcomes of patients who underwent treatment for meniscal cysts, with or without biologic augmentation were included. Radiographic studies, anatomic studies, studies which focused on Baker’s cysts, and case studies were excluded. Quantitative analysis was carried out by obtaining weighted averages of the extracted data from the included studies.

Results: This review found 27 studies with a total of 838 patients who were treated for meniscal cysts with or without meniscal tears. The most common type of meniscal tear was horizontal tear at 52.4%. While the majority of the surgical treatments were meniscectomies and arthroscopic decompression, all surgical techniques yielded overall improvement in clinical outcomes measured by Lysholm and IKDC scores, cyst recurrence rate, and reoperation rate. Meniscal repair has a statistically significantly higher Lysholm score average at follow-up compared to that of meniscectomy. Arthroscopic excision had the lowest rate of the cyst recurrence at 6.9%, compared to the 9.6% and 11.0% of cyst recurrence for arthroscopic decompression and open excision, respectively. All studies that only performed meniscal repair reported no cyst recurrence and no reoperations. However, the number of cases which involved meniscal repair was six times lower than that of meniscectomy, indicating the need for further evaluation of the effectiveness of meniscal repair in larger sample sizes.

Conclusions: The aggregated evidence reports the clinical improvement and common usage of meniscectomy for meniscal cyst. Although there is a relative paucity of studies on meniscus repair during treatment of meniscal cysts, good results have been achieved with this treatment approach but there is insufficient data to support comparison of meniscectomy versus repair in the meniscal cyst population.

## **UVM Ortho Research Day Abstract**

### **Authors**

Jason Brant, MD; Michael Roberts, MD; Mark Haimes, MD; Nathaniel Nelms, MD; Patrick Schottel, MD; Michael Blankstein, MD

### **Title**

Femoral Component Flexion in Robotic-Assisted Total Knee Arthroplasty Increases Sagittal Angle Trajectory for Retrograde Intramedullary Nailing

### **Introduction**

In robotic-assisted total knee arthroplasty (TKA), the femoral component is commonly placed in flexion to prevent notching and overstuffing of the patellofemoral joint. This flexion alters retrograde intramedullary nail (rIMN) trajectory in distal femoral peri-implant fracture fixation causing a hyperextension deformity. We hypothesize that flexion of the femoral component increases nail trajectory sagittal angulation.

### **Methods**

This is an academic single-center prospective observational study including all adult patients undergoing primary cruciate-retaining robotic-assisted TKA by three fellowship trained arthroplasty surgeons from August 2023 – February 2024. Patient demographics were obtained from electronic medical records. Femoral implant positioning characteristics were obtained from intraoperative computerized tomography screenshots taken after knee gap balancing. Sagittal angle measurements were determined for both 10- and 12-mm nail sizes using ImageJ software. A combination of bivariate regression and student t-test analyses were used for group comparisons.

### **Results**

A total of 111 patients (61 female and 50 male) with a mean age (SD) of 66.8 years (9.68) were included in this study. Mean flexion (SD) was 5.87 degrees (2.13) and mean sagittal angle (SD) was 9.83 degrees (2.79) and 11.43 degrees (2.88) for the 10- and 12-mm nails, respectively. Females had more mean flexion (6.39 degrees) when compared to males (5.24 degrees) ( $p = 0.004$ ). In bivariate regression models, there was a significant linear correlation of a 0.496 and 0.501 degree increase in mean sagittal angle for every one degree increase in femoral flexion for the 10- and 12-mm nails, respectively ( $p < 0.001$ ).

### **Conclusion**

Femoral component flexion in robotic-assisted TKA is linearly correlated with rIMN sagittal angle trajectory. The average sagittal angulation in this TKA implant design is approximately 10 degrees. When choosing to fix distal femoral peri-implant fractures with a rIMN, it is important to use a nail with a designed distal bend to prevent hyperextension fracture deformity.