





OREF MID-ATLANTIC REGION RESIDENT RESEARCH SYMPOSIUM Friday, May 2, 2025

University of Pittsburgh School of Medicine Alan Magee Scaife Hall 3550 Terrace Street 3rd Floor – Auditorium Room 3785 Pittsburgh, PA

Hosted by: **MaCalus Hogan, MD** Chair Department of Orthopaedic Surgery University of Pittsburgh

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About OREF:

The Orthopaedic Research and Education Foundation (OREF) is a charitable 501(c)(3) organization committed to improving lives by supporting excellence in orthopaedic research through its grant funding and research education programs. As an independent nonprofit, OREF strives to improve clinical care and patient outcomes by advancing innovative research, developing new investigators, and uniting the orthopaedic community in promoting musculoskeletal health. Visit oref.org or follow OREF on LinkedIn (Orthopaedic Research and Education Foundation) Facebook (OREFtoday) and X (@OREFtoday).

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OREF Resident Research Symposia: An Important Pipeline for Prospective Orthopaedic Surgeon-Scientists

Mathangi Sridharan, Nicole J. Newman-Hung, Charlotte Wahle, Frank Petrigliano, Nicholas M. Bernthal, Lauren E. Wessel First published: 12 April 2025

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ABSTRACT

Non-governmental educational programs such as the annual Orthopaedic Research and Education Foundation (OREF) Resident Research Symposia aim to elevate and fund trainee research endeavors. This study investigates the translation of research recognized at the Resident Research Symposia into peer-reviewed publication and the rate of awardees who pursue academic careers after training. Awards from the OREF Resident Research Symposia between 2008 and 2023 were aggregated. Characteristics of awardees and projects were noted. Conversion to publication and journal characteristics were identified by indexing major research databases. The current practice type and specialty of each trainee was queried using the American Academy of Orthopedic Surgeons roster and institutional sites. Descriptive statistics, univariate and multivariate regression models were performed. Primary outcomes included rates of OREF symposia presentation conversion to publication and trainees pursuing a career in academia. Three hundred and eighty-nine awards were included with 72 (18.5%) females and 317 (81.5%) males. One hundred and forty-two (36.5%) were first place awards, 101 (25.9%) second place, 131 (33.7%) third place, and 15 (3.9%) presenter's choice, across five regions. Basic science projects were more likely to win first-place awards (p = 0.001). Awarded projects translated to 300 (77%) peer-reviewed publications, with an average impact factor of 1.78 ± 1.65. Male and first-place awardees were more likely to publish (p = 0.014, p = 0.001). The current practice types of 376 distinct awardees were identified with 149 awardees currently practicing in academia (42.3%). Awardees that successfully published their projects (p < 0.001), and those from the Mid-Atlantic region (p = 0.01) were more likely to pursue academic careers. Research awarded at the OREF symposium translates to peer-reviewed publication at a high rate, and awardees enter academia at a disproportionately high rate. OREF provides an effective platform to identify and support budding surgeon-scientists, which is vital given that musculoskeletal research is historically underfunded at a national level.

OREF MID-ATLANTIC REGION RESIDENT RESEARCH SYMPOSIUM SUMMARY AGENDA

Friday, May 2, 2025

7:45 a.m. – 7:50 a.m.	Welcome and Introductions MaCalus Hogan, MD Chair, Department of Orthopaedics University of Pittsburgh
7:50 a.m. – 8:00 a.m.	OREF Welcome Lee Grossman, MBA, ML, CAE Chief Executive Officer Orthopaedic Research and Education Foundation
8:00 a.m. – 8:35 a.m.	Session I – Resident Research Presentations & Discussion Sports Medicine and Biomechanics
8:35 a.m. – 9:10 a.m.	Session II – Resident Research Presentations & Discussion Trauma and Fracture Management
	Break – Please submit your scores from Sessions I and II to OREF Staff
9:20 a.m. – 9:50 a.m.	Session III – Resident Research Presentations & Discussion Arthroplasty Outcomes
9:50 a.m. – 10:15 a.m.	Session IV – Resident Research Presentations & Discussion Hip and Knee
	Break – Please submit your scores from Sessions III and IV to OREF Staff
10:25 a.m. – 10:55 a.m.	Session V – Resident Research Presentations & Discussion Miscellaneous
	Break – Please submit your scores from Session V to OREF Staff
11:00 a.m.– 11:05 a.m.	Introduction of Keynote Speaker
11:05 a.m.– 11:45 a.m	Keynote Address Posttraumatic Osteoarthritis to Inflammation Resolution: A Translational Science Journey Christian Lattermann, MD Brigham and Women's Chair in Orthopaedics, Associate Professor, Harvard University Director of Sports Medicine Research, Mass General Brigham Director of Cartilage Repair Center, Brigham & Women's Hospital/Harvard University
11:45 a.m. – 11:50 a.m.	Closing Remarks Awards Presentation immediately following the program
Noon – 1:00 p.m.	Awards Presentation and Lunch Reception

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KEYNOTE SPEAKER



Christian Lattermann, MD

Brigham and Women's Chair in Orthopaedics, Associate Professor, Harvard University, Director of Sports Medicine Research, Mass General Brigham, Director of Cartilage Repair Center, Brigham & Women's Hospital/Harvard University

Dr. Lattermann began his training at Hannover Medical School in Germany. In 1997 he did a 2-year research and clinical fellowship in sports medicine at the University of Pittsburgh, USA, before he continued his career as resident in orthopaedic surgery from 1999-2004. He continued on to perform a specialty year as junior attending (Superchief) with a focus on trauma at the University of Pittsburgh before he completed a fellowship in sports medicine and cartilage repair at Rush University Medical Center in 2006.

Dr Lattermann started his independent career in 2006 at the University of Kentucky where he built a strong clinical research program. He is an expert in cartilage repair, and posttraumatic osteoarthritis as well as in outcomes research and clinical trials.

Dr. Lattermann was appointed as Chief of Sports Medicine and Director of the Cartilage Repair Center at the Brigham and Women's Hospital at Harvard Medical School in 2018. He is an Associate Professor at Harvard Medical School and holds the Brigham and Women's Endowed Chair for Orthopaedics and Sports Medicine. Dr. Lattermann serves as Co-Chair of the Leadership Committee for (MGB) Sports Medicine and is the Director of Research for Mass General Brigham, overseeing the research program in Sports Medicine at Brigham and Women's Hospital as well as Massachusetts General Sports Medicine. He serves as a scientific advisor for the CSPAR.

Dr. Lattermann has served as team physician for several professional and Division I College teams. He was an assistant team physician for the Chicago White Sox during their World Series winning season in 2005 and served as assistant team physician for the Chicago Bulls. He was team physician for the DI SEC, University of Kentucky Wildcats from 2006-2018

Dr. Lattermann has published over 200 peer-reviewed papers, over 40 book chapters, and his research has been funded by the NIH, DOD, Foundations and Societies.

He is the current President elect of the International Cartilage Repair and Joint Regeneration Society (ICRS) and has held multiple positions in national and international societies over the last two decades. He is a Founding Board Member of the Biologics Association, a multispecialty society association aimed at directing orthopaedic surgeons in the field of orthobiologics. He is a world-renowned speaker on the topic of cartilage repair and early osteoarthritis and sought after as teacher and instructor for orthopaedic sports medicine procedures around the knee.

Judges

Christian Lattermann, MD Brigham & Women's Hospital/Harvard University

Joon Lee, MD University of Pittsburgh Medical Center

Albert Lin, MD University of Pittsburgh Medical Center

> James H-C Wang, PhD University of Pittsburgh

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7:50 a.m. – 8:00 a.m.	OREF Welcome Lee Grossman, MBA, ML, CAE Chief Executive Officer Orthopaedic Research and Education Foundation
	Session I – Resident Research Presentations and Discussion Sports Medicine and Biomechanics
8:00 a.m. – 8:05 a.m.	Early Anterior Cruciate Ligament Reconstruction Mitigates the Development of Post- Traumatic Osteoarthritis in a Murine Anterior Cruciate Ligament Rupture Model Julia Retzky, MD, The Hospital for Special Surgery
8:05 a.m. – 8:10 a.m.	Overhead Athletes Have Comparable Intraoperative Injury Patterns and Clinical Outcomes to Non-Overhead Athletes Following Surgical Stabilization for First Time Anterior Shoulder Instability at Average 6-year Follow-Up Zachary J. Herman, MD, University of Pittsburgh Medical Center
8:10 a.m. – 8:15 a.m.	The Effect of Posterior Tibial Slope on Tibiofemoral Joint Biomechanics: An In-Vitro Analysis Alexander E. White, MD, The Hospital for Special Surgery
8:15 a.m. – 8:20 a.m.	Impact of Obesity on Patient-Reported Outcomes Two Years After Multiple Ligament Knee Reconstruction Alexandra Baker Lutz, MD, University of Maryland
8:20 a.m. – 8:25 a.m.	A Multi-perspective Look at Secondary School Student-Athletes' Access to Orthopaedic Care and Athletic Training: A Preliminary Study Elizabeth O. Clayton, MD, University of Pittsburgh Medical Center
8:25 a.m. – 8:35 a.m.	Question and Answer
	Session II – Resident Research Presentations & Discussion Trauma and Fracture Management
8:35 a.m. – 8:40 a.m.	Patients with Vitamin D Deficiency are More Likely to Develop Complex Regional Pain Syndrome After Extremity Fractures: A Large Database Propensity-Matched Cohort Study Alexander Berk, MD, University Hospitals/Case Western Reserve University
8:40 a.m. – 8:45 a.m.	Comparative Outcomes of Operative Treatment for Two and Three-part Proximal Humerus Fractures: Intramedullary Nail Versus Open Reduction Internal Fixation Zachariah Whiting, MD, University Hospitals/Case Western Reserve University

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8:45 a.m. – 8:50 a.m.	Outcomes of a Curved Intraosseous Fixation Device for Pelvic Fractures Lucas A. Blumenschein, DO, Case Western Reserve University/University Hospitals Cleveland Medical Center
8:50 a.m. – 8:55 a.m.	To Fix or to Replace? An Analysis of Geriatric Periprosthetic Distal Femur Fractures Treated with Open Reduction Internal Fixation, Retrograde Intramedullary Nail, or Distal Femoral Replacement Margaret Sinkler, MD, Case Western Reserve University
8:55 a.m. – 9:10 a.m.	Question and Answer
	Break - Please submit your scores from Sessions I and II to OREF Staff
	Session III – Presentations and Discussion Arthroplasty Outcomes
9:20 a.m. – 9:25 a.m.	GLP-1 Receptor Agonist Mediated Weight Loss Improves Outcomes After Total Knee Arthroplasty Whitney Kagabo, MD, Johns Hopkins University
9:25 a.m. – 9:30 a.m.	Impact of GLP-1 Agonists on Total Shoulder Arthroplasty Outcomes: Using Natura Language Processing to Assess Postoperative Risks and Complications Troy Amen, MD, The Hospital for Special Surgery
9:30 a.m. – 9:35 a.m.	Predictors of PROMIS Pain Interference after Reverse Total Shoulder Arthroplasty Stefan Dabic, MD, University of Maryland
9:35 a.m. – 9:40 a.m.	Predictors of "Completely Better" Status Two Years after Shoulder Arthroplasty Michael McCurdy, MD, University of Maryland
9:40 a.m. – 9:50 a.m.	Question and Answer
	Session IV – Resident Research Presentations & Discussion Hip and Knee
9:50 a.m. – 9:55 a.m.	Postoperative Opioid Consumption and 2-year Outcomes after Hip Arthroscopy Leah Henry, MD, University of Maryland
9:55 a.m. – 10:00 a.m.	Predictors of "Completely Better" Status Two Years after Meniscectomy Dominic J. Ventimiglia, MD, University of Maryland
10:00 a.m. – 10:05 a.m.	Impact of Preoperative Opioid Use on Two-Year Outcomes after Hip Arthroscopy Kathleen Healey, MD, University of Maryland
10:05 a.m. – 10:15 a.m.	Question and Answer
10:15 a.m. – 10:25 a.m.	Break – Please submit your scores from Sessions III and IV to OREF Staff

OREF Mid-Atlantic Region Resident Research Symposium DETAILED AGENDA

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	Session V – Resident Research Presentations & Discussion Miscellaneous
10:25 a.m. – 10:30 a.m.	Quantification of Doxycycline and Vancomycin Elution from 1.5mm and 2.0mm Commercial High-Strength Sutures William M. DeGouveia, MD, Northwell Health-Long Island Jewish Medical Center/ North Shore University Hospital
10:30 a.m. – 10:35 a.m.	Intraoperative Evaluation of Sarcoma Surgical Margins with Indocyanine Green Fluorescence Imaging Alexander P. Hoffman, MD, University of Pittsburgh Medical Center
10:35 a.m. – 10:40 a.m.	Comprehension and Satisfaction with Informed Consent for Arthroscopic Procedures Using Supplemental Online Educational Materials Kira L. Smith, MD, University Hospitals Cleveland Medical Center/ Case Western Reserve University
10:40 a.m. – 10:45 a.m.	Trends in Gender Disparities in Authorship of Spine Research From 2004 to 2023: A Review of Spine Articles in a High Impact General Orthopaedic Journal Theodore Quan, MD, George Washington University
10:45 a.m. – 10:55 a.m.	Question and Answer
10:55 a.m. – 11:00 a.m.	Break – Please submit your scores from Session V to OREF Staff
11:00 a.m. – 11:05 a.m.	Introduction of Keynote Speaker
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Early Anterior Cruciate Ligament Reconstruction Mitigates the Development of Post-Traumatic Osteoarthritis in a Murine Anterior Cruciate Ligament Rupture Model

Julia Retzky, MD The Hospital for Special Surgery

Purpose: Primary aim: To evaluate the impact of timing of anterior cruciate ligament reconstruction (ACLR) on the development of PTOA using a murine non-invasive ACL rupture model. Secondary aim: To evaluate the impact of ACLR timing on pain-related gait behaviors, peripheral/central immune response, knee range of motion (ROM), and tendon graft-bone tunnel healing.

Significance: The impact of ACLR timing on development of PTOA remains subject to debate.

Methods: Fifty-five 11-12-week-old male B6 mice were randomized to one of three conditions: ACL rupture only, ACL rupture followed by immediate ACLR, or ACL rupture followed by delayed ACLR (7 days post-injury). Uninjured animals were controls. Sacrifice was at 28 days (postoperatively/post-injury). Primary outcome measure: histologic evaluation using Osteoarthritis Research Society International (OARSI) score. Secondary outcomes: ROM, flow cytometry (ipsilateral iliac lymph node/spleen), gait analysis, and micro-computed tomography (µCT) analysis.

Results: The ACL rupture and delayed ACLR groups had higher femoral and tibial OARSI scores, consistent with a greater degree of osteoarthritic changes, compared to the control and immediate ACLR groups (p<0.001 for all). There were no differences between groups with respect to ROM, tendon graft-to-bone healing (μ CT), or pain-related gait behaviors. There was an increase in total ipsilateral iliac lymph node cellularity in the surgical cohorts compared to the ACL rupture and control cohorts.

Conclusion: Immediate ACLR mitigates the development of PTOA in a murine ACL rupture model.

Overhead Athletes Have Comparable Intraoperative Injury Patterns and Clinical Outcomes to Non-Overhead Athletes Following Surgical Stabilization for First Time Anterior Shoulder Instability at Average 6-year Follow-Up

Zachary J. Herman, MD University of Pittsburgh Medical Center

Purpose: Little is known regarding the differences in clinical outcomes after operative management of overhead vs. non-overhead athletes with first-time anterior shoulder instability.

Significance: Elucidating a difference in outcomes of these populations may drive treatment strategies.

Methods: Patients with first-time anterior shoulder instability were included. Exclusion criteria included multiple dislocations and multidirectional shoulder instability. Baseline demographic characteristics, imaging data, examination findings, and intraoperative findings were retrospectively collected. Patient-reported outcomes including ASES score, WOSI score, Brophy score, and SSV in addition to return-to-work and -sport, recurrent dislocation, and revision rates were prospectively collected.

Results: 256 patients met inclusion criteria; 178 (70%) were non-overhead athletes. There was no significant difference in demographics, concomitant shoulder pathology, or preoperative range of motion or strength between cohorts. A greater proportion of overhead athletes presented with instability events not requiring manual reduction (subluxations). With average follow- up of 6.7 years, no significant differences were found between groups with respect to recurrent postoperative instability event rates, revision rates, ASES score, WOSI score, Brophy score, SSV, or rates of return to work or sport.

Conclusion: The findings of this study suggest that overhead athletes can be considered in the same treatment pathway for first-time dislocation as non-overhead athletes.

The Effect of Posterior Tibial Slope on Tibiofemoral Joint Biomechanics: An In-Vitro Analysis

Alexander E. White, MD

The Hospital for Special Surgery

Purpose: The purpose of this study was to quantify the effects of posterior tibial slope (PTS) on tibiofemoral contact mechanics in cadaveric knees through axial loading with knee flexion. We hypothesized that decreased PTS will translate the tibial weight center of contact (WCoC) anteriorly and there will be no change in peak contact pressures between high and low PTS.

Significance: Very few studies investigate the joint-level contact mechanics following anterior closing wedge osteotomy being performed for recurrent ACL failure.

Methods: Anterior tibial osteotomies were performed on 5 cadaveric knees mounted to a robotic test system. Knee test conditions included: (1) intact, (2) increased PTS, and (3) decreased PTS, which were tested at 0°, 15°, 30°, and 45° flexion. WCoC and peak contact stress were recorded.

Results: In the lateral compartment, increased PTS shifted the WCoC posteriorly 2.1mm and increased PTS shifted the WCoC anteriorly 5.2mm. No significant directional changes occurred in the medial compartment, and there were no significant changes in peak contact stresses after either osteotomy at low flexion angles.

Conclusion: Decreased PTS translates the tibial WCoC anteriorly, while increased PTS shifts the WCoC posteriorly in the lateral compartment without significantly affecting peak tibiofemoral contact stresses.

Impact of Obesity on Patient-Reported Outcomes Two Years After Multiple Ligament Knee Reconstruction

Alexandra Baker Lutz, MD University of Maryland

Purpose: To investigate the relationship between obesity and patient-reported outcomes (PROs) 2 years after multi-ligament knee reconstruction (MLKR).

Significance: Body mass index (BMI) is a routine consideration in evaluation of surgical candidates and has also been shown to impact outcomes after orthopaedic surgery. Multiple ligament knee injuries (MLKI) are rare, making it a difficult population to study.

Methods: A prospectively enrolled registry was queried for patients undergoing MLKR from January 2019 to March 2022. Patients were categorized as obese if their BMI \ge 30 kg/m². Patients completed electronic surveys at baseline and 2 years postoperatively consisting of various PROs, including Patient-Reported Outcomes Measurement Information System (PROMIS), International Knee Documentation Committee Subjective Knee Form (IKDC), and Numeric Pain Scale (NPS).

Results: There were 38 eligible patients, of which 27 (71.1%) completed 2-year PROs. At 2-year follow-up, obesity was associated with worse IKDC, NPS operative knee, and NPS body. On regression, obesity was a predictor of worse two-year PROMIS Fatigue, IKDC, NPS operative knee and body.

Conclusion: This study found that obesity was an independent predictor of worse pain, function, and mental fatigue 2 years after MLKR.

A Multi-Perspective Look at Secondary School Student-Athletes' Access To Orthopaedic Care and Athletic Training: A Preliminary Study

Elizabeth O. Clayton, MD

University of Pittsburgh Medical Center

Purpose: This qualitative study aimed to explore factors and access to athletic trainers (ATs) and orthopedic care among secondary school student-athletes.

Background: Approximately 7.6 million high school student-athletes are at an increased risk for sports-related injuries. Access to appropriate medical care, particularly orthopedic care, can be influenced by socioeconomic status (SES), as individuals from lower SES backgrounds often experience greater challenges in securing orthopedic physician appointments due to insurance limitations and other financial constraints.

Methods: Fourteen semi-structured interviews were conducted via videoconferencing from 2023 to 2024 with secondary school student-athletes and ATs in western Pennsylvania. Audio recordings were transcribed using Otter.ai and analyzed using NVivo for qualitative thematic analysis.

Results: Participants included eight athletes (mean age = 15.13 years, 6 male, 2 female) and six ATs (mean age = 41.83 years, 3 male, 3 female). Barriers to care included insurance incompatibility, parental pushback, limited AT hours, inconsistencies in concussion protocols, and communication challenges with providers. Facilitators included favorable insurance coverage, parental involvement, and proximity to medical facilities.

Conclusion: Addressing gaps in access to orthopedic care requires improved policies that consider the unique needs of student-athletes and ATs to ensure equitable healthcare opportunities.

Patients with Vitamin D Deficiency Are More Likely to Develop Complex Regional Pain Syndrome After Extremity Fractures: A Large Database Propensity-Matched Cohort Study

Alexander Berk, MD

University Hospitals/Case Western Reserve University

Purpose: To investigate the association between preexisting vitamin D deficiency and the development of complex regional pain syndrome (CRPS) in patients with isolated extremity fractures.

Significance: CRPS is a debilitating chronic pain condition which can significantly impair quality of life.

Methods: The TriNetX database was queried to identify patients aged 18 and older who experienced upper or lower extremity fractures. Two cohorts were created based on the presence of vitamin D deficiency and further stratified by fracture location (upper vs. lower extremity). Cohorts were propensity-matched based on age, gender, race, and ethnicity, and the incidence of CRPS following fracture compared.

Results: After 1:1 propensity score matching, both cohorts included 151,591 patients (71,557 upper extremity, 80,034 lower extremity), with no significant differences in baseline characteristics ($p \le 0.05$). The overall incidence of CRPS was 0.24% for upper and 0.27% for lower extremity fractures. Patients with vitamin D deficiency had a higher risk of CRPS following both upper (OR 1.60, 95% Cl 1.29–2.00; p < 0.001) and lower (OR 1.78, 95% Cl 1.46–2.16; p < 0.001) extremity fractures.

Conclusions: Vitamin D deficiency is independently associated with an increased risk of CRPS amongst patients sustaining upper and lower extremity fractures.

Comparative Outcomes of Operative Treatment for Two and Three-part Proximal Humerus Fractures: Intramedullary Nail Versus Open Reduction Internal Fixation

Zachariah Whiting, MD

University Hospitals/Case Western Reserve University

Purpose: To investigate whether the outcomes differed following intramedullary nailing (IMN) or open reduction internal fixation (ORIF) of two and three-part proximal humerus fractures.

Significance: The literature has continued to debate whether IMN and ORIF are superior for the treatment of proximal humerus fractures.

Methodology: Inclusion criteria were two and three-part proximal humerus fracture treated with either IMN or ORIF from 2015-2022 with at least 3 months of postoperative follow up.

Results: 228 patients. No significant differences in preoperative subject characteristics. IMN significantly more common with ipsilateral shaft fractures (p=0.011). The number of fracture parts was significantly associated with treatment (p<0.001). IMN had significantly less blood loss (p=0.005), but operative time was not significantly less (p=0.163). Union rates, complications, revision surgery, postoperative humeral neck shaft angle, and postoperative range of motion were not significantly different.

Conclusions: IMN and ORIF result in similar outcomes for proximal humerus fractures. Both treatments result in high union rates, nearly anatomic postoperative humeral neck shaft angles, and sufficient postoperative range of motion. IMN has lower blood loss than ORIF. IMN is a viable option for 2-part proximal humerus fractures and may be effective in select 3-part fractures as well.

Outcomes of a Curved Intraosseous Fixation Device for Pelvic Fractures

Lucas A. Blumenschein, DO Case Western Reserve University/ University Hospitals Cleveland Medical Center

Purpose: To evaluate outcomes of a curved intraosseous implant for patients with unstable pelvic ring and acetabulum disruptions.

Significance: Due to complex pelvic anatomy and variability in pelvic fracture patterns, percutaneous fixation poses challenges. An intraosseous implant that is flexible during implantation then locked rigid in final position may address some obstacles.

Methodology: Retrospective review was conducted on patients who underwent pelvic or acetabular fixation utilizing a percutaneously placed curved intraosseous implant. Patient demographics, medical history, and fracture patterns were recorded. Outcomes included time to weight-bearing (WB), time to radiographic union, and complications.

Results: There were 27 patients with a mean age of 67 years and 17 patients (63%) were female. Fracture patterns included chronic injury (7%), pelvic ring fracture (30%), sacral fracture (15%), acetabular fracture (22%), and multiple fractures (26%). The mean time to WB and radiographic union were 29 days and 113 days, respectively. History of diabetes, osteoporosis, tobacco use, or fracture pattern did not impact time to WB or radiographic union (p>0.05). There were no recorded complications or re-operations.

Conclusion: A flexible, curved intraosseous implant is safe for use in pelvic and acetabular fractures, allowing for early WB and radiographic union within a reasonable time frame.

To Fix or to Replace? An Analysis of Geriatric Periprosthetic Distal Femur Fracturs Treated with Open Reduction Internal Fixation, Retrograde Intramedullary Nail, or Distal Femoral Replacement

Margaret Sinkler, MD Case Western Reserve University

Purpose: To compare outcomes of periprosthetic distal femur fractures treated with ORIF, rIMN, and DFR. Main outcomes include time to weight bearing, length of hospital stay, re-operations, hospitals readmissions and one-year mortality rates.

Methodology: 377 patients with distal femur fractures across three major academic hospitals were grouped based on operative management. Univariate, multivariate linear, and logistic regression analysis was conducted to identify risk factors. Mixed effects binary logistic regression modelling was performed to quantify the impact of non-modifiable risk factors and fixation technique on the primary outcomes.

Results: 163 patients were included in the study (65 ORIF, 47 rIMN, and 51 DFR). DFR patients were immediately weight bearing while rIMN and ORIF were transitioned an average of 41.5 days days(p<0.001). DFR had longest length and 87.6 the of hospital stay (9.1vs.6.1(ORIF)vs.6.7(rIMN) days;p=0.010). Both DFR and rIMN had increased 1-year mortality rates (24%vs.25%vs.8%(ORIF); p=0.053). Patients that receive DFR were more likely to be readmitted (27%vs.12%(ORIF)vs2%(rIMN);p=0.002). There were no differences in re-operation rates. DFR was an independent risk factor for length of stay (p<0.01) and readmission (p=0.004) on multivariate analysis. For 1-year mortality rIMN (p=0.03) was an independent risk factor. Mixed effects binary logistic regression modelling found that fixation technique had an independent impact on both length of stay and readmission by 20% and 19% respectfully.

Conclusion: Each approach to periprosthetic distal femur fractures has its own unique benefits and considerations. Therefore, we advocate for replacement techniques to be reserved as a salvage option and should continue to use fixation techniques including ORIF and rIMN as the standard management.

GLP-1 Receptor Agonist Mediated Weight Loss Improves Outcomes After Total Knee Arthroplasty

Whitney Kagabo, MD

Johns Hopkins University

Purpose: There remains a paucity of literature on the effect of GLP-1RA mediated weight loss on outcomes after total knee arthroplasty.

Significance: To evaluate the risk profile of TKA patients who underwent significant preoperative weight reduction using GLP-1RAs.

Methods: TrinetX database was queried to identify patients who underwent primary TKA between March 2021 - May 2024. Patients who achieved a preoperative BMI reduction from \geq 43 to \leq 40 within 1 year while being prescribed a GLP-1RA were identified. Patients were then 1:1 propensity matched with two control groups. Control group A were patients with a preoperative BMI \geq 43 who did not lose weight and control group B were patients with a preoperative BMI \leq 40 who were not being prescribed a GLP-1RA. Risk ratios were evaluated for postoperative outcomes.

Results: 268 patients were identified. After 1:1 propensity matching, 266 patients were matched to group A and 268 patients were matched to group B. Compared to group A, GLP-1RA patients had a decreased risk of deep infection (0% vs 3.9%, p=0.001) and pulmonary embolism (0% vs 4% p=0.001). Compared to group B, GLP-1RA patients had a decreased risk of aspiration (0% vs 3.7% p=0.001).

Conclusion: Patients prescribed a GLP-1RA who underwent significant weight loss prior to TKA had a decreased risk of complications compared to patients who did not lose weight.

Impact of GLP-1 Agonists on Total Shoulder Arthroplasty Outcomes: Using Natural Language Processing to Assess Postoperative Risks and Complications

Troy Amen, MD The Hospital for Special Surgery

The Hospital for Special Surgery

Purpose: The purpose of this study was to use natural language processing (NLP) to assess the effects of preoperative glucagon-like peptide-1 (GLP-1) agonists use on (1) perioperative nausea, vomiting, and aspirations and (2) postoperative complications following total shoulder arthroplasty (TSA).

Methods: Patients undergoing TSA at a multi-institutional academic hospital with documented GLP-1 agonist use were propensity-matched to a control group in a 1:4 ratio. Perioperative events including nausea, vomiting, and lung aspiration during the intraoperative/immediate postoperative period were identified from anesthesia and progress notes via natural language processing. Postoperative outcomes including PJI, hardware failure, periprosthetic fracture, aseptic loosening, nerve injury, and need for revision surgery were also assessed.

Results: The number of postoperative nausea and vomiting episodes were not statistically different between patients taking GLP-1 agonists and their controls (p=0.892). Rates of intraoperative lung aspirations were also similar between the groups (p=0.409). Complication rates were comparable with no significant differences in PJI (p=0.999), hardware failure (p=0.999), periprosthetic fracture (p = 0.889), aseptic loosening (p=0.217), or revision surgery (p=0.871).

Conclusion: To our knowledge, this is the first study to evaluate the perioperative gastric and anesthetic safety profile of GLP-1 agonist following any orthopaedic procedure. We that patients taking GLP-1 agonists prior to TSA had no differences in perioperative gastric complications including nausea, vomiting, and lung aspiration, and any postoperative complication.

Predictors of PROMIS Pain Interference After Reverse Total Shoulder Arthroplasty

Stefan Dabic, MD University of Maryland

Purpose: To investigate predictors of Patient-Reported Outcomes Measurement Information System Pain Interference (PROMIS PI) two years after reverse shoulder arthroplasty (rTSA).

Significance: Primary objectives of shoulder arthroplasty include reducing pain and improving function. PI, one of the six PROMIS domains, captures how pain impacts patients' function with daily activities.

Methods: Patients undergoing rTSA from June 2015 to April 2022 were identified from a prospectively enrolled registry. PROs were collected at baseline and 2 years postoperatively, including PROMIS, the American Shoulder and Elbow Surgeons Score (ASES), and a numeric pain scale (NPS) of the operative shoulder and body.

Results: Overall, 120 patients were included, 99 (82.5%) of which completed 2-year PROs postoperatively. Preoperative opioid use, American Society of Anesthesiologists (ASA) score, legal claim, and prior ipsilateral shoulder surgery were associated with worse 2-year PROMIS PI. On regression, preoperative opioid use, irreparable rotator cuff tear, legal claim, and worse NPS body were predictors of worse 2-year PROMIS PI.

Conclusion: This study found that opioid use, irreparable cuff tear, legal claim, and worse baseline NPS body were predictive of worse 2-year PROMIS PI. These findings suggest that worse baseline pain and massive cuff tears may lead to worse pain 2 years after rTSA.

Predictors of "Completely Better" Status Two Years After Shoulder Arthroplasty

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Purpose: To investigate the use of a new patient-centric metric—completely better (CB)—after shoulder arthroplasty.

Significance: Recent focus on clinical interpretation of patient-reported outcomes (PROs) has led to the development of several metrics: minimal clinically important difference (MCID), patient acceptable symptom state (PASS), and substantial clinical benefit (SCB).

Methodology: Patients undergoing shoulder arthroplasty from June 2015 to April 2022 were queried from a prospective registry. PROs collected at baseline and 2 years postoperatively included the Patient-Reported Outcomes Measurement Information System (PROMIS), the American Shoulder and Elbow Surgeons Score (ASES), and the Numeric Pain Scale (NPS). CB status was determined by asking, "Is the condition for which you underwent surgery completely better now?"

Results: Overall, 123 of 189 patients (65.1%) completed the CB question by 2-year follow-up. 95 patients (77%) responded "Yes". Better PROMIS Pain Interference (PI), Social Satisfaction, Anxiety, Depression, ASES, and NPS Shoulder and Body at 2 years were also associated with achieving CB status. On regression analysis, older age and greater baseline PROMIS PF were predictors of achieving CB status.

Conclusion: 77% of patients undergoing TSA achieved CB status by 2 years postoperatively. Predictors of achieving CB included older age and better baseline PROMIS PF.

Postoperative Opioid Consumption and 2-Year Outcomes After Hip Arthroscopy

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Purpose: To investigate the impact of postoperative opioids on patient-reported outcomes (PROs) 2 years after hip arthroscopy.

Significance: Previous studies in orthopedics have associated preoperative opioid use with worse outcomes; however, none have studied the influence of postoperative opioids on outcomes after hip arthroscopy.

Methods: Patients undergoing hip arthroscopy from 2015 to 2022 were identified from a registry. Opioid prescriptions were identified in the Prescription Drug Monitoring Program (PDMP) and were standardized to morphine milligram equivalents (MMEs). PROs included the Patient-Reported Outcomes Measurement Information System (PROMIS), a numeric pain scale (NPS) of the operative hip and body, the Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS).

Results: There were 127 patients included for this study, with 88 (69%) completing 2-year PROs. Greater postoperative opioid consumption was associated with prior ipsilateral hip surgery, lower income, preoperative opioid use, and obesity. On regression, greater postoperative MME was predictive of worse operative NPS hip, worse MODEMS met expectations, but better PROMIS Depression at 2 years postoperatively.

Conclusion: This study found that postoperative opioid consumption was associated with lower income, obesity, prior hip surgery, and preoperative opioid use. Additionally, greater postoperative opioid use predicted worse NPS hip and met expectations 2 years postoperatively.

Predictors of "Completely Better" Status Two Years After Meniscectomy

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Purpose: To determine the rate and identify predictors of a patient-reported sense of feeling "completely better" after meniscectomy.

Significance: Several metrics for clinical interpretation of patient-reported outcomes (PROs) exist, including minimal clinically important difference (MCID), patient acceptable symptom state (PASS), and substantial clinical benefit (SCB). The novel metric, completely better (CB) status, raises the bar for measuring a successful outcome.

Methods: Patients undergoing meniscectomy from June 2015 to September 2018 were queried from a prospective registry. Demographics and PROs were collected at baseline and 2 years postoperatively. CB status was determined at 2 years postoperatively by asking, "Is the condition for which you underwent surgery completely better now?", ("Yes or "No").

Results: 114 of 177 patients (64.4%) responded to follow-up. 65 patients (57%) achieved CB status. Obesity, unemployment, prior knee surgery, and contralateral compartment cartilage damage were associated with failure to achieve CB status. On regression analysis controlling for severity of cartilage damage and other predictors of poor outcomes, obesity and contralateral compartment cartilage damage were predictors of failure to achieve CB status.

Conclusion: Patients achieving CB status had better 2-year PROs across all domains. Nonobese patients with well-preserved cartilage may be more likely to achieve CB status after meniscectomy.

Impact of Preoperative Opioid Use on Two-Year Outcomes After Hip Arthroscopy

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Purpose: To investigate the impact of preoperative opioid use on 2-year patient-reported outcomes (PROs).

Significance: Preoperative opioid use has been shown to negatively impact PROs. Though this has been studied in many procedures, little exists on the impact of preoperative opioid use on 2-year PROs after hip arthroscopy.

Methods: Patients undergoing hip arthroscopy from October 2015 to February 2022 in a registry were identified. Patients that had complete Prescription Drug Monitoring Program (PDMP) data were included for analysis. Surveys included six Patient-Reported Outcomes Measurement Information System (PROMIS) domains, Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS) expectations, a Numeric Pain Scale (NPS), Marx Activity Rating Scale (MARS) and Tegner Activity Scale (TAS). Preoperative opioid use was defined as filling an opioid prescription within 3 months of surgery.

Results: There were 84 included patients. At 2-year follow-up, preoperative opioid use was associated with worse PROMIS Fatigue, TAS, and MARS. Regression found that preoperative opioid use was a predictor of worse MODEMS Met Expectations and less improvement in NPS operative hip two years postoperatively.

Conclusion: This study found that preoperative opioid use was a predictor of less fulfillment of expectations and less improvement in operative hip pain after hip arthroscopy.

Quantification of Doxycycline and Vancomycin Elution from 1.5mm and 2.0mm Commercial High-Strength Sutures

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Purpose: To determine the feasibility of coating high-strength sutures with either doxycycline or vancomycin and compare their antibiotic elution profiles.

Significance: Up to 33% of sutures used in arthroscopic rotator cuff repair may undergo contamination during surgery leading to a greater chance of infection and re-tear. Identifying a preventative method to reduce bacterial burden may decrease the need for subsequent treatment.

Methods: Four different sutures, 1.5mm and 2.0mm ActivBraid (AB1.5 and AB2 respectively), 1.5mm LabralTape (LT1.5), and 2.0mm FiberWire (FW2.0) were exposed to either a doxycycline or vancomycin dip-coat. Enzyme-linked immunosorbent assays quantified the amount of antibiotic eluted from daily aliquots over one week.

Results: In all sutures, the highest elution of doxycycline occurred in days 1-3 and the lowest in days 5-7. AB1.5 and LT1.5—but not AB2 and LT2—demonstrated a constant elution of vancomycin with minor fluctuations across all 7 days.

Conclusion: Coating commercial high-strength sutures is feasible; both suture types and sizes exhibit a measurable elution profile over 1 week. Elution of doxycycline demonstrated a downward trend in all sutures while elution of vancomycin displayed a consistent release over time in only the 1.5mm sutures.

Intraoperative Evaluation of Sarcoma Surgical Margins with Indocyanine Green Fluorescence Imaging

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Purpose: We sought to understand how intraoperative indocyanine green (ICG) fluorescence imaging could assess for negative surgical margins during sarcoma excision.

Significance: There is currently no way to definitively assess surgical margins in sarcoma resection intraoperatively; however, ICG has been used during other oncologic resections to aid in obtaining negative margins.

Methods: This was a prospective, observational study completed between 2021 and 2024 evaluating the use of ICG in achieving negative margins during sarcoma excision. Patients were given ICG preoperatively, then a SPY-PHI fluorescent camera (Stryker) was used to determine relative fluorescent units of the resected tumor and tumor bed so a signal background ratio (SBR) could be calculated. Sensitivity, specificity, PPV, NPV, and accuracy of ICG with various SBR levels and surgeon impression were determined by comparing them to the final pathology report.

Results: There were 51 patients who met inclusion criteria. SBR of 1.5 and 1.7 were both highly sensitive (93.3% and 80.0%, respectively), while the surgeons were highly specific (74.4%).

Conclusions: This study shows that the use of ICG, combined with surgeon expertise, may aid in obtaining negative surgical margins. This is a hallmark study showing that intraoperative fluorescence imaging during sarcoma surgery needs further research.

Comprehension and Satisfaction with Informed Consent For Arthroscopic Procedures Using Supplemental Online Educational Materials

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Purpose: Determine whether addition of online educational materials to the standard informed consent would improve patient comprehension and satisfaction.

Significance: Informed consent is fundamental for protecting patient autonomy and a crucial component of building the patient-physician relationship. However, there are many challenges to implementing an effective informed consent process.

Methodology: Patients undergoing hip, knee, or shoulder arthroscopy were prospectively enrolled and randomized into Group 1 (standard consent) or Group 2 (online educational materials). Comprehension of the procedure and satisfaction with the informed consent process were assessed with a survey on the day of surgery prior to the patients' procedure.

Results: There was a significant difference in awareness of the risks, benefits, and alternatives to knee arthroscopy between groups (p=0.02). Patients who accessed the online educational materials were significantly more satisfied with the information and teaching they received as part of the informed consent for knee arthroscopy (p=0.005). These findings were not demonstrated in the hip arthroscopy or shoulder arthroscopy cohorts. However, patients in all three cohorts (hip, knee, shoulder) found the online information useful.

Conclusion: Online educational materials increased patients' comprehension and satisfaction with the informed consent process for knee arthroscopy, offering a potential approach to improve patient care.

Trends in Gender Disparities in Authorship of Spine Research From 2004 to 2023: A Review of Spine Articles in a High Impact General Orthopaedic Journal

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Purpose: Women representation in high-impact spine research remains limited, particularly in leadership roles. Understanding these trends is critical to addressing inequities and fostering a more diverse research environment.

Significance: Gender disparities in academic spine surgery have persisted despite efforts to promote inclusivity.

Methods: A review of spine articles published in *JBJS* from 2004-2023 was conducted. The total number of authors and the number of female/male authors were recorded. Each article was also evaluated for whether the first or last author was female. Publication trends were analyzed over time.

Results: 665 spine articles were evaluated from the 20-year study period. Most of the articles had zero female authors (47.2%), with 30.2% having one female author. The proportion of female authors in slightly increased in the past two decades, with 11.9% female authors in 2004 and 12.7% in 2023 (p=0.046). The proportion of the articles first authored by a female increased over the study period (p=0.009). However, the proportion of studies with the senior author being female did not increase over the study period (p=0.600).

Conclusion: This study highlights incremental progress in female authorship within spine research, particularly among first authors, while underscoring the persistent underrepresentation of women in senior authorship roles.

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