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OREF MIDWEST REGION
RESIDENT RESEARCH SYMPOSIUM
Friday, September 19, 2025

David Rubenstein Forum at the
University of Chicago
1201 E. 60th Street
Chicago, Illinois

Co-Hosted by:

Jennifer Moriatis Wolf, MD, PhD
Harold and Betsy Newton Professor in the Wallman Society of Fellows
Chair, Department of Orthopaedic Surgery & Rehabilitation Medicine
University of Chicago

Rex Haydon, MD, PhD
Simon and Kalt Families Professor
Vice Chair, Department of Orthopaedic Surgery & Rehabilitation Medicine
University of Chicago

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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 MIDWEST REGION RESIDENT RESEARCH SYMPOSIUM
SUMMARY AGENDA
Friday, September 19, 2025

Noon – 1:00 p.m.	**Registration and Lunch** David Rubenstein Forum at the University of Chicago 1201 E. 60th Street Chicago, Illinois
1:00 p.m. – 1:03 p.m.	**Welcome and Introductions** Jennifer Moriatis Wolf, MD, PhD Harold and Betsy Newton Professor in the Wallman Society of Fellows Chair, Department of Orthopaedic Surgery & Rehabilitation Medicine The University of Chicago
1:03 p.m. – 1:13 p.m.	**OREF Welcome** Lee Grossman, MBA, ML Chief Executive Officer Orthopaedic Research and Education Foundation
1:13 p.m. – 1:53 p.m.	**Session I – Resident Research Presentations & Discussion**
1:53 p.m. – 2:33 p.m.	**Session II – Resident Research Presentations & Discussion**
	Break – ***Please submit your scores from Sessions I and II to OREF Staff***
2:43 p.m. – 3:23 p.m.	**Session III – Resident Research Presentations & Discussion**
.	**Break –** ***Please submit your scores from Session III to OREF Staff***
3:26 p.m. – 3:29 p.m..	**Introduction of Keynote Speaker**
3:30 p.m. – 4:00 p.m.	**Keynote Address** *Leadership in Turbulent Times* Joshua J. Jacobs, OREF President Professor & Chair Emeritus, Department of Orthopaedic Surgery Rush University Medical Center Grainger Director, Rush Arthritis and Orthopaedic Institute Co-Director, Institute for Translational Medicine
4:00 p.m. – 4:15 p.m.	**Keynote Question & Answer**
4:15 p.m. – 4:30 p.m.	**Closing Remarks and Awards Presentation**

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KEYNOTE SPEAKER

Joshua J. Jacobs, MD

OREF President
Professor & Chair Emeritus, Department of Orthopaedic Surgery
Rush University Medical Center
Grainger Director, Rush Arthritis and Orthopaedic Institute
Co-Director, Institute for Translational Medicine

Joshua J. Jacobs, MD received a Bachelor of Science degree in Materials Science and Engineering from Northwestern University and graduated from the University of Illinois Medical School. Dr. Jacobs completed his residency training at the Combined Harvard Orthopaedic Residency Program followed by a fellowship in Adult Reconstructive Orthopaedic Surgery at Rush University Medical Center under the direction of Dr. Jorge Galante. Dr. Jacobs has remained at Rush since his fellowship training and served as the William A. Hark, MD/Susanne G. Swift Professor and Chair of the Department of Orthopaedic Surgery for 16 years until he recently stepped down to become the Grainger Director of the Rush Arthritis and Orthopaedics Institute.

Dr. Jacobs has published more than 300 peer-reviewed manuscripts, most of which focus on the biological consequences of material degradation from joint replacement implants. He is a Multiple Principal Investigator on two large National Institutes of Health (NIH) awards including the University of Chicago/Rush University Clinical and Translational Science Award from the National Center for Advancing Translational Sciences (NCATS) and the Acute to Chronic Pain Signature (A2CPS) consortium of the NIH Common Fund's Helping End Addiction Long-term (HEAL) initiative. Dr. Jacobs has received several awards for his research and leadership including a Career Development Award from the Orthopaedic Research and Education Foundation (OREF), the Otto Aufranc Award from The Hip Society, the Ann Doner Vaughan Kappa Delta Award from the American Academy of Orthopaedic Surgeons (AAOS), the Mark Coventry Award from the Knee Society, the Orthopaedic Research Society (ORS)/OREF Distinguished Investigator Award, the William W. Tipton Jr., MD, Leadership Award from the AAOS and the Nicolas Andry Lifetime Achievement Award from the Association of Bone and Joint Surgeons.

Dr. Jacobs has served in leadership positions in several professional organizations related to orthopaedic surgery. He is a Past President of the AAOS, ORS, the United States Bone and Joint Decade, and The Hip Society. He served as a Director of the American Board of Orthopaedic Surgery and is a Past Chairman of the Board of Trustees of the Journal of Bone and Joint Surgery. Dr. Jacobs currently serves as the President of the Board of Trustees of the OREF.

Judges

Ilyas Aleem, MD
University of Michigan

Tessa Balach, MD
University of Chicago

Mary Kate Erdman, MD
University of Chicago

Alfonso Mejia, MD
University of Illinois-Chicago

John Morellato, MD
The University of Mississippi Medical Center

OREF Midwest Region Resident Research Symposium
DETAILED AGENDA
Friday, September 19, 2025

Noon – 1:00 p.m.	**Registration and Lunch** David Rubenstein Forum at the University of Chicago 1201 E. 60th Street Chicago, Illinois
1:00 p.m. – 1:03 p.m.	**Welcome and Introductions** Jennifer Moriatis Wolf, MD, PhD Harold and Betsy Newton Professor in the Wallman Society of Fellows Chair, Department of Orthopaedic Surgery & Rehabilitation Medicine The University of Chicago
1:03 p.m. – 1:13 p.m.	**OREF Welcome** Lee Grossman, MBA, ML Chief Executive Officer Orthopaedic Research and Education Foundation
	Session I – Presentations and Discussion
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1:18 p.m. – 1:23 p.m.	*Ipsilateral Femoral Neck Fracture Rates Following Ballistic Fractures of the Femoral Shaft* Matthew Todd, MD, Franciscan Health Olympia Fields
1:23 p.m. – 1:28 p.m.	*Ten Years of a Novel Telemedicine System for Management of Statewide Hand Trauma in Arkansas - A Decade in Review* Katherine J. Montoya, MD, University of Arkansas for Medical Sciences
1:28 p.m. – 1:33 p.m.	*Nicotine Dependence as a Risk Factor for Complications After Flexor Tendon Repair: A Retrospective Cohort Analysis* Alexander Berk, MD, University Hospitals/Case Western Reserve
1:33 p.m. – 1:38 p.m.	*Midcarpal Stability Persists with ≤33% Distal Scaphoid Resection: A 3D Computational Analysis* Kyleen Jan, MD, Rush University Medical Center
1:38 p.m. – 1:43 p.m.	*Patient-Reported Functional Outcomes Following Charcot Foot Reconstruction* Elizabeth Cho, MD, Loyola University Medical Center
1:43 p.m. – 1:53 p.m.	**Question & Answer**

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Session II – Presentations and Discussion

1:53 p.m. – 1:58 p.m.	*Hydrophilic Versus Non-Hydrophilic High-Tensile Strength Sutures During Lesser Tuberosity Osteotomy Repair in Total Shoulder Arthroplasty: A Biomechanical Study* Hassan Farooq, MD, Loyola University Medical Center
1:58 p.m. – 2:03 p.m.	*Optimizing Contact Pressures of the Posterior Heel During Lower Extremity Immobilization: A Biomechanical Study* Erik Nakken, MD, University of Michigan
2:03 p.m. – 2:08 p.m.	*Pre-Clinical Safety and Efficacy Assessment of a Novel 3D-Printed Hydroxyapatite-Demineralized Bone Matrix (HA-DBM) Composite Scaffold Using a Rodent Posterolateral Fusion Model* Mark Plantz, MD, Northwestern University
2:08 p.m. – 2:13 p.m.	*Anticoagulation Increases Complications Without Reducing DVT or PE in Lumbar Decompression Surgery: A Propensity-Matched Study with Prospective Outcomes* Emmanuel Arhewoh, MD, University of Michigan
2:13 p.m. – 2:18 p.m.	*Predictors of Anterior Cruciate Ligament Re-Injury and Return to Sport in Adolescent Athletes: Increased Risk in Younger Age and Earlier Time to Return to Sport* Bhargavi Maheshwer, MD, University Hospitals Cleveland Medical Center
2:18 p.m. – 2:23 p.m.	*Achilles Tendon Rupture Injuries in Major League Soccer: A 10-Year Analysis of Injury Rate and Return to Play* Anne Timmermann, MD, University of Chicago
2:23 p.m. – 2:33 p.m.	**Question and Answer**
2:33 p.m. – 2:43 p.m.	**Break** - ***Please submit your scores from Sessions I and II to OREF Staff***

Session III – Presentations and Discussion

2:43 p.m. – 2:48 p.m.	*Is Patellofemoral Joint Replacement Still a Wise Choice as Opposed to Modern Total Knee Arthroplasty in Patients with Isolated Patellofemoral Osteoarthritis* Omar Martini, MD, University of Illinois Chicago
2:48 p.m. – 2:53 p.m.	*Repeat Exposure to Mesh-Glue Dressing is Associated with Allergic Contact Dermatitis: A Prospective Cohort Study* Conor Jones, MD, Rush University Medical Center
2:53 p.m. – 2:58 p.m.	*Joint Arthroplasty in Breast Cancer: PE Risk and Thrombo-Prophylaxis Depend on Time Since Mastectomy* Apurva Choubey, MD, University of Illinois Chicago

OREF Midwest Region Resident Research Symposium
DETAILED AGENDA
Friday, September 19, 2025

2:58 p.m. – 3:03 p.m.	*AI-Assisted MRI Interpretation Improves Surgeon Performance in Diagnosing Bankart Lesions* Jordan Serotte, MD, University of Chicago
3:03 p.m. – 3:08 p.m.	*Is Intraoperative Fluoroscopy Necessary for Spica Cast Application in Pediatric Femoral Shaft Fractures?* Drew Carter, MD, University of Mississippi Medical Center
3:08 p.m. – 3:13 p.m.	*Influence of GLP-1 RA Use in Tendinopathy Development in Diabetic and Non-Diabetic: A Propensity Matched Database Study* Ian Marigi, MD, University Hospitals Cleveland Medical Center
3:13 p.m. – 3:23 p.m.	**Question and Answer**
3:23 p.m. – 3:26 p.m.	**Break – *Please submit your scores from Session III to OREF Staff***
3:26 p.m. – 3:29 p.m.	**Introduction of Keynote Speaker**
3:30 p.m. – 4:00 p.m.	**Keynote Address** *Leadership in Turbulent Times* Joshua J. Jacobs, MD OREF President Professor & Chair Emeritus, Department of Orthopaedic Surgery Rush University Medical Center Grainger Director, Rush Arthritis and Orthopaedic Institute Co-Director, Institute for Translational Medicine
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Rate of Fibular Nonunion in Patients with Tibial Shaft Fractures

William Day, MD
University of Mississippi Medical Center

Purpose: Determining the incidence of fibular nonunion in Tibial shaft fractures and identifying any associated risk factors.

Significance: The rate of fibular nonunion in patients with tibial shaft fractures is not well established.

Methodology: Retrospective cohort study at a level one trauma center, reviewing cases from June 2012 to June 2021. Inclusion criteria: patients with fibular fractures associated with tibial shaft fractures, treated with intramedullary rod fixation, and a minimum of three months follow-up. Fibular union was assessed using a RUST or mRUST score of 8.

Results: Out of 401 patients, the overall rate of fibular nonunion was 21%. Distal third fibular fractures showed a higher nonunion rate (25%) compared to proximal (12%) and middle third (20%) fractures ($p = 0.036$). Patients with fibular fixation had a nonunion rate of 25%, versus 19% in those without fixation ($p = 0.114$). Among those with fixation, intramedullary flexible nails (IMFN) resulted in fewer nonunions than plates or screws (RR = 0.47; NNT = 6.05; $p = 0.007$).

Conclusion: Fibular nonunion is relatively common after tibial shaft fractures, especially with distal fractures and plate or screw fixation. IMFN may reduce nonunion risk.

Ipsilateral Femoral Neck Fracture Rates Following Ballistic Fractures of the Femoral Shaft

Matthew Todd, MD
Franciscan Health Olympia Fields

Purpose: To evaluate the incidence of ipsilateral femoral neck and femoral shaft fractures after ballistic injuries.

Significance: Prior literature has demonstrated that in patients with blunt femoral shaft fractures, ipsilateral femoral neck fractures occur at a rate of 1-9%. There is little evidence whether ballistic fractures of the femoral shaft carry a similar risk.

Methods: We performed a retrospective review of ballistic diaphyseal femur fractures treated at a single level one trauma center from 2015-2023. X-ray (XR) and computed tomography (CT) images were utilized to assess for ipsilateral femoral neck fractures diagnosed peri-operatively. The distance from the most proximal extent of the femoral shaft fracture to the lesser trochanter was used to stratify the risk of proximal extension.

Results: CT imaging of the femoral neck was available in 66 of 77 patients who sustained ballistic diaphyseal femur fractures, with two patients (2.6%) demonstrating direct extension into the femoral neck. No femoral neck fractures occurred independent of the site of primary femoral shaft comminution.

Conclusion: Ballistic diaphyseal femur fractures carry a low risk of ipsilateral femoral neck involvement. Understanding the incidence of femoral neck involvement has implications on both the diagnosis and treatment of these injuries.

Ten Years of a Novel Telemedicine System for Management of Statewide Hand Trauma in Arkansas - A Decade in Review

Katherine J. Montoya, MD
University of Arkansas for Medical Sciences

Purpose: We hypothesize that the rate of EMS transfer for hand trauma in Arkansas has significantly decreased since the establishment of the Arkansas Hand Trauma Telemedicine Program (AHTTP) in 2014.

Significance: Hand trauma is a challenge to triage and manage, especially in rural states, due to the relative paucity of fellowship-trained hand surgeons and of equipped treatment centers. Preliminary data have suggested early success of the AHTTP, but no long-term data have been analyzed.

Methods: Data from all AHTTP encounters were used to compare trends in program utilization and interfacility transfers from 2013-2023. Trend analyses were conducted on percentage of overall and EMS-based interfacility transfers during the study period (2013-2023).

Results: The AHTTP has facilitated 7,260 remote hand trauma consults since 2014. The overall rate and EMS rate of transfer have significantly decreased from 73.1% to 55.2% ($p < .0001$), and 44.9% to 33.2% ($p < .0001$) respectively. An estimated 2,519 EMS ground and 156 air transfers have been saved (estimated cost savings of $9,515,000).

Conclusion: The AHTTP has significantly decreased the rate of EMS ground and air interfacility transfer for hand trauma in Arkansas, correlating to an estimated cost savings of $9.5M and increased availability of EMS resources.

Nicotine Dependence as a Risk Factor for Complications After Flexor Tendon Repair: A Retrospective Cohort Analysis

Alexander Berk, MD
University Hospitals/Case Western Reserve

Purpose: To evaluate the association between non-tobacco nicotine dependence (NTND) and postoperative complications following flexor tendon repair.

Significance: While tobacco's impact on surgical outcomes is well known, the effects of nicotine dependence from non-tobacco products including e-cigarettes and pouches remain unclear. As NTND use rises, understanding risks is essential for surgical planning and counseling.

Methods: Patients ≥18 who underwent flexor tendon repair (2010–2023) were identified using TriNetX. Two cohorts—nicotine-dependent and non-dependent—were matched 1:1 (n=5,566 each) by age, sex, race, BMI, and diabetes status. Ninety-day major medical and two-year procedure-related complications were analyzed.

Results: Nicotine dependence was associated with higher 90-day rates of acute kidney injury (RR 1.75, p=0.020), sepsis (RR 2.10, p=0.048), surgical site infection (RR 1.43, p=0.018), wound dehiscence (RR 2.17, p=0.023), ED visits (RR 1.64, p<0.001), readmission (RR 1.60, p<0.001), and tenolysis (RR 1.70, p=0.041). At 2 years, surgical site infection remained elevated (RR 1.52, p<0.001). No differences were observed in rerupture, triggering, contracture, swan neck deformity, or long-term tenolysis. Stratified analysis showed NTND users had lower tenolysis risk but higher rerupture risk at 2 years (RR 2.10, p<0.001).

Conclusion: NTND is associated with increased early and late complications after flexor tendon repair.

Midcarpal Stability Persists with ≤33% Distal Scaphoid Resection: A 3D Computational Analysis

Kyleen Jan, MD
Rush University Medical Center

Purpose: To determine the maximum extent of distal scaphoid excision that preserves midcarpal stability in radioscapholunate fusion using computed tomography (CT)-based 3D modeling.

Significance: Distal scaphoid excision is performed in radioscapholunate (RSL) fusion to reduce impingement, alleviate pain, and preserve midcarpal motion. However, the upper limit of excision that can be safely performed without compromising midcarpal stability remains undefined.

Methods: 22 wrist CTs were segmented into 3D models. Capitate-scaphoid alignment was standardized, and five excision states modeled (0%, 25%, 33%, 50%, 66%). Capitate-scaphoid overlap was calculated and normalized to the intact condition. ANOVA was performed to compare between excision states ($p<0.05$).

Results: Capitate-scaphoid overlap was well preserved at 25% (99.2% coverage) and 33% (96.3% coverage) excision. At 50%, overlap dropped significantly to 74.3% coverage, and at 66%, to 47.8% coverage ($p<0.001$). No significant difference was observed between intact and 25% or 33% models, but coverage at 50% and 66% differed significantly from all lesser excision states ($p<0.001$). The 33% excision threshold marked the inflection point where articular support declined sharply.

Conclusion: Up to 33% distal scaphoid resection can be performed without compromising midcarpal stability. Exceeding this may result in a loss of capitate support, providing surgeons with quantitative guidance in partial wrist arthrodesis.

Patient-Reported Functional Outcomes Following Charcot Foot Reconstruction

Elizabeth Cho, MD
Loyola University Medical Center

Background: Charcot foot reconstruction has been shown to improve quality of life in patients with diabetes-associated arthropathy. However, patient-reported outcomes following surgical reconstruction remain underreported. This study aimed to quantify functional recovery using validated patient-reported outcome measures (PROMs), including the PROMIS Global Health, Physical Function, and Pain Interference domains, as well as the Foot and Ankle Disability Index (FADI), which have not been previously reported in this population.

Methods: This was a retrospective study of patients with diabetes-associated Charcot foot arthropathy who underwent surgical reconstruction between 2022 and 2023 at a single academic institution. PROMs collected were the Foot and Ankle Disability Index (FADI), PROMIS Global Health (Physical and Mental), PROMIS Pain Interference, and PROMIS Physical Function. Surveys were administered preoperatively and at 6- and 12-months postoperatively; patients were included if they completed all surveys at all three timepoints. Generalized estimating equations (GEE) were used to estimate mean changes in PROM scores over time; multivariable models were used to assess the impact of clinical variables including fixation type (internal versus external), infection, and location of deformity. Statistical significance was set at $p<0.05$.

Results: Twenty-seven patients met inclusion criteria with complete PROM data at baseline, 6 months, and 12 months postoperatively. Median age was 59 years and median BMI was 36. Compared to baseline, patients demonstrated a statistically significant decrease in PROMIS Pain Interference scores at 6 months (Δ -3.93, $p=0.025$), but this improvement was not sustained at 12 months. No significant differences were observed in other PROMs across timepoints, although mean scores for PROMIS Global Health Physical, PROMIS Physical Function, and FADI all trended in a positive direction. Notably, PROMIS Global Health Mental scores trended negatively, although these findings did not meet statistical significance.

Subgroup analysis revealed that presence of infection negatively impacted all PROMIS domains, with significantly lower Global Health Physical (Δ -9.6 at 6 months, -8.0 at 12 months), Global Health Mental (Δ -9.2 at 6 months, -7.8 at 12 months), and FADI scores (Δ -27.0 at 6 months, -25.4 at 12 months; all $p<0.05$). In contrast, patients who underwent external fixation showed improved outcomes, including significantly higher Global Health Physical (+3.5 at 12 months), Global Health Mental (+8.6 at 6 months), and FADI (+14.5 at 12 months) scores, as well as lower Pain Interference scores at 6 and 12 months (Δ -5.7 and -4.5, respectively; all $p<0.05$) compared to patients with internal fixation. Location of Charcot deformity was also found to influence outcomes. Patients with midfoot deformity had higher Pain Interference scores at 6 months (+5.0, $p=0.036$), while those with tibiotalar reported worse Physical Function scores (-6.0, $p=0.034$) than the remaining cohort.

Conclusion: Charcot foot reconstruction can lead to meaningful improvements in pain and function, with early gains notable by 6 months postoperatively. Overall PROM trends were favorable and trended in a positive direction except for the PROMIS Global Health Mental, which slightly declined. Presence of infection was a strong predictor of worse outcomes, highlighting the importance of counseling patients with suspected infection preoperatively about their elevated risk and potential for limited functional recovery. These results underscore the challenging nature of treating Charcot neuroarthropathy, and reinforce the need for individualized, multidisciplinary management in this vulnerable patient population.

Hydrophilic Versus Non-Hydrophilic High-Tensile Strength Sutures During Lesser Tuberosity Osteotomy Repair in Total Shoulder Arthroplasty: A Biomechanical Study

Hassan Farooq, MD
Loyola University Medical Center

Purpose: The purpose of this study was to compare the biomechanical performance of a novel hydrophilic suture to a standard non-hydrophilic suture in lesser tuberosity osteotomy (LTO) repair during anatomic total shoulder arthroplasty.

Significance: The LTO is commonly repaired with standard non-hydrophilic sutures that have been shown to lose significant tension over time. This new hydrophilic suture claims to maintain tension through self-tightening properties.

Methods: 32 sutures were tested, 16 hydrophilic and 16 non-hydrophilic. Groups were further divided to assess either suture elongation or force relaxation over 24 hours. Elongation was measured under a constant 22 N load, while force relaxation was assessed at a fixed length after pre-tensioning to 22 N. Results were averaged and compared using Mann-Whitney U tests.

Results: Net elongation of hydrophilic sutures was 0.25 ± 0.15 mm, while non-hydrophilic sutures was 0.46 ± 0.20 mm, which was a significant difference ($p < 0.001$). The hydrophilic sutures also demonstrated less force relaxation than non-hydrophilic sutures, with net tension differences of -3.31 ± 4.59 N and -11.90 ± 0.83 N, respectively ($p < 0.001$).

Conclusion: Hydrophilic sutures demonstrated lesser elongation and force relaxation compared to non-hydrophilic counterparts. This reported effect would hypothetically result in more stable LTO repair constructs.

Optimizing Contact Pressures of the Posterior Heel During Lower Extremity Immobilization: A Biomechanical Study

Erik Nakken, MD
University of Michigan

Purpose: This study hypothesizes that heel floating positioning and increased padding reduce posterior heel contact pressures in short leg splints (SLS) and controlled ankle motion (CAM) boots.

Significance: SLS and CAM boots are essential in orthopaedic care but carry the risk of posterior heel pressure injuries. There is limited biomechanical data to guide optimization of contact pressure in these devices.

Methods: Twenty legs from ten volunteers were analyzed. In a SLS, heel contact pressures were measured with varying padding thicknesses (0–10 layers), heel positions (resting versus floating), and brands. In a CAM boot, heel resting versus floating was tested. Pressures were compared to a 32mmHg threshold representing dermal arteriolar capillary collapse.

Results: In a SLS, mean heel resting pressures remained above 32mmHg, regardless of padding thickness or brand. Floating the heel with 8-10 layers of padding reduced pressures below 32mmHg. In a CAM boot, only 55% of legs with the heel floating achieved similar reductions. Improperly bunched/folded padding behind the heel in a SLS increased pressure three-fold.

Conclusion: Floating the heel significantly reduces pressure in both SLS and CAM boots. This highlights the importance of education on proper heel positioning and SLS design to optimize heel contact pressures.

Pre-Clinical Safety and Efficacy Assessment of a Novel 3D-Printed Hydroxyapatite-Demineralized Bone Matrix (HA-DBM) Composite Scaffold Using a Rodent Posterolateral Fusion Model

Mark Plantz, MD
Northwestern University

Purpose: To compare the safety and efficacy of a novel 3D-printed hydroxyapatite-demineralized bone matrix (HA-DBM) scaffold to rhBMP-2**.**

Significance: rhBMP-2 is efficacious for spinal fusion but is associated with host inflammatory response. There is need for synthetic bone grafts with favorable safety profiles.

Methods: 50 Sprague-Dawley rats underwent bilateral L4-L5 posterolateral fusion with either 10 µg rhBMP-2 or HA-DBM composite scaffold. A non-operative control group was also included. Fusion was assessed at 8 weeks postoperatively via manual palpation. Specimens underwent biomechanical testing to quantify segmental range-of-motion and overall stiffness. Lumbar MRI quantified surgical site edema at various time points. Various gene and protein expression analyses were used to investigate pro-osteogenic mechanism-of-action. Chi-squared and unpaired t-tests were used to compare categorical and continuous variables, respectively.

Results: Fusion rates were similar between rhBMP-2 (100%) and HA-DBM (93%) groups. Both groups yielded significantly greater stiffness and reduced segmental range-of-motion relative to controls. HA-DBM yielded significantly less surgical site edema at both 2- and 5-days postoperatively. Both groups had significant increases in various pro-osteogenic marker expression (*Alp*, *Osx*, and *Runx2*).

Conclusion: A novel HA-DBM composite yielded similar fusion rates with less host inflammatory response compared to rhBMP-2 in a rodent spinal fusion model.

Anticoagulation Increases Complications Without Reducing DVT or PE in Lumbar Decompression Surgery: A Propensity-Matched Study with Prospective Outcomes

Emmanuel Arhewoh, MD
University of Michigan

Purpose: To evaluate the effect of anticoagulation use in lumbar spine surgery

Significance: Anticoagulation (AC) in spine surgery remains controversial. Prior studies are limited by small samples, retrospective designs, and unclear indications for AC. At our institution, differing prescribing habits between orthopedic and neurosurgical services created a natural experiment.

Methodology: A prospectively collected cohort of 2,996 lumbar surgery patients was propensity-matched, yielding 1,722 (861 per group). Outcomes included multiple complication measures and composite neurological/all complications. T-tests and chi-square tests were used for groups; logistic regression with/without Firth correction was used for predictors.

Results: No significant differences were seen in DVT (1.2% vs. 0.7%), PE (0% vs. 0.3%), or hematoma (0.2% vs. 0.9%). AC patients had higher wound dehiscence, CSF leaks, neurogenic bladder, UTIs, and longer stays, all $p<0.01$.
In the decompression subgroup (n=883), AC patients had higher rates of any complication (32.7% vs. 22.3%), neurologic complications (9.9% vs. 4.1%), new weakness (9.3% vs. 3.6%), and ileus (1.5% vs. 0%), all $p<0.01$. Fusion patients showed no major differences. AC independently predicted neurologic complications (OR=2.57, $p=0.026$) in decompression patients.

Conclusion: Anticoagulation increased complications without reducing thromboembolic events, especially in decompression. Routine use should be reconsidered based on patient and procedural risk.

Predictors of Anterior Cruciate Ligament Re-Injury and Return to Sport in Adolescent Athletes: Increased Risk in Younger Age and Earlier Time to Return to Sport

Bhargavi Maheshwer, MD
University Hospitals Cleveland Medical Center

Purpose: Characterize recent epidemiologic trends of anterior cruciate ligament (ACL) injuries and graft failure rates in high school adolescents and determine variables associated with sustaining secondary ACL injury.

Significance: Delayed return to sport may be protective in this high-risk population.

Methods: A retrospective review was performed for all minors age 13-17 who underwent primary ACL reconstruction between 2015 to 2020. Odds ratios were calculated for baseline patient characteristics and association with risk of recurrent tear. Multivariate regression analyses identified relationships between recurrent tear and specific categorical variables.

Results: Four-hundred-thirty-one patients were included. Recurrent primary graft failure was in 9.0% of patients, and 11.1% sustained a contralateral ACL tear. With respect to combined secondary ACL injuries, as age at primary ACLR increased by 1 year, the rate of secondary ACL injury decreases by 27%. For every subsequent 1-month delay in return to sport, the risk of secondary ACL injury decreased by 13%.

Conclusion: Younger age and earlier time to return to sport following ACL injury are independent risk factors associated with sustaining both primary ACL recurrent tear and contralateral ACL injury in the adolescent patient population. Counseling of adolescent athletes should include allowing adequate healing and time to return to sport.

Achilles Tendon Rupture Injuries in Major League Soccer: A 10-Year Analysis of Injury Rate and Return to Play

Anne Timmermann, MD
University of Chicago

Purpose: Achilles tendon ruptures (ATR) are critical injuries that impair athletic performance, especially in sports like soccer requiring explosive movements. We hypothesized that ATR has a measurable, position-specific impact on return to play (RTP) and performance outcomes in Major League Soccer (MLS) players.

Significance: Although ATR is a common MLS injury, its impact on RTP and long-term performance by position is poorly defined. Understanding these effects can guide prognosis, rehabilitation, and career planning.

Methods: This retrospective matched-cohort study examined MLS players who sustained ATR between 2010–2021, matched 1:2 match with uninjured controls. Performance metrics—games played, minutes, goals, assists, and clean sheets—were extracted from league databases and compared using t-tests.

Results: 185 injured players were analyzed over a three-year post-injury period. Forwards showed significant decline in goals per season by year three (Injured [I]: 5.00 vs. Uninjured [U]: 10.75; p=0.044). Defenders had fewer goals during the injury year (I: 0.62 vs. U: 1.08; p=0.009). Midfielders showed no significant differences. Goalkeepers had more clean sheets during the injury year (I: 8.75 vs. U: 8.38; p=0.016).

Conclusion: ATR has a position-specific impact on RTP and long-term performance. Findings support tailored rehabilitation strategies based on position-specific demands.

Is Patellofemoral Joint Replacement Still a Wise Choice as Opposed to Modern Total Knee Arthroplasty in Patients with Isolated Patellofemoral Osteoarthritis

Omar Martini, MD
University of Illinois Chicago

Purpose: The purpose of this study is to compare complications between patellofemoral joint replacement (PFJR) and total knee arthroplasty (TKA) performed for cases of isolated patellofemoral arthritis (PFA) using a large database approach that could detect less commonly-reported complications.

Significance: Limited literature has shown PFJR to have a higher risk of revision and early postoperative complications than TKA for PFA, but these procedures have not been compared on a larger scale.

Methods: PFJR patients from a healthcare claims database were matched to TKA patients to control for confounders. Medical, infectious, and 10-year orthopaedic complications were compared.

Results: 1,498 PFJR patients were matched to 1,498 TKA patients. PFJR patients had significantly higher rates of loosening (OR 19.0, $P < 0.0001$), lower extremity fracture (OR 2.70, $P < 0.00001$), surface wear (OR 5.0, $P < 0.043$), PJI (OR 2.1, $P < 0.005$), patella dislocation (OR 5.0, $P < 0.002$), revision at two and ten years (OR 3.0, OR 3.9, $P < 0.00001$) compared to TKA patients.

Conclusion: This study supports previous findings of an elevated risk of orthopaedic complications like surface wear, patella dislocation, and revision that may result from altered PFJR biomechanics. Surgeons and patients should remain selective when choosing PFJR over TKA.

Repeat Exposure to Mesh-Glue Dressing is Associated with Allergic Contact Dermatitis: A Prospective Cohort Study

Conor Jones, MD
Rush University Medical Center

Purpose: The purpose of this study was to compare rates of allergic contact dermatitis (ACD) following arthroplasty between patients who have prior exposure and those naïve to a specific dressing type (2-octyl cyanoacrylate liquid adhesive and a self-adhesive polyester mesh).

Significance: Understanding risk factors for ACD following arthroplasty can guide post-operative decision-making on dressing selection.

Methods: 245 procedures (163 TKAs, 69 THAs, 13 UKA) at a single institution were prospectively evaluated. Patients were categorized as “Exposed” or “Naive” based on prior exposure to the studied dressing. The primary outcome was ACD requiring treatment. Multivariate logistic regression analysis was utilized to determine the independent risk of dressing exposure on ACD. There were 86 procedures in patients previously exposed and 159 in naïve

Results: ACD was more common in exposed patients (7/86; 8.1%) compared to naïve patients (3/159; 1.9%; *P*=0.030). After controlling for demographic variables, patients with prior dressing exposure were more likely to experience ACD (odds ratio: 6.48, 95% confidence interval: 1.64 to 25.43, *P* = 0.003).

Conclusion: Previous exposure to the mesh-glue dressing increases the risk of ACD by 6-fold as compared to dressing naïve patients. Clinicians should weigh the benefits of repeat use of this dressing given the risk of ACD.

Joint Arthroplasty in Breast Cancer: PE Risk and Thrombo-Prophylaxis Depend on Time Since Mastectomy

Apurva Choubey, MD
University of Illinois Chicago

Purpose: The purpose of this study is to examine the risk of venous thromboembolism (VTE) after total joint arthroplasty (TJA) in breast cancer (BC) patients based on time since mastectomy.

Significance: BC patients are thought to have a higher risk of VTE after TJA with a decrease of that risk over time. However, this has not been clearly evaluated in the literature.

Methods: Patients from a healthcare claims database were included if they had mastectomy for BC and subsequent TJA. VTE events occurring within 90 days of surgery were assessed relative to time between mastectomy and TJA. Statistical comparisons were performed to evaluate the effect of time since mastectomy on VTE.

Results: Pulmonary embolism (PE) incidence significantly decreased over time after TKA (R^2 = 0.85). Compared to BC patients undergoing TJA more than five years after mastectomy, TJA within five years of mastectomy had greater odds of PE for both TKA (OR 5.8, P = 0.004) and THA (OR 2.9, P = 0.02). Time since mastectomy was an independent risk factor for PE in both TKA and THA.

Conclusion: TJA patients presenting within five years of mastectomy should be counseled on an increased risk of complications, especially PE. Surgeons should consider delaying elective surgery if possible.

AI-Assisted MRI Interpretation Improves Surgeon Performance in Diagnosing Bankart Lesions

Jordan Serotte, MD
University of Chicago

Purpose: This study evaluates a deep learning (DL) model trained to detect Bankart lesions on both magnetic resonance imaging (MRI) and MRI arthrography (MRA) and assesses its clinical utility through a multi-reader study involving orthopaedic surgeons.

Methods: 586 shoulder MRIs (335 standard, 251 MRA; 18.5% with Bankart lesions) who underwent arthroscopy within one year after imaging were included. Arthroscopy reports/photos were used as the ground truth. Four orthopaedic trained readers each reviewed all 117 MRIs/MRAs in two phases: without model predictions (unaided), and again after a 60-day washout period with DL-generated predictions shown (aided).

Results: The model achieved 90.14%/89.13% accuracy, 83.33%/94.12% sensitivity, and 90.77%/86.21% specificity for detecting Bankart lesions on standard MRI and MRAs, respectively. Radiology reports on these MRIs and MRAs demonstrated lower sensitivity (16.7%, 82.4%) with the same specificity (86.2%, 86.2%), and lower accuracy overall (80.3%, 84.8%), respectively. Mean sensitivity improved from 39.1% to 76.1% when clinicians were provided with model predictions. Specificity decreased from 91.0% to 86.7%, and accuracy increased from 80.8% to 84.6%.

Conclusions: These results highlight the potential for DL tools to supplement clinical interpretation and close the diagnostic gap between non-contrast and contrast-enhanced imaging—avoiding the added cost, discomfort, and invasiveness of MRA

Is Intraoperative Fluoroscopy Necessary for Spica Cast Application in Pediatric Femoral Shaft Fractures?

Drew Carter, MD
University of Mississippi Medical Center

Purpose: Evaluating whether fluoroscopy use impacts radiographic outcomes in an effort to minimize radiation exposure in young children.

Significance: Pediatric patients undergoing treatment for femoral shaft fractures may be exposed to excess radiation, especially if intraoperative fluoroscopy is used for spica cast application. Some providers at this Level 1 Trauma Center use fluoroscopy to ensure proper length, alignment, and rotation of the femur, some do not

Methodology: A retrospective review was conducted on 546 patients aged 0–5 years who underwent spica casting. 222 had adequate follow-up and postoperative radiographs. Demographic data and coronal plane angulation were analyzed at three follow-up visits. Acceptable alignment was defined as less than 15 degrees of angulation

Results: Among 222 patients (67% male; mean age 2.1 years), 194 received intraoperative fluoroscopy and 28 did not. There were no statistically significant differences in femoral angulation between groups at any follow-up (p-values: 0.36, 0.18, 0.07). Fluoroscopy use was also not significantly associated with achieving acceptable alignment (p=0.54).

Conclusion: Intraoperative fluoroscopy during spica cast application does not significantly affect coronal alignment outcomes. Its routine use may be unnecessary.

Influence of GLP-1 RA Use in Tendinopathy Development in Diabetic and Non-Diabetic: A Propensity Matched Database Study

Ian Marigi, MD
University Hospitals Cleveland Medical Center

Purpose: To evaluate the association between GLP-1 RAs on the incidence of tendinopathy in 1) patients with obesity, 2) patients with diabetes, and 3) patients with both.

Significance: GLP-1 RAs have been introduced to mitigate the risk of tendinopathy in obese and diabetic populations. There is minimal data assessing the impact of GLP-1 RAs on tendinopathy rates in patients with obesity and diabetes.

Methods: Obese diabetic, obese nondiabetic, and nonobese diabetic patient were queried. A propensity match was used to balance GLP-1-RA use in stratified cohorts. The primary outcomes were subsequent diagnosis of tendinopathy.

Results: Among obese non-diabetic patients, the GLP-1 RA cohort had lower rates of Biceps (OR:0.52; p=0.0357) and Achilles (OR:0.25; p<0.0001) tendinopathy. In diabetic non-obese patients, the GLP-1 RA cohort had lower rates of Rotator Cuff (OR:0.24; p<0.0001), Biceps (OR:0.41; p<0.0001), Patellar (OR:0.37; p = 0.0053), and Achilles (OR:0.47; p<0.0001). In obese diabetic patients, the GLP-1 RA cohort had lower rates of Rotator Cuff (OR:0.48; p<0.0001), Biceps (OR:0.54; p<0.0001), Patellar (OR:0.48; p = 0.0223), Achilles (OR:0.59; p = 0.0002), and Peroneal (OR:0.40; p =0.0002) tendinopathy.

Conclusion: This study demonstrates semaglutide and liraglutide use is associated with reduced incidence of tendinopathy in obese and/or diabetic patients.

OREF gratefully acknowledges sponsors of the 2025 Resident Research Symposia

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2024 OREF Resident Research Symposia Winners

National Resident Research Symposium
Virtual, OREF, Rosemont, IL
November 6, 2024

2024 OREF National Resident Research Symposium Champion
Zaamin Hussain, MD
Emory University
Incision or Excision? What to do with the A1 Pulley for Trigger Finger: Results of a Multi-Surgeon Randomized Controlled Trial

Top Scoring Residents
Benjamin Averkamp, MD
Carolinas Medical Center/OrthoCarolina
Repair Technique and Fellowship Training Background Predict Major and Minor Complications after Achilles Tendon Repair

Tristan J. Elias, MD
University of Texas Medical Branch
Osteochondral Allograft Reaming Significantly Affects Chondrocyte Viability

Kyleen Jan, MD
Rush University Medical Center
THA-10 Score Predicts Conversion to Total Hip Arthroplasty After Hip Arthroscopy for Femoroacetabular Impingement Syndrome at Minimum 10-Year Follow-Up

Brian Shear, MD
University of Maryland
Your iPhone Knows How You Will Recover from Your Fracture

Presenters' Choice
Wade Karam, MD
UTHealth Houston, McGovern Medical School
Rapid Sequence MRI vs CT Capsular Width Sign for Detection of Occult Femoral Neck Fractures Associated with Femoral Shaft Fractures

Southwest Resident Research Symposium
UTHealth Houston,
McGovern Medical School, Houston
October 11, 2024

First Place Award Winner
J. Matthew Helm, MD
UTHealth Houston McGovern Medical School
The Effect of Anterior Closing Wedge Slope Reducing Osteotomy on Coronal Alignment – Considerations with Regards to Osteotomy Technique and Degree of Slope Correction

Second Place Award Winners
Tristan J. Elias, MD
University of Texas Medical Branch
Osteochondral Allograft Reaming Significantly Affects Chondrocyte Viability

Wade Karam, MD
UT Health Houston McGovern Medical School
Rapid Sequence MRI vs CT Capsular Width Sign for Detection of Occult Femoral Neck Fractures Associated with Femoral Shaft Fractures

Third Place Award Winners
Hayden Anz, MD,
UTHealth Houston McGovern Medical School
Biomechanical Analysis of Contact Pressures in Scaphotrapeziotrapezioid Arthritis

Kenneth Ford, MD
UTHealth Houston McGovern Medical School
Vascular Injury in Tibial Plateau Fractures: Incidence and Risk Factors

Guillermo R. Pechero Jr., MD
UTHealth Houston McGovern Medical School
Does Reduction Technique for Hip Fractures Matter? A Comparison of Closed, Open and Percutaneous Reduction Techniques in the Treatment of Intertrochanteric Femur Fractures

Presenters' Choice Award Winner
Ayane Rossano, MD
Dell Medical School at the University of Texas at Austin
Social Work Interventions Improve Outcomes in Total Joint Arthroplasty: An Effort to Improve Equity at an Urban Musculoskeletal Integrated Practice Unit

Southeast Resident Research Symposium
University of South Florida, Tampa
October 4, 2024

First Place Award Winner
Zaamin Hussain, MD
Emory University
Incision or Excision? What to do with the A1 Pulley for Trigger Finger: Results of A Multi-Surgeon Randomized Controlled Trial

Second Place Award Winners
Benjamin Averkamp, MD
Carolinas Medical Center/OrthoCarolina
Repair Technique and Fellowship Training Background Predict Major and Minor Complications after Achilles Tendon Repair

John T. Wilson, MD
University of South Florida/Florida Orthopedic Institute
Conventional versus Robotic-Arm Assisted Medial Uni-compartmental Knee Arthroplasty: A-20-Year Analysis of Radiographic and Clinical Outcomes

Third Place Award Winners
Bradley Alexander, MD
University of Mississippi Medical Center
Comparison of Recent Trends in Medicare Utilization and Reimbursement for Cervical Spine Discectomy and Fusion Procedures Versus Cervical Disc Arthroplasty

Raahil Patel, MD
University of South Florida/Florida Orthopedic Institute
Early Success in Anterior Compartment Sparing Tibial Tubercle Osteotomy Utilizing Back-Cut Technique

Brittany Raymond, MD
University of Florida
Clinical Outcomes of Operative Management for Radial Tunnel Syndrome According to Surgical Approach: A Systematic Review

Presenters' Choice Award Winner
Aseel Dib, MD
Carolinas Medical Center/OrthoCarolina
Implant Selection in Distal Femur Fractures: An Analysis of Alignment and Outcomes

Western Resident Research Symposium
University of California, Los Angeles (UCLA)
September 4, 2024

First Place Award Winner
Seth Ahlquist, MD
University of California, Los Angeles (UCLA)
A Comparison of Total Knee Arthroplasty Outcomes Between Hemodialysis and Renal Transplant Patients

Second Place Award Winners
Molly A. Hulbert, MD
University of California, San Diego
A Community-Based Outreach Program Can Change Underrepresented Minority Student Perception of Orthopaedic Profession Fit and Attainability: Lessons from BONE Academy

Thomas E. Olson, MD
University of California, Los Angeles (UCLA)
Correction of Fixed Knee Flexion Deformity in Patients with Cerebral Palsy Using Suture Anchors for Anterior Distal Femur Hemi-Epiphysiodesis

Third Place Award Winners
Reinaldo E. Colon-Morillo, MD, LT, MC, USN
Naval Medical Center San Diego
Proximal Pole Scaphoid Fracture Nonunion Treated with Ipsilateral Hamate Transfer

Abhinav Sharma, MD
University of California, Irvine
Laminectomy with Fusion for Cervical Spondylotic Myelopathy is Associated with Higher Early Morbidity and Risk of Perioperative Complications Compared to Laminectomy Alone

Jonathan Yu, MD
University of California, Los Angeles (UCLA)
How Have Total Joint Arthroplasty Implant Prices Changed Compared to Overall Costs and Reimbursements?

Presenters' Choice Award Winner
Rishi Trikha, MD
University of California, Los Angeles (UCLA)
From the Lab to the Clinic: Angiotensin Converting Enzyme Inhibition May Incur Infectious Risk

Mid-Atlantic Resident Research Symposium
MedStar Georgetown, Washington, DC
May 11, 2024

First Place Award Winner
Brian Shear, MD
University of Maryland Medical Center
Your iPhone Knows How You Will Recover from Your Fracture

Second Place Award Winners
Alex Gu, MD
George Washington University
Can Hip and Knee Arthroplasty Surgeons Help Address the Osteoporosis Epidemic

Denver Burton Kraft, MD
Medstar Georgetown University Hospital
Minimally Displaced Lateral Humeral Condyle Fractures: Optimizing Follow-up and Minimizing Cost

Third Place Award Winners
William Johns, MD
Thomas Jefferson University Hospital/Rothman Institute
Lower Opioid Prescription Quantity Does Not Negatively Impact Pain Control or Patient Satisfaction Following ACL Reconstruction: A Randomized, Prospective Trial

Matthew Kolevar, MD
University of Maryland Medical Center
Development of a Patient-Specific Cartilage Graft Using Magneti Resonance Imaging and 3D Printing

Matthew B. Weber, MD
Virginia Commonwealth University
Evaluation of Peripheral Nerve Perfusion in Tensioned Repairs

Presenters' Choice Award Winner
Micheal Raad, MD
Johns Hopkins Medicine
A New Morphologic Classification of Proximal Junctional Kyphosis Following Lower Thoracic to Pelvis Fusion in Adult Spinal Deformity Predicts Revision Surgery and Neurologic Complications

Midwest Resident Research Symposium
Rush University Medical Center, Rosemont, IL
May 3, 2024

First Place Award Winner
Kyleen Jan, MD
Rush University Medical Center
THA-10 Score Predicts Conversion to Total Hip Arthroplasty After Hip Arthroscopy for Femoroacetabular Impingement Syndrome at Minimum 10-Year Follow-up

Second Place Award Winners
Jonathan A. Ledesma, MD
University of Illinois at Chicago
A Prospective, Randomized Clinical Trial of Pedicle Lengthening Osteotomy Versus Open Decompression with Transforaminal Lumbar Interbody Fusion for Lumbar Degenerative Spondylolisthesis with Stenosis

Madeline Tiee, MD
Loyola University Medical Center
Sagittal Deformity of Garden Type I and II Geriatric Femoral Neck Fractures is Frequently Misclassified by Lateral Radiographs

Third Place Award Winners
Myles A. Atkins, MD
Rush University Medical Center
Risk Factors of Subchondral Insufficiency Fracture of the Knee in the Setting of Medial Meniscus Posterior Root Tears

Jordan Serotte, MD
University of Chicago
Time to Union in Ballistic vs. Blunt Pertrochanteric, Extra-Capsular Femur Fractures

Joseph Tanenbaum, MD
Northwestern McGaw Medical Center
The Natural History of Ulnar Collateral Ligament Injuries in Professional Baseball

Presenters' Choice Award Winners
Lohith Vatti, MD
University of Chicago
The Effect of Perioperative Dexamethasone on Functional Outcomes of Lower Extremity Long Bone Fracture Fixation

Luke Zabawa, MD
University of Illinois at Chicago
Knee Arthroplasty Reimbursement Dynamics: Inflation-Adjusted Analysis for 2006-2022

California Orthopaedic Association (Annual Meeting)
OREF Resident Award Winner

Emily Mills, MD
Keck School of Medicine University of Southern California
Preoperative Radiographic Findings Associated with Postoperative Spinopelvic Factors for Instability Following Total Hip Arthroplasty

OREF Edward C. McElfresh Awards for Best Resident Abstracts at Minnesota Orthopaedic Association Annual Meeting

Nicholas Reiners, MD
University of Minnesota
Outcomes of Geriatric Hip Fracture Patients with Associated Proximal Humerus Fracturs. Does Surgical Treatment of the Proximal Humerus Lead to Improved Mobility?

Austen Thompson, MD, PhD
Mayo Clinic
Impact of Intraoperative Periprosthetic Fractures During Cemented Hemiarthroplasty for Femoral Neck Fractures