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OREF NORTHEAST REGION
RESIDENT RESEARCH SYMPOSIUM
Tuesday, October 21, 2025

The Hospital for Special Surgery
Richard L. Menschel Conference Center
Rooms A, B & C – 2nd Floor
535 East 70th Street
New York, NY 10021

Hosted by:
Douglas E. Padgett, MD
Surgeon-in-Chief and Medical Director
Professor of Orthopaedic Surgery
Weill Cornell Medical College

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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 NORTHEAST REGION RESIDENT RESEARCH SYMPOSIUM
SUMMARY AGENDA
Tuesday, October 21, 2025

Noon – 1:00 p.m.	**Registration and Lunch** The Hospital for Special Surgery Richard L. Menschel Conference Center Rooms A, B & C – 2nd Floor 535 East 70th Street New York, New York
1:00 p.m. – 1:03 p.m.	**Welcome and Introductions** Douglas E. Padgett, MD Surgeon-in-Chief and Medical Director Professor of Orthopaedic Surgery Weill Cornell Medical College
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** **Moderators: Duretti Fufa, MD and Claire Eliasberg, MD** **Shoulder/Hands**
1:53 p.m. – 2:33 p.m.	**Session II – Resident Research Presentations & Discussion** **Moderators: Alberto Carli, MD and Michelle Kew, MD** **Trauma/Joints**
	Break – ***Please submit your scores from Sessions I and II to OREF Staff***
2:48 p.m. – 3:28 p.m.	**Session III – Resident Research Presentations & Discussion** **Moderator: Claire Eliasberg, MD** **Sports Medicine/Pediatrics**
3:28 p.m. – 4:03 p.m.	**Session IV – Resident Research Presentations & Discussion** **Moderator: Kyle Morse, MD** **Spine**
	Break – ***Please submit your scores from Sessions III and IV to OREF Staff***
4:13 p.m. – 4:16 p.m.	**Introduction of Keynote Speaker**
4:16 p.m. – 4:46 p.m.	**Keynote Address** *Thoughts on a Clinician Scientist Career in Orthopaedic Surgery* Scott Rodeo, MD Co-Chief Emeritus, Sports Medicine and Shoulder Service Vice Chair of Orthopaedic Research Co-Director, Orthopaedic Soft Tissue Research Program Professor, Orthopaedic Surgery Weill Medical College of Cornell University Attending Orthopaedic Surgeon, The Hospital for Special Surgery Head Team Physician, New York Giants Football The Hospital for Special Surgery

4:46 p.m. – 5:01 p.m.	**Keynote Question & Answer**
5:01 p.m. – 5:16 p.m.	**Closing Remarks and Awards Presentation**
5:16 p.m. – 6:00 p.m.	**Reception**

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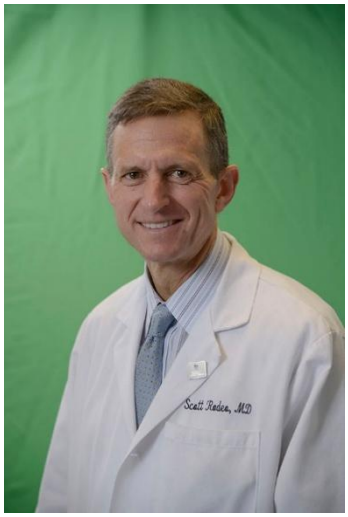
KEYNOTE SPEAKER



Scott Rodeo, MD

Co-Chief Emeritus, Sports Medicine and Shoulder Service
Vice Chair of Orthopaedic Research
Co-Director, Orthopaedic Soft Tissue Research Program
Professor, Orthopaedic Surgery, Weill Medical College of Cornell University
Attending Orthopaedic Surgeon, The Hospital for Special Surgery
Head Team Physician, New York Giants Football
The Hospital for Special Surgery

Dr. Scott Rodeo is Professor of Orthopaedic Surgery at Weill Medical College of Cornell University and is an Attending Surgeon at the New York-Presbyterian Hospital and The Hospital for Special Surgery, where he is Co-Chief Emeritus of the Sports Medicine and Shoulder Service, Vice Chair of Orthopaedic Research, and Co-Director of the Orthopaedic Soft Tissue Research Program. He also serves as Director of the Center for Regenerative Medicine at The Hospital for Special Surgery. Dr. Rodeo is Head Team Physician for the New York Giants Football Team, and he served as a Team Physician for the United States Olympic Team in 2004, 2008, 2012 and 2016. His clinical practice involves orthopaedic sports medicine, with specialty interests in complex knee reconstruction (ligament, meniscus and cartilage surgery), tendon repair in the shoulder and other joints, shoulder instability, and osteoarthritis surgery in the knee and shoulder. He runs a translational research laboratory program, investigating the cellular and molecular mechanisms of soft tissue repair. Dr. Rodeo graduated cum laude from Stanford University where he completed his undergraduate work while competing on the Stanford Swimming Team. He completed medical school graduating with honors from Cornell University Medical College.

Judges

Steven Koehler, MD
Montefiore Medical Center

Joseph Lane, MD
The Hospital for Special Surgery

Bradford Parsons, MD
Mount Sinai Hospital

Thomas Sculco, MD
The Hospital for Special Surgery

OREF Northeast Region Resident Research Symposium
DETAILED AGENDA
Tuesday, October 21, 2025

Noon – 1:00 p.m.	**Registration and Lunch** The Hospital for Special Surgery Richard L. Menschel Conference Center Rooms A, B & C – 2nd Floor 535 East 70th Street New York, New York
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	Session I – Presentations and Discussion **Moderators: Duretti Fufa, MD and Claire Eliasberg, MD** **Shoulder/Hands**
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1:18 p.m. – 1:23 p.m.	*Novel Scapholunate Bridge Augmentation to Treat Scapholunate Interosseous Ligament Injury* Rafa Rahman, MD, MPH, The Hospital for Special Surgery
1:23 p.m. – 1:28 p.m.	*Patients Return-to-Sport at Similar Rates Following Reverse and Anatomic Total Shoulder Arthroplasty: A Matched Cohort Study in Active Patients Younger Than 65 Years Old* Mark F. Megerian, MD, The Hospital for Special Surgery
1:28 p.m. – 1:33 p.m.	*Opioid Initiation in Family Members Following Pediatric Hand Surgery: A Retrospective Cohort Analysis* Troy Amen, MD, The Hospital for Special Surgery
1:33 p.m. – 1:38 p.m.	*Reverse-Anatomical Front and Back Reconstruction for Volar Intercalated Segment Instability Non-Dissociative: A Biomechanical Study* Sreetha Sidharthan, MD, The Hospital for Special Surgery
1:38 p.m. – 1:53 p.m.	**Question & Answer**

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Session II – Presentations and Discussion
Moderators: Alberto Carli, MD and Michelle Kew, MD
Trauma/Joints

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1:58 p.m. – 2:03 p.m.	*Coronal Plane Knee Alignment Phenotype Does Not Predict Flexion Gap Characteristics for Total Knee Arthroplasty* Billy Insup Kim, MD, The Hospital for Special Surgery
2:03 p.m. – 2:08 p.m.	*Assessing Predictive Accuracy of 2D Digital Templating in Fluoroscopic-Guided Direct Anterior Approach Total Hip Arthroplasty* Jeffrey Okewunmi, MD, Brown University
2:08 p.m. – 2:13 p.m.	*The Power of Interdisciplinary Rounds in an Orthopedic Joint Replacement Program* Michael Shatkin, MD, Mount Sinai Hospital
2:13 p.m. – 2:18 p.m.	*Biomechanical Comparison of Tension Band Constructs in Patella Fractures: Fully Threaded Cortical Screws versus Partially Threaded Cannulated Screws* Ryan Fallon, MD, Warren Alpert Medical School Brown University
2:18 p.m. – 2:33 p.m.	**Question and Answer**
2:33 p.m. -2:48 p.m.	**Break** - ***Please submit your scores from Sessions I and II to OREF Staff***

Session III – Presentations and Discussion
Moderators: Claire Eliasberg, MD
Sports Medicine/Pediatrics

2:48 p.m. – 2:53 p.m.	*AI Chatbots Provide Anterior Cruciate Ligament (ACL) Injury Education with Readability Comparable to the American Academy of Orthopaedic Surgeons (AAOS) OrthoInfo Website* Salvatore Capotosto, MD, Mount Sinai Hospital
2:53 p.m.- 2:58 p.m.	*Skeletal Age Assessment from Knee Radiographs Using Deep Learning* Joshua T. Bram, MD, The Hospital for Special Surgery
2:58 p.m. – 3:03 p.m.	*AI-Driven Virtual Athlete Avatars for Injury Risk Stratification and Performance Analysis in Sports Medicine* Gergo B. Merkely, MD, Harvard Combined Orthopaedic Residency Program
3:03 p.m. – 3:08 p.m.	*Can We Reliably Diagnose Medial Patellofemoral Ligament Injuries on Magnetic Resonance Imaging?* Harrison Volaski, MD, Montefiore Medical Center

OREF Northeast Region Resident Research Symposium
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3:08 p.m. – 3:13 p.m.	*Low Complication Rate Following Contemporary Pure Anteriorization Tibial Tubercle Osteotomy for Patellofemoral Overload* Nathan Varady, MD, The Hospital for Special Surgery
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	Session IV – Presentations and Discussion **Moderator: Kyle Morse, MD** **Spine**
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3:33 p.m. – 3:38 p.m.	*Operative Complexity and Patient Factors as Predictors of ICU Admission Following Three-Column Osteotomy for Adult Spinal Deformity: A Machine Learning Approach* Bradley Hammoor, MD, Harvard Combined Orthopaedic Residency Program
3:38 p.m. – 3:43 p.m.	*Mobilization Matters: Early Versus Late Ambulation after Three Column Osteotomy – Predictors and Outcomes* Christopher Lai, MD, Harvard Combined Orthopaedic Residency Program
3:43 p.m. – 3:48 p.m.	*A Novel Clinical Calculator to Identify Patients at Risk for Ileus after Short-Segment Lumbar Fusion* Austin C. Kaidi, MD, The Hospital for Special Surgery
3:48 p.m. – 4:03 p.m.	**Question and Answer**
4:03 p.m. – 4:13 p.m.	**Break - *Please submit your scores from Sessions III and IV to OREF Staff***
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Preoperative Use of Continuous Positive Airway Pressure Therapy for Obstructive Sleep Apnea Improves Short-Term Perioperative Medical Complications in Patients Undergoing Total Shoulder Arthroplasty

Mitchell Johnson, MD
The Hospital for Special Surgery

Purpose: To determine the impact of perioperative Continuous Positive Airway Pressure (CPAP) on the complication profile of patients with Obstructive Sleep Apnea (OSA) undergoing Total Shoulder Arthroplasty (TSA). Our hypothesis was that the use of perioperative CPAP would ameliorate both medical and surgical perioperative risks.

Significance: OSA has been associated with inferior outcomes across a variety of elective orthopaedic procedures, including total shoulder arthroplasty (TSA).

Methods: This was a retrospective cohort study using a large nationwide database looking at adults undergoing anatomic or reverse TSA. Three groups were formed for statistical comparisons: 1) OSA+ with CPAP usage, 2) OSA+ without CPAP usage, and 3) OSA-. A multivariable logistic regression was performed to evaluate risk of both orthopaedic and medical complications.

Results: A total of 3,661 TSAs were included for analysis. Patients with OSA had overall higher rates of all medical complications relative to healthy controls, but no difference in revision TSA or other orthopaedic complications (p=0.240). OSA+/CPAP+ patients had a similar risk to OSA- patients for perioperative cardiac complications and acute kidney injury.

Conclusion: Our analysis demonstrates that perioperative CPAP usage improved 7-day risk for cardiac complications as well as 7-day and 30-day risk of AKI after TSA, reducing risk to that of patients without a history of OSA

Novel Scapholunate Bridge Augmentation to Treat Scapholunate Interosseous Ligament Injury

Rafa Rahman, MD
The Hospital for Special Surgery

Purpose: We hypothesize that a novel scapholunate bridge augmentation using all-suture, knotless anchors will restore carpal stability radiographic parameters after injury to the scapholunate interosseous ligament (SLIL).

Significance: SLIL injury can lead to substantial morbidity including wrist instability and arthritis if untreated. There is no optimal surgical treatment.

Methods: Nine cadavers were tested in: wrist flexion, extension, ulnar deviation, radial deviation, clenched fist, and neutral. Radiographic parameters included scapholunate interval (SLI), scapholunate angle (SLA), and dorsal scaphoid translation (DST). SLIL was sectioned, and parameters again measured. The scapholunate interval was bridged using one anchor each in the scaphoid and lunate, affixed to one another, and parameters again measured. Parameters were compared between each state (intact, sectioned, bridged).

Results: Mean SLI was wider in the sectioned state than intact and bridged in flexion($p<0.01$), ulnar deviation($p<0.01$), and clenched fist($p=0.01$). SLA was greater in sectioned compared to bridged in flexion($p<0.05$) and greater in intact versus sectioned in clenched fist($p=0.01$). DST was greater in sectioned than both intact and bridged in ulnar deviation($p<0.05$) and radial deviation($p<0.05$), and was greater in sectioned than repaired in neutral($p<0.05$).

Conclusion: Scapholunate bridge augmentation successfully restored carpal alignment, highlighting an effective new technique, which affords small anchor size and elimination of bulky extraarticular constructs.

Patients Return-to-Sport at Similar Rates Following Reverse and Anatomic Total Shoulder Arthroplasty: A Matched Cohort Study in Active Patients Younger than 65 Years Old

Mark F. Megerian MD
The Hospital for Special Surgery

Purpose: To compare postoperative return-to-sport (RTS) between anatomic (aTSA) and reverse total shoulder arthroplasty (rTSA) in patients ≤65.

Significance: RTS is a crucial measure of quality of life for many TSA patients. No studies compare RTS between aTSA and rTSA in younger patients with glenohumeral osteoarthritis (GHOA).

Methods: A postoperative survey (n=385) assessed sport participation, timing/level of RTS, and patient satisfaction for patients ≤65 years old who underwent primary aTSA or rTSA for GHOA. Cohorts were matched 2:1 by age, sex, Charlson Comorbidity Index, arm dominance, and primary sport and compared with univariate analysis.

Results: Cohorts were comparable after matching (100 aTSA, 50 rTSA). RTS rates (77% vs. 86%, p=0.42) and time-to-RTS (176 vs. 154 days, p=0.57) were similar between aTSA and rTSA, respectively. 46% of aTSA and 57% of rTSA patients reported RTS at the same level or higher (p=0.42). Both groups reported being “somewhat” or “very” satisfied at similar rates (aTSA 91% vs. rTSA 86%, p=0.35) with comparable baseline and final follow-up ASES scores.

Conclusion: RTS, time-to-RTS, satisfaction, and functional outcomes were comparable between aTSA and rTSA in patients ≤65. rTSA may be a viable option for younger GHOA patients seeking high-quality functional outcomes, a population traditionally indicated for aTSA.

Opioid Initiation in Family Members Following Pediatric Hand Surgery: Retrospective Cohort Analysis

Troy Amen, MD
The Hospital for Special Surgery

Purpose: This study examines whether opioid dispensing after pediatric hand surgery influences opioid initiation among parents and siblings.

Significance: Although the postoperative risks of opioid prescriptions for surgical patients are well documented, there is limited research on how these medications may influence opioid use within households. This study explores whether opioid dispensing following pediatric hand surgery is associated with new opioid initiation among the patient's parents and siblings.

Methods: Using the MarketScan database (2007–2022), we identified opioid-naïve patients aged 13–25 undergoing common hand procedures. The primary outcome was a new opioid prescription filled by an opioid-naïve parent or sibling within six months post-surgery. Logistic regression adjusted for sex, age, comorbidities, surgery type, region, and year.

Results: The study included 125,514 patients (mean age 16.8), along with 142,534 opioid-naïve parents and 73,652 opioid-naïve siblings. Siblings of patients who received surgical opioids had a higher likelihood of initiating opioids (aOR 1.22; 95% CI, 1.14–1.31; $p<0.001$), with increased risks at multiple postoperative intervals (31–60, 61–90, 91–120, and 150–180 days). Parents also showed elevated opioid initiation overall (aOR 1.19; 95% CI, 1.13–1.25; $p<0.001$), with increases at various time points up to 180 days post-surgery.

Discussion: Opioid prescribing after pediatric hand surgery is linked to increased initiation among family members. Siblings exhibit a delayed but sustained rise, while parents show immediate and ongoing risk. These findings highlight household exposure, emphasizing the need for strategies to reduce unintended opioid use within families.

Reverse-Anatomical Front and Back Reconstruction for Volar Intercalated Segment Instability Non-Dissociative: A Biomechanical Study

Sreetha Sidharthan, MD
The Hospital for Special Surgery

Purpose: We hypothesize that a reverse anatomical front and back (RANAFAB) technique will restore normal wrist kinematics by reducing lunate flexion, capitate translation, and midcarpal shift in a cadaveric model of volar intercalated segment instability non-dissociative (CIND-VISI).

Significance: While limited midcarpal or four-corner fusions are used to treat CIND-VISI, they often sacrifice motion. There is a need for motion-preserving surgical solutions that restore stability.

Methods: Seven cadaveric wrists underwent sectioning of critical volar and dorsal midcarpal ligaments to simulate CIND-VISI. A synthetic tape was weaved through the carpus to reconstruct the affected ligaments (RANAFAB). Testing was performed on a custom jig that applied a 40N palmar-directed force to the capitate during video-fluoroscopy. Specimens were tested intact, post-ligament sectioning, and post-reconstruction. Radiolunate angle (RLA), capitate displacement, and midcarpal shift were analyzed at each state.

Results: In all seven specimens, ligament sectioning produced a positive midcarpal shift test and reconstruction with the RANAFAB technique eliminated wrist clunking ($p<0.001$). RANAFAB reduced mean RLA by 33.8° ($p=0.007$) and decreased capitate displacement by 7.8 mm ($p=0.004$) compared to the CIND-VISI state.

Conclusion: RANAFAB restored normal wrist kinematics and eliminated instability in a cadaveric model of CIND-VISI and may offer a motion-preserving surgical alternative for younger patients seeking to avoid arthrodesis.

Does the Distal Tip Position of Long Cephalomedullary Nails Impact Mechanical Failure Rates?

Aonnicha Burapachaisri, MD
Icahn School of Medicine at Mount Sinai Hospital

Purpose: This study evaluated the association between distal tip location of long cephalomedullary nails and mechanical failure and revision rates.

Significance: Mechanical failure is a known complication of cephalomedullary nailing, but the effect of distal tip positioning remains unclear.

Methods: A retrospective review was conducted of hip fracture patients treated with long cephalomedullary nails with a minimum follow-up of 6 months from 2013-2023. The femoral metaphysis was divided into 5ths on anteroposterior and lateral radiographs; nails were classified as centered if the tip was in the central 5th, and off-centered otherwise. T-test, chi square, and Mann-Whitney U tests were performed to compare outcomes.

Results: 72 patients were included. In the coronal plane, 46 nails were centered and 26 off centered, with no significant differences in outcomes. In the sagittal plane, 26 nails were centered and 46 off centered. Baseline characteristics were comparable between groups. Sagittally off-centered nails had significantly higher reoperation rates (22% vs 4%, p=0.043) compared to centered nails, with 90% of reoperations due to mechanical complications and 40% due to distal screw failure. No other outcomes were significantly different.

Conclusion: Off-centered placement of long cephalomedullary nails in the sagittal plane may be associated with increased reoperation rates. Further investigation is warranted

Coronal Plane Knee Alignment Phenotype Does Not Predict Flexion Gap Characteristics for Total Knee Arthroplasty

Billy Insup Kim, MD
The Hospital for Special Surgery

Purpose: Flexion gap balancing has a critical role in optimizing kinematics and patellar tracking during total knee arthroplasty (TKA).

Significance: The association of coronal plane knee alignment phenotype on the flexion gap remains poorly defined.

Methods: We identified 591 consecutive patients undergoing primary TKA using a computed tomography-based robotic platform at a high-volume academic center. Intraoperative gap assessments, resection thicknesses, and anatomic parameters—including the angle between the transepicondylar axis (TEA) and posterior condyles (PCA-TEA), arithmetic hip-knee angle (aHKA), MPTA, LDFA, JLO, and posterior tibial slope—were measured. Medial and lateral flexion gaps were assessed separately. Partial correlations were calculated, adjusting for all other variables, and Bonferroni corrections were applied.

Results: No associations were identified between coronal plane parameters (aHKA, JLO, MPTA, LDFA) and medial or lateral flexion gap. A lax lateral pattern was observed in 92.4% of patients and was independent of coronal plane alignment. In the sagittal plane, lateral tibial slope was inversely correlated with the medial flexion gap ($r=-0.185$, adjusted $p<0.001$), while PCA-TEA was positively correlated with lateral flexion gap ($r=0.153$, adjusted $p=0.001$).

Conclusion: Coronal plane alignment phenotype does not predict flexion gap laxity, which should be assessed intraoperatively as an independent variable.

Assessing Predictive Accuracy of 2D Digital Templating in Fluoroscopic-Guided Direct Anterior Approach Total Hip Arthroplasty

Jeffrey Okewunmi, MD
Brown University

Purpose: To evaluate the predictive accuracy of 2D digital templating for component sizing and positioning in fluoroscopic-guided direct anterior approach total hip arthroplasty (DAA THA).

Significance: Preoperative templating is essential for surgical planning in THA. While it improves implant selection and outcomes, the extent of its accuracy for specific parameters in DAA THA remains underexplored.

Methods: A retrospective review of 100 patients who underwent DAA THA from 11/2022–9/2024 by a single surgeon. All received Emphasys femoral stems and Pinnacle cups. Preoperative Traumacad™ templates were compared with postoperative findings.

Results: Average patient age was 68.8 years; 59% were female. Templating accurately predicted cup size in 56% of cases (95% within two sizes), and femoral size in 52% (95% within two sizes). Head size prediction was exact in all cases. Greater BMI and male sex were associated with reduced prediction accuracy for certain variables.

Conclusion: 2D templating in DAA THA reliably predicts implant sizes and positioning within narrow tolerances. Despite minor variances linked to patient demographics, it remains a valuable tool in preoperative planning.

The Power of Interdisciplinary Rounds in an Orthopedic Joint Replacement Program

Michael Shatkin, MD
Mount Sinai Hospital

Background: Appropriate discharges for hip and knee arthroplasty require high levels of resources and coordination. To assist in this process, an orthopedics department at an urban tertiary care hospital implemented interdisciplinary rounds (IDRs) to enhance collaborative care for patients undergoing joint replacement surgery. This study presents data to evaluate the impact of IDRs in a total joint replacement program.

Methods: This is a retrospective database study designed to evaluate the effectiveness of the IDRs. Data was collected from the hospital EMR from January 1st, 2012 to April 30th, 2025. The database was created using diagnosis-related group codes 469 and 470 to collect patients undergoing hip and knee replacements. IDRs were initiated in 2015. The data was divided into two groups: Patients treated in 2012-2014 versus 2015-2024. Various outcomes were analyzed, including length of stay, discharge to rehab, readmission rates and same-day discharges.

Results: From 2012 to 2025, 9956 patients underwent total joint arthroplasty at this institution. Comparing the data before and after 2015 and the IDR implementation, length of stay (3.57vs.1.69), discharge to rehab (64.2%vs.16.5%), 30-day readmission rates (5.38vs.2.91%), and same-day discharges (0vs.53.1%) all improved ($P<0.05$). Also, when evaluating before the COVID-19 pandemic, length of stay (3.57vs.2.53), discharge to rehab (64.2%vs.26.0%), 30-day readmission rates (5.38vs.3.24%), and same-day discharges (0vs.19.8%) all improved with the implementation of IDRs ($P<0.05$).

Conclusion: The collaborative decision-making and coordination among team members in IDRs improves the length of hospital stay, discharge to rehab, same-day discharges, and 30-day readmission rates. The data also presents significant improvements when comparing data before the COVID-19 Pandemic. IDRs are an effective platform for assisting discharge planning for a total joint replacement program.

Biomechanical Comparison of Tension Band Constructs in Patella Fractures: Fully Threaded Cortical Screws versus Partially Threaded Cannulated Screws

Ryan Fallon, MD
Warren Alpert Medical School Brown University
Orthopedic Residency Program

Purpose: We hypothesized that a fully threaded, cortical screw tension band construct for patella fractures will be biomechanically superior to a partially threaded, cannulated screw tension band.

Significance: There is no clear biomechanically superior and cost-effective fixation method for transverse patella fractures.

Methods: Transverse patella osteotomies were created in twelve matched pairs of cadaveric knees. These were fixed with partially threaded cannulated or fully threaded cortical screws and tension banded. Specimens underwent cyclic loading and load-to-failure testing. Mean fracture displacement, load to failure, and cycles to failure were compared.

Results: Fracture displacement after cyclic loading was not significantly different between fully threaded screws (2.1mm, 95% CI 1.4-2.8) and partially threaded screws (3.3mm, 1.7-4.9, p=0.095). Specimens that failed (displaced >2mm) during cyclic loading did so at 151.7 cycles (78.4-225.1) for fully threaded and 133.3 cycles (70.7-195.8) for partially threaded screws (p=0.68). Load to failure was 717.8 N (376.2 -1059.3) and 435.8 N (283.1-588.5, p=0.09) for fully threaded and partially threaded screws respectively.

Conclusion: No significant differences were observed between constructs, providing support for using the more cost-effective, fully threaded cortical screw construct in a clinical setting

AI Chatbots Provide Anterior Cruciate Ligament (ACL) Injury Education with Readability Comparable to the American Academy of Orthopedic Surgeons (AAOS) OrthoInfo Website

Salvatore Capotosto, MD
Mount Sinai Hospital

Purpose: We hypothesize that AI-generated educational resources on ACL injuries demonstrate comparable readability to professionally authored content from the AAOS OrthoInfo website.

Significance: Patients frequently rely on online health information (HRI) for guidance on ACL injuries. As AI tools like ChatGPT and Gemini proliferate, evaluating their readability against established resources is critical to ensuring patient comprehension.

Methods: Six ACL-related questions were derived from OrthoInfo, covering ACL anatomy, description, injury cause, injury symptoms, physical examinations, and injury treatment. Responses were generated using ChatGPT-4 and Gemini 2.0 Flash on May 3, 2025. Corresponding OrthoInfo content served as control. Readability was measured using the Flesch-Kincaid Reading Ease, Grade Level, Gunning Fog, Coleman-Liau, FORCAST, and SMOG indices. Kruskal-Wallis ANOVA was used to compare readability across platforms ($\alpha=0.05$).

Results: No significant differences in readability were observed between platforms across individual content areas ($p>0.05$). When all contents were pooled, OrthoInfo scored slightly better (mean grade level 12.2 vs. 12.4 for AI; $p=0.004$), though the 0.2 difference is unlikely to be clinically meaningful. No source met the sixth-grade readability level recommended by the AMA/NIH.

Conclusion: AI-generated ACL content shows readability comparable to OrthoInfo, but all sources exceed recommended reading levels. Simplification of educational materials remains a critical need across platforms.

Skeletal Age Assessment from Knee Radiographs Using Deep Learning

Joshua T. Bram, MD
The Hospital for Special Surgery

Purpose: We hypothesized that a highly accurate/reliable deep learning (DL) model for bone age estimation could be developed based on routinely available knee radiographs.

Significance: Management of children with knee pathologies relies on accurate maturity evaluation to guide appropriate intervention (e.g. physeal-sparing ACLR). Traditional bone age estimation requires unnecessary hand imaging/radiation for patients with knee imaging, and existing knee-based tools lack the accuracy/precision of hand grading systems.

Methods: A total of 2,374 knee radiographs from patients aged ≤18 years (with paired hand imaging within 3 months) were used. Patients with genetic disorders (including skeletal dysplasias/endocrinopathies) were excluded. A ConvNeXT model was trained using sex, skeletal age, and chronological age as inputs.

Results: The model achieved a mean absolute error (MAE) of 5.02 months from ground truth bone ages, half that determined using the knee-based abbreviated Fels method (9.59 months). An MAE of 3.43 months was observed relative to pseudolabels from a hand-based model that annotated the training set. Bland-Altman analysis revealed near-zero bias.

Conclusion: This highly accurate DL model demonstrates automated bone age estimation from knee radiographs is feasible, outperforming prior simple classifications/AI-based models. We anticipate this model can obviate the requirement for additional hand radiographs in patients with knee pathologies.

AI-Driven Virtual Athlete Avatars for Injury Risk Stratification and Performance Analysis in Sports Medicine

Gergo B. Merkely, MD
Harvard Combined Orthopaedic Residency Program

Purpose: To revolutionize athletic performance and injury prevention by developing AI-powered virtual avatars that integrate motion capture, biometrics, physiological measurements, and real-time analytics.

Significance: Current athlete monitoring systems often require invasive or isolated testing that lacks real-time utility during actual play. Our approach enables continuous, non-invasive performance and injury risk monitoring during practices and games by combining wearable and video-based motion capture with physiological and biomechanical data. This integrated platform provides actionable insights that support decision-making in both clinical and performance settings.

Methodology: Fourteen youth athletes (mean age 17.1 ± 1.3 years; 3 females) from Budapest Honvéd, Hungary, including seven basketball players and seven track and field athletes, were followed over a four-month period. Athletes underwent a structured four-phase protocol across laboratory, studio, field, and competition settings. Cardiopulmonary evaluations, including VO_2 max, lactate, and ventilation measurements, were conducted alongside motion capture in controlled environments. Functional movement assessments (jump, hop, Y-balance) and sport-specific protocols (5v5 basketball, sprinting) were incorporated. AI algorithms trained avatar models to identify fatigue-related mechanical deviations and physiological overload.

Results: The avatars accurately identified pathologic motion patterns, such as dynamic valgus and kinematic asymmetries, and correlated these findings with physiological fatigue thresholds. This facilitated personalized risk stratification and training load optimization.

Conclusion: AI-generated avatars represent a novel tool for real-time injury prevention and performance assessment through dynamic, individualized monitoring.

Can We Reliably Diagnose Medial Patellofemoral Ligament Injuries on Magnetic Resonance Imaging?

Harrison Volaski, MD
Montefiore Medical Center

Purpose: To evaluate the inter- and intra-observe reliability of MRI in assessing medial patellofemoral Ligament (MPFL) integrity following patellar dislocation.

Significance: MPFL reconstruction is a critical intervention for patellar instability, yet MRI findings are often variable and may inconsistently guide surgical decisions. Clarifying MRI's diagnostic reliability is essential for evidence-based treatment planning.

Methods: Fifty MRIs from patients with recent patellofemoral dislocation and 50 from matched controls were independently reviewed by a fellowship-training orthopedic surgeon and a musculoskeletal radiologist. Each MPFL was graded as intact, attenuated/thickened, or completely disrupted. Reviews were repeated after four weeks. Cohen's kappa and weighted kappa were used to assess reliability.

Results: Intra-obervers reliability ws substantial to excellent (κ = 0.76–0.90). Inter-oberserver reliability was only fair to moderate (κ = 0.44–0.46). Misclassification occurred in 26-28% of controls and 5-8% of dislocators. Discrepancies were greatest in attenuated MPFLs.

Conclusion: MRI interpretation of MPFL integrity lacks sufficient inter-observer consistency to serve as a standalone criterion for surgery. Clinical history, physical exam, and comprehensive radiographic findings should remain central to decision-making in patellofemoral instability. The absence of MRI evidence of MPFL injury should likely not preclude consideration of MPFL reconstruction.

Low Complication Rate Following Contemporary Pure Anteriorization Tibial Tubercle Osteotomy for Patellofemoral Overload

Nathan Varady, MD
The Hospital for Special Surgery

Purpose: To assess the safety of contemporary pure anteriorizing tibial tubercle osteotomy (aTTO) for patellofemoral overload.

Significance: While some cartilage lesions may theoretically be best addressed with pure aTTO, traditional aTTO techniques were associated with unacceptable complication rates, necessitating the need for a safer aTTO technique.

Methods: Consecutive patients undergoing a modern aTTO technique for isolated patellofemoral overload from 2016-2024 with minimum six-month follow-up were evaluated. The primary outcome was overall complication rate. Secondary outcomes included PROMs at two-years (among patients with minimum two-year follow-up).

Results: There were 57 patients with mean follow-up of 2.4 years; 68.4% underwent concomitant cartilage restoration. Mean anteriorization was 11.2±2.2 mm. The overall complication rate was 5.3%(3 patients), including two(3.5%) manipulations under anesthesia for arthrofibrosis and one(1.8%) superficial cellulitis successfully managed with oral antibiotics. There were significant improvements in mean IKDC(41.0 vs. 81.1, $p<0.001$) and VAS pain(4.6 vs. 1.6, $p<0.001$) scores from baseline to two-year follow-up.

Conclusion: Contemporary pure aTTO can be performed safely for isolated patellofemoral overload, with no instances of wound breakdown or nonunion/fracture encountered in this series. These finding suggest contemporary aTTO may be considered for patients with patellofemoral chondral wear who may not be ideal candidates for traditional TTO techniques.

Association Between Cervical Paraspinal Muscle Health and Patient-Reported Outcomes After Anterior Cervical Discectomy and Fusion

Junho Song, MD
Mount Sinai Hospital

Purpose: To evaluate for an association between cervical paraspinal muscle health and PROMs following anterior cervical discectomy and fusion (ACDF).

Significance: MRI-based measurements of paralumbar muscle health have been associated with patient-reported outcome measures (PROMs) following lumbar spine surgery. However, the importance of cervical muscle health on outcomes following cervical spine surgery is unclear.

Methods: The degree of fatty infiltration of the paraspinal muscles were assessed utilizing the Goutallier Classification. Bilateral cross-sectional areas (CSA) were measured for various muscle groups including deep extensors (DE). Preoperative PROMs and improvement in PROMs were compared based on Goutallier grade. Muscle health measurements were compared between patients who achieved patient acceptable symptom state (PASS) for NDI vs. those who did not.

Results: A total of 74 patients were included. Higher Goutallier grade was associated with higher preoperative NDI and greater improvement in NDI and VAS arm. Patients who achieved PASS for NDI had significantly greater DE CSA compared to those who did not meet PASS.

Conclusion: Both qualitative and quantitative measurements of cervical paraspinal muscle health are associated with PROMs following ACDF. Assessment of baseline muscle health. may serve as a valuable component of preoperative evaluation among patients undergoing ACDF.

Operative Complexity and Patient Factors as Predictors of ICU Admission Following Three-Column Osteotomy for Adult Spinal Deformity: A Machine Learning Approach

Bradley Hammoor, MD
Harvard Combined Orthopaedic Residency Program

Purpose: To develop and validate machine learning models to predict ICU admission following 3 column osteotomy (3CO) for adult spinal deformity surgery

Significance: 3CO procedures require complex postoperative care decisions regarding ICU admission. Optimizing patient selection for routine post-op ICU admission is essential for preventing post-operative morbidity and allocating healthcare resource utilization.

Methods: Retrospective cohort study of 167 consecutive patients with ASD who underwent deformity correction including 3CO. 19 clinically relevant features encompassing demographics, comorbidities, surgical complexity, and intraoperative variables were selected for model development. Four machine learning algorithms (Random Forest, XGBoost, Support Vector Machine, Logistic Regression) were trained using 80/20 data partitioning with 5-fold cross-validation.

Results: Comprehensive univariate analysis identified significant predictors including operative time (543 vs 429 minutes, $p<0.001$), estimated blood loss (3,667 vs 2,649 mL, $p=0.012$), and surgery specific factors. XGBoost demonstrated optimal performance with AUC 0.880. Random Forest achieved highest overall accuracy (87.5%) and specificity (88.0%). Both ensemble methods substantially outperformed logistic regression (AUC 0.771). Feature importance analysis consistently identified operative time and estimated blood loss as dominant predictors across algorithms.

Conclusion: Machine learning models, particularly ensemble methods, demonstrate excellent discriminatory capacity for identifying patients with ICU level needs following complex adult spinal deformity surgery.

Mobilization Matters: Early Versus Late Ambulation after Three Column Osteotomy – Predictors and Outcomes

Christopher Lai, MD
Harvard Combined Orthopaedic Residency Program

Purpose: To identify predictors of delayed ambulation and evaluate the impact of late ambulation on outcomes after three-column osteotomy (3CO) for spinal deformity.

Significance: Early ambulation after spine surgery is associated with improved recovery; factors affecting ambulation timing and its consequences following 3CO are poorly defined.

Methods: 198 consecutive 3CO patients were included. Early and late ambulators were defined as ambulation by postoperative day 2 (EA), or after (LA). Outcomes included complications, length of stay (LOS), discharge disposition, and PROMIS to 2-years. Multivariable logistic regression identified predictors of LA and assessed effects on outcomes. Mixed-effects modeling analyzed PROM changes.

Results: LA was associated with higher BMI, EBL, operative time, ICU admission, and delayed extubation ($p<0.05$). LA had increased LOS, complications, and discharge to facility ($p<0.001$). ICU admission (OR=3.71, $p=0.002$) and operative time ≥448 min (OR=2.28, $p=0.023$) predicted LA. LA was an independent predictor of increased LOS (OR=2.4, $p<0.001$), facility discharge (OR=7.60, $p<0.001$), and inpatient complications (OR=4.54, $p<0.001$). LA was associated with inferior PROMIS Physical Function improvement at 1 and 2-years compared to EA ($p<0.05$).

Conclusion: ICU stay and prolonged surgery predict delayed ambulation after 3CO, which is linked to worse perioperative outcomes and diminished functional recovery. Early mobilization should be prioritized postoperatively.

A Novel Clinical Calculator to Identify Patients at Risk For Ileus After Short-Segment Lumbar Fusion

Austin C. Kaidi, MD
The Hospital for Special Surgery

Purpose: This study aimed to identify risk factors for ileus after short-segment lumbar fusion and create a clinical calculator for risk stratification.

Significance: Post-operative ileus is a common complication that can increase length of stay and hinder recovery – currently the risk factors are poorly understood

Methods: 584 patients undergoing primary, short-segment primary lumbar fusion were included. Ileus was defined as an abdominal XR ordered or methylnaltrexone administered. Machine learning model with best fit and features applied to identify predictive risk factors. Outcomes of interest were utilized to create a binary nomogram.

Results: Using our novel marker for low-grade ileus, we identified 25 (4.3%) patients with ileus. Upon multivariable analysis, surgical technique (open vs. MIS) was found to be a colinear variable but not an independent factor. Our machine learning model identified 7 characteristics predictive of ileus: BMI<29 or >41; anterior approach; operative time >127minutes; EBL >110mL; pre-operative SF-12 mental score ≤41; VAS-Back score 5-9; and CCI >3. This model predicted ileus with a high degree of accuracy (AUC:0.85, Sensitivity:0.72, Specificity:0.85, McNemar's P-Value:2.31e-21).

Conclusion: This study created a novel clinical calculator that accurately predicts post-operative ileus after short-segment lumbar fusion. This can guide prophylactic interventions aimed at preventing ileus

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