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THE STEADMAN CLINIC
AND
STEADMAN PHILIPPON
RESEARCH INSTITUTE

OREF CENTRAL WEST REGION RESIDENT RESEARCH SYMPOSIUM

Sunday, August 20, 2023

The Hythe Resort Hotel
Mountain View Room
715 W. Lionshead Cir
Vail, CO 81657

Hosted by:
Marc Philippon, MD
Managing Partner, The Steadman Clinic and
Chair, Steadman Philippon Research Institute

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Note: The 2023 OREF Central West Region Resident Research Symposium will be livestreamed on OREF TV at https://www.oref.tv/Events/2023-OREF-Central-West-Region-Resident-Research-Symposium

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 Twitter (@OREFtoday).

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OREF CENTRAL WEST REGION
RESIDENT RESEARCH SYMPOSIUM
SUMMARY AGENDA
Sunday, August 20, 2023

7:00 a.m. – 7:45 a.m.	**Registration and Breakfast** The Hythe Resort – Berry Picker Room – Breakfast Buffet Mountain View Room - Program 715 W. Lionshead Cir - Vail, CO
	Begin Livestreaming of Symposia on OREF TV
7:45 a.m. – 7:55 a.m.	**Welcome and Opening Remarks** Dan Drawbaugh Chief Executive Officer Steadman Philippon and Steadman Philippon Research Institute (SPRI)
	Brief Remarks from Host Mark Philippon, MD Managing Partner, Steadman Philippon Chair, Steadman Philippon Research Institute (SPRI)
7:55 a.m. – 8:00 a.m.	**OREF Welcome** Lee Grossman Chief Executive Officer Orthopaedic Research and Education Foundation
8:05 a.m. – 8:45 a.m.	Session I – Resident Research Presentations & Discussion Arthroplasty, Pain and Infection Management
8:50 a.m. – 9:25 a.m.	Session II – Resident Research Presentations & Discussion Arthroscopy, Reconstructive Surgery and Orthopaedic Career
	Break – Complete scoring for Sessions I and II
9:40 a.m. – 10:20 a.m.	Session III – Steadman Philippon Research Institute Presentations & Discussion Orthopaedic Education, Radiology and Biomedical Research
10:25 a.m.– 11:05 a.m.	Session IV – Steadman Philippon Research Institute Presentations & Discussion Knee, Shoulder, Ankle and Hip Surgery & Clinical Outcomes
	Break – Complete scoring for Sessions III and IV
11:15 a.m.–11:57 a.m.	**Keynote Speakers Introduction, Address and Discussion**
.	Keynote Address ***"Life Lessons on Setting Up and Running a Successful Orthopaedic Practice and Laboratory in Orthopaedic Surgery: True Bench to Bedside stories."***
	Marc Philippon MD Managing Partner, The Steadman Clinic and Chair, The Steadman Philippon Research Institute (SPRI) **Johnny Huard PhD** Chief Scientific Officer and Director of the Linda & Mitch Hart Center for Regenerative and Personalized Medicine Steadman Philippon Research Institute (SPRI)

11: 58 a.m.– Noon	**OREF Closing Remarks** Lee Grossman Chief Executive Officer Orthopaedic Research and Education Foundation
	End Livestreaming of Symposia on OREF TV
Noon – 1:00 p.m.	**Lunch Reception** Boxed Lunch and Awards Presentation

KEYNOTE SPEAKER

Marc Philippon, MD

Marc Philippon, MD
Managing Partner, The Steadman Clinic
and
Chair, Steadman Philippon Research Institute (SPRI)

Dr. Marc J. Philippon is the Managing Partner of The Steadman Clinic and Chairman of Steadman Philippon Research Institute. Dr. Philippon joined The Steadman Clinic in 2005 from the University of Pittsburgh Medical Center where he served as Director of Sports Medicine/Hip Disorders, Director of Sports Medicine/Hip Disorders Fellowship. He also was the Director of the University of Pittsburgh Medical Center's Golf Medicine Program. Previously, he served as Chief of Orthopaedic Surgery at Holy Cross Hospital in Fort Lauderdale, Florida. He earned his medical degree with an academic scholarship from McMaster University Medical School in Hamilton, Ontario, Canada in 1990, and completed his orthopaedic surgery residency at the University of Miami, Jackson Memorial Hospital in 1995.

Dr. Philippon is board certified by the American Board of Orthopaedic Surgery, a former President and Founding Member of the International Society of Hip Arthroscopy (ISHA) and an elected member of the Herodicus Society. Dr. Philippon is a consultant to the NHLPA and the Royal Spanish Tennis Federation (Real Federación Española de Tenis) and many other professional organizations. Dr. Philippon is also a Trustee with the U.S. Olympic and Paralympic Foundation and the U.S. Ski and Snowboard Team Foundation.

Dr. Philippon lives in Colorado with his wife and three children. He enjoys spending time with his family and participating in sports such as cycling, skiing, ice hockey, swimming and golfing.

KEYNOTE SPEAKER

Johnny Huard, MD

Chief Scientific Officer and Director of the
Linda & Mitch Hart Center for Regenerative
and Personalized Medicine
Steadman Philippon Research Institute (SPRI)

Dr. Huard is the Chief Scientific Officer and Director of Linda & Mitch Hart Center for Regenerative & Personalized Medicine at Steadman Philippon Research Institute (SPRI), Vail, Colorado. Dr. Huard also holds Professor of Surgery position at the Duquesne University, Affiliate Faculty position at Colorado State University, Orthopaedic Surgery at the University of Miami and University of Pittsburgh. Dr. Huard was Professor, Distinguished Chair in the Department of Orthopaedic Surgery at the University of Texas Health Science Center (2015-2019). Dr. Huard held Henry J. Mankin Endowed Chair in the Department of Orthopaedic Surgery and was Director of the Stem Cell Research Center at the University of Pittsburgh (1995-2015). Dr. Huard's team published around 430 peer reviewed papers, over 90 reviews/book chapters, and over 900 abstracts at scientific conferences with Google Scholar Citations: 47131; h-index:113, i10-index: 381).

Dr. Huard is well known as the discoverer of Muscle-Derived Stem Cells (MDSCs) and his current research laboratory focuses on four different categories, including: Biologics (PRP/BMAC, adult stem cells); Regenerative Medicine approaches (gene therapy, CRISPR-Cas9, Coacervate, Microspheres, PA-nanofibers); Therapeutics (FDA-approved anti-fibrotic & pro-angiogenic agents, telomerase activity, (hTERT), senolytic/senomorphic drugs); and Animal Modeling (dystrophic and progeria, super healer (MRL/MpJ), osteoarthritis/microfracture/tibia fracture & calvarial defect and ovariectomy models). Dr. Huard's laboratory is currently funded with nine NIH grants, two DoD contracts, seven DOD/NIH-sponsored clinical trials and philanthropic funding. Dr. Huard's research is published in journals including Nature, Journal of Cell Biology, JCI, Cell, Stem Cells, Biomaterials, etc. and received over 90 honors & awards, including: 2023 Orthopaedic Research and Education Foundation (OREF) Clinical Research Award, AOSSM Cabaud Memorial and 3M Award, ORS NIRA, AAOS Kappa Delta awards, Ortho-Regeneration, Honorary Doctorate and many others.

Dr. Huard lives in Edwards, Colorado with his wife and two sons. He enjoys spending time with his family and participating in sports such as cycling, skiing, golfing, running and riding his motorbike.

Judges

Johnny Huard, MD
Steadman Philippon Research Institute (SPRI)

Richard Santore, MD
University of California San Diego (UCSD)

Marc Philippon, MD
Steadman Philippon Research Institute (SPRI)

Moderators

Chelsea Bahney, PhD
University of California, San Francisco (UCSF)

Francis J. Hornicek, MD, PhD
University of California, Los Angeles (UCLA)

Johnny Huard, MD
Steadman Philippon Research Institute (SPRI)

Marc Philippon, MD
Steadman Philippon Research Institute (SPRI)

Matthew Provencher, MD
The Steadman Clinic

Richard Santore, MD
University of California San Diego (UCSD)

Scott Tashman, PhD
Steadman Philippon Research Institute (SPRI)

Armando Vidal, MD
The Steadman Clinic

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	Session I – Moderators: Marc Philippon, MD and Richard Santore, MD
	Resident Research Presentations & Discussion **Arthroplasty, Pain and Infection Management**
8:05 a.m. – 8:10 a.m..	*Early Clinical Outcomes of "Lemon-Dropped" Complex Primary Total Joint Arthroplasty Patients to a Tertiary Care Center* Ellen L. Tsay, MD, University of California San Francisco
8:10 a.m. – 8:15 a.m.	*Effectiveness of Augmented Reality in Reducing Perioperative Anxiety in Patients Undergoing Orthopaedic Ambulatory Surgery: A Randomized Clinical Trial* Jacob L. Cohen, MD, University of Miami/Jackson Memorial Hospital
8:15 a.m. – 8:20 a.m.	*Epidemiology and Video Analysis of Hamstring Injuries in the National Basketball Association* Samuel Roswell Huntley, MD, University of Miami
8:20 a.m. – 8:25 a.m.	*Intravenous Meloxicam versus Intravenous Ketorolac for Pain Control Following Total Joint Arthroplasty: A Randomized Controlled Trial* David S. Constantinescu, MD, University of Miami
8:25 a.m. – 8:30 a.m.	*Are Real Component Articulating Spacers a Safe and Effective Option Compared to All Cement Spacers for the Treatment of Prosthetic Joint Infection in Total Knee Arthroplasty?* Annemarie K. Leonard, MD, University of Nebraska Medical Center
8:30 a.m. – 8:35 a.m.	*Can Discharge Radiographics Predict Junctional Complications? A Decision Tree Analysis* Bryan Ang, MD, Lenox Hill Hospital, Northwell Health
8:35 a.m. – 8:45 a.m.	**Question and Discussions**

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.	**Resident Research Presentations & Discussion** **Arthroscopy, Reconstructive Surgery and Orthopaedic Career**
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8:55 a.m. – 9:00 a.m.	*Recent Workforce Trends in Orthopedic Surgery: Overall Attrition is Increasing, Yet Female Orthopedic Surgeons are Leaving More Frequently and Much Earlier in Their Careers -* Alexandra Cancio-Bello, MD, Mayo Clinic Arizona
9:00 a.m. – 9:05 a.m.	*Female Medical Students' Interest in Orthopedics Decreased After Sawbones Lab* Sarah N. Powell, MD, University of Nebraska Medical Center
9:05 a.m. – 9:10 a.m.	*Bubble Sign: An Arthroscopic Technical Trick to Differentiate Between Partial-and-Full-Thickness Rotator Cuff Tears* Drashti Upadhyay, MD – University of Wisconsin Hospital and Clinics
9:10 a.m. – 9:15 a.m.	*Risk Factors Associated with Revision Cubital Tunnel Release* Gillian Ahrendt, MD, University of Pittsburgh Medical Center
9:15 a.m. – 9:25 a.m.	**Question and Discussions**
9:25 a.m. – 9:35 a.m.	**Break & Networking:** *Presenters and Judges Return Score Sheets from the first 2 sessions to Carmen Metoyer, OREF Grants and Program Manager*
	Session III – Moderators: Matt Provencher, MD and Chelsea Bahney, PhD
	Steadman Philippon Research Institute Presentations & Discussion **Orthopaedic Education, Radiology and Biomedical Research**
9:40 a.m. – 9:45 a.m..	*The Performance of ChatGPT on Orthopaedic In-Service Training Exams: A Comparative Study of the GT-3.5 Turbo and GPT-4 Models in Orthopaedic Education* Michael G. Rizzo, MD, The Steadman Philippon Research Institute (SPRI)
9:45 a.m. – 9:50 a.m.	*Clinical and Structural Outcome of Arthroscopic Rotator Cuff Repair Are Improved by Preservation of Tendon Remnant at the Rotator Cuff Footprint* Marco Adriani, MD, The Steadman Philippon Research Institute (SPRI)
9:50 a.m. – 9:55 a.m.	*Malrotated Lateral Knee Radiographs Do Not Allow for A Proper Assessment of Medical or Lateral Posterior Slope* Maximilian Hinz, MD, The Steadman Philippon Research Institute (SPRI)

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9:55 a.m. – 10:00 a.m.	*A Unique Golf Ball-Like Cartilage Morphology of the Femoral Head-Neck Junction in Patients with Femoroacetabular Impingement Syndrome* Kohei Yamaura, MD, PhD, The Steadman Philippon Research Institute (SPRI)
10:00 a.m. – 10:05 a.m.	*Biomechanical Evaluation of the Two Different Levels of Coracoid Graft Positions in the Latarjet Procedure for Anterior Shoulder Instability* Phob Ganokroj, MD, The Steadman Philippon Research Institute (SPRI)
10:05 a.m. – 10:10 a.m.	*Fisetin Treated Human Bone Marrow Aspirate Concentrate on Osteoarthritis Rats* Haruki Nishimura, MD, PhD, The Steadman Philippon Research Institute (SPRI)
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	Session IV – Moderators: Armando Vidal, MD and Scott Tashman, PhD
	Steadman Philippon Research Institute Presentations & Discussion **Knee, Shoulder, Ankle and Hip Surgery & Clinical Outcomes**
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10:30 a.m. – 10:35 a.m.	*MPFL Repair Has a Higher Failure Rate at Long-Term Follow-up Compared to MPFL Reconstruction for Recurrent Lateral Patellar Instability* Bradley M. Kruckeberg, MD, The Steadman Philippon Research Institute (SPRI)
10:35 a.m. – 10:40 a.m.	*Distal Clavicle Excision is not Associated with Adverse Outcomes After Reverse Total Shoulder Arthroplasty* Ajay Kanakamedala, MD The Steadman Philippon Research Institute (SPRI)
10:40 a.m. – 10:45 a.m.	*Simplifying Postoperative Rehabilitation Protocol After Ankle Fractures: A Randomized Control Trial* Ian Backlund, MD, The Steadman Philippon Research Institute (SPRI)
10:45 a.m. – 10:50 a.m.	*Can They Run? Comparing Highly Crossed-Linked Polyethylene Wear With Functional Activity in Your Total Hip Arthroplasty Patients* Michael B. Stuart, MD, The Steadman Philippon Research Institute (SPRI)
10:50 a.m.-- 10:55 a.m.	*Outcomes of Revision Posterior Shoulder Capsulolabral Repair in Adolescents* Emily Whicker, MD, The Steadman Philippon Research Institute (SPRI)
10:55 a.m. – 11:05 a.m.	**Question and Discussions**
11:05 a.m. – 11:15 a.m.	**Break:** *Presenters and Judges Return Score Sheets from Session III and Session IV to Carmen Metoyer, OREF Grants and Program Manager*

OREF Central West Region Resident Research Symposium
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11:15 a.m. – 11:17 a.m.	**Keynote Speakers Introduction**
11:17 a.m. – 11:57 a.m.	**Keynote Address and Discussion** "***Life Lessons on Setting Up and Running a Successful Orthopaedic Practice and Laboratory in Orthopaedic Surgery: True Bench to Bedside Stories."*** **Marc Philippon MD** Managing Partner, The Steadman Clinic Chair, The Steadman Philippon Research Institute (SPRI) **Johnny Huard PhD** Chief Scientific Officer and Director of the Linda & Mitch Hart Center for Regenerative and Personalized Medicine Steadman Philippon Research Institute (SPRI)
11:58 a.m. - Noon.	**OREF Closing Remarks** Lee Grossman Chief Executive Officer Orthopaedic Research and Education Foundation **Conclusion of OREF TV Livestreaming**
Noon – 1:00 p.m.	**Lunch Reception** Boxed Lunch and Awards Presentation

Early Clinical Outcomes of "Lemon-Dropped" Complex Primary Total Joint Arthroplasty Patients to a Tertiary Care Center

Ellen T. Tsay, MD
University of California, San Francisco

Purpose/Significance: Value-based care creates pressure to preferentially provide care to less-risky patients. This study examines whether "lemon-dropped" primary total hip and knee arthroplasty (pTJA) patients, or patients referred to tertiary care centers (TCC) due to medical/surgical complexity, have worse outcomes and increased costs.

Methodology: This is a retrospective study of all pTJAs at a TCC in 2022. Bilaterals, acute fractures, oncologic cases and conversion hips were excluded. Patients were classified as simple or complex/"lemon-dropped". Outcomes were recorded via EMR review and analyzed via Fisher's exact and unpaired Welch's t tests.

Results: 641 pTJAs (65 complex, 576 simple) met inclusion criteria. The complex group had more racial minority patients (42% vs 31%, $p<0.001$) and non-primary osteoarthritis diagnoses (59% vs 12%, $p<0.001$); were more likely to experience 90-day ED visits (OR=2.65, $p=0.04$), 90-day complications (OR=2.79, $p<0.001$) and require placement (OR=2.65, $p=0.005$); and had higher mean relative implant costs (1.31x, $p<0.001$), in-room time (181 vs 158 min, $p<0.001$), surgery length (125 vs 106 min, $p<0.001$) and LOS (3.2 vs 1.7 days, $p=0.006$).

Conclusion: "Lemon-dropped" pTJAs have worse clinical outcomes and increased costs, even despite a control group that includes complex patients who utilize a TCC as their medical home. Reimbursement models need to account for these risk/cost differences.

Effectiveness of Augmented Reality in Reducing Perioperative Anxiety in Patients Undergoing Orthopaedic Ambulatory Surgery: A Randomized Clinical Trial

Jacob L. Cohen, MD
University of Miami/Jackson Memorial Hospital

Purpose: Determine if augmented reality (AR) as an educational tool decreases perioperative patient anxiety.

Significance: AR has increasing applications in orthopaedic surgery. No studies have examined AR's impact on patient anxiety.

Methods: Randomized clinical trial at a single outpatient surgery center of patients undergoing elective orthopaedic surgery with the senior author. Patients were randomized to the preoperative AR educational experience, simulating their day of surgery via headset, or the standard instructions group. Main outcome was change in State-trait Anxiety Inventory (STAI) from the screening survey to preoperative survey.

Results:46 patients received the AR intervention and 49 received standard instructions. The AR group experienced decreased anxiety from the screening to preoperative survey, while the standard group experienced an increase (mean -2.4 vs. 2.6, p=0.01, respectively). All patients experienced decreased anxiety postoperatively compared with the screening survey (AR mean -8 vs. standard -4.2, p=0.19) and preoperative survey (AR mean -5.4 vs. standard -6.7, p=0.32). In the AR group, 71.4% agreed/strongly agreed they enjoyed the experience, 69.0% would recommend it, and 66.7% would use it again.

Conclusion: The AR group had lower levels of preoperative anxiety compared with the control group. Use of AR may lead to decreased preoperative anxiety, serving as an effective patient education tool.

Epidemiology and Video Analysis of Hamstring Injuries in the National Basketball Association

Samuel Roswell Huntley, MD
University of Miami

Purpose: To characterize the epidemiology and performance outcomes of hamstring injuries (HSIs) in the National Basketball Association (NBA) and analyze the mechanism of HSI through video analysis.

Significance: This study can be used to determine risk factors for and mechanisms of HSI in the NBA.

Methods: HSIs that occurred in the NBA from 2019-2022 were identified. Demographic and performance data were recorded. Video analysis of 45 players determined the mechanism of HSI.

Results: 181 HSIs were identified in the NBA 2019-2022 seasons. HSIs occurred most often during games (79.6%) and were mostly sustained by guards (65.7%). Players injured their left hamstring most frequently (59.6%; p=0.044). Players missed an average of 5.5 games after injury. Within 3 months of returning to play, 16.0% reinjured their ipsilateral hamstring and 5.0% injured their contralateral hamstring. Higher-performing players and those aged over 30 sustained the greatest deficits in performance. Video analysis revealed most injuries were noncontact (62.2%) and occurred as a player initiated a plant/jump movement with the injured extremity (41.9%).

Conclusions: HSIs in the NBA lead to a decline in player performance especially in older and higher-performing players, higher-performing players have higher rates of reinjury, and most injuries occur while jumping or landing.

Intravenous Meloxicam versus Intravenous Ketorolac for Pain Control Following Total Joint Arthroplasty: A Randomized Controlled Trial

David S. Constantinescu, MD
University of Miami

Purpose: To evaluate the efficacy of IV meloxicam for postoperative pain management in total joint arthroplasty (TJA) compared to the standard of care, IV ketorolac**.**

Significance: Despite meloxicam demonstrating efficacy in reducing postoperative pain scores and opioid usage, few trials have compared it to other nonsteroidal anti-inflammatory drugs.

Methods: Patients scheduled for total hip or knee arthroplasty were randomized to receive either IV ketorolac or IV meloxicam. Both groups received a standardized multimodal pain management regimen alongside their respective drug assignments. Pain and nausea scores were assessed at 2 and 24 hours postoperatively.

Results: Between April 2022 and April 2023, 231 patients undergoing TJA were enrolled, with 105 patients in the standard group and 85 in the IV meloxicam group. No significant differences were observed between groups regarding pain at 2 (mean 3.3 vs. 3.3, p=0.95) or 24 hours (3.8 vs. 4.1, p = 0.44), nor in nausea at 2 (0.54 vs. 0.49, p = 0.63) or 24 hours (0.29 vs. 0.47, p = 0.97).

Conclusion: Intraoperative administration of IV meloxicam for TJA demonstrated no significant differences in pain management or nausea compared to IV ketorolac. However, the once-daily dosing schedule of IV meloxicam may offer a more convenient alternative.

Are Real Component Articulating Spacers a Safe and Effective Option Compared to All Cement Spacers for the Treatment of Prosthetic Joint Infection in Total Knee Arthroplasty?

Annemarie K. Leonard, MD
University of Nebraska Medical Center

Purpose: We hypothesize real-component (RC) spacers are a safe alternative to all-cement (AC) spacers for the treatment of total knee arthroplasty (TKA) prosthetic joint infection (PJI)

Significance: Limited data exists comparing AC versus real femoral and polyethylene tibial components.

Methods: This ongoing retrospective review assessed demographics, baseline health, surgical metrics, discharge status, and MSIS management tier of patients treated with articulating spacer between 3/2019-4/2023.

Results: 31 RC and 16 AC patients had similar baseline characteristics except for Charleston Comorbidity Index (mean RC 3.82, AC 2.62; p =0.04). No significant differences were identified at the first stage. At second stage, RC mean surgical time (125 vs 148 minutes; p=0.16) and length of stay (1.65 vs 2.5 day, p=0.06) were shorter. Less RC patients had controlled infections with no chronic suppression (Tier 1) (42% vs 68%), required septic revision (Tier 3B/3D) (9.6% vs 12.5%), and were not replant candidates with retained spacers (tier 3F) (16% vs 18.5%). Additionally for RC patients, 1 required above knee amputation, 4 plan for replant, and 5 do not desire replant given RC spacer satisfaction.

Conclusion: Preliminary data demonstrates RC spacers are a comparable alternative that may allow facilitate avoiding a two-stage procedure for TKA PJI.

Can Discharge Radiographics Predict Junctional Complications? A Decision Tree Analysis

Bryan Ang, MD
Lenox Hill Hospital, Northwell Health

Purpose: Determine if standing pre-discharge radiographs can predict the development of junctional complications.

Significance: Junctional complications after adult spinal deformity surgery is debilitating, and risk factors remain difficult to elucidate.

Methods: Adult spinal deformity patients who underwent fusion of the lumbar spine were stratified into 3 exclusive groups: No PJK, PJK, and PJF. Chi-square automatic decision tree analysis was utilized to identify pre-discharge proximal junctional angle (PJA) thresholds associated with PJK/PJF.

Results: The 117 study patients had a mean age 65.8 ± 8.5, BMI 27.2 ± 4.9, PI-LL 23.3 ± 17.4, TPA 27.2 ± 11.5. Sample was stratified into 64 (54.7%) No PJK, 39 (33.3%) PJK, 14 (12.0%) PJF. No differences were detected between cohorts in discharge alignment, preop-discharge change, or offset from age-adjusted alignment targets (P > .005). Most patients with an UT UIV did not develop PJK or PJF (no PJK, 67.4%). t
The highest risk group comprised of ΔPJA ≥4.3° and PJA > 15.5°, as 57.1% of developed PJF and 28.6% PJK.

Conclusion: Most patients with a lower thoracic UIV, preop-discharge ΔPJA ≥4.3°, and discharge PJA > 15.5° develop PJF.

Effect of Ulnar Collateral Ligament Reconstruction on Off-Speed Pitch Performance in MLB Pitchers

Galvin Loughran, MD
Stanford University

Purpose: To evaluate the impact of primary UCL reconstruction (UCLR) on changeups (CU) and curveballs (CB) among Major League Baseball pitchers utilizing novel pitching metrics.

Significance: UCL injuries are common and devastating injuries in baseball, yet no prior research has employed advanced pitching metrics to assess how UCLR affects the performance of off-speed pitches.

Methods: The Statcast System was used to collect spin rate, velocity, hard-hit rate, and whiff rate data for 42 MLB pitchers who underwent UCLR and returned to MLB from 2016-2019. Preinjury data and from the first two seasons after UCLR were analyzed. Each pitcher was matched with two separate groups of control pitchers based on draft class and round.

Results: 21 pitchers included CBs in their repertoires, while 24 included CUs. Pitchers threw significantly fewer pitches before surgery (1400.8±845.7) compared to the first (582.5±592.6, $p<0.001$) and second (839.1±719.1, $p=0.014$) post-UCLR seasons. There were no statistically significant differences in spin rate, pitch velocity, hard-hit rate, or whiff rate for CB or CU pitches after UCLR.

Conclusion: MLB pitchers who successfully return from UCLR can expect similar off-speed pitching performance compared to pre-UCLR levels, however they may throw fewer pitches during their first two seasons after the surgery.

Recent Workforce Trends in Orthopedic Surgery: Overall Attrition is Increasing, Yet Female Orthopedic Surgeons are Leaving More Frequently and Much Earlier in Their Careers

Alexandra Cancio-Bello, MD
Mayo Clinic Arizona

Purpose: The study aimed to assess attrition rates in orthopedic surgery, analyze demographic profiles, and determine the timing of those leaving the field.

Significance: The study aimed to assess attrition rates in orthopedic surgery, analyze demographic profiles, and determine the timing of those leaving the field.

Methods: Using Medicare Physician and Other Practitioners data from 2015 to 2021, a repeated cross-sectional analysis was conducted.

Results: The study included 27,704 independent orthopedic surgeons. Results showed that the annual attrition rate in orthopedic surgery increased from 4.1% in 2015 to 5.2% in 2020 ($p<0.01$). Female orthopedic surgeons had a higher mean annual attrition rate (5.9% ± 0.9%) compared to male orthopedic surgeons (4.6% ± 0.4%) ($p=0.016$). When leaving the field, females had significantly fewer mean years in practice (15.2 ± 2.5 years, range 0-40 years) compared to males (29.1 ± 0.6 years, range 0-66 years) ($p<0.01$).

Conclusions: These findings indicate that female orthopedic surgeons have shorter careers and leave the field earlier. Future studies and interventions should focus on improving job satisfaction, work-life balance, and addressing gender-specific challenges to enhance recruitment, retention, and diversity in the orthopedic workforce.

Female Medical Students' Interest in Orthopedics Decreased After Sawbones Lab

Sarah N. Powell, MD
University of Nebraska Medical Center

Purpose: Participating in a sawbones lab would increase interest in orthopedics for male and female medical students.

Significance: The field of orthopaedics lags behind other surgical specialties in the recruitment of women.

Methods: Medical students attending the lab filled out a pre-lab survey, participated in a sawbones lab hosted by orthopedic attendings and residents, and filled out a post lab survey regarding how the lab had influenced their interest in orthopedics.

Results: 21 medical students (6 women, 15 men) filled out the pre-lab survey and 19 filled out the post-lab survey. All 6 women in attendance were M1s compared to 5 male M1s, 5 male M2s, 4 male M3s, and 1 male M4. 15 out of 19 respondents reported that the lab had a significant impact on their interest in applying to orthopedics. There was a significant decline in interest in applying to orthopedic surgery after the lab for female participants ($p=0.046$).

Conclusion: This study provides insight into the importance of purposeful mentorship and interaction with medical students. It also highlights the need for research into effective ways to interact with medical students, but particularly female medical students, to encourage greater diversity in orthopedics.

Bubble Sign: An Arthroscopic Technical Trick to Differentiate Between Partial-and-Full-Thickness Rotator Cuff Tears

Drashti Upadhyay, MD
University of Wisconsin Hospital and Clinics

Purpose: To present a simple intraoperative technical trick to distinguish between partial-thickness (incomplete) tears and full-thickness rotator cuff tears.

Significance: Even with advanced imaging modalities, it can be challenging to distinguish between partial-thickness rotator cuff tears and focal full-thickness tears in certain patients. Distinguishing between partial-thickness and small focal full-thickness rotator cuff tears via diagnostic arthroscopy may be important for determining appropriate surgical treatment options in patients with rotator cuff pathology.

Methods: The operative shoulder is placed in neutral rotation and slight flexion. The glenohumeral joint typically has a negative pressure of around –4 mm Hg, and the subacromial space has a pressure range of 8-17.5 mm Hg at rest. Hence, the native shoulder joint has a natural pressure gradient separated by an intact supraspinatus tendon.

Results: When the integrity of the supraspinatus tendon is disrupted, a connection now forms between the high- and low-pressure compartments. Free fluid subsequently flows from the high pressure subacromial space to the low pressure glenohumeral joint, which manifests as air bubbles when the supraspinatus tendon is lifted, suggesting a full-thickness rotator cuff tear.

Conclusion: The “bubble sign” can help confirm the presence of a full-thickness rotator cuff tear in a diagnostic shoulder arthroscopy.

Risk Factors Associated with Revision Cubital Tunnel Release

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Purpose: The purpose of this study was to evaluate the revision rates between in situ decompression, subcutaneous transposition, and submuscular transposition and to assess potential risk factors for revision surgery.

Significance: While thousands of cases of cubital tunnel release are performed each year, the optimal surgical technique for relieving ulnar nerve entrapment at the elbow remains controversial.

Methods: A retrospective review of 1107 patients who underwent cubital tunnel decompression at a single institution between 2010 and 2019 was conducted. The patients were divided into 3 groups based on the surgery performed: in situ decompression; subcutaneous transposition; and submuscular transposition. The revision rates between the 3 groups and risk factors associated with revision were assessed.

Results: A total of 991 patients and 995 limbs met inclusion criteria. There was no significant difference in revision rates between the 3 groups. Patients who underwent a concomitant procedure had an increased risk of requiring revision cubital tunnel release.

Conclusion: While there is no difference in the rate of revision cubital tunnel surgery between in situ decompression, subcutaneous transposition or submuscular transposition, patients who undergo a concomitant procedure at the time of cubital tunnel release are at an increased risk of undergoing revision surgery.

The Performance of ChatGPT on Orthopaedic In-Service Training Exams: A Comparative Study of the GT3.5 Turbo and GPT-4 Models in Orthopaedic Education

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Purpose: This study aims to investigate the application of OpenAI's GPT-3.5 Turbo and GPT-4 Large Language Models (LLMs) to Orthopaedic In-service Training Exams (OITEs) from 2020 to 2022.

Significance: Given the demonstrated competence of Artificial Intelligence and GPTs in other licensing exams, their potential uses in orthopaedics represent novel insights.

Methodology: We applied OpenAI's GPT-3.5 Turbo and GPT-4 LLMs to Orthopaedic In-service Training Exams (OITEs) from 2020 to 2022, using a zero-shot inference approach. Using the OpenAI Application Programming Interface (API), we solicited chat completions from the gpt-4-0314 and gpt-3.5-turbo-0301 models. Each model was given a multiple-choice question, without prior exposure to similar queries, and their generated responses were compared to the correct answer for all questions within each OITE. The models were then evaluated on the proportion of questions correctly answered and how they fared for questions with and without media.

Results: The GPT-4 model significantly outperformed the GPT-3.5 Turbo model across all years and question categories. In 2022, GPT-4 achieved an overall accuracy of 67.63%, contrasting with GPT-3.5 Turbo's 50.24%. Comparable patterns were observed in 2021 (GPT-4: 58.69%, GPT-3.5 Turbo: 47.42%) and 2020 (GPT-4: 59.53%, GPT-3.5 Turbo: 46.51%). Both models showcased better performance with questions devoid of associated media, with GPT-4 attaining accuracies of 68.80%, 65.14%, and 68.22% for 2022, 2021, and 2020, respectively. However, the models' performance varied across different question categories throughout the years.

Conclusion: While GPT-4 exhibited superior performance compared to GPT-3.5 Turbo, the results reflect both the potential and the limitations of AI in orthopaedics. The LLMs demonstrated improved handling of questions without associated media, which is not surprising, as a significant amount of orthopaedic information is contained within imaging studies, and this additional information was not provided to the models. Despite its proficiency, even GPT-4 would not have achieved passing scores on the American Board of Orthopaedic Surgery (ABOS) Part I licensing exam, suggesting that the application of current LLMs does not substitute orthopaedic training. This study sets a precedent for future endeavors integrating GPT models into orthopaedic education and underlines the necessity for specialized training of these models for specific medical domains.

Clinical and Structural Outcome of Arthroscopic Rotator Cuff Repair Are Improved by Preservation of Tendon Remnant at the Rotator Cuff Footprint

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Purpose: The purpose of the present study was to evaluate the efficacy of biologic augmentation of arthroscopic rotator cuff repair by maintaining tendon remnant on rotator cuff footprint combined with nano fractures of the greater tuberosity.

Significance: Results of the present study achieved 100% healing in medium tears, thus suggesting that combination of nano fractures and footprint preservation could have an additive positive effect on tendon healing.

Methods: A retrospective study was conducted. Primary outcome was the ASES score. Secondary outcomes were: Quick-DASH and WORC scores, and structural integrity of repaired tendons by magnetic resonance imaging (MRI) performed six months after surgery. Significance was set at $p< 0.05$.

Results: The study included 29 patients. Mean age of patients was 61.69 $\pm$ 8.89 years. Mean follow-up was 46.68 $\pm$ 3.92. Comparison between pre- and postoperative functional scores showed significant clinical improvement. Subgroup analysis for tear size showed significant differences in the QuickDASH score. Particularly, a significant difference in the QuickDASH score could be detected between medium and big tears as well as medium and massive lesions. Postoperative imaging showed healed tendons in 71.4% MRI.

Conclusions: Footprint preservation associated with nano fractures of the greater tuberosity enhances functional and structural outcome after rotator cuff repair.

Malrotated Lateral Knee Radiographs Do Not Allow for a Proper Assessment of Medical or Lateral Posterior Slope

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Purpose: The aim of this study was to investigate whether malrotation of lateral knee radiographs (LR) has an effect on posterior tibial slope (PTS) measurements. Our hypothesis was that PTS measurements differ significantly between malrotated (MLR) and true-lateral radiographs (TLR).

Significance: An accurate evaluation of the PTS is paramount in patients suffering from anterior cruciate ligament re-instability as PTS values ≥ 12° may be an indication for slope-correcting osteotomies.

Material and Methods: Lateral knee radiographs of all patients who underwent knee joint surgery at our institution from 06/01/2022 to 01/31/2013 and received multiple LR were eligible for inclusion. Lateral knee radiographs exhibiting a short tibial shaft axis and those from patients with potentially PTS-altering injuries or procedures were excluded. The derived LR were categorized as MLR or TLR based on the distance between the medial and lateral posterior femoral condyles (PFCD, in mm). Medial (MPTS) and lateral posterior tibial slope (LPTS) were evaluated on MLR and TLR. Medial posterior tibial slope and LPTS measurements were compared on MLR vs. TLR using the paired t-test.

Results: A total of 46 pairs (MLR and TLR) of LR (92 radiographs) from 46 patients were included. Mean PFCD in MLR was 6.2 ± 4.1mm. Overall, MPTS and LPTS were significantly higher on MLR vs. TLR (MPTS: 10.5 ± SD 3.2° vs. 9.7 ± 3.5°, $p < 0.05$; LPTS: 10.6 ± 3.7° vs. 9.8 ± 3.5°, $p < .05$). Mean difference between MPTS and LPTS on MLR vs. TLR was |1.9| ± |1.5|° ($p < .05$) and |2.0| ± |1.8|° ($p < .05$). There was no significant correlation between PFCD and MPTS (R = .225; $p > .05$) or PFCD and LPTS (R= .234; $p > .05$).

Conclusion: Malrotation of LR leads to a significant distortion of both the MPTS and LPTS. Attention should be placed on the (mal)rotation of LR, especially in patients with borderline PTS values who may undergo slope-correcting osteotomies.

A Unique Golf Ball-Like Cartilage Morphology of the Femoral Head-Neck Junction in Patients with Femoracetabular Impingement Syndrome

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Purpose: The purpose of this study was to describe and evaluate a unique dimpled pattern of superficial fissured cartilage lesions on the femoral head-neck junction at impingement site in patients with femoroacetabular impingement syndrome (FAIS).

Significance: While an association between FAIS and osteoarthritis (OA) has been reported, the mechanistic differences and transition between the two conditions is not fully understood.

Methods: Six hips with dimpled or fissured cartilage were included among patients who underwent hip arthroscopy for treatment of FAIS. This affected cartilage (dimple-pattern group) and normal cartilage (control group) on the femoral head-neck junction were collected from the same patients and evaluated for histological quantification by Mankin scores and expression of proteins related to cartilage degeneration by Milliplex Multiplex Assays.

Results: Dimple pattern fissured cartilage showed a significant increase in Mankin score ($p=0.031$) and a significant increase in protein expression of CS846 ($p=0.031$) compared to normal cartilage. There were no significant differences in matrix metalloproteinases (MMP), tissue inhibitor of metalloproteinases (TIMP), or hyaluronic acid (HA) levels between the two groups.

Conclusion: The dimple pattern fissured cartilage, compared to normal cartilage, showed histologically significant cartilage degeneration and a significant increase in protein expression of CS846, a biomarker for early OA.

Biomechanical Evaluation of the Two Different Levels of Coracoid Graft Positions in the Latarjet Procedure for Anterior Shoulder Instability

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Purpose/Significance: To compare coracoid graft position between traditional 3-5 o'clock and a more inferior position of 4-6 o'clock with regards to glenohumeral joint stability in Latarjet procedure.

Methods: Ten fresh-frozen cadaveric shoulders were tested in a dynamic, custom-built robotic shoulder model. Four conditions were tested: (1) intact, (2) 6-mm glenoid bone loss (GBL), Latarjet procedure fixed at 3-5 o'clock (3), and 4-6 o'clock (4). The stability ratio (SR) and degree of lateral humeral displacement (LHD) were recorded.

Results: The SR significantly decreased after creating GBL compared with the intact state ($p=0.009$). There was no significant difference in SR between Latarjet 3-5 o'clock ($p=0.51$) and 4-6 o'clock ($p=0.52$) compared with the intact state. LHD decreased significantly in the shoulder with GBL compared with the intact state and Latarjet 4-6 o'clock ($p<0.001$). The displacement decreased significantly after the performance of the Latarjet procedure 3-5 o'clock ($p=0.04$) compared with the intact state but not with the Latarjet procedure 4-6 o'clock ($p=0.71$).

Conclusion: The Latarjet procedure in both coracoid graft positions restored the SR to the values measured in the intact state. A more inferior graft position may improve shoulder biomechanics, but additional work is needed to establish clinical relevance.

Fisetin Treated Human Bone Marrow Aspirate Concentrate on Osteoarthritis Rats

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Purpose: To evaluate the efficacy of Fisetin treated human bone marrow aspirate concentrate (hBMAC) in reducing pain behavior on knee osteoarthritis (OA) rats.

Significance: Fisetin treated hBMAC might have the improved regenerative quality and reduce the pain behavior in knee OA rats.

Methods: First, in vitro study was performed to evaluate the efficacy of Fisetin in reducing senescent cells (SnCs), After that, in vivo study using knee OA rats was performed. Rats were divided into 5 groups for intraarticular injections at 4 weeks after OA surgery: PBS, Fisetin (FIS), BMAC, BMAC co-injection with 50μM fisetin (BMAC+FIS), and BMAC pretreated with 50μM fisetin for 2hr (2h FIS BMAC). Pain testing (von Frey test and knee bend test) was performed.

Result: 50μM Fisetin treatment for 24hr reduced SnCs in bone marrow derived mesenchymal stem cells. Further, 50μM Fisetin treatment for 2hr reduced SnCs in hBMAC. The study groups that received hBMAC (BMAC, BMAC+FIS and 2h FIS BMAC) significantly improved pain behavior, however, only BMAC+FIS and 2h FIS BMAC showed significant improvement in knee bend score compared to PBS and FIS groups at 4 weeks after the injections.

Conclusion: hBMAC with adjuvant Fisetin treatment showed the sustained antinociceptive effect in knee OA rats.

Clinical Differences Between Medical and Lateral Sided Knee Dislocations at 10-year Follow-up

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Introduction: Knee dislocations pose a significant clinical challenge due to the spectrum of patient presentation, concomitant injuries and unknown long term patient outcomes after treatment. Most of the literature regarding knee dislocations is retrospective in nature and lacks long term subjective and objective follow up. As such, the purpose of this study was to compare the post-operative 10-year subjective and objective outcomes of lateral and medial based knee dislocations Furthermore, the influence of surgical timing, and concomitant meniscus and cartilage injuries on outcomes was analyzed.

Methods: A total of 303 consecutive patients with traumatic knee dislocations were treated at a level 1 trauma center (Oslo University Hospital, Oslo, Norway) between May 1996 and December 2023. Of these 303 patients, 56 patients reached a ten-year interval since their index operations. At the time of injury, these patients were entered into a prospective database and have been followed since the time of injury. Acute injuries were defined as those treated within 3 weeks of injury. Inclusion criteria for this study were injury to both the ACL and PCL with concomitant ligamentous injury of the lateral or medial side (KD III-L or KD III-M) who had complete subjective and objective data at 10 years from surgery. Exclusion criteria included patients with KD I or KD IV knee dislocation, concomitant periarticular fracture, or skeletal immaturity. The primary endpoints studied were patient reported outcomes (Lysholm, Tegner, KOOS) and objective clinical outcomes (postoperative flexion and extension). Secondary endpoints study included the proportion of concomitant meniscal and cartilage injuries across the included patients, and the effect of these lesions on the studied postoperative outcomes.

Results: After application of inclusion and exclusion criteria, 55 knee dislocations (24 KD III-M, 31 KD III-M) were included in the final analysis (1 patient lost to follow up). The mean age at the time of injury was 35.3 years +/- 14 years. Thirty one patients underwent surgery acutely, while 24 patients were treated beyond 3 weeks from injury. Overall, there were no statistically significant differences between medial and lateral-based knee dislocations in any subjective or objective outcomes. A subgroup analysis of the medial based dislocations demonstrated a significantly greater amount of flexion in patients > 3 weeks from injury compared with those treated acutely ($p=0.036$). Analysis of the laterally based knee dislocations demonstrated significantly better KOOS-Symptoms scores in patients treated acutely ($p<0.0001$). Conversely, significantly higher KOOS-sports scores were found in KDIII-L patients treated >3 weeks from injury ($p<0.001$). There were no significant differences in the rates of meniscal or cartilage lesions when comparing lateral and medial based dislocations ($p=0.721$ and $p=0.96$, respectively). For KDII-M dislocations, the presence of combined chondral/meniscal injuries at the time of initial surgery was associated with inferior IKDC scores ($p=0.018$) and KOOS-sport scores ($p=0.041$). Conversely, the presence of concomitant pathology in KDIII-L patients did not affect outcomes (all $p > 0.05$)

Discussion The most important finding of the present study is that the subjective and objective outcomes following operative treatment of KDIII-L and KDIII-M at 10-year follow up were not significantly different. However, there were subtle differences when comparing acute and chronic treatment of KDIII-M injuries, with those treated in the chronic phase obtaining significantly greater flexion (~8 degrees) as compared to those treated acutely. The chronicity of treatment appeared to be less important of KDIII-L injuries, with acute treatment of KDIII-L resulting in superior KOOS-

symptoms scores, while chronic treatment of KDIII-L resulted superior KOOS-Sport scores. Concomitant pathology had greater effect KDIII-M injuries, with combined meniscal and cartilage injury having the greatest negative effect on outcomes.

MPFL Repair Has a Higher Failure Rate at Long-Term Follow-up Compared To MPFL Reconstruction for Recurrent Lateral Patellar Instability

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Purpose: The objective of this study was to compare long-term clinical outcomes, complications, and recurrence rates of isolated MPFL reconstruction and MPFL repair for recurrent lateral patellar instability.

Significance: The medial patellofemoral ligament (MPFL) is the primary soft tissue restraint to lateral patellar translation. Surgical management for recurrent patellar instability focuses on restoring MPFL function with repair or reconstruction techniques. Recent studies have favored reconstruction over repair; however, long-term comparative studies are limited.

Methods: A total of 55 patients (58 knees) with recurrent lateral patellar instability were treated between 2005 and 2012 with either MPFL repair or MPFL reconstruction. Exclusion criteria included prior or concomitant tibial tubercle osteotomy or trochleoplasty, and follow-up less than 8 years.

Results: MPFL repair was performed on 26 patients (29 knees; 14 females, 15 males) at a mean age of 18.4 years. MPFL reconstruction was performed on 29 patients (29 knees; 18 females, 11 males) at a mean age of 18.2 years. At mean follow-up of 12.0 years (range 8.3-18.9), the reconstruction group had a significantly lower rate of recurrent dislocation compared to the repair group (14% vs 41%, p=0.019). There were no differences in post-operative Tegner, Lysholm or Kujala scores at final follow-up. Additionally, there were no differences in return to play rates (repair 80.8% vs reconstruction 75.0%, p=0.610) nor reoperation rates (repair 17.2% vs reconstruction 6.9%, p=0.227).

Conclusions: MPFL repair results in a nearly 3-fold higher rate of recurrent patellar dislocation (41% vs. 14%) at long term follow-up compared to MPFL reconstruction. Given this disparate rate, the authors recommend MPFL reconstruction over repair.

Distal Clavicle Excision is not Associated with Adverse Outcomes After Reverse Total Shoulder Arthroplasty

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Purpose/Significance: Distal clavicle excision (DCE) can be performed with RTSA to address ACJ OA, but it is unclear if DCE affects the risk of post-operative acromial stress fractures (ASF's). The purpose of this study was to evaluate the effect of concomitant open DCE on clinical outcomes after RTSA, with particular attention to the incidence of stress fractures.

Methods: Patients who underwent primary elective RTSA from 2015-2019 with minimum follow-up of 6 months were reviewed. Subjects were grouped into RTSA or RTSA-DCE cohorts based on whether DCE was performed concomitantly. Data including pre- and post-operative range of motion and the incidence of adverse outcomes including ASF's were collected and analyzed.

Results: Fifty RTSA and seventy-one RTSA-DCE patients were included in the final analysis. There were no significant differences in the rates of acromial stress reaction or ASF's between cohorts ($p>0.05$). Compared to the RTSA cohort, the RTSA-DCE cohort experienced significantly greater pre-to-postoperative improvement in flexion (44° vs 57°, $p\leq0.05$) and internal rotation (0.3 vs 1, $p<0.05$).

Conclusion: Concomitant distal clavicle excision is NOT associated with adverse outcomes after reverse total shoulder arthroplasty. Concomitant distal clavicle excision may help improve gains in flexion + IR in patients with symptomatic ACJ OA undergoing RTSA.

Simplifying Postoperative Rehabilitation Protocol After Ankle Fractures: A Randomized Control Trial

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Background: Ankle fractures of some of the most common injuries encountered by orthopedic traumatologists and generalists. They can have long term mobility impacts for our patients after recovery from surgical fixation often in the form of anterior ankle pain and/or impingement. Oftentimes postoperative rehabilitation protocols are employed in an attempt to avoid posttraumatic ROM limitations. Protocols can be lengthy, leading to decreased compliance and possibly poorer patient outcomes. Choosing a single targeted exercise for ankle dorsiflexion to perform as postoperative rehab may be a simple and cost-effective change to implement in comparison to formal postoperative PT protocols. Our goal is to investigate the comparison in pain, PROMIS, and measurable ankle dorsiflexion to the contralateral uninjured ankle after an ankle fracture with these two postoperative therapy protocols. We hypothesize noninferiority of a simplified ankle block stretch as compared to standard PT protocols for the above metrics.

Methods: This study is a randomized control trial which was reviewed and approved by the University of Virginia Institutional Review Board. Inclusion criteria: between ages of 18-65, operative bimalleolar/trimalleolar ankle fracture, pilon fracture, or fracture dislocation that underwent operative fixation with one of our three fellowship trained orthopedic traumatologists at UVA. Patients will be excluded if they had contralateral lower extremity injuries, prior ipsilateral ankle injury/hardware, baseline neurologic deficits, severe injury requiring vascular/soft tissue reconstruction, baseline non ambulatory status, BMI >50, and prisoners. The mode of operative fixation was at the discretion of the treating surgeon and was unaltered by participation in the study. These patients were electronically randomized to either arm of the study - AAOS home exercise protocol (AAOS HEP) or a simplified ankle block stretch HEP (AB HEP) at their 2 week surgical follow-up. Primary outcomes of the study were ankle dorsiflexion as measured by an inclinometer, PROMIS 8b scores, and pain scores. The contralateral ankle was also measured for comparison as the control. Patients were assessed at 2 (+/-1 week), 6 (+/- 2 weeks), and 12 (+/- 2 weeks) weeks and 6 (+/- 3 weeks) months post surgery per standard follow-up timeframes.

Results: In total 42 patients were recorded. 21 patients were randomized to AAOS HEP group and 21 to the AB HEP. The AAOS HEP had an average age of 40.9 (+/- 10.8) and BMI 32.6 (+/- 8.1). The AB HEP had an average age 44 (+/- 14) and average BMI 31.2 (+/- 5.8). There were no statistically significant differences between our patient demographics. The AB HEP demonstrated a 10.8 (+/- 15.7) degree improvement in ADF from 6 to 12 week follow-up, while the AAOS HEP demonstrated a 6.6 (+/- 9.6) degrees improvement with no statistically significant difference between the two groups in both ROM (.14) and PRO (.22) at both timepoints.

Conclusions: Anterior ankle pain and/or impingement is a well documented post-operative complaint in patients who have required surgical fixation of their ankle/pilon fractures. This study is a prospective randomized controlled trial including patients who have undergone ankle/pilon fracture fixation and evaluate the efficacy of two physical therapy protocols to determine if a simplified focused exercise protocol can have comparable outcomes in postoperative ankle ROM and PROs. Based on our current data, a simplified ankle dorsiflexion protocol is non-inferior to the more complex HEP and post operative formal PT regiment, yielding similar post operative ROM and PROs.

Can They Run? Comparing Highly Crossed-Linked Polyethylene Wear With Functional Activity in Your Total Hip Arthroplasty Patients

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Background: The incidence of primary and revision total hip arthroplasty (THA) is increasing in the United States. Total hip arthroplasty has become a feasible option in increasingly younger patients using current implant technology and surgical techniques. Limited data exists regarding long-term radiographic and clinical outcomes of modern THA in patients under the age of fifty. Studies available at present are limited by small numbers and short-term follow up. This study investigates polyethylene wear compared to perceived activity level in young patients with long-term clinical and radiographic outcomes following contemporary total hip replacement.

Methods: With prior Institutional Review Board (IRB) approval, we identified 909 patients between 18-50 years-old undergoing primary total hip arthroplasty with a highly cross-linked polyethylene (HXLPE) liner from 1999-2008 using our institution's total joint registry. Functional activity questionnaires including the HOOS Jr score, UCLA activity scale, HAAS score and AAHKS activity recommendations after THA were sent to patients between 2018 and 2019. Patients were excluded from the study if they did not fill out the questionnaire, had a ceramic liner in place, underwent revision THA, or had less than 10-year follow-up. We measured linear wear from the immediate post operative x-ray and most recent x-ray at least 10 years apart using the Roentgen Monographic Analysis Tool (ROMAN). Linear wear rates were then compared to patient age at the time of surgery, femoral head size and functional activity scores.

Results: There were 479 patients included for final analysis, with a mean age of 43 years-old (SD +/- 6) and 48.4% were female. Regarding femoral head size, 1.6% were 22 mm, 43.5% were 28 mm, 37.1% were 32 mm, and 17.7% were 36 mm. The median linear wear rate was 0.06 mm/year, interquartile range (IQR) 0.032 to 0.098 mm/year. The median functional activity scores (IQR) for walking (0-5), running (0-4), stair climbing (0-3), and activity level (1-11) were 5 (2 to 5), 1 (0 to 2), 2 (1 to 3), and 6 (3 to 7) respectively. There were no statistically significant factors associated with increased wear, including age at surgery ($p= 0.073$), femoral head size ($p= 0.292$), walking ($p= 0.978$), running ($p= 0.400$), stair climbing ($p= 0.155$), and activity level ($p= 0.922$).

Conclusion: Patients undergoing primary total hip arthroplasty with a HXLPE liner between 18-50 years of age at the time of surgery did not have significant linear wear at least 10 years after surgery. Linear wear was not associated with functional activities, age at the time of surgery, or femoral head size. Wear data related to activity level may serve as a valuable tool for patient education and counseling before and after surgery.

Outcomes of Revision Posterior Shoulder Capsulolabral Repair in Adolescents

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Background: Posterior arthroscopic capsulolabral repair has been shown to be successful in the athletic population; however, few studies have evaluated the unique population of adolescents. Further, risk factors for failure of surgical repair have not been evaluated in adolescents.

Hypothesis: Adolescent athletes who undergo revision arthroscopic posterior unidirectional capsulolabral repair will have similar outcomes and return to play when compared to adolescent athletes who underwent a primary arthroscopic posterior unidirectional capsulolabral repair.

Methods: A total of 718 patients who underwent posterior shoulder stabilization between 2000-19 with a minimum of 2-year follow-up were reviewed. Patients <11 years and >19 years of age and those with multidirectional instability were excluded. Revision surgery was defined as repeat arthroscopic posterior capsular repair. The ability to return to sport (and level of sport), clinical outcomes scores (American Shoulder and Elbow Surgeons scoring system (ASES) and Visual Analog Scale (VAS), and patient reported perception of range of motion, strength, and whether the surgery was satisfactory were recorded. Comparisons between the primary and revision cohorts were made using the Chi-square or the Mann-Whitney *U* tests with a significance level of $p<0.05$.

Results: 180 adolescent patients (182 shoulders) underwent a primary unidirectional posterior stabilization, with an average follow-up of 6.1 years. 17 patients required revision surgery, for an overall revision rate of 9.3%. At final follow-up, patients who underwent revision surgery returned to sport at similar rates to those who did not (70.6% vs 85.9%, $p=0.095$) and were similarly likely to return to their pre-surgery level of play. Non-revision patients had higher ASES scores, as well as less pain and improved range of motion scores. However, both groups had similar strength scores and reported that surgical repair was worthwhile (93.2% vs. 88.2%, $p=0.45$).

Conclusion: Adolescent patients requiring revision had poorer outcomes scores when compared to those who did not undergo revision surgery but were able to return to sport at a high level and had a high level of satisfaction. Adolescent athletes return to play at high levels following arthroscopic posterior capsulolabral repair with a low rate of revision; however, those that require revision have poorer outcomes but high satisfaction.

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