OREF ORTHOPAEDIC RESEARCH AND EDUCATION FOUNDATION®

COLUMBIA ORTHOPEDICS

OREF NORTHEAST REGION
RESIDENT RESEARCH SYMPOSIUM
Tuesday, September 13, 2022

Columbia University Irving Medical Center
Roy and Diana Vagelos Education Center
Academic Program in the Auditorium Room 201
104 Haven Avenue
New York, NY 10032

Hosted by:
William N. Levine, MD
Chair, Department of Orthopaedic Surgery
Columbia University Irving Medical Center

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About OREF:
The Orthopaedic Research and Education Foundation (OREF) was founded in 1955 to ensure an expanding base of knowledge and effective, evidence-based treatment protocols for orthopaedic surgeons to continually improve patient care. Since its founding, OREF has funded well over $100 million in research and educational grants and awards that benefit all of orthopaedics. For more information about OREF grants and awards, please visit www.oref.org. Follow OREF on its Facebook page (OREFtoday) and on Twitter (@OREFtoday).

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OREF NORTHEAST REGION
RESIDENT RESEARCH SYMPOSIUM
SUMMARY AGENDA
Tuesday, September 13, 2022

12:00 noon – 1:00 p.m.	**Registration and Lunch** Roy and Diana Vagelos Education Center Academic Program in the Auditorium Room 201 104 Haven Avenue, New York, NY
1:15 p.m. – 1:19 p.m.	**Welcome and Introductions** **William N. Levine, MD** Chair, Department of Orthopaedic Surgery Columbia University Irving Medical Center
1:19 p.m. – 1:22 p.m.	**OREF Welcome** **Lee Grossman** Chief Executive Officer Orthopaedic Research and Education Foundation
1:22 p.m. – 1:25 p.m.	**Thomas P. Sculco, MD** President Orthopaedic Research and Education Foundation
1:25 p.m. – 1:55 p.m.	**Session I – Resident Research Presentations and Discussion**
1:55 p.m. – 2:25 p.m.	**Session II – Resident Research Presentations and Discussion**
	Break
2:35 p.m. – 3:05 p.m.	**Session III – Resident Research Presentations and Discussion**
3:05 p.m. – 3:35 p.m.	**Session IV – Resident Research Presentations and Discussion**
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3:45 p.m. – 4:15 p.m.	**Session V – Resident Research Presentations and Discussion**
4:15 p.m. – 4:45 p.m.	**Session VI – Resident Research Presentations and Discussion**
4:45 p.m. – 4:47 p.m.	**Keynote Speaker Introduction**
4:47 p.m. – 5:25 p.m.	**Keynote Address** Leesa M. Galatz, MD, MBA Mount Sinai Professor and Chair Shoulder and Elbow Sports and Reconstructive Surgery Leni & Peter May Department of Orthopaedic Surgery Icahn School of Medicine at Mount Sinai Mount Sinai Health System
5:25 p.m. – 6:00 p.m.	**Reception** **Awards Presentation and Closing Remarks**

KEYNOTE SPEAKER

Leesa M. Galatz, MD

Mount Sinai Professor and Chair
Shoulder and Elbow Sports and Reconstructive Surgery
Leni and Peter May Department of Orthopaedic Surgery
Icahn School of Medicine at Mount Sinai
Mount Sinai Health System

Dr. Leesa Galatz is the Mount Sinai Professor and Chair of the Leni and Peter May Department of Orthopaedic Surgery at the Icahn School of Medicine and the Mount Sinai Health System in New York. She specializes in shoulder and elbow surgery, with expertise in sports and reconstructive procedures, including instability, rotator cuff disorders, and joint replacement. She has a strong interest in shoulder replacement and arthritic conditions of the shoulder, with joint replacement a significant component of her clinical practice. Her primary research interest throughout her career has been basic science of rotator cuff disease and tendon healing as it pertains to cuff repair. She has participated in NIH-funded research on tendon healing and tissue engineering as a co-principal investigator and continues to collaborate and mentor colleagues and students in basic science research. Dr. Galatz received the 2021 Women's Leadership Forum Award from the Orthopedic Research Society. Dr. Galatz is listed in New York Magazine Top Doctors 2018-2022, Castle Connolly America's Top Doctors 2018-2022, Top Doctors New York Metro Area 2016-2022, and Exceptional Women in Medicine 2019-2021. In 2019, she received the Notable Women in Healthcare Award by Crain's New York Business. She was the recipient of the Neer award for Basic Science Research at the American Shoulder and Elbow Surgeons Open Meeting in 2009. Dr. Galatz received the Kappa Delta Ann Doner Award, the most prestigious award for orthopedic research, along with her colleagues in 2014 for research on the natural history of rotator cuff disease, and in 2020 for research on the role of tendon stem cells in rotator cuff development and healing. In 2007, she was a European Shoulder and Elbow Traveling Fellow, sponsored by American Shoulder and Elbow Surgeons and was an American British Canadian Traveling Fellow in 2009. She has served as a Member at Large on

the Board of the American Academy of Orthopedic Surgeons and as a Delegate on the Board of the American Orthopedic Association.

Dr Galatz serves on the Executive Committee of the Mount Sinai faculty Practice. She is chair of the Contracts Committee of the Faculty Practice and is on the board of the Mount Sinai IPA. She came to Mount Sinai as the first System Chair and was responsible for integrating the Mount Sinai Manhattan practices and the Orthopedic residency across the System. Mount Sinai Hospital is currently ranked #8 for Orthopedics in US News and World Report. Dr Galatz is the first female Chair of an Orthopedic Surgery Department, and importantly, since she assumed her role in 2015, at least seven other women have been appointed Orthopedic Chair positions.

Judges

Scott Rodeo, MD
Hospital for Special Surgery

Stavros Thomopoulos, PhD
Columbia University Irving Medical Center

David P. Trofa, MD
Columbia University Irving Medical Center

OREF Northeast Region Resident Research Symposium
DETAILED AGENDA
Tuesday, September 13, 2022

12:00 noon – 1:00 p.m.	**Registration and Lunch** Roy and Diana Vagelos Education Center Academic Program in the Auditorium Room 201 104 Haven Avenue, New York, NY
1:15 p.m. – 1:19 p.m.	**Welcome and Introductions** **William N. Levine, MD** Chair, Department of Orthopaedic Surgery Columbia University Irving Medical Center
1:19 p.m. – 1:22 p.m.	**OREF Welcome** **Lee Grossman** Chief Executive Officer Orthopaedic Research and Education Foundation
1:22 p.m. – 1:25 p.m.	**Thomas P. Sculco, MD** President Orthopaedic Research and Education
	Session I – Resident Research Presentations & Discussion
1:25 p.m. – 1:29 p.m.	*A Vertebral Stem Cell Mediating Spine Fusion* Kyle W. Morse, MD, Hospital for Special Surgery
1:29 p.m. – 1:33 p.m.	*Enhanced Tendon-to-Bone Attachment Healing Through Hedgehog Activation* Andrew Luzzi, MD, Columbia University Irving Medical Center
1:33 p.m. – 1:37 p.m.	*Revision Rate Following Unipolar vs. Bipolar Hemiarthroplasty* Benjamin Schaffler, MD, NYU Langone Health
1:37 p.m. – 1:41 p.m.	*Sublaminar Decompression: A Lamina Preserving Technique for Lumbar Spinal Decompression Is Associated with Lower Pseudarthrosis Rate in Adult Spinal Deformity Surgery* Amy Li Xu, MD, Johns Hopkins University
1:41 p.m. – 1:45 p.m.	*Patient Reported Outcomes Associated with "Completely Better" Status After Hip Arthroscopy* Matthew Kolevar, MD, University of Maryland
1:45 p.m. – 1:55 p.m.	**Question and Answer**

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Session II – Resident Research Presentations & Discussion

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1:59 p.m. – 2:03 p.m.	*Factors Predicting Failed Same Day Discharge for Ambulatory Total Hip and Knee Arthroplasty* Hemant Reddy, MD, Montefiore Medical Center/Albert Einstein College of Medicine
2:03 p.m. – 2:07 p.m.	*Outcomes and Timing of Elective Total Joint Arthroplasty Following a COVID-19 Infection* David Novikov, MD, Boston University
2:07 p.m. – 2:11 p.m.	*Evaluating the Impact of Case-Based Unconscious Bias and Racial Equity Training on Orthopaedic Surgery Trainees* Troy Amen, MD, Hospital for Special Surgery
2:11 p.m. – 2:15 p.m.	*Comparing Skill Acquisition and Validity of Immersive Virtual Reality to Cadaver Laboratory Sessions in Training for Reverse Total Shoulder Arthroplasty* William K. Crockatt, MD, New York-Presbyterian/Columbia University
2:15 p.m. – 2:25 p.m.	**Question and Answer**
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Session III – Resident Research Presentations & Discussion

2:35 p.m. – 2:39 p.m.	*The Yield of Subsequent Radiographs During Nonoperative Treatment of Radial Head and Neck Fractures* Vidushan Nadarajah, MD, SUNY Downstate Health Sciences University
2:39 p.m. – 2:43 p.m.	*Decreasing the Rate of Unnecessary Pediatric Deformity Surgery Allogenic Blood Transfusions* Taylor Paskey, MD, Columbia University Irving Medical Center
2:43 p.m. – 2:47 p.m.	*UIV Within 3 Levels of the Thoracic Apex is the Most Significant Risk Factor for Proximal Junctional Kyphosis in Lenke Type 5 and 6 Adolescent Idiopathic Scoliosis Patients* Josephine Coury, MD, Columbia University Irving Medical Center
2:47 p.m. – 2:51 p.m.	*A Postoperative Dressing Comparison: Polyester Mesh with Liquid Adhesive Compared to Incisional Negative Pressure Therapy for Direct Anterior Total Hip Arthroplasty* Michael B. Held, MD, Columbia University/New York Presbyterian

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2:51 p.m. – 2:55 p.m.	*Understanding the Role of Leg Length Discrepancy, Pelvic Obliquity, and Asymmetric Knee Flexion in Determining the Appropriate Intraop Target for Coronal Alignment in Adult Spinal Deformity* Nathan J. Lee, MD, Columbia University Irving Medical Center
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3:09 p.m. – 3:13 p.m.	*The Risk of Lymphedema Following Breast Cancer Surgery Should Not Restrict Necessary Hand Surgery Interventions* Michael Fitzgerald, MD, Northwell/Hofstra at Northshore-Long Island Jewish Medical Center
3:13 p.m. – 3:17 p.m.	*Risk Factors and Rate of Conversion to Total Hip Arthroplasty Within 2 years After Hip Arthroscopy Utilizing a Large National Cohort of Commercially Insured Patients* Kevin Wang, MD, Mount Sinai
3:17 p.m. – 3:21 p.m.	*Non-Operative Management of First-Time Patellar Dislocation in the Pediatric Population: Risk of Recurrence and Functional Outcomes* Steven Henick, MD, Montefiore Medical Center/Albert Einstein College of Medicine
3:21 p.m. – 3:25 p.m.	*High Variability in Pelvic Orientation in the Lateral Decubitus Position Negatively Effects Acetabular Component Abduction* David Sherwood, MD, Montefiore Medical Center
3:25 p.m. – 3:35 p.m.	**Question and Answer**
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3:45 p.m. – 3:49 p.m.	*Timing of Preoperative Antibiotics is Not Associated with Infection After Total Knee Arthroplasty* Max L. Willinger, MD, Long Island Jewish Medical Center
3:49 p.m. – 3:53 p.m.	*Sensitivity of Magnetic Resonance Imaging for Detection of Medial Patellofemoral Ligament Injury* Daniel Berman, MD, Montefiore Medical Center
3:53 p.m. – 3:57 p.m.	*The Impact of Mental Health on Postoperative Outcomes for Adolescents Undergoing Posterior Spinal Fusion for Idiopathic Scoliosis in an Urban Tertiary Care Children's Hospital* David Ge, MD, Montefiore Medical Center/Albert Einstein College of Medicine

OREF Northeast Region Resident Research Symposium
DETAILED AGENDA
Tuesday, September 13, 2022

3:57 p.m. – 4:01 p.m.	*Nationwide Utilization Trends of Outpatient Total Knee Arthroplasty* Daniel Bowles, MD, Long Island Jewish Medical Center
4:01 p.m. – 4:05 p.m.	*Epidemiology and Outcomes of Ankle Injuries in the National Football League* Sohil S. Desai, MD, Columbia University/NYOH
4:05 p.m. – 4:15 p.m.	**Question and Answer**
	Session VI – Resident Research Presentations and Discussion
4:15 p.m. – 4:19 p.m.	*Identification of Novel Genetic Markers for Risk of Spinal Pathologies: A Genome-Wide Association Study of Two Biobanks* Patawut Bovonratwet, MD, Hospital for Special Surgery
4:19 p.m. – 4:23 p.m.	*Preoperative Opioid Use is Associated with Worse Preoperative Patient Reported Outcomes in Hip Arthroscopy Patients* Michael Rocca, MD, University of Maryland
4:23 p.m. – 4:27 p.m.	*The Ultrastructure of the Developing Human Anterior Cruciate Ligament: A Preliminary Analysis Using Scanning Electron Microscopy* Tyler Uppstrom, MD, Hospital for Special Surgery
4:27 p.m. – 4:31 p.m.	*One-Year Outcomes of Hip Fracture Patients for a Health System at the Epicenter of the COVID-19 Pandemic: A Multicenter Cohort Study* Sally Trout, MD, Northwell Health— Northshore-Long Island Jewish Medical Center
4:31 p.m. – 4:35 p.m.	*Surgical Duration Increases the Risk of Infection Following Total Knee Arthroplasty* Jamie Heimroth, MD, Northshore-Long Island Jewish Medical Center-Northwell Health
4:35 p.m. – 4:45 p.m.	**Question and Answer**
4:45 p.m. – 4:47 p.m.	**Keynote Speaker Introduction**
4:47 p.m. – 5:25 p.m.	**Keynote Address** Leesa M. Galatz, MD, MBA Mount Sinai Professor and Chair Shoulder and Elbow Sports and Reconstructive Surgery Leni & Peter May Department of Orthopaedic Surgery Icahn School of Medicine at Mount Sinai Mount Sinai Health System
5:25 p.m. – 6:00 p.m.	**Reception** **Awards Presentation and Closing Remarks**

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A Vertebral Stem Cell Mediating Spine Fusion

Kyle W. Morse, MD
Hospital for Special Surgery

Purpose: We aim to identify the specific skeletal stem cell responsible for spine fusion.

Significance: Spine fusion is a common orthopedic procedure and multiple cellular adjuncts are used to improve fusion outcomes. The specific stem cell mediating spine fusion remains unknown.

Methods: A murine posterolateral spine fusion model was utilized with both iliac crest bone graft (ICBG) and demineralized bone matrix (DBM). Our group previously identified a distinct murine vertebral stem cell (VSC) and a Zic1-cre targeting this cell was created. Bone volume (BV) formed was measured with microCT and lineage tracing was performed with confocal microscopy. Flow cytometry was used to isolate the VSC.

Results: Lineage tracing within the fusion mass confirmed the contribution of the Zic1+ VSC lineage to osteoblasts in the fusion mass with both ICBG and DBM. Inducing a gain-of-function in Zic1+ VSCs via conditional deletion of the bone formation inhibitor, Shn3, triggered an increase in fusion BV, confirming that Zic1 stem cells functionally contribute to fusion mass formation. FACS identified that induction of fusion triggers egress of Zic1+ VSCs.

Conclusion: Skeletal stem cells marked by Zic1-cre were sorted as Lin-CD200+Thy-6C3-CD105- and are responsible for the fusion mass in a murine posterolateral spine fusion model.

Enhanced Tendon-to-Bone Attachment Healing Through Hedgehog Activation

Andrew Luzzi, MD
Columbia University Irving Medical Center

Purpose: Evaluate the effect of hedgehog(Hh) signaling upregulation on tendon-to-bone healing.

Significance: Rotator cuff repair failures occur largely due to insufficient regeneration of the mineralized-fibrocartilaginous, tendon-bone transition, termed the enthesis, and bone loss below the attachment site. Enthesis formation and mineralization are driven by Hh-responsive cells. Hh-signaling drives regeneration of injured entheses in young animals. Furthermore, Hh-agonism enhances bone formation.

Methods: Bilateral supraspinatus injury-and-repair was performed in 78 adult rats. Right shoulders received microsphere-encapsulated Hh-agonist, while left shoulders received control microspheres. Treatment effects were evaluated via gene expression, biomechanics, bone morphometry, and histology.

Results: *Gene expression*- At 3-days, treatment upregulated Hh-pathway genes (*GLI1, SMO)* and *RUNX2*, a transcription factor of osteogenesis. At 2-weeks, treatment upregulated transcription factors of tenogenesis (*SCX*) and chondrogenesis (*SOX9*), as well as genes of mineralized fibrocartilage extracellular matrix (ECM) (*COL2, COLX)*. *Bone Morphometry*- At 4-weeks, treatment increased trabecular thickness. At 8-weeks, there was a trend towards increased trabecular number. *Histology*- Treatment improved tendon-bone maturity, organization and continuity. *Biomechanics*- At 4-weeks, treatment increased ultimate stress. At 8-weeks, treatment increased work-to-failure, resilience, and yield force.

Conclusion: The effects of treatment on ECM production and mineralization improved biomechanical properties, indicating the therapeutic potential of Hh-agonism in tendon-bone healing.

Revision Rate Following Unipolar vs. Bipolar Hemiarthroplasty

Benjamin Schaffler, MD
NYU Langone Health

Purpose/significance: There is much debate on use of bipolar or unipolar femoral heads during hemiarthroplasty for the treatment of femoral neck fractures. No studies have compared the outcomes of these femoral head implant choices in the America Joint Replacement Registry.

Methods: The American Joint Replacement Registry (AJRR) was utilized to search for all primary femoral neck fractures treated with hemiarthroplasty between January 2012 and June 2020. All cause-revision between unipolar and bipolar hemiarthroplasty was assessed at latest follow up.

Results: There were no differences in all-cause revisions between unipolar and bipolar hemiarthroplasty. However, a Cox model analysis demonstrated increased revisions for bipolar hemiarthroplasty at 6-months post-index operation, but an increased risk of revision for unipolar between 2 and 3 years and after 3-years.

Conclusion: In the early postoperative period, the bipolar group had higher risk of revision. The time dependent interaction indicates that this risk decreased over time, and the bipolar group had a lower risk of revision at later follow-ups. We hypothesize that this is due to decreased wear of the native acetabulum, and surgeons should consider using bipolar prosthesis when performing hemiarthroplasty for femoral neck fracture in patients expected to live more than 2 years post-injury.

Sublaminar Decompression: A Lamina Preserving Technique for Lumbar Spinal Decompression is Associated with Lower Pseudarthrosis Rate in Adult Spinal Deformity Surgery

Amy Li Xu, MD
Johns Hopkins University

Purpose: To compare surgical outcomes for Sublaminar Decompression (SLD) technique versus traditional wide laminectomy

Significance: Wide laminectomy entails removing a valuable bony surface, which limits surface area available for fusion. Recently, SLD was developed for adult spinal deformity (ASD) to allow for effective decompression of the neural elements while preserving the lamina.

Methods: ASD patients undergoing primary posterior spinal fusion between 2014 and 2018 were identified, with SLD or laminectomy (Lami) as dictated by surgeons' preference. The two groups were otherwise similar. Primary outcome was reoperation for symptomatic pseudarthrosis. A logistic regression controlling for possible confounders was performed.

Results: 106 patients were included (51 SLD, 55 Lami). Follow-up time was 3.2 years (1–8 years). Age, gender, and patient-reported outcomes were similar ($p>0.05$). The SLD group had higher mean number of levels fused (11±3.1 vs 9.6±3.2, $p=0.03$) and pedicle subtraction osteotomy (PSO) use (18% vs 4%, $p=0.02$). Pseudarthrosis rate was significantly lower in the SLD group (14% vs 40%, $p<0.01$). After controlling for C7PL, BMP use, PSO, levels fused, and age, SLD was associated with a significantly lower rate of reoperation for pseudarthrosis (OR=0.2, 95%CI: 0.07–0.64, $p<0.01$).

Conclusion: Preserving the bony posterior elements with SLD lowers pseudarthrosis rate in ASD surgery.

Patient Reported Outcomes Associated with "Completely Better" Status After Hip Arthroscopy

Matthew Kolevar, MD
University of Maryland

Purpose: This study assessed the rate of Completely Better (CB) status after hip arthroscopy and associations with PROs.

Significance: Contextualizing PROs can help differentiate meaningful outcomes. PASS and MCID have been investigated, however patients' perception of being "completely better" after hip arthroscopy has not.

Methods: Hip arthroscopy patients from 2015-2020 with 2-year follow-up data were included. Patients were administered six PROMIS domains, NPS, SSQ8 and a CB anchoring question pre-operatively and 2 years postoperatively. Thresholds for PROs associated with CB status were identified with 90% specificity.

Results: 29 of the 62 patients (46.8%) reported CB at 2 years postoperatively. There were no differences in demographics between CB and non-CB. The 2-year and change PROMIS Physical Function, Pain Interference, Social Satisfaction, Fatigue, and Anxiety, and SSQ8 were significantly better in the CB group. 2-year NPS-operative hip was significantly better in the CB group. Thresholds of 2-year PROMIS PF≥51.3, change PROMIS PF≥12, 2-year PROMIS PI≤46.6, change PROMIS PI≤-12.2, 2-year NPS–operative hip≤1.0, and 2-year SSQ8≥87.5 were best predictors of CB status.

Conclusion: Nearly half of patients reported being CB 2 years following hip arthroscopy. Function, pain, and satisfaction PROs were predictors of CB status. This study provides contextualization to PROs.for researchers/clinicians.

Patients' Understanding of Sling Necessity is Predictive of Sling Wear Following Shoulder Surgery

Michael G. Livesey, MD
University of Maryland

Purpose: The aim of the present study was to identify predictors of sling compliance following shoulder surgery.

Significance: Recent research has shown sling wear can positively impact patient-reported outcomes and radiographic results following shoulder surgery.

Methods: Sixty-six patients were enrolled prospectively if they underwent shoulder surgery requiring a sling for >1 month postoperatively. Sling wear was measured using a validated temperature-sensing device. Patients' understanding of sling necessity was graded (PUGS grade, I-III). PUGS-I demonstrated the least technical knowledge. Descriptive statistics and a multivariate regression analysis determined the variables associated with sling wear.

Results: There was a linear relationship between patients' understanding of sling necessity and hours of sling wear/week. PUGS-I patients wore the sling the least(61.2±50.5h) compared to PUGS-II (111.5±45.8h) or PUGS-III(120.2±52.3h;*P*=0.024). Patients with home assistance (HA) have significantly greater sling wear compared to those without HA(β,40.8 hours;*P*=0.031). Patients >60years wear their slings significantly more, while males and those with a higher BMI wear their slings significantly less. Area Deprivation Index was not significantly associated with sling wear.

Conclusion: This study demonstrates that patients with greater understanding for sling necessity, those with HA, and patients >60years have greater sling wear. Male patients and those with a higher BMI have lower sling wear.

Factors Predicting Failed Same Day Discharge for Ambulatory Total Hip and Knee Arthroplasty

Hemant Reddy, MD
Montefiore Medical Center/Albert Einstein College of Medicine

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Purpose: Recognizing risk factors for unforeseen overnight admission (failure to launch; FTL) for total joint arthroplasty (TJA) is essential.

Significance: Most reports on the efficacy of same day discharge (SDD) TJA are within commercially insured populations from ambulatory surgery centers.

Methodology: We retrospectively reviewed SDD primary TJA patients between July 2020 and December 2021 at an urban academic medical center. Patients were excluded if the pre-operative plan was inpatient admission. Reasons for FTL, demographic and clinical data were collected. Differences between the FTL and successful SDD (SSDD) groups were compared by Chi-square and Mann-Whitney U-tests.

Results: 445 SDD-TJA patients were included. Medicare/Medicaid compromised 54%, and 73% were low socioeconomic status (Low-SES). FTL rate was 38% (169/445) with 94 (56%) due to PT failure and 34 (20%) for medical necessity. The remaining failed for pain, wound drainage, and miscellaneous factors. The FTL rate was higher in females than males (45% vs 24%; $p<0.01$) and for BMI $\geq$ 40 than BMI < 40 (64% vs 36%; $p<0.01$).

Conclusion: In contrast to prior studies, we report a high FTL, largely due to failure with PT and medical necessity. BMI $\geq$ 40, female gender and afternoon surgery completion are risk factors for FTL.

Outcomes and Timing of Elective Total Joint Arthroplasty Following A COVID-19 Infection

David Novikov, MD
Boston University

Purpose: To evaluate outcomes and the effect of timing between a COVID+ test and total joint arthroplasty (TJA) on cardiopulmonary (CP) and venous thromboembolism (VTE) rates.

Significance: COVID is associated with an increased risk of VTE and CP events. The effect of a COVID infection on outcomes following TJA and the optimal time between infection and TJA is unknown. We hypothesize that a COVID+ test within one year of TJA increases the risk for postoperative VTE and CP.

Methods: A multicenter, retrospective review of TJA recipients between 8/2020 to 11/2021 identified 221 COVID+ and 433 COVID- patients. Nine COVID+ patients had TJA<90 days from a positive test and 212 had TJA>90 days.

Results: VTE (1.4% vs 0.9%; p=0.6) and CP (4.1% vs 3.5%; p=0.7) events were similar between COVID+ and COVID- patients. TJA<90 days from a positive test had a significantly higher rate of VTE (22.2% vs 0.5%; p<0.001) and CP (88.9% vs 0.5%; p<0.001) complications.

Conclusion: COVID+ patients at a mean time of 8 months from a positive test had similar VTE and CP rates compared to COVID- patients. However, VTE and CP rates were higher in COVID+ patients that underwent TJA<90 days from a positive test.

Evaluating The Impact of Case-Based Unconscious Bias and Racial Equity Training on Orthopaedic Surgery Trainees

Troy Amen, MD
Hospital for Special Surgery

Purpose: This study sought to (1) evaluate implicit bias of trainees at an orthopaedic surgery program; and (2) assess trainee confidence in cultural competency content before and after an unconscious bias and racial equity educational intervention.

Significance: There are substantial health disparities among minority patients in orthopaedic care. Improving cultural competency has shown to be one strategy to reduce implicit bias, and thus disparities.

Methods: 51 trainees participated in a 1.5-hour implicit bias training focusing on case-based, small group discussions. Before and after the training, anonymous Race Implicit Association Tests and cultural competence confidence questionnaires were completed.

Results: Most trainees demonstrated a preference for European American over African American, which remained unchanged after the intervention ($p<0.05$). Participants self-reported feeling more confident in three areas of cultural competency after the session: (1) using strategies to identify/address bias and stereotyping ($p=0.03$); (2) recognizing institutional cultural issues ($p=0.03$); and (3) discussing race and culture in medical interviews with respect ($p<0.01$). 71.4% of participants were satisfied with the session and 85.7% would incorporate the tools into their practice.

Conclusion: After a single unconscious bias and racial equity educational intervention, orthopaedic trainees felt more equipped to incorporate culturally competent care despite unchanged racial preferences.

Comparing Skill Acquisition and Validity of Immersive Virtual Reality to Cadaver Laboratory Sessions in Training for Reverse Total Shoulder Arthroplasty

William K. Crockatt, MD
New York-Presbyterian/Columbia University

Purpose: Our aim is to compare skill acquisition using cadaver lab training or immersive virtual reality (iVR) training methods for augmented baseplate insertion during reverse total shoulder arthroplasty (rTSA).

Significance: iVR allows surgical trainees to practice skills at their convenience without risking harm to patients or other operating room/laboratory factors. However, iVR has never been directly compared to cadaver training, the longtime gold standard.

Methodology: After a lecture and technique video demonstrating key steps of augmented baseplate insertion and rTSA, PGY1-3 residents were allowed 1 hour to practice with their assigned modality. Participants were assessed by a blinded evaluator using validated competency checklists (OSATS, GRS) during cadaveric glenoid baseplate insertion. Continuous and categorial variables were analyzed using the unpaired t-test and chi-squared test, respectively.

Results: No significant difference in total OSATS score (average iVR score 18.4, cadaver 17.75, p=0.633), mean GRS scores (iVR 4.7, cadaver 4.6, p=0.699), nor time to completion (average iVR 546s, cadaver 591.25s, p=0.669) among 14 residents (8 cadaver, 6 iVR). Average cost of iVR hardware and a 1-year software license was $4900, while average cost of a single cadaver lab was $1268.20/resident.

Conclusion: Among junior residents, there is similar skill acquisition when training with either cadaver labs or iVR.

The Yield of Subsequent Radiographs During Nonoperative Treatment of Radial Head and Neck Fractures

Vidushan Nadarajah, MD
SUNY Downstate Health Sciences University

Purpose: To (1) how often subsequent radiographs were obtained after the initial diagnosis of a non-or-minimally-displaced radial-head/neck fracture and (2) if subsequent radiographs changed initial management. We hypothesized that subsequent radiographs would not change initial management.

Significance: Literature suggests that serial radiographs may not be necessary after the initial diagnostic radiograph in non-or-minimally displaced radial-head/neck fractures without additional injury to the affect limb.

Methodology: We retrospectively reviewed a large-urban-hospital-system between ears 2019-2022, and collected demographics, provider characteristics, and treatment-details. Nonparametric-bivariate analysis was performed, and a p-value<0.05 was used to determine statistical significance.

Results: A total of 767-patients were identified (459-males), with a mean-age of 40.8-years(±18.8). Thirty-eight-percent (n=292) of patients had subsequent radiographs. Twl-of-292 patients tat had subsequent radiographs (4.1%) were offered surgery but declined. None of the patients with subsequent radiographs had a alteration of their weight-bearing status. Whether a subsequent readiograph was obtained was not associated with BMI, se, race, marital status, or insurance. Patients who had subsequent radiographs were significantly more likely to be older (p-vlue=0.028).

Conclusion: Radiographs subsequent to diagnosis do not alter treatment of non-or minimally displaced radial-head/neck fractures. The decreased utility of subsequent radiographs highlights a potential area for quality improvement and decreased health-resource utilization.

Decreasing The Rate of Unnecessary Pediatric Deformity Surgery Allogenic Blood Transfusions

Taylor Paskey, MD
Columbia University Irving Medical Center

Purpose: To analyze methods for decreasing the rate of blood transfusions in pediatric spinal deformity surgery.

Significance: Spinal deformity surgery is associated with a high perioperative blood loss and risk for allogenic blood transfusion (ABT). Previous studies have shown ABT has an increased risk of surgical site infection, acute hemolytic reaction, and transfusion-related lung injury.

Methodology: A retrospective review was performed of 198 patients with AIS, ages 10-18, with a major cobb angle between 45 to 70 degrees from 2019 to 2022. Between 2020 and 2021 a protocol was created to decrease the rate of ABT, including primarily meetings with postoperative care units where scoliosis patients recovered and scrutiny of transfusions that occurred.

Results: The rate of ABT from January 2019 to 2020 was 19.5% (15/77) and from January 2020 to 2021 13.1% (8/61). The interventions to reduce ABT rates were implemented between November 2020 to January 2021. From January 2021 to January 2022 only 5% (3/60) of patients received an ABT, representing a significant decrease from 2020 to 2021 ($p<0.01$). No significant difference in demographics between groups existed including gender or age.

Conclusion: Increasing scrutiny or awareness of ABT can significantly lower the rate of unnecessary transfusion.

UIV Within 3 Levels of the Thoracic Apex is the Most Significant Risk Factor for Proximal Junctional Kyphosis in Lenke Type 5 and 6 Adolescent Idiopathic Scoliosis Patients

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Purpose: To identify the risk factors for proximal junctional kyphosis (PJK) in Lenke Type 5/6 Adolescent Idiopathic Scoliosis (AIS) Patients.

Significance: Proximal junctional kyphosis (PJK) is an unfortunate complication of AIS deformity surgery. In Lenke Type 5/6 curves, the rates of PJK after instrumented fusion are reported as high as 50% with no clear risk factors.

Methodology: A retrospective, multicenter data collection was performed in 191 Lenke Type 5/6 patients. Using SAS software, ANOVA was used to identify the significant risk factors ($p<0.05$) for PJK. Patient reported outcome scores, namely SRS-22 scores, were compared between patients.

Results: 6.2% of patients (n=12) developed radiographic PJK. SRS-22 scores were significantly worse in PJK patients at postoperative years 2 and 5. Patients with PJK had an average distance from their upper instrumented vertebra (UIV) to thoracic kyphosis apex of 2 ± 1.1 levels as compared to 3.8 ± 1.1 ($p<0.0001$). No other radiographic or demographic factors were significantly associated with PJK.

Conclusion: In Lenke 5/6 Curve Types, UIV within 3 or more levels caudal to the thoracic apex was the most significant factor leading to development of PJK. This is the first study to demonstrate worse outcomes scores in AIS PJK patients.

A Postoperative Dressing Comparison: Polyester Mesh with Liquid Adhesive Compared to Incisional Negative Pressure Therapy for Direct Anterior Total Hip Arthroplasty

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Purpose: We investigated superficial wound complications following the direct anterior approach (DAA) to total hip arthroplasty (THA) comparing two different dressing types, polyester mesh (PM) with liquid adhesive and incisional negative pressure therapy (iNPT). We hypothesized that iNPT would be associated with fewer wound complications (WC), especially in obese patients.

Significance: Some data suggest an increased rate of WC following DAA-THA when compared to other approaches, likely owing to the proximity of the incision to the groin crease.

Methods: Consecutive DAA-THAs were retrospectively reviewed (n=711, iNPT=213, PM=498). WC within 3 months of surgery were recorded. Demographics were compared using student's t-test with Welch's correction and Chi-square tests. Comorbidities, BMI, and dressings were included in multiple logistic regression.

Results: The rate of WC was 9.00%. Wound dehiscence was the most frequent complication, affecting 26 patients (3.66%). Multiple regression showed that BMI and smoking were associated with increased WC (aOR=1.072, p=0.007; aOR=3.258, p=0.009). Additionally, it showed PM use was associated with fewer WC when compared to iNPT (aOR=0.555, p=0.047).

Conclusions: The use of PM in DAA-THA was associated with a decreased risk of WC compared to iNPT. Secondarily, smoking and increased BMI were risk factors to WC following DAA-THA.

Understanding the Role of Leg Length Discrepancy, Pelvic Obliquity, and Asymmetric Knee Flexion in Determining the Appropriate Intraop Target for Coronal Alignment in Adult Spinal Deformity

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Purpose: To develop a novel system to account for preop leg length discrepancy(LLD) and pelvic obliquity(PO) to determine the optimal intraop coronal target and predict immediate/2yr postop Coronal Vertical Alignment(CVA) for Adult Spinal Deformity(ASD)

Significance: The major challenge with assessing intraop coronal alignment for ASD include the inability to quantify verticality in the prone position. The horizontal distance from C7 to the central sacral pelvic line(C7-CSPL;CSPL=perpendicular line that bisects the line touching both acetabular sourcils) was recently introduced as a potential target for intraop CVA; however, this may fail in the presence of LLD and PO.

Methods: Two lines are drawn on intraop prone films(CSPL and "Proxy CSVL"). The PO angle(between horizontal line and line touching top of acetabular sourcils) on erect preop xray is used to draw the "Proxy CSVL" on intraop xray relative to intraop CSPL. The C7-CSPL and C7-Proxy(intraop distance from C7 to "Proxy CSVL") are compared with actual immediate postop CVA and 2yr postop CVA. To account for LLD, PO, and asymmetric knee flexion, pts were categorized into 4 groups: Type 1=No LLD(<1cm) and No PO(<1deg); Type 2=No LLD with PO(*asymmetric knee flexion); Type 3=LLD and PO; Type 4=LLD with No PO (*compensated asymmetric knee flexion). A retrospective review of a consecutively collected cohort with ASD surgery w/ min 6 levels was performed to validate.

Results: 68 pts(age 57.1±13.7yrs, levels fused 13.5±3.8) were reviewed. Mean preop/2yr postop CVA was 5.1±2.6/2.2±1.4cm. Type 1: C7-CSPL and C7-Proxy had similar error margins for immediate postop CVA(1.1 vs.0.9cm, p=0.588) and 2yr postop CVA(0.5 vs.0.5cm, p=0.825). Type 2: C7-CSPL was more accurate than C7-Proxy for immediate postop CVA(0.9 vs.1.8cm, p=0.01) and 2yr postop CVA(0.4 vs.1.8cm, p<0.01). Type 3: C7-CSPL was less accurate than C7-Proxy for immediate postop CVA(2.0 vs.0.6cm, p<0.01) and 2yr postop CVA (2.2 vs.0.6cm, p<0.01). No Type 4 was observed.

Conclusion: This novel system, which accounts for asymmetric knee flexion, PO, and LLD, provides guidance on using the most appropriate intraop alignment target to optimize both immediate and 2yr postop CVA with high accuracy.

The Error between Actual Postop CVA (Immediate, 2 Year) and Intraoperative Measurements (C7-CSPL, Proxy CVA)

PREOP *based on erect films		**INTRAOP**	**Immediate Postop CVA**		**2 Year Postop CVA**	
			Error (cm)	**P-Value**	**Error (cm)**	**P-Value**
1	**LLD<1cm and PO<1deg**	C7-CSPL	1.1 (1.2)	0.588	0.5 (0.5)	0.825
		C7-Proxy	0.9 (1.1)		0.5 (0.4)	
2	**LLD<1cm and PO>1deg**	C7-CSPL	**0.9 (0.6)**	**0.011**	**0.4 (0.3)**	**<0.001**
		C7-Proxy	1.8 (1.4)		1.75 (1.1)	
3	**LLD>1cm and PO>1deg**	C7-CSPL	2.0 (0.9)	**<0.001**	2.2 (0.8)	**<0.001**
		C7-Proxy	**0.6 (0.5)**		**0.6 (0.4)**	

*No type 4 (LLD with No PO) was observed in this cohort

Complications After Percutaneous Osteotomies of the Calcaneus

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Purpose: There is a sparsity of literature describing the outcomes of percutaneous techniques for hindfoot surgery given their relatively recent adoption. Therefore, our purpose is to describe the risk of complications with different types of calcaneal osteotomies performed via a percutaneous approach.

Significance: To our knowledge, this is the largest analysis of percutaneous calcaneal osteotomies to date.

Methods: One hundred and eighteen patients (unilateral feet) were treated with one of three common percutaneous calcaneal osteotomies. Sixty-five patients (55.1%) were treated with a medializing calcaneal osteotomy for hindfoot valgus, 32 patients with a Zadek Osteotomy (27.1%) for insertional Achilles tendinopathy, and 21 patients (17.8%) with a modified Dwyer osteotomy for hindfoot varus.

Results: The mean age was 46.2 years and there was a mean follow up of 16.1 months. The overall rate of postoperative complications was 3.4% (N=4), and no significant differences were found between the different osteotomy types. Complications included two cases (1.7%) of transient neuritis, one case of prolonged wound drainage (0.8%), and one non-union (0.8%).

Conclusion: Percutaneous calcaneal osteotomies are a safe alternative method for the treatment of conditions involving the hindfoot. The rate of postoperative complications may be less when compared to the reported rates of open hindfoot correction.

The Risk of Lymphedema Following Breast Cancer Surgery Should Not Restrict Necessary Hand Surgery Interventions

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Purpose: To evaluate the incidence of lymphedema onset or exacerbation in patients undergoing upper extremity interventions, both nonoperative and operative, after breast cancer surgery.

Significance: Breast cancer surgery patients are often told they cannot undergo upper extremity interventions out of concern for lymphedema despite a lack of evidence to support this claim.

Methods: The study inclusion criteria: 1. Prior history of breast cancer surgery; 2. Upper extremity intervention, ipsilateral to the breast cancer side; 3. Follow-up of at least 1 month. Patients were evaluated for demographic information, type of breast cancer procedure and hand intervention, number of lymph nodes dissected, pre-existing lymphedema, exacerbation of lymphedema, and new-onset lymphedema.

Results: A total of 161 patients undergoing 385 hand interventions (300 injections, 85 surgeries) were reviewed. Median follow-up was 31 months. 19 patients had pre-existing lymphedema ipsilateral to the hand procedure and none experienced an exacerbation. Three patients developed new onset lymphedema ipsilateral to their hand intervention at an average follow up of 30 months. One patient had a single injection while the other two had two injections.

Conclusions: Patients who have undergone breast cancer surgery can safely undergo upper extremity intervention with low risk of lymphedema exacerbation or onset.

Risk Factors and Rate of Conversion to Total Hip Arthroplasty Within 2 years After Hip Arthroscopy Utilizing a Large National Cohort of Commercially Insured Patients

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Purpose: To utilize a large, national database to analyze rates and predictors of conversion to total hip arthroplasty (THA) within 2 years of hip arthroscopy (HA). We hypothesize a higher rate of conversion in patients undergoing isolated debridement.

Significance: Current studies evaluating conversion to THA after HA do not stratify patients by age groups or procedure type.

Methods: Patients were identified from the 2013-2017 U.S. IBM MarketScan database. Multivariable logistic regression estimated risk factors for conversion to THA. Kaplan-Meier tests estimated median time to conversion. Univariable comparisons were made with log-rank tests. Chi-square tests compared rates of conversion.

Results: Overall, 3640 FAI, 1047 debridement, and 507 labral repair subjects were identified. The debridement group had the highest rate of (12.51%, repair: 8.68%, FAI: 6.87%, $p<0.001$) and the shortest median time to conversion (10.13 months, repair: 10.50 months, FAI: 11.82 months, log-rank $p=0.018$). Osteoarthritis, isolated debridement, and older age increased conversion rate. The 41-50 age group demonstrated a difference in conversion rate between procedure types ($p=0.043$) which was not noted in the ≤40 or >50 age groups.

Conclusion: Older age, osteoarthritis, and HA debridement increase rates of conversion to THA within 2 years. However, rates of conversion were still <15% at 2 years.

Non-Operative Management of First Time-Time Patellar Dislocation in the Pediatric Population: Risk of Recurrence and Functional Outcomes

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Purpose: Determine the incidence of recurrence and its risk factors, and the functional outcomes after non-operative management of first-time patellar dislocation.

Significance: This study suggests that despite the relatively high risk of recurrence, non-operative treatment of a first-time patellar dislocation is still a viable option with excellent functional outcomes

Methodology: A retrospective review of pediatric patients presenting with a first-time patellar dislocation was performed. All recurrent patellar instability/dislocation episodes were extracted, and statistical analysis was performed to determine the risk factors for recurrence.

Results: 176 knees in 158 patients (102F) (14.0±2.5 years) were included. Patients were followed for a mean of 16.4±17.1 months. 72 knees experienced recurrent patellar instability (41%). On a multivariate binary logistic regression model, trochlear dysplasia (OR:4.53, 95%CI:1.61–12.7, P=0.004), Patella alta as defined by CD index >1.3 (OR:4.27, 95%CI:1.76–10.3, P=0.001), and TT-TG>15mm (OR:2.49, 95%CI:1.3–6.03) were significant risk factors for recurrence. Both groups were similar in all PROMs at the initial visit. The Lysholm score, Pedi-IKDC, KOOS-Child pain, and KOOS-Child QoL improved significantly at the final follow-up in all patients.

Conclusion: We found a 41% recurrence rate in first-time patellar dislocators treated non-operatively, with trochlear dysplasia, patella alta, and TT-TG>15 being risk factors for recurrence.

High Variability in Pelvic Orientation in the Lateral Decubitus Position Negatively Effects Acetabular Component Abduction

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Purpose: Acetabular component positioning is critical to total hip arthroplasty (THA). We hypothesized high variability in pelvis orientation in the LDP and sought to determine factors that increase risk. Second, we hypothesized a malpositioned pelvis leads to placement outside the safe zone for abduction.

Methods: A retrospective review of X-rays from 413 posterior THA in the LDP. Pelvic tilt and rotation, acetabular component abduction were measured on intra-operative and post-operative X-rays. Proper pelvic orientation (PPO) was tilt and rotation +/- 15° neutral. Proper abduction (PA) 30-50° of abduction.

Results: Average pelvic tilt and rotation were 5.2° inlet and 5.3° obturator oblique. PPO was obtained in 284/413 (69%). PPO in 168/221 patients (76.0%) with the Capello or Wixon positioner, compared to 116/192 (60.4%) with De Mayo positioner ($p<0.01$). Shorter patients were found to have a higher rate of PPO ($p<0.01$). PA was obtained in 249/284 (87.6%) within PPO, as compared to 103/129 (79.8%) without PPO ($p=0.04$) OR 2.7 (1.35-5.39)

Conclusion: Pelvis orientation in the LDP is highly variable. Certain positioners and height are associated with significant malpositioning. Component abduction is negatively affected by improper positioning. Given high variability of pelvic orientation, external alignment guides may lead to erroneous component placement.

Timing of Preoperative Antibiotics is Not Associated with Infection After Total Knee Arthroplasty

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Purpose: To determine if the timing of preoperative antibiotics is associated with postoperative infection after total knee arthroplasty (TKA).

Significance: Since the 2003 NIH consensus statement, the use of prophylactic preoperative antibiotics in TKA has been the standard of care. Studies have shown that the administration of antibiotics needs to be within one hour before skin incision; however, no specific time frame has been delineated.

Methods: A prospectively collected institutional database was manually reviewed for patients undergoing primary TKA between March and December 2020. Analyses were performed to compare patients who received antibiotics at 15-minute intervals within 60 minutes of skin incision, and those who received antibiotics more than 60 minutes before skin incision.

Results: Of the 2,511 patients, 19 had postoperative infections, 7 SSIs and 12 PJIs. The timing of antibiotic administration ranged from 5 to 125 minutes before incision. 15 infections occurred in the 0-30 minutes prior to incision group. There were no infections in those who received antibiotics greater than 1 hour prior to incision. There was no difference in infection rate between those who received antibiotics within an hour and those who received antibiotics greater than an hour before skin incision ($p=0.49$), and there was no difference between each time interval of administration ($p=0.45$).

Conclusion: This study demonstrates that timing of preoperative antibiotics is not associated with postoperative infection after TKA.

Sensitivity of Magnetic Resonance Imaging for Detection of Medial Patellofemoral Ligament Injury

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Montefiore Medical Center

Purpose: Our study evaluates the diagnostic utility of MRI for assessing MPFL integrity in patients with recurrent instability after failed conservative management.

Significance: MRI is frequently obtained for patients with patellar instability due to traumatic event, ligamentous laxity, or predisposing anatomic factors. There are a number of reconstructive options available when conservative management is not effective. However, limited data exists regarding the sensitivity and specificity of MRI for diagnosing MPFL injury.

Methods: A single-institution retrospective review from January 2016 to September 2021 was conducted, including cases of isolated MPFL reconstruction or combined procedures. Patients with infection, associated fracture, and no pre-operative MRI were excluded. Sensitivity of MRI in detecting MPFL rupture based on confirmed intra-operative rupture was assessed.

Results: Our analysis included 113 patients (52 males; 61 females). Interestingly, 43/113 of MRI reports did not document MPFL integrity. When specifically analyzed, 27/70 radiologist reads reported intact MPFL. Only 43/113 reports correctly identified the ruptured MPFL.

Conclusion: The sensitivity of MRI for detecting MPFL rupture was 61.4% when the official report specifically mentioned the MPFL. MRI may not be sensitive for evaluating MPFL injury and there must be more effective communication between surgeons and radiologists to ensure analysis of critical structures.

The Impact of Mental Health on Postoperative Outcomes for Adolescents Undergoing Posterior Spinal Fusion for Idiopathic Scoliosis in an Urban Tertiary Care Children's Hospital

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Purpose: This study aimed to assess preoperative and postoperative mental health, self-image, and pain scores in patients undergoing posterior spinal fusion for adolescent idiopathic scoliosis (AIS-PSF).

Significance: Pediatric patients with higher levels of pre-surgical depression and anxiety before AIS-PSF may experience worse postoperative outcomes.

Methodology: A retrospective cohort of 258 AIS-PSF patients (14.9 ±2.1 years, 76% female) at an urban tertiary care children's hospital from 2013-2019 were analyzed in terms of self-reported surveys (SRS-30, SRS-22) throughout their pre- and postoperative course using Pearson bivariate analyses.

Results: Significant correlations were found between preoperative mental health and preoperative pain ($r=0.52$, $p<0.01$), pre-operative and 6-week postoperative mental health scores ($r=0.48$, $p<0.01$), 6-week and 6-month postoperative mental health scores ($r=0.77$, $p<0.01$), as well as 6-month postoperative mental health and 6-month postoperative self-image ($r=0.71$, $p<0.01$). Compared to their preoperative baseline, 29% of patients had worse mental health scores at 6-week follow-up, while 32% had worse mental health at 6-month follow-up.

Conclusion: AIS-PSF patients with low preoperative mental health scores were more likely to have worse postoperative mental health, self-image, and pain scores. Our results support the importance of recognizing the interconnectedness of pathophysiology, mental health, and general well-being when trying to improve long term outcomes.

Nationwide Utilization Trends of Outpatient Total Knee Arthroplasty

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Purpose: The purpose of this study was to evaluate the utilization, typical outpatient population, and postoperative outcomes of outpatient TKA compared to inpatient TKA.

Significance: With primary total knee arthroplasty (TKA) removed from the inpatient only list, major strides have been made to efficiently transition TKAs to the outpatient setting.

Methods: Prospectively collected data from over 700 hospitals was queried to isolate patients who underwent TKA between 2015 and 2020. Proportional utilization trends of outpatient vs. inpatient TKAs, patient demographics, and postoperative outcomes were compared.

Results: A total of 301,965 TKA patients were identified. Of these, 17,066 (5.65%) were done as outpatients and 284,899 (94.35%) were done as inpatient stays between 1 and 5 days. The proportion of TKA done as outpatients was higher in 2020 than 2015 (1.1% vs 13.6%, $p<0.001$). Outpatients were younger and lower body mass index, and a greater proportion were male. Outpatients also had lower rates of complications, readmission, and reoperation.

Conclusion: Patients undergoing outpatient TKA were associated with lower risks of 30-day adverse events, as well as readmissions and reoperations compared to patients who had inpatient TKAs. This national data suggests younger men, with comparatively lower BMIs are the typical patient undergoing outpatient TKA.

Epidemiology and Outcomes of Ankle Injuries In The National Football League

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Purpose: We hypothesized that ankle injuries lead to persistent decreases in National Football League (NFL) performance metrics in the years following injury.

Significance: Ankle injuries are frequently complicated by time loss and persistent symptoms, but the effect on NFL player performance is unknown.

Methods: Ankle injuries sustained by NFL players during the 3 NFL seasons were identified, and cumulative incidence and return to play (RTP) rate were calculated. Mean power rating (PR) was calculated in the pre-injury (Y–1) and post-injury seasons (Y+1 and Y+2) and compared using paired t-tests. Subgroup analyses of PR were performed by player position, injury type, and years of experience category.

Results: 668 ankle injuries were identified (cumulative incidence=11.2%, RTP rate=91%). 159 of these injuries met inclusion criteria for the PR analysis. The mean PR_{Y-1} (96.95) declined significantly to 76.10 in PR_{Y+1} (–22%, p<.001), and 70.93 in PR_{Y+2} (–27%, p<.001). The mean PR per game played decreased from 6.70 in Y–1 to 5.75 in Y+1 (–14%, p<.001), and 5.54 in Y+2 (–17%, p <.001).

Conclusion: Ankle injuries hamper the performance of NFL players even multiple years after the injury occurs despite a relatively high return to play rate.

Identification of Novel Genetic Markers for Risk of Spinal Pathologies: A Genome-Wide Association Study of Two Biobanks

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Purpose: To determine if there are genetic markers that influence risk of developing spinal pathologies such as lumbar spondylolisthesis, spinal stenosis, degenerative disc disease, and postsurgical complications such as pseudarthrosis after spinal fusion.

Significance: Identifying genetic risk factors for spinal disorders may lead to knowledge on underlying molecular mechanisms and development of new treatments.

Methods: Cases of lumbar spondylolisthesis, spinal stenosis, degenerative disc disease, and pseudarthrosis were identified from the UK Biobank, a prospective cohort of approximately 500,000 United Kingdom residents. Controls were patients without the diagnosis. Whole-genome regressions were used to test for genetic variants associated with each phenotype. External validation was performed in the FinnGen Biobank.

Results: Two loci corresponding to the LOC105376270 gene were associated with pseudarthrosis. Another locus on chromosome 2 spanning genes GFPT1, NFU1, AAK1, LOC124906020 was associated with lumbar spondylolisthesis. Two loci on chromosomes 2 and 12 spanning GFPT1, NFU1, PDE3A were associated with spinal stenosis. Degenerative disc disease was associated with three loci on chromosomes 6, 10, and 15 spanning genes CHST3, LOC102723493, SMAD3. Several of these genes were replicated in the FinnGen Biobank.

Conclusion: Common spinal pathologies were associated with variants in several genes, several of which have not been previously identified.

Preoperative Opioid Use is Associated with Worse Preoperative Patient Reported Outcomes in Hip Arthroscopy Patients

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Purpose: This study evaluated the rate of preoperative opioid usage and its association with preoperative PROs.

Significance: As hip arthroscopy has grown recently; it is important to utilize PROs to guide clinical practice. Yet, there is limited literature on the association between PROs in hip arthroscopy and preoperative opioid usage.

Methods: Patient undergoing hip arthroscopy from 2015-2022 were administered six PROMIS domains, NPS, and MODEMS Expectations domain preoperatively. Chart review identified preoperative opioid use 6 weeks before surgery. Associations between preoperative opioid use and PROs were determined, and significant associations were tested by multivariate analysis to determine independent predictors.

Results: 21 of the 123 patients (17%) were taking opioids preoperatively. Prior orthopaedic or other surgeries were associated with preoperative opioid use. Preoperative opioid use was associated with worse preoperative PROMIS Physical Function, Pain Interference, Fatigue, Social Satisfaction, Depression, NPS operative hip and whole body. Preoperative opioid use was independent predictor of worse baseline PROMIS PI, Fatigue, SS and NPS operative hip.

Conclusion: Hip arthroscopy patients with preoperative opioid use had worse baseline function, pain, satisfaction, and depression and was predictive of worse baseline pain, fatigue and social satisfaction. Preoperative opioid use should be identified and its effects on PROs considered.

The Ultrastructure of the Developing Human Anterior Cruciate Ligament: A Preliminary Analysis Using Scanning Electron Microscopy

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Purpose: To investigate the ultrastructural anatomy of the developing human anterior cruciate ligament (ACL) enthesis in the early post-natal stage.

Significance: The ultrastructure of the human developing ACL enthesis is not well understood. An improved understanding may help inform targets for innovative approaches to restore the native insertion site during ACL reconstruction surgery.

Methods: Fresh-frozen human cadaveric knees at 1-month and 24-months of age were obtained. Both specimens underwent anatomical dissection to isolate the ACL insertion to the tibial chondroepiphysis. Samples were then prepared for SEM to examine the ultrastructural anatomy of the enthesis.

Results: SEM analysis of the 1-month-old post-natal ACL enthesis revealed a shallow interdigitation between the soft and hard tissues, with minimal transition zone. In contrast, while the depth of interdigitation remains shallow, a distinct transition (i.e., fibrocartilage) zone within the ACL enthesis between the ligamentous tissue and chondro-epiphysis is apparent in the 24-month-old post-natal specimen.

Conclusion: Our preliminary results suggest the ACL enthesis of the developing knee begins to mimic that of an adult by 24-months of age, as a more complex transition between ligamentous and chondro-epiphyseal tissue is developed, which may be related to mechanical loading of the enthesis with the onset of weightbearing.

One-Year Outcomes of Hip Fracture Patients for a Health System at the Epicenter of the COVID-19 Pandemic: A Multicenter Cohort Study

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Numerous studies have shown an increase in 30-day morbidity and mortality for COVID+ geriatric patients with hip fractures but there are no studies on long-term outcomes of these patients.

Data was retrospectively collected for all patients over 55 who presented from March 1 to May 31, 2020. The same period in 2019 was used as a control group. Primary outcomes were mortality and major postoperative complications at 1, 3, 6, and 12 months. The 2020 and 2019 cohorts were compared as well as COVID+ versus COVID-. Variables found to be associated with outcomes of interest were included in a multivariate analysis using binary logistic regression.

There was no difference in patient or injury characteristics, or time to presentation or OR for either group. There were lower rates of aspiration pneumonia in 2020 and no difference in other postoperative complications. COVID+ patients had higher rates of PE, infectious pneumonia, and mortality and an increased risk of 30-day postoperative VTE (OR=6.58). Heart failure, ASA 3, and AKI were independent risk factors for 1-year mortality.

COVID+ patients have increased risk of postoperative mortality and pulmonary and thromboembolic complications. AKI is an independent risk factor for postoperative mortality for geriatric hip fractures.

Surgical Duration Increases the Risk of Infection Following Total Knee Arthroplasty

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Purpose: To determine if prolonged surgical duration and tourniquet time are associated with postoperative complications.

Significance: Risk stratification is used to optimize outcomes and minimize complications. Intraoperative modifiable risk factors such as surgical duration and tourniquet time can be controlled to improve patient outcomes.

Methods: A prospectively collected institutional database was used to review patients undergoing total joint arthroplasties (TKAs) between March 2020 to December 2020. Surgical duration and tourniquet time were measured and compared against the rate of periprosthetic joint infection (PJI) and superficial surgical site infection (SSI) rate. PJI was defined based on MSIS criteria, and superficial SSI included infections not meeting MSIS criteria.

Results: Of the 2,511 patients, 19 were found to have an infection. Average surgical duration of 120 minutes was associated with increased risk of infection compared to 103 minutes for TKAs without infection ($p=0.02$). Also, infected patients had an average tourniquet time of 79 minutes, whereas patients without infections averaged 62 minutes ($p=0.004$).

Conclusion: Our study demonstrates the risk of infection increases with longer surgical duration and tourniquet time. While there are many circumstances that can lead to increased surgical time, surgeons should strive to maximize efficiency to minimize the risk of postoperative infection.

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