Final Program

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Nov. 5–8, 2026

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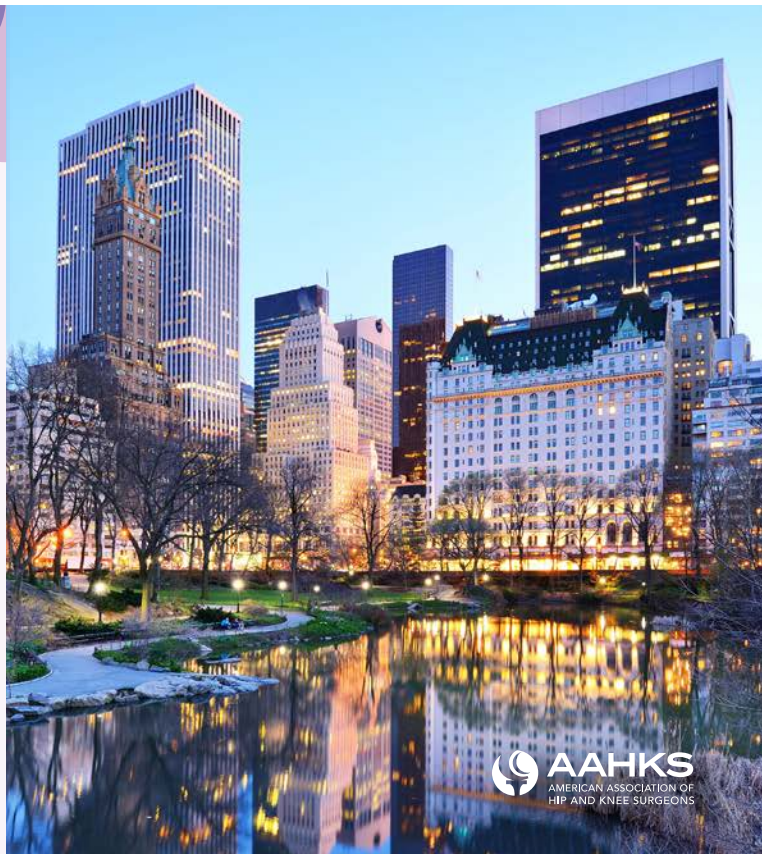
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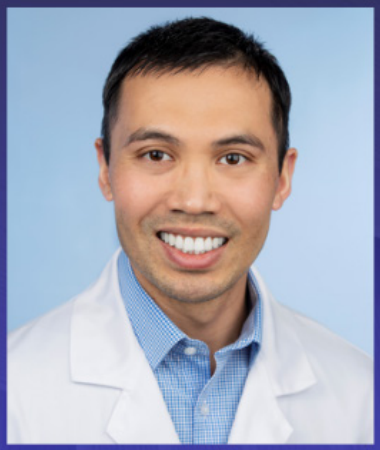
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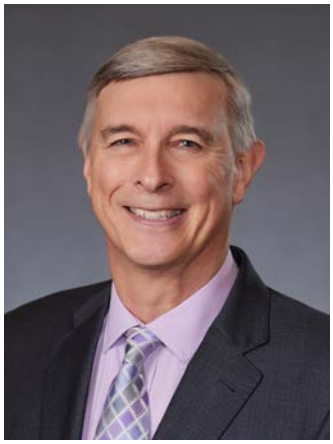


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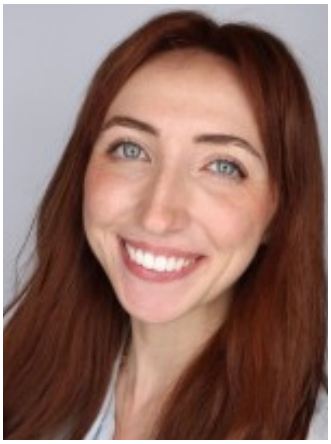
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EDUCATIONAL ACTIVITY SCOPE

The 2026 AAHKS Annual Meeting is designed to provide practicing orthopaedic surgeons with research-based, state-of-the-art information on diagnosis, surgical and non-surgical treatment options and overall management of hip and knee conditions. This educational activity includes the review of the most current scientific research study findings, faculty and participant discussions and interactive symposia. It covers multiple clinical topics such as primary and revision total hip arthroplasty, primary and revision total knee arthroplasty, non-arthroplasty, infection, complications other than infection as well as health policy. It is aimed at improving overall surgeon competence related to the care of patients with arthritis and degenerative diseases.

OBJECTIVES

Upon completion of this educational activity, participants will be able to:

- Synthesize the most current research study findings in hip and knee condition management
- Evaluate various surgical and non-surgical treatment options (e.g., primary total joint arthroplasty, revision total joint arthroplasty, non-arthroplasty) in hip and knee condition management
- Assess the efficacy of new treatment options through evidence-based data
- Interpret relevant health care policy

ACCREDITATION AND CME CREDIT

The American Association of Hip and Knee Surgeons (AAHKS) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

AAHKS designates this live activity for a maximum of 18 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

CLAIM CME CREDITS

Once the meeting concludes, AAHKS will send an email and an app notification with a link to the Annual Meeting evaluation. At the end of the evaluation, you will be redirected to claim CME credit. It is the meeting attendee's responsibility to claim credits based on the hour-for-hour participation in the educational activity.

DISCLAIMER

The material presented at this 2026 Annual Meeting has been made available by AAHKS for educational purposes only. This content is not intended to represent the only method or practice appropriate for the medical situations discussed; it is intended to present a balanced and scientifically sound view, approach, statement or opinion of the faculty, which may be helpful to others who face similar situations, or afford a forum to discuss, debate and explore new and evolving topics. The presentation of topics and any data about clinical practices should not be interpreted as advocating for, or promoting, practices that are not, or not yet adequately based on current science, evidence and clinical reasoning.

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By attending the Annual Meeting, participants acknowledge and agree that AAHKS and/or its agents may record the Program and related events, use audio and video recordings, photographs, and presentation materials such as slides and abstracts for AAHKS's purposes, including but not limited to other educational products, news, advertising and promotional purposes, without compensation.

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Some pharmaceuticals and/or medical devices demonstrated or discussed at the Annual Meeting have not been cleared by the US Food and Drug Administration (FDA) or have been cleared by the FDA for specific purposes only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each pharmaceuticals and/or medical device he or she wishes to use in clinical practice. The AAHKS policy provides that "off label" status of the device or pharmaceutical is also specifically disclosed (i.e. that the FDA has not approved labeling the device for the described purpose). Any device or pharmaceutical is being used "off label" if the described use is not set forth on the product's approved label.

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Each planner, presenter or contributor to the Annual Meeting has been asked to disclose if they have received something of value from a commercial company or institution, which relates directly or indirectly to the subject of their presentation.

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For the most up to date disclosure list, please visit www.AAHKS.org/Meeting.

Presenting the 2026 Lawrence D. Dorr, MD Humanitarian Award to Robyn J. Hakanson, MD



AAHKS is proud to present the 2026 Lawrence D. Dorr, MD Humanitarian Award to Robyn J. Hakanson, MD. Dr. Hakanson is a board-certified orthopaedic surgeon in Salem, VA. In 2009, Dr. Hakanson, along with other female surgeons, co-founded Women Orthopaedist Global Outreach (WOGO). WOGO's mission is to restore mobility around the globe and deliver life-changing orthopaedic care in places where treatment is often out of reach, helping patients regain mobility, reduce pain and expand their independence and opportunities.

In 2006, Dr. Hakanson spoke on a panel that consisted of five women who all shared an equal drive and purpose for women and arthritis. This experience led to the formation of WOGO – five female orthopaedic surgeons who all share the same goal to deliver life-changing total joint arthroplasty in underserved global communities. Through strengthening health care delivery and empowering patients and health care professionals, WOGO works to make a difference on a global scale and to respond to the unique needs of everyone but specifically women with knee arthritis who experience more advanced stages of joint disease and greater disability, while often facing barriers to receiving effective long-term treatment.

Dr. Hakanson saw this as the perfect opportunity to combine her passions of orthopaedics and philanthropy – knowing how women are disproportionately affected by arthritis and how routine orthopaedic reconstructive procedures are not readily available to them in certain parts of the globe. Despite hectic schedules and competing demands, each surgeon's commitment remained strong. It was 2008 when Zimmer Biomet agreed to provide support to WOGO's mission, allowing them to organize their first outreach trip to Katmandu, Nepal.

Over the years, WOGO has continued to expand and grow, adding other likeminded female surgeons to the team who are committed to reducing the impact and severity of knee arthritis. Through their various medical trips, WOGO has helped in providing care for underserved communities who experience limited access to care and treatment. AAHKS thanks Dr. Hakanson for her role in creating WOGO and providing much needed care globally.

The Lawrence D. Dorr, MD Humanitarian Award recognizes AAHKS members who have distinguished themselves by providing humanitarian medical services and programs with a significant focus on musculoskeletal diseases and trauma including the hip and knee in the United States or abroad.

For more information on the Lawrence D. Dorr, MD Humanitarian Award, please go to **www.AAHKS.org/Humanitarian.**

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Presenting the 2026 Presidential Award to Michael A. Mont, MD

Each year, the American Association of Hip and Knee Surgeons (AAHKS) Presidential Award is presented to a member who exemplifies exceptional service to the association and the arthroplasty profession. AAHKS President Antonia F. Chen, MD, MBA is proud to bestow the 2026 Presidential Award on Michael A. Mont, MD, in recognition of his longstanding contributions to the organization and the field of hip and knee arthroplasty.

Dr. Mont has been a committed member of AAHKS since 2008. His service has been most visible as Editor-in-Chief for the *Journal of Arthroplasty (JOA)*, the official journal of AAHKS that brings together the clinical and scientific foundations for joint arthroplasty. Dr. Mont has served in editorial roles for more than 35 years, starting during his fellowship in lower-extremity joint reconstruction under David S. Hungerford, MD and Kenneth A. Krackow, MD.

As Editor-in-Chief, Dr. Mont has worked to ensure that *JOA* provides education across the full breadth of research related to the practice of hip and knee arthroplasty and related topics, building on the strong foundations established by former Editors-in-Chief David S. Hungerford MD, William J. Hozack, MD and John J. Callaghan, MD. Dr. Mont has successfully expanded the journal's role as a forum not only for scientific research, but also for education, advocacy, health policy and issues directly affecting the clinical practice of AAHKS members.

Under his leadership, the journal has regularly featured reports from AAHKS committees and subcommittees, as well as commentaries on Centers for Medicare & Medicaid Services policies, reimbursement, quality measures and other matters important to arthroplasty surgeons and their patients. Dr. Mont has made it a priority to work closely with the AAHKS Board of Directors and successive AAHKS presidents, serving as a sounding board and helping translate the organization's priorities into timely publications. A recent example was a commentary co-authored with Dr. Chen and other AAHKS leaders that reconsidered federal functional-status measures for total hip and knee arthroplasty and advocated for more meaningful outcome assessment.

AAHKS also applauds Dr. Mont's commitment to leadership, education, mentorship and scientific advancement. His extensive body of published work has addressed a broad range of topics that have influenced the practice of hip and knee surgery. Equally important, he has devoted much of his career to teaching others how to develop research questions, conduct clinical investigations, obtain research support and communicate scientific findings. He has mentored more than 200 clinical and research fellows, many of whom have become leaders in AAHKS and the broader orthopaedic community.

As Editor-in-Chief of the *Journal of Arthroplasty*, Dr. Mont has dedicated countless hours to advancing our specialty and serving the arthroplasty community. Through his leadership, scholarship, and extraordinary commitment to the journal, he has helped ensure that important research reaches our community in a timely, thoughtful and meaningful way. What makes his contribution particularly remarkable is the personal time and energy he gives to this work, personally reviewing and editing manuscripts and helping multiple authors bring their work to the field. His service has strengthened not only the *Journal of Arthroplasty*, but also AAHKS and the entire arthroplasty community. It is my great honor to present Dr. Mont with the 2026 Presidential Award in recognition of his exceptional service, leadership and enduring commitment to our specialty," says Antonia F. Chen, MD, MBA, AAHKS President

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Presenting the 2026 Women in Arthroplasty Empowerment Award to Audrey K. Tsao, MD



It is with great pleasure that AAHKS presents the Women in Arthroplasty (WIA) Empowerment Award to Audrey K. Tsao, MD. Dr. Tsao is a leader, mentor and champion for women in arthroplasty whose career has been defined as much by the surgeons she has lifted as by her own accomplishments. As the inaugural Chair of the AAHKS Women in Arthroplasty (WIA) Committee, she took a brand-new committee and helped build it into one of the most active and influential committees in the organization. A place where women in hip and knee surgery could find one another, mentor one another, develop as leaders and advance. Many of the women who were once members of the WIA committee now sit on various other committees and AAHKS boards. They have even gone on to chair committees of their own.

"I am one of the many women whose career has been profoundly influenced by Dr. Tsao. As a resident, she personally recruited me to become involved in the AAHKS Membership Committee, recognizing potential in me before I fully recognized it in myself. Her mentorship has been transformative, not simply because of the opportunities she provided, but because she taught me to have confidence in my own abilities and, in turn, to create those same opportunities for others," says Antonia F. Chen, MD, MBA, AAHKS President.

Dr. Tsao has also been very influential in how industry engages with women in the arthroplasty field. She has said plainly, in public and in private, that a company cannot claim to support women in arthroplasty while its consultants and design teams include none, and she has pressed companies to bring women surgeons and engineers into the rooms where implants are designed and decisions are made.

"Dr. Tsao helped build the room the rest of us walked into. When WIA was just an idea with a very small group of us, she took WIA on and gave it a heartbeat. She made sure women in arthroplasty had mentors, a voice in AAHKS, and a seat at the industry table, long before most thought to ask. She has been generous with her time, her praise, and her belief in us, and she has never once done any of it for the credit. Every woman who has been handed a microphone or a committee seat owes some part of that to Audrey," says Kim K. Tucker, MD, AAHKS Women in Arthroplasty (WIA) Committee Chair.

Symposium I

Artificial Intelligence & Technology in Hip and Knee Arthroplasty: Clinic, Operating Room, Education/Research, and Back-Office Applications

Moderator: Brett C. Perricelli, MD

Artificial intelligence (AI) is moving from theoretical discussion to practical application in hip and knee arthroplasty. For arthroplasty surgeons, the central question is no longer whether AI will influence practice, but how it can be used safely, responsibly and effectively while preserving surgeon judgment and the surgeon-patient relationship. This symposium will provide a practical review of AI and technology applications across four domains of contemporary arthroplasty care. This symposium is structured to avoid overlap with broader technology discussions by organizing AI around the practical workflow of the arthroplasty surgeon. It is broken down into four sections: office, operating room, research/education and back office. The goal is a balanced session focused on actionable use, responsible adoption and preservation of surgeon oversight.

The introduction will briefly define relevant AI concepts, including large language models, generative AI, agentic workflows and clinical automation. Dr. Long will address clinic-based and patient-facing applications, including patient education, engagement platforms, ambient documentation, clinical communication and appropriate oversight. Dr. Lustig will discuss in-the-operating room AI and technology, current value and future directions. Topics include current robotic technology, semi-autonomous technology, emerging digital surgery concepts including robotics, automation and augmented reality, predictive AI and digital twins. Dr. Haddad will examine the role of AI in education and research, including knowledge synthesis, training, research efficiency, data analysis, scientific integrity and the responsible generation of evidence. Dr. DeCook will focus on the back office and the pre-operative pathway, including pre-operative optimization and readiness, prior authorization, denial prevention, billing and medical-necessity documentation, and the AI-assisted integration of the fragmented office systems that independent practices have historically struggled to control. The symposium will conclude with a moderated discussion addressing implementation, risks, vendor selection, privacy, responsible use and future directions for AAHKS members.

Learning Objectives:

1. Identify practical AI applications in clinic-based care, the operating room, education/research, and back-office workflows in hip and knee arthroplasty.
2. Describe the potential role of robotics, augmented reality, predictive AI, digital twins, and personalized technologies in contemporary surgical care.
3. Recognize opportunities for AI to support orthopaedic education, research, evidence generation, revenue cycle operations, denial management, billing, and systems integration.
4. Evaluate risks related to hallucination, privacy, bias, compliance, payer misuse, and overreliance while considering responsible implementation.

Outline:

Introduction
Brett C. Perricelli, MD

Out-of-Scrubs AI: Clinic-Based Tools, Patient Engagement, and Patient-Facing Technology
William J. Long, MD

In-the-OR AI and Technology: Digital Surgery, Prediction and Personalized Arthroplasty
Sebastien Lustig, MD, PhD

AI in Education and Research: Advancing Knowledge, Training and Evidence Generation
Fares S. Haddad, MD, FRCS (ORTHO)

The Connected Arthroplasty Episode: AI-Driven Pre-Operative Optimization, Authorization and Billing
Charles A. DeCook, MD

Discussion
All Faculty

Notes

Paper #1

AI-Enhanced Gait Analysis Tool Shows Long-Leg Alignment X-Rays May Not Show True Knee Alignment

Jaden Queen, BS, Jason J. Peres da Silva, BS, **Jeffrey A. Geller, MD**, John Ferrara, BS, Lauren Burgett, BS

Introduction: Long-leg alignment (LLA) radiographs have been the gold-standard for measuring coronal plane alignment for knee arthroplasty (KA) planning. However, evidence suggests that knee alignment often differs between standing and walking. These differences may cause planning errors, as LLA films only characterize static alignment. This study compared preoperative, radiographic, static hip-knee-ankle-angle (s-HKAA) to dynamic hip-knee-ankle-angle (d-HKAA) from an artificial intelligence-enhanced gait analysis tool to determine if LLA radiographs should indeed be the planning model in KA. We hypothesized that coronal deformity would be exacerbated during gait.

Methods: After IRB approval, 60 pre-KA patients were prospectively enrolled. Preoperative bilateral knee alignment was assessed using LLA radiographs (s-HKAA) and video-based gait analysis (d-HKAA) for a total of 81 varus and 39 valgus knees. Videos were captured using the Exer Health AI application. Agreement between d-HKAA and s-HKAA was evaluated using Bland-Altman analysis and paired t-tests. Linear mixed-effects models accounting for nonindependence were used to assess the association between s-HKAA and d-HKAA, as well as whether preoperative s-HKAA and d-HKAA predicted postoperative d-HKAA.

Results: In both varus and valgus knees, d-HKAA was significantly more neutral than s-HKAA ($p< 0.001$). Varus d-HKAA was attenuated by an average of 2.1° compared to s-HKAA, and valgus d-HKAA by an average of 3.2°. Linear mixed-effects modeling demonstrated a compression of deformity in gait compared to standing radiographs ($ß = 0.48$, $p < 0.001$). For each 1° of radiographic coronal deformity, a patient is predicted to have only 0.48° of angular deformity in midstance. Neither preoperative s-HKAA nor d-HKAA predicted postoperative d-HKAA ($p>0.05$).

Conclusion: The data were not consistent with the hypothesis: coronal deformity was stabilized by approximately 50% during gait. This significant compression of dynamic coronal deformity relative to radiographic measurements suggests that a dynamic assessment of knee alignment may help characterize alignment and ligament balancing more fully.

Notes

Paper #2

The Sagittal Plane Alignment of the Knee (SPAK) Classification. A New Phenotypic Framework

Darren Chen, FRACS, Filippo Leggieri, MD, Jil A. Wood, RN, Natasha Sergis, Samuel J. Grant, FRCSC, **Samuel J. MacDessi, FRACS**

Introduction: Sagittal plane alignment influences stability and kinematics in total knee arthroplasty (TKA) yet lacks a pragmatic phenotypic framework. This study introduces the Sagittal Plane Alignment of the Knee (SPAK) classification, integrating medial contact point (MCP) and medial tibial slope (MTS) to characterize sagittal tibiofemoral morphology.

Methods: Sagittal alignment was prospectively analyzed in 309 knees undergoing robotic-assisted TKA. Robotic-assisted MCP was measured at 90°, 45°, and 0°, and MTS was measured using computed tomography. MCP at 90° (mean 62.1%; SD 5.3%) and MTS (median 6.1°; IQR 4°-8.5°) were used to define nine SPAK phenotypes. Validation analyses assessed changes in SPAK type following functionally-aligned (FA) TKA, differences in 0-90° MCP according to SPAK type, and differences in sagittal laxity at 90° according to SPAK type.

Results: SPAK boundaries for MCP were anterior <55%, central 55-65%, posterior >65%; and for MTS, low <4°, neutral 4°-8°, and high >8°. Type V (central MCP, neutral MTS) was the most common phenotype (28.8%). Following FA TKA, SPAK distribution converged towards five phenotypes with Type V predominating (44.6%). FA anteriorized MCP at 90° (mean -6.5%; $p< 0.001$) and 45° (mean -5.4%; $p<0.001$) and posteriorized MCP at 0° across all phenotypes (mean 8.1%, $p<0.001$). Posterior MCP phenotypes (III, VI, IX) demonstrated the greatest anterior MCP translation at 45° at 90° following FA TKA. Type IV demonstrated the greatest sagittal laxity at 90° whereas posterior phenotypes (III, VI) demonstrated the least. Following FA TKA, native SPAK type no longer predictive sagittal laxity, indicating normalization of sagittal kinematics.

Conclusion: SPAK provides the first sagittal phenotypic framework, integrating medial tibiofemoral position and tibial alignment. SPAK phenotypes demonstrated constitutional variability associated with MCP changes and sagittal laxity, whilst FA TKA normalized these patterns. As individualized surgical strategies evolve, SPAK provides a new platform to study sagittal knee.

Notes

Paper #3

Kinematically Aligned TKA Shows Equivalent 13-Year Survivorship: A Combined Registry Analysis

Andrew Fraval, MBBS, MPH, FRACS, Chris Wall, MD, Dirk Van Bavel, MBBS, Mei Lin Tay, PhD, Michael J. McAuliffe, FRACS, Shumirai Mushangwe, PhD, Simon W. Young, FRACS

Introduction: Kinematic alignment (KA) using patient-specific instrumentation (PSI) has been proposed as an alternative to mechanical alignment in total knee arthroplasty (TKA), but long-term comparative survivorship data remain limited. This study aimed to compare long-term revision risk following KA-PSI TKA with other TKA of the same implant design.

Methods: We performed a registry-based cohort study using data from the Australian Orthopaedic Association National Joint Replacement Registry and the New Zealand Joint Registry. All primary cruciate retaining (CR) Triathlon TKA performed for osteoarthritis between January 1, 2011 and Dec. 31, 2013 were included with follow-up to Dec. 31, 2024. KA-PSI TKA were compared with all other CR Triathlon TKA implanted using conventional or computer-assisted techniques. The primary outcome was cumulative percent revision (CPR), and hazard ratios (HR) were derived using Cox proportional hazards models adjusted for age and sex.

Results: A total of 20,512 TKA were included, of which 454 were KA-PSI. Mean follow-up was 11.3 years for the KA-PSI group and 10.8 years for the Other TKA group, with a maximum of 13.7 years. The 13-year CPR was 4.9% (95% CI 3.1–7.7) for KA-PSI TKA and 4.4% (95% CI 4.1–4.7) for Other TKA, with no difference in revision risk (HR 1.06, 95% CI 0.68–1.65; P = 0.85). Revision indications were similar between groups. The most common aseptic cause of revision in the KA-PSI group was patella maltracking (15% of revisions).

Conclusion: Kinematically aligned CR Triathlon TKA implanted using patient-specific instrumentation demonstrates survivorship equivalent to conventional and computer-assisted techniques at up to 13 years. These findings support the long-term durability of kinematic alignment without an increased revision risk; however, physicians should remain aware of the potential for patella-related complications.

Notes

Paper #4

Is Tibial Joint Line Parallel To Ground After TKA? A Dynamic Test of Kinematic-Alignment Assumption

Carmelo Burgio, MD, David J. Mayman, MD, Eytan M. Debbi, MD, PhD, Fernando J. Quevedo Gonzalez, PhD, **Karan Goswami, MD, PhD**, Karlos Zepeda, DO, MS

Introduction: TKA planning relies on static hip-knee-ankle (HKA) alignment and CPAK phenotyping from standing radiographs, yet modern alignment strategies require understanding of the reconstructed limb during function. Kinematic alignment justifies accepting native joint-line obliquity(JLO) by assuming the tibial joint line is parallel to the ground during gait. However, this assumption has not been verified. Recent biomechanical work shows dynamic coronal alignment diverges from radiographic HKA, and varies with knee flexion intraoperatively. This study tested the parallel-to-ground assumption directly and characterized dynamic tibial JLO across stance after TKA.

Methods: Twenty-seven patients at 1-year after primary TKA underwent biplanar-EOS imaging and motion capture during level walking. Implant components were registered to motion markers on postoperative radiographs. Femur and tibia were modeled as independent rigid bodies. JLO relative to ground was computed across stance, with a prespecified 20-80% analytic window to limit flexion-induced rotational confounding.

Results: Static-HKA clustered between -3.4° valgus and +4.0° varus. Despite this static neutrality, the dynamic tibial joint line was not parallel to ground during gait. During 20-80% stance, JLO sat in mild valgus across the cohort (predominantly -3° to -6°), with progressive divergence through late mid-stance. By terminal stance, individual peaks reached +7° varus and -10° valgus; a ~17° dynamic-JLO range despite only ~7° of static variation. Standing HKA did not predict the magnitude of dynamic-JLO excursion.

Conclusion: Dynamic-JLO shows inter-patient and phase-specific variability after TKA, revealing functional coronal-plane behavior that static HKA and CPAK phenotyping may miss. Dynamic-JLO and dynamic-HKA may bridge mechanical alignment, kinematic joint-line restoration, and functional alignment by quantifying whether an arthroplasty behaves stably during gait. Further work is needed to corroborate these findings with PROMs, subjective instability, and functional tasks (e.g.stairs); these metrics could become clinically-actionable endpoints with dynamic measurements informing implant fixation failure mechanisms, which manifest in motion rather than static stance.

Notes

Paper #5

A Novel Nerve Selective Therapy is Superior to Intraarticular Corticosteroid for Knee Osteoarthritis

Matthew Higgs, MD, Robert J. Yong, MD, MBA, Vincent E. Rampersaud, MD, David Provenzano, MD, Paul C. Pappademos, MD, Casey Wagner, MD, Sameer Ahmed, MD, Ajay Antony, MD, Douglas Beall, MD, Ramana Naidu, MD, Maxim Eckmann, MD, Josh Ferrell, MD, **Yogesh Mittal, MD**

Introduction: Intraarticular corticosteroids injections (IACS) are used for management of symptomatic osteoarthritis of the knee (OAK) but are associated with short-term relief and accelerated cartilage damage. BXT-786 (ReneurxTM), a novel, nerve-selective biomaterial administered adjacent to nerve branches of the knee joint for prolonged analgesia, is a potential alternative to IACS.

Methods: A multi-center, randomized controlled trial investigated the use of BXT-786 compared to IACS in 265 subjects with OAK (23.7% Kellgren-Lawrence [KL] stage-2, 43.0% KL-3, and 33.3% KL-4), (ClinicalTrials.gov ID: NCT06700109). The study evaluated the safety and effectiveness of BXT-786 and the treatment impact on pain and function at 6 months follow-up. Outcomes were Numerical Rating Scale (NRS) pain and Knee Injury and Osteoarthritis Outcome Sores, Joint Replacement (KOOS, JR) scores.

Results: At baseline, BXT-786 and IACS treatment groups had no limits on BMI and were statistically homogenous in demographics, KL severity, and mean NRS pain and KOOS-JR scores. The BXT-786 group had a higher rate of subjects, at all KL stages, that reached ≥30% reduction in knee pain, compared to IACS, at 3 months (82.2% vs. 63.8%, $p< 0.001$) and 6 months (85.1% vs. 61.3%, $p< 0.0001$). The BXT-786 group had a higher rate of subjects than IACS that reached ≥50% (76.0% vs. 46.3%, $p< 0.0001$) and ≥80% (53.9% vs. 26.3%, $p< 0.0001$) pain reduction at 6 months. In subjects with BMI≥30, the BXT-786 group had a 23.9% higher rate of responders than IACS. The BXT-786 group had a higher mean KOOS, JR score than IACS (69.5±17.7 SD vs. 60.6±16.0 SD) at 6 months, that approached the Patient Acceptable Symptom State benchmark (70). Of the BXT-786 device-related adverse events, 98.3% were primarily mild/moderate erythema or swelling which resolved without intervention.

Conclusion: BXT-786 nerve-selective therapy is a safe, effective treatment for OAK that demonstrated superiority to IACS for pain reduction and functional outcome.

Notes

Paper #6

Meniscal Root Tears: Medial Unicompartmental Knee Arthroplasty vs. Meniscal Root Repairy

Christopher M. Melnic, MD, Donnell L. Williams, BS, Hany S. Bedair, MD, **Kyle G. Alpaugh, MD**, Majd Marrache, MD, Rohan Singh, BS, Timothy Matthews, BS

Introduction: The use of medial unicompartmental knee arthroplasty (UKA) for management of symptomatic meniscal root tears with isolated pre-existing osteoarthritis is underexplored. Conversely, appropriately selected patients undergoing meniscal root repair demonstrate variable healing rates and endure a substantial rehabilitation burden. Medial UKA may be a reasonable management option for those unlikely to substantially benefit from root repair. This study compared patient-reported outcome measures (PROMs) and complication rates between patients who underwent medial meniscus root repair vs. medial UKA.

Methods: Patients ≥55 years diagnosed with a medial meniscal root tear were retrospectively identified from a multi-institutional registry. Imaging and operative reports were reviewed to identify patients who underwent medial meniscus root repair or UKA. Fifty-four root repair patients were matched 1:1 to UKA patients on baseline demographics, including age, sex, body mass index, Charlson Comorbidity Index, and American Society of Anesthesiologists classification. Baseline characteristics, PROMs, minimal clinically important difference (MCID) achievement, and 2-year complication rates were compared.

Results: Demographics and follow-up times were similar between groups. Medial UKA patients had higher medial compartment KL grades (3.6 vs. 2.7, P< 0.001). Preoperative Knee Injury and Osteoarthritis Outcome Score Physical Function Short Form (KOOS-PS) scores were lower in the UKA group (53.5 vs. 62.4, P=0.041). At follow-up, UKA patients demonstrated greater improvement in KOOS-PS (18.4 vs. 8.0, P=0.006) and higher MCID achievement (87.5 vs. 52.4%, P=0.004). Improvements in the Patient-Reported Outcomes Measurement Information System Physical Function Short Form-10a (PROMIS PF-10a) and MCID achievement were similar between groups (P=0.258 and P=0.999, respectively). There were no significant differences in 2-year conversion to arthroplasty or reoperation rates.

Conclusion: Medial UKA was associated with greater improvement and higher MCID achievement in the joint-specific KOOS-PS compared to medial meniscus root repair, while PROMIS outcomes and complication rates were similar. UKA may provide superior joint symptom relief in selected patients.

Notes

Paper #7

Slower Preoperative Gait Speed Predicts Achievement of Clinically Relevant PROM Thresholds After TKA

Evan R. Deckard, BS, **John B. Meding, MD**, R. Michael Meneghini, MD

Introduction: Patient-reported outcome measures (PROMs) are increasingly used to define meaningful improvement after total knee arthroplasty (TKA). Prior work suggests patients with worse preoperative status may achieve greater improvement in PROMs. Gait parameters are objective markers of knee function, but associations with PROMs after TKA are not well established. This study evaluated whether clinical variables or gait parameters, particularly gait speed, predict achievement of clinically relevant PROM thresholds after TKA.

Methods: Forty patients undergoing primary TKA were prospectively enrolled and underwent preoperative and postoperative three-dimensional level-ground walking gait analysis using infrared motion capture. Fifteen demographic variables, comorbidities, potential covariates, and 16 gait parameters including gait speed were evaluated. Multivariable logistic regression analyses identified predictors of achievement of clinically relevant thresholds in validated PROMs at a significance level of 0.05. Mean follow-up related to PROMs was 26.0 months.

Results: The cohort was 65% women, with a mean age and body mass index (BMI) of 69 years and 31 kg/m2, respectively. Preoperatively, most patients (69%) had varus tibiofemoral alignment. In multivariable analysis, slower preoperative gait speed was independently associated with higher odds of achieving the KOOS JR patient-acceptable symptom state threshold (odds ratio [OR] 0.14, 95% CI, 0.02-0.93, P = 0.041) and the minimal clinically important difference for the Knee Society pain with climbing stairs score (OR 0.15, 95% CI, 0.03-0.87, P=0.035). Receiver operating characteristic analysis demonstrated good predictive ability of preoperative gait speed for these outcomes (area under the curve, 0.763-0.772).

Conclusion: Slower preoperative gait speed may be a surrogate for osteoarthritis severity and was associated with greater likelihood of achieving clinically relevant postoperative PROM thresholds after TKA with numbers available for study. Preoperative gait speed may serve as a simple, objective marker for preoperative counseling and identification of patients more likely to achieve meaningful improvement.

Notes

Paper #8

Comparing Time to Meaningful Recovery After Unicompartmental vs. Total Knee Arthroplasty

Christopher M. Melnic, MD, Donnell L. Williams, BS, Hany S. Bedair, MD, Olivia Bono, MD, Rohan Singh, BS, Zainab Ibrahim, MD

Introduction: Unicompartmental knee arthroplasty (UKA) is associated with faster early recovery than total knee arthroplasty (TKA). However, whether these differences are clinically meaningful – as measured by the minimal clinically important difference (MCID) – remains unclear. This study aimed to compare the proportion of patients achieving the MCID and the time-to-MCID between procedures. We also sought to compare complication rates between groups.

Methods: This study used a propensity-matched, retrospective cohort design based on data from a multi-institutional database (2016-2025) of adults undergoing UKA or TKA with minimum two years of follow-up. Patients were matched 1:5 (UKA:TKA) on age, sex, body mass index, Charlson Comorbidity Index, and American Society of Anesthesiologists classification. Distribution-based MCIDs were calculated for the Knee Injury and Osteoarthritis Outcome Score Physical Function Short-form (KOOS-PS), Patient-Reported Outcomes Measurement Information System (PROMIS) Global Physical Health, and PROMIS Physical Function Short-form 10a (PF-10a). Time-to-MCID was assessed using non-interval-censored and interval-censored survival analyses. Reoperations were categorized at two and five years.

Results: 1,738 UKA and 8,206 TKA patients were included. MCID achievement rates were comparable between cohorts for the KOOS-PS (73.3 vs. 70.2%, P=0.111) and PROMIS Global Physical Health (65.4 vs. 67.1%, P=0.591). However, UKA patients were more likely to achieve the MCID for the PROMIS PF-10a (77.6 vs. 72.0%, P=0.002). Using interval-censored analyses, both groups achieved MCID within approximately 0.8–1.6 months across all three PROMs, with no significant differences between groups. At two and five years, UKA had higher conversion/revision rates (3.1 vs. 1.3%, P< 0.001), while TKA had higher rates of other reoperations, predominantly manipulation under anesthesia (4.5 vs. 2.6%, P=0.014).

Conclusion: UKA and TKA patients achieve meaningful functional recovery at comparable rates and timeframes. Although UKA was more likely to be converted/revised, TKA had a greater rate of other reoperations. These findings provide useful data for perioperative counseling.

Notes

Symposium II

Winning the Arthroplasty Career Marathon: Wellness, Occupational Health and Fulfillment from First Job to Retirement

Moderator: Elizabeth G. Lieberman, MD

A successful career in hip and knee arthroplasty requires more than technical excellence. Surgeons must make sound early career choices, adapt thoughtfully during mid-career transitions, preserve meaning and effectiveness in late career, and protect both their mental and physical health over decades of practice. This symposium will provide a practical roadmap for building and maintaining a durable, satisfying and sustainable career in arthroplasty from first job to retirement. Using an early-, mid- and late-career framework, faculty will discuss common threats to fulfillment across academic, employed and private-practice models. Early-career discussion will focus on choosing the right first job, avoiding common mistakes, identifying healthy partners and practice cultures, and recognizing warning signs for early dissatisfaction. Mid-career discussion will address when frustration is temporary and fixable or when opportunity and a meaningful change in role, environment or scope is needed for professional fulfillment or life satisfaction. Late-career discussion will explore slowing down with intention, succession planning, dealing with medical and health risks, retirement timing, identity after practice and finding purpose and joy beyond full-time surgical work. The final integrative talk will address surgeon protection across the entire career marathon, with emphasis on mental health, burnout prevention, occupational hazards, ergonomics, repetitive musculoskeletal injury, team structure and work-environment design. The focus will be on evidence-informed strategies that help surgeons maintain performance, physical health, relationships and professional satisfaction throughout their careers. Attendees will leave with practical frameworks they can apply to themselves, their partners, and their trainees to build longer, healthier and more fulfilling careers in arthroplasty.

Learning Objectives:

1. Identify evidence-based strategies that support long-term fulfillment, durability and satisfaction in hip and knee arthroplasty practice.
2. Recognize common early, mid and late-career challenges to surgeon wellness and career longevity.
3. Within the lens of career trajectory, compare how academic, employed, and private-practice models can support or undermine career fit and fulfillment.
4. Apply best practices to protect mental health, prevent burnout and improve the work environment for arthroplasty surgeons.
5. Describe occupational health strategies that reduce repetitive injury, improve ergonomics and support sustainable high-performance practice over time.

Outline:

Introduction
Elizabeth G. Lieberman, MD

Early Career: Starting Right—How to Choose the Right Practice, Avoid Common Mistakes and Find the Right Partners
Anna R. Cohen-Rosenblum, MD, MSc

Mid Career: Stay, Stretch, or Switch? Knowing When to Adapt, Recommit or Make a Change
R. Michael Meneghini, MD

Late Career: Slowing Down With Intention — Retirement Timing, Identity and Joy After Practice
David G. Lewallen, MD

Protecting the Surgeon: Mental Health, Burnout Prevention and Occupational Health Across the Career Marathon
Victor H. Hernandez, MD, MS

Discussion
All Faculty

Notes

Paper #9

Robotic Assistance Reduces Cognitive Load During Arthroplasty: A Real-Time Brain Imaging Study

Fares S. Haddad, MD, FRCS (ORTHO), **Flaminia Ronca, PhD**, Natalia Asemota-Lopez, BS, Uzair Hakim, PhD

Introduction: Orthopaedic surgery poses a significant mental and physical burden on the surgeon, leading to high rates of burnout, occupational fatigue and musculoskeletal complaints. Intraoperative stress carries well-established consequences for technical performance, decision-making, and team communication, posing implications for surgeon wellbeing and patient safety. Robotic assistance is posited to reduce intraoperative demand, although this is yet to be measured objectively. This study aimed to assess whether robotic surgery reduces cognitive load on the lead surgeon, through intra-operative brain activity and physiological monitoring.

Methods: Seven experienced orthopaedic surgeons performed conventional and robotic-assisted total hip and knee arthroplasty (17 conventional, 30 robotic). Brain activity was monitored on the lead surgeon of each case using 48-channel functional Near-Infrared Spectroscopy (Artinis Brite MkII) covering bilateral dorsolateral prefrontal cortex (DLPFC) and parietal regions, with simultaneous ECG (BIOPAC MP160) to capture heart rate variability (RMSSD). Frontoparietal functional connectivity was assessed using Pearson correlation with Fisher-z transformation and wavelet coherence, with acquisition-level and within subject effects.

Results: Stage-level RMSSD revealed higher parasympathetic activity during robotic cases (neck osteotomy, assessment of stability, stem trial and reduction, femoral preparation, cup impaction). Acquisition-level connectivity analysis revealed a significant reduction in right DLPFC-left parietal correlation during robotic surgery (diff = -0.14, p = 0.037), with corresponding attenuation of wavelet coherence at 0.05-0.08 Hz (associated with low-frequency prefrontal engagement).

Conclusion: Robotic-assisted arthroplasty was associated with lower physiological stress (RMSSD) and a reduction in cross-hemispheric prefrontal-parietal coupling. These findings suggest that robotic assistance reduces physiological strain across the surgery, and alleviates cognitive load, particularly through the offloading of spatial control. This is the first study to provide objective intraoperative neuroimaging and cardiac evidence that robotic arthroplasty reduces physiological burden for the operating surgeon, supporting future work with direct relevance to workforce sustainability, fatigue management, and career longevity in high-volume orthopaedic practice.

Notes

Paper #10

Reducing Clinician Messaging Burden with Autonomous Surgeon-Specific AI in Total Joint Arthroplasty

Andrew Ehmke, DO, Connor A. King, MD, James Raley, MD, Joshua A. Bell, MD, Justin M. LaReau, MD, **Kerry S. Hale, MD**, Omar A. Behery, MD, Paul B. Jacob, DO, Thomas J. Parisi, MD, Vasili Karas, MD

Introduction: Patient portals generate growing volumes of patient inquiries, burdening clinicians and contributing to workload and burnout. Generative artificial intelligence (AI) can automate responses, but their safety and appropriateness remain uncertain. We conducted the first multi-surgeon validation of autonomous, surgeon-specific AI responses, with each surgeon evaluating the appropriateness of replies sent to their own patients.

Methods: In this prospective cohort study, ten fellowship-trained total joint arthroplasty surgeons, all current users of an AI patient-messaging program, graded 110 inquiry-response pairs. For each pair, the AI received a patient inquiry, generated a response from that surgeon's stored treatment preferences, and delivered it to the patient without human involvement. Per surgeon, 100 pairs were randomly sampled from their 500 most recent query-response pairs, capped at 10 per patient, spanning the perioperative period. The remaining 10 were identical standardized scenarios (5 TKA, 5 THA) representing ideal responses, graded by all surgeons to assess stringency. Pairs were rated on a 5-point Likert scale (5=exceeds expectations; 1=unacceptable); ≥3 was acceptable. Failures (≤2) were categorized by type. Acceptability was estimated using surgeon-clustered bootstrap 95% confidence intervals (CI).

Results: Across 1,000 own-patient responses (619 TKA, 381 THA), 96.9% were acceptable (clustered 95% CI 95.2% to 98.3%); mean Likert 4.54; per-surgeon pass rates 91% to 100%. All standardized ratings were acceptable. Standardized and own-practice means correlated strongly per surgeon (r=0.96), consistent with variation reflecting grading stringency, not AI performance. Of 31 failures, 25 (81%) were missing/outdated stored preferences, two were medication safety concerns, and none reflected misapplication of a correct, current preference.

Conclusion: AI responses were highly rated (mean 4.54/5) and acceptable in 97% of cases, with failures due to missing/outdated preference data, not model error. Because responses were delivered autonomously, these inquiries bypassed the clinical inbox, supporting surgeon-specific generative AI to reduce messaging burden in arthroplasty practice.

Notes

Paper #11

The Hidden Cost of Protection: Surgical Helmets Expose Arthroplasty Surgeons to High CO2 Levels

Ajay Premkumar, MD, MPH, Ashish Chowdary, MD, Brian Muffly, MD, Greg A. Erens, MD, Jacob M. Wilson, MD, Jennifer Culley, MD, Marisa Brito, BS, Nigam Sheth, MPH, Max McCall, MD, Omar Syed, BS, R. John Dougall, BA

Introduction: Surgical helmet systems are widely used in hip and knee arthroplasty as personal protective equipment. Unlike Charnley's original body exhaust suit, which used negative-pressure suction to actively remove contaminated air, contemporary positive-pressure helmets circulate filtered air without a dedicated pathway for active removal of exhaled gases. Intra-helmet carbon dioxide (CO^2) accumulation in modern systems remains poorly quantified. We hypothesized that intra-helmet CO^2 would frequently exceed 2,500 ppm, a threshold linked to cognitive performance changes.

Methods: This single-center prospective observational study measured real-time intra-helmet CO^2 during 132 hip and knee arthroplasties performed by 9 surgeons, with each surgeon trialing multiple different helmet systems for the study. Outcomes included case-level mean, median, and peak CO^2 and percentage of hood time ≥2,500 and ≥5,000 ppm. Analyses included ANOVA, Kruskal-Wallis, Fisher exact testing, and multivariable linear regression adjusting for helmet system, fan speed, mask status, gown type, procedure type, hood time, surgeon BMI and exercise level.

Results: Mean intra-helmet CO^2 was 3,401 ± 1,318 ppm and intra-helmet CO^2 reached a max of 15,202 ppm. CO^2 was ≥2,500 ppm for 68.3% ± 35.3% of the time, and 71.2% of cases had mean CO^2 >2,500 ppm. Peak CO^2 reached ≥5,000 ppm in 53.8% of cases. Mean CO^2 did not differ significantly among helmet systems after multivariable analysis. Low fan speed was independently associated with higher mean CO^2 vs. high (+2,567 ppm; $p< 0.001$), as were absent masks (+930 ppm; $p< 0.001$) and reusable green vs. disposable blue gowns (+634 ppm; $p=0.004$).

Conclusion: Modern helmet systems permit substantial intra-helmet CO^2 accumulation during arthroplasty. Exposure appears driven less by helmet model than by modifiable use factors, particularly fan speed. These findings highlight an underrecognized physiologic consideration and support further evaluation of ventilation strategies that preserve protective function while minimizing intra-helmet CO^2 accumulation.

Notes

Paper #12

Beyond Nickel in Painful TKA: Evidence of Multi-Material Hypersensitivities in 13,453 Patients

Citlali Perez-Leonor, BS, **Joshua J. Jacobs, MD**, Marco S. Caicedo, PhD, Nadim J. Hallab, PhD, Sara Hilali, BS

Introduction: Nickel is the most commonly reactive metal identified in painful total knee arthroplasty (TKA) patients evaluated for implant-related hypersensitivity. However, metal-hypersensitivity cannot be adequately characterized as a binary positive vs. negative nickel response given the large spectrum of nickel reactivity potency and frequent concomitant sensitivities to other orthopedic biomaterials. We hypothesized that an increasing level of nickel-hypersensitivity is associated with other distinct multi-material hypersensitivity phenotypes.

Methods: A retrospective study was performed using a blinded de-identified database of 13,453 painful TKA patients referred for in vitro lymphocyte metal sensitivity testing between 2011- 2025. Nickel-hypersensitivity was categorized by the highest stimulation index (SI) observed: reactive (SI>4), highly-reactive (SI>8), and extremely-reactive (SI>15). Associations between nickel-reactivity, sex, and concomitant biomaterial sensitivity scores were evaluated using chi-square testing and odds ratios.

Results: Nickel-hypersensitivity (SI>4) was identified in 39.8% (n=5,354) of patients, high-reactivity (SI>8) in 20.5% (n=2,758), and extreme-reactivity (SI>15) in 8.9% (n=1,197). Females demonstrated higher rates of nickel-reactivity: SI>4 (44.0% vs. 32.4%), SI>8 (23.7%vs.14.9%), and SI>15 (10.8%vs.5.4%) (all $p < 0.001$). Females were more than twice as likely to exhibit extreme nickel-reactivity (OR 2.13, 95% CI 1.84–2.46; $p < 0.001$). Compared with patients demonstrating non-reactive/equivocal nickel responses ($SI < 4$), the odds of exhibiting two or more additional material sensitivities increased among reactive (OR 1.17), highly-reactive (OR 1.33), and extremely-reactive patients (OR 1.53) (all $p \leq 0.01$). The most common concomitant sensitivities among extremely-reactive patients were titanium-alloy particles(28.9%), vanadium (11.2%), cobalt-alloy particles(8.4%), cobalt (6.5%), bone cement particles(6.4%), and chromium(3.8%).

Conclusion: Nickel-sensitivity in painful TKA patients exists along a spectrum rather than as a binary diagnosis. Increasing levels of nickel reactivity were associated with progressively higher rates of concomitant biomaterial sensitivities, supporting the existence of distinct multi-material hypersensitivity phenotypes. These findings suggest that evaluation and implant selection should consider broader patterns of material adaptive immune responses beyond that of nickel.

Notes

Paper #13

The Optimal Time Interval Between Staged Bilateral Total Knee Arthroplasty Procedures

Jay R. Lieberman, MD, Matthew Orringer, MD, Matthew A. Lim, BS, **Nathanael D. Heckmann, MD**, Pranit Kumaran, BS, Ryan Palmer, MD, Sahil S. Telang, BS

Introduction: Simultaneous bilateral total knee arthroplasty (TKA) is associated with an increased risk of postoperative complications. To mitigate this risk, arthroplasty surgeons often stage procedures, though the optimal time interval between surgeries remains unknown. This study sought to identify the minimum interprocedural interval at which the risk of complications decreases.

Methods: A national healthcare database was queried to identify adult patients undergoing primary elective TKA from 2016-2023. Patients who underwent bilateral TKAs within one year were subsequently identified. Multivariable logistic regression with restricted cubic splines (RCS) modeled the relationship between the procedure interval (in weeks) and the 90-day risk of postoperative complications, including major adverse events (myocardial infarction, stroke, or mortality), and venous thromboembolism (VTE). The minimum interprocedural interval between staged bilateral TKAs at which the risk of each complication decreased was identified using Markov Chain Monte Carlo simulations. Multivariable logistic regression modeling was used to compare patients who underwent bilateral TKA above and below each identified interprocedural interval.

Results: There were a total of 91,407 patients who underwent bilateral TKA within a one-year period. Of these, 29,324 (32.1%) were performed simultaneously. The cohort had a mean age of 65 years, and 59.0% were female. The minimum procedure interval thresholds identified were 9.7 weeks for major adverse events, and 10.6 weeks for VTE. Patients who underwent staged bilateral TKA before these timepoints demonstrated significantly elevated rates of major adverse events (0.37% vs. 0.26%, adjusted odds ratio [aOR]: 1.69, 95% confidence interval [CI]: 1.32-2.16), and VTE (1.51% vs. 0.84%, aOR: 1.77, 95%-CI: 1.56-2.01).

Conclusion: The present analysis identified a minimum interprocedural interval of 10 to 11 weeks for staged bilateral TKA to reduce the risk of complications. However, individualized patient risk stratification remains essential when determining the optimal timing of staged TKAs.

Notes

Paper #14

Evaluating the Impact of Suzetrigine on Opioid Prescribing Patterns in Total Knee Arthroplasty

Ann M. Menzie, MS, Jaideep Mehta, MD, MBA, Kanun Pokharel, PhD, Nicole R. Villemarette-Pittman, PhD, Sakshi Sharma, MS, **Vinod Dasa, MD**

Introduction: Total knee arthroplasty (TKA) is a common orthopedic procedure associated with substantial postoperative pain that has traditionally been managed with opioids. Concerns about opioid-related adverse events and dependence have increased the use of multimodal pain management strategies. This study evaluated the impact of Suzetrigine (SUZ) adoption on post-discharge opioid prescribing patterns among TKA patients.

Methods: This retrospective, observational cohort study evaluated adults undergoing primary, unilateral TKA using a de-identified dataset linking Ochsner Health electronic health records with administrative claims. Ochsner Health uses a meds-to-beds program for filling discharge prescriptions to maximize medication access. Index was defined as hospital discharge. Inclusion criteria included 6 months pre-index baseline data, and ≥30 days follow-up. The SUZ cohort included patients prescribed standard of care (SOC) post-operative pain medications, including SUZ, following discharge protocol incorporation (April 1, 2025, to January 31, 2026). The historical control cohort included patients prescribed SOC without SUZ prior to protocol incorporation (January 1, 2024, to March 31, 2025). Patients were stratified by setting: outpatient (length of stay [LOS] ≤ 23 hours) or inpatient (LOS >23 hours). The study was IRB exempt.

Results: This study included 106 patients in the SUZ cohort and 1,487 in the control cohort. Compared with controls, a greater proportion of patients in the SUZ cohort were discharged without an opioid prescription in both outpatient (62.0% vs. 21.1%) and inpatient (51.8% vs. 26.5%) settings. During 30-day follow-up, 70% of the SUZ cohort never filled an opioid prescription. Across both settings, mean morphine milligram equivalents (MMEs) were consistently lower in the SUZ cohort compared to the control.

Conclusion: Incorporation of SUZ into multimodal postoperative pain management was associated with higher rates of discharge without an opioid prescription, fewer opioid fills through 30 days, and lower opioid exposure among patients undergoing TKA in both inpatient and outpatient settings.

Notes

Paper #15

Addition of Suzetrigine to a Multimodal Pain Pathway Reduces Opioid Use In Total Knee Arthroplasty

Abdullah Alnaqib, BS, Benyamin Dadpey, BS, Eknoor Sandhu, BS, Kevin Y. Zhu, MD, Mohammad Khuroo, BS, Phong Ngo, BS, **Scott T. Ball, MD**

Introduction: Post-operative pain management following total knee arthroplasty (TKA) remains a challenge. Suzetrigine (Journavx) is a novel, non-opioid analgesic approved by the FDA in 2025 for acute pain in adults. Unlike opioids, suzetrigine works exclusively on the peripheral nervous system by blocking sodium channels involved in pain transmission rather than acting on opioid receptors thereby avoiding the opioid side effects of addiction, respiratory suppression and constipation. The objective of this study was to determine the efficacy of suzetrigine in patients undergoing TKA.

Methods: A retrospective study was conducted on 255 patients undergoing primary TKA between April 2025 and April 2026. Patients were divided into two groups; the standard multimodal group minus suzetrigine (MM-S, n=184) and multimodal plus suzetrigine (MM+S, n=71). Supplemental opioids prescribed, when needed, included tramadol, oxycodone and/or hydrocodone.

Results: Groups were comparable in age, sex, body mass index, and co-morbidities. Ten of the 71 MM+S patients (15.1%) completely avoided opioids compared to only 5 of the 184 MM-S patients (2.7%, $p< 0.001$). Total milligram morphine equivalents after discharge were significantly lower in the MM+S group (median 6.3 vs. 150, p=0.04). The MM+S group reported lower pain scores (median 3.5 vs. 5.0, $p< 0.001$) and were more likely to ambulate independently at 4 weeks (87.7% vs. 74.6%, p=0.03). There was a lower rate of MUA (1.4% vs. 3.3%) and ED visits due to constipation (0% vs. 1.6%) in the MM+S group but these differences were not statistically significant (p=0.68 and p=0.6 respectively). No complications related to suzetrigine were reported.

Conclusion: In patients undergoing TKA, suzetrigine was associated with a higher chance of total opioid avoidance, lower overall opioid consumption, lower post-operative pain, and improved early mobility, with a similarly low complication risk and without apparent side effects.

Notes

Paper #16

Antibiotic Prophylaxis Through Wound Closure May Be Sufficient After Primary Total Knee Arthroplasty

Adam M. Freedhand, MD, Ali Oliashirazi, MD, **Alisina Shahi, MD, PhD**, David Rodriguez-Quintana, MD, Robert Frangie, MD

Introduction: Extended postoperative antibiotic prophylaxis remains common after primary total knee arthroplasty (TKA), despite growing emphasis on antimicrobial stewardship. Whether antibiotics need to be continued beyond wound closure to reduce periprosthetic joint infection (PJI) risk remains unclear. We hypothesized that discontinuing prophylactic antibiotics at wound closure would not increase 90-day PJI risk after primary TKA.

Methods: A retrospective comparative cohort study was performed of 5,680 primary TKAs at a single institution. Twelve patients receiving antibiotics for nonstandard indications were excluded, yielding 5,668 patients: 2,715 in the wound-closure cohort and 2,953 in the postoperative-dose cohort. The primary outcome was PJI within 90 days. Secondary outcomes included superficial surgical site infection, readmission, and antibiotic-related complications. Cohorts were compared using relative risk with 95% confidence intervals. Multivariable logistic regression adjusted for age, sex, BMI, diabetes, smoking status, ASA class, and host risk factors.

Results: Baseline demographics, BMI, diabetes prevalence, ASA class, and host risk factors were comparable between cohorts. PJI occurred in 0.80% of wound-closure patients compared with 0.87% of postoperative-dose patients (RR 0.92, 95% CI 0.52–1.62; p=0.77), with the confidence interval excluding clinically meaningful differences in infection risk. Superficial suture abscess rates were similar between cohorts (0.11% vs. 0.14%), as were readmission rates (3.4% vs. 2.8%). Antibiotic-related complications were observed only in the postoperative-dose cohort, including skin reactions (n=8), diarrhea (n=4), nausea (n=3), vertigo (n=1), and hearing disturbance (n=1).

Conclusion: Discontinuing prophylactic antibiotics at wound closure was not associated with increased 90-day PJI risk after primary TKA and was associated with fewer observed antibiotic-related complications. These findings support a narrower perioperative prophylaxis strategy after primary TKA while preserving individualized decision-making for patients with elevated infection risk. Prospective non-inferiority trials are needed to confirm these findings.

Notes

Symposium III

The Modern Aseptic Revision TKA: Five Videos to Optimize Your Reconstruction

Moderator: Jeremy M. Gililland, MD

Aseptic revision total knee arthroplasty (TKA) continues to grow in volume and complexity, with failure modes including instability, aseptic loosening, stiffness, and bone loss. Despite advances in implants and reconstruction strategies, variability persists in surgical technique and decision-making. This video-based symposium will present five high-yield topics illustrating contemporary approaches to aseptic revision TKA, focusing on exposure, soft tissue balancing, levels of constraint, fixation strategies, and management of the extensor mechanism. Through expert commentary and case-based discussion, attendees will gain practical strategies to optimize outcomes in challenging revision scenarios.

Learning Objectives:

1. Select appropriate reconstructive strategies for common aseptic revision TKA indications, including loosening, instability, stiffness and extensor mechanism failure.
2. Implement efficient and extensile surgical exposures while minimizing complications.
3. Recognize and manage soft tissue imbalance and instability in revision TKA and how to choose the appropriate level of constraint.
4. Apply modern techniques for obtaining fixation, including cones, sleeves, stem choice and impaction bone grafting.
5. Apply modern techniques for optimizing patellar tracking and treating extensor mechanism failures.

Outline:

Introduction
Jeremy M. Gililland, MD

Exposure to the Stiff/Multiply Operated Knee
Elizabeth B. Gausden, MD, MPH

How to Balance your Revision TKA
Jeremy M. Gililland, MD

Obtaining Zone 2 Fixation and Stem Choices
Joshua C. Rozell, MD

Obtaining Zone 3 Fixation Beyond Simple Stem
Nicholas A. Bedard, MD

Extensor Mechanism: From Lateral Release to Reconstruction
Cory G. Couch, MD

Discussion
All Faculty

Notes

Paper #17

Tibial Metaphyseal Cones Associated with Decreased Re-Revision and Reoperation After Revision TKA

Evan R. Deckard, BS, Kevin A. Sonn, MD, **Leonard T. Buller, MD**, MacKenzie Molina, BS, R. Michael Meneghini, MD

Introduction: Tibial metaphyseal cones provide durable biologic fixation for bone loss during revision total knee arthroplasty (rTKA), but their association with patient-reported outcome measures (PROMs) and re-revision rates remains less well-defined. This study compared rTKAs performed with and without metaphyseal tibial cones in terms of outcomes and re-revision rates.

Methods: A retrospective cohort study identified 364 rTKAs in which both femoral and tibial components were revised for instability (48%), aseptic loosening (28%), periprosthetic joint infection (PJI) (13.7%), arthrofibrosis (6%), wear/osteolysis (3%), and other reasons (2%). 196 cases without metaphyseal tibial cones were compared with 168 with cones. Mean follow-up was 2.1 years. Outcomes included PROMs and re-revision rates. Univariable and multivariate analyses were performed, with significance set at P≤0.05d.

Results: The tibial-cone cohort was older (67.4 vs. 63.9 years; P=0.001), had a shorter mean follow-up (1.1 vs. 2.8 years; P< 0.001), and less frequently used preoperative narcotics (27.4 vs. 46.4%; P< 0.001). Similarly, KOOS-JR improvement scores were similar between the tibial cone and no cone groups (+17.5 vs. +18.0; P=0.853, Power=80%). The all-cause re-revision rate was significantly less for the tibial-cone group (2.4 vs. 9.7%; P=0.004), and only one tibial cone was removed during re-revision. Results were consistent within all revision etiology groups. However, in the PJI subgroup analysis, 88.2% (15 of 17) of patients with tibial cones, vs. 66.7% (16 of 24) without cones, were satisfied/very satisfied (P=0.152), which may represent a clinically relevant difference.

Conclusion: Tibial metaphyseal cones were not associated with inferior PROMs and were associated with a lower re-revision risk after rTKA. Metaphyseal cones demonstrated a durable construct for rTKA without deleterious effects on PROMs and, as intended and designed, appear to improve metaphyseal fixation and prevent aseptic loosening and re-revision.

Notes

Paper #18

Robotic-Assisted vs. Manual Revision Total Knee Arthroplasty: A Matched Cohort Study

Alexander T. Caughran, MD, Jonathan R. Danoff, MD, Matthew Bullock, DO

Introduction: Robotic assistance has been increasingly utilized in revision total knee arthroplasty (rTKA) as a potential adjunct to assist with component positioning, gap assessment, and restoration of anatomic parameters. However, comparative clinical evidence in the aseptic revision setting remains limited. The purpose of this study was to compare functional, radiographic, implant construct, and short-term survivorship outcomes between conventional manual rTKA and robotic-assisted revision TKA (rarTKA).

Methods: We conducted a retrospective multicenter cohort study of 186 patients undergoing aseptic rTKA (112 conventional, 74 robotic-assisted) performed by three fellowship-trained surgeons at two academic centers. Mean follow-up was 2.4 ± 1.8 years. Propensity score matching based on age, sex, body mass index, ASA classification, and revision indication yielded 74 matched pairs. The primary outcome was midterm postoperative knee range of motion (ROM), defined as the most recent measurement obtained at ≥6 months postoperatively. Secondary outcomes included changes in posterior condylar offset (PCO), Knee injury and Osteoarthritis Outcome Score for Joint Replacement (KOOS-JR) at one year, implant construct characteristics, perioperative outcomes, and two-year all-cause re-revision-free survivorship.

Results: In the matched cohort, rarTKA demonstrated modestly greater midterm ROM compared with conventional rTKA (119.8° vs. 113.5°, p = 0.01) and greater restoration of PCO (2.31 vs. 0.97 mm, p = 0.04). KOOS-JR scores at one year were similar between groups (62.3 ± 18.1 vs. 60.0 ± 16.8, p = 0.50). Two-year re-revision-free survivorship did not differ (95.0% vs. 94.8%, p = 0.70). Robotic-assisted cases more frequently utilized metaphyseal cones and distal femoral augments, with reduced use of stem offsets and shorter tibial stems.

Conclusion: Robotic-assisted aseptic rTKA was associated with modest improvements in midterm ROM and PCO restoration without differences in early patient-reported outcomes or short-term survivorship. These findings suggest robotic assistance may facilitate alternative reconstructive strategies in selected revision cases; however, longer-term follow-up is required.

Notes

Paper #19

The Good, Bad, and Ugly: A Treatment-Oriented Classification System for Extensor Mechanism Failure

Corey F. Hryc, PhD, **Cory G. Couch, MD**, Drake G. Lebrun, MD, Gregory W. Stocks, MD, Justin O. Aflatooni, MD, Mark Brinker, MD, Ugonna N. Ihekweazu, MD

Introduction: Extensor mechanism failure following total knee arthroplasty (TKA) is a rare but devastating complication associated with substantial morbidity and reconstructive complexity. Existing classification systems inadequately account for reconstructive burden and surgical decision-making. Therefore, this study evaluated the inter-rater reliability of the novel treatment-oriented CHAPELS classification system for extensor mechanism pathology following TKA.

Methods: Twenty extensor mechanism failure cases following primary or revision TKA were retrospectively identified from outside institutions and deidentified and blinded prior to review. Four fellowship-trained arthroplasty surgeons independently evaluated all cases using the seven-domain CHAPELS classification system incorporating Chronicity, Host status, Active infection, Prosthesis status, Extensor mechanism surgery history, Location, and Soft tissue envelope. Domain scores generated a cumulative severity score categorized as Good (0–2), Bad (3–5), or Ugly (6–14). Inter-rater reliability was assessed using percent agreement, kappa statistics, and intraclass correlation coefficients (ICC[2,1]).

Results: Overall cumulative severity score reliability demonstrated excellent agreement (ICC[2,1]=0.914), while the derived Good/Bad/Ugly severity classification demonstrated substantial agreement (k=0.768) with 75% complete agreement across cases. Location demonstrated almost perfect agreement (k=0.852; 85% agreement), while active infection demonstrated substantial agreement (k=0.809; 75% agreement). Host status (k=0.651), prior extensor mechanism surgery history (k=0.647), and soft tissue envelope assessment (k=0.537) demonstrated moderate-to-substantial agreement. Although chronicity demonstrated lower kappa agreement (k=0.381), surgeons achieved 90% complete agreement across cases. Prosthesis status demonstrated fair agreement (k=0.310; 55% agreement).

Conclusion: The CHAPELS classification system demonstrated excellent overall inter-rater reliability among fellowship-trained arthroplasty surgeons. By incorporating host status, infection, implant complexity, prior reconstruction history, and soft tissue compromise into a unified framework, CHAPELS provides a reproducible, clinically relevant method for stratifying extensor mechanism failure severity and guiding surgical decision-making.

Notes

Paper #20

Bearing Constraint and Risk of Re-Revision after Revision TKA: An AJRR Analysis

Connor Riley, MPH, Derek F. Amanatullah, MD, PhD, James I. Huddleston, MD, Ryland Kagan, MD, **Vishal Hegde, MD**

Introduction: Contemporary revision total knee arthroplasty (rTKA) offers a continuum of bearing constraint. Higher constraint may reduce risk of instability but increased stress transfer may also result in mechanical loosening. We utilized the American Joint Replacement Registry (AJRR) to examine risk of re-revision after aseptic rTKA comparing different levels of constraint.

Methods: The AJRR was queried for rTKAs in patients ≥65 years from 2012 to 2023, with minimum 1-year follow-up and linkage to CMS claims data. Index revisions for infection were excluded. Cohorts were defined as primary constraint (cruciate retaining, condylar stabilized or posterior stabilized) n=25,291 (52.5%), mid-level constraint (PS-plus) n=2,597 (5.4%), varus-valgus constrained (VVC) n=18,160 (37.7%), and hinge n=2,089 (4.3%). The primary outcome was all-cause re-revision; secondary outcomes were re-revision for periprosthetic fracture, instability, mechanical loosening, and wound complications. Cause-specific Cox models adjusted for age, sex, region, CCI, and BMI.

Results: Compared to primary constraint, PS-plus (aHR:1.10, CI:0.93-1.29, P=0.28) and VVC (aHR:1.02, CI:0.95-1.10, P=0.55) showed no difference in all-cause re-revision risk. Hinge bearings had a higher risk for all-cause re-revision (aHR:1.41, CI:1.19-1.65, P< 0.001), periprosthetic fracture (aHR:4.25, CI:1.39-13.00, P=0.01 in the first 2 years), instability (aHR:1.71, CI:1.25-2.33, P< 0.001), and wound complications (aHR:2.32, CI:1.23-4.36, P< 0.01) compared to VVC. Compared to primary constraint, PS-plus and VVC showed no difference in re-revision for instability or mechanical loosening. There was a strong trend towards decreased mechanical loosening with primary constraint compared to VVC (aHR:0.88, CI:0.76-1.00, P=0.06).

Conclusion: Primary, PS-plus and VVC showed similar risk for re-revision after aseptic rTKA, while hinges carried a higher risk of all-cause re-revision, periprosthetic fracture, instability, and wound complications. These findings support reserving hinges for complex cases with global ligamentous deficiency or massive bone loss. Furthermore, given longer term concerns of mechanical loosening, the least constraint to achieve adequate balancing may be sufficient with pathology-driven constraint escalation.

Notes

Paper #21

The Indication for Revision TKA Predicts Postoperative Patient Reported Outcomes and Satisfaction

Cristian A. DeSimone, MD, Eric Tecce, MD, Jessica H. Leipman, MD, Mason T. Sellig, MS, Matthew B. Sherman, BS, **Yale A. Fillingham, MD**

Introduction: Revision total knee arthroplasty (rTKA) is increasing and carries substantial cost and patient burden. Revision indications vary in etiology and complexity (e.g., infection, loosening, instability, stiffness), yet how patient-reported outcomes differ across the spectrum of indications remains incompletely characterized. We evaluated the association between revision indication and postoperative patient-reported outcomes, satisfaction, and reoperation after rTKA.

Methods: We performed a retrospective single-center cohort study of rTKA cases from 2012–2023 across a multi-site academic orthopedic practice. Revision indication was abstracted from an institutional database and categorized into: periprosthetic joint infection (PJI), instability, arthrofibrosis, aseptic loosening, polyethylene wear, malalignment, wound complications, fracture, effusion, patellar resurfacing, extensor mechanism disruption (EMD), and other. Patient-reported outcomes were assessed using KOOS-JR preoperatively and at the latest available postoperative follow-up, along with Knee Society Score (KSS) satisfaction and expectation scores, and KOOS-JR MCID attainment.

Results: The cohort included 2,092 rTKAs, most commonly for aseptic loosening (n=795), instability (n=509), and PJI (n=390). Median postoperative KOOS-JR varied by indication, highest for polyethylene wear (76.6 [57.1–100]) and lower for arthrofibrosis (52.5 [42.3–68.3]) and malalignment (58.2 [44.9–71.4]). Satisfaction similarly differed, with the lowest postoperative satisfaction following arthrofibrosis (15.5 [12.0–20.0]) and malalignment (14.0 [12.5–19.0]) and the highest with loosening (20.0 [14.0–28.0]) and polyethylene wear (22.0 [18.0–25.5]). MCID achievement varied across indications (e.g., arthrofibrosis 43.1% vs. aseptic loosening 63.7%). Reoperation rates also differed, with the highest rate after arthrofibrosis (25.8%) compared with most other indications (typically ~2.5–9.1%).

Conclusion: Patient-reported outcomes and satisfaction after rTKA differ substantially by revision indication, with arthrofibrosis and malalignment associated with poorer KOOS-JR and lower satisfaction, and arthrofibrosis demonstrating the highest reoperation burden. These findings support indication-specific counseling and targeted strategies to improve subjective outcomes in high-risk revision groups.

Notes

Symposium IV

Practice Norms in Primary Hip and Knee Arthroplasty: What Is Everyone Else Doing?

Moderator: Matthew P. Abdel, MD

The moderator will conduct a poll of attendees using an audience response system (ARS) with real-time display of results and commentary and will ask the audience a series of questions about their current practices in primary THA and TKA. The audience will respond using the ARS and results will be displayed immediately. The moderator will weave in comparison of the current year's responses to data gathered in previous years to demonstrate areas of practice evolution.

The 2026 version will preserve the strengths of prior sessions while contemporizing the content around domains where adoption patterns and evidence are actively evolving: operative approach, fixation, robotics and navigation, alignment philosophy, implant design, instability prevention, outpatient/ASC care, patient selection and optimization, and selected infection-related decisions that remain relevant to primary arthroplasty. The emphasis will remain on areas of rapid practice change, persistent variability and longitudinal trends worth continuing to evaluate

.**Learning Objectives:**

1. To identify major changes in arthroplasty practice patterns over time.
2. To evaluate current controversies in technique, implants, and indication.
3. To recognize shifting failure modes and implications for revision burden.
4. To anticipate future directions in hip and knee arthroplasty.

Outline:

Introduction: 15 Years of Change
Matthew P. Abdel, MD

How We Operate: Approaches, Techniques, Fixation, Technology
Matthew P. Abdel, MD

What We Implant: Alignment, Design, Bearings
Matthew P. Abdel, MD

Why They Fail: Instability, Infections and Other Failure Modes
Matthew P. Abdel, MD

Who We Operate On: Indications, Outpatient, Demographics
Matthew P. Abdel, MD

Lighting Round: What Are We Getting Wrong or Right
Matthew P. Abdel, MD

Conclusion: (5 minutes)
Matthew P. Abdel, MD

Notes

Symposium V

Advocacy for Arthroplasty Surgeons in 2026: State of the Union

Moderator: Michael P. Bolognesi, MD

The Centers for Medicare and Medicaid Services (CMS) released the 2027 Medicare Physician Fee Schedule Proposed Rule in summer 2026, proposing a sharp 20% decrease in reimbursement for THA and TKA. CMS stated the American Medical Association Relative Value Scale Update Committee (RUC) did not go far enough in their cuts, and the new values better reflect modern medical practice and support the administration's goal of shifting from sick care to health care. AAHKS members have rightfully raised significant concerns regarding how steep cuts will affect access to quality arthroplasty care.

CMS has also announced CJR-X, a new mandatory bundled payment program for TJA that will significantly impact all hospitals and surgeons beginning in 2027. Together with TEAMS, these programs signal a continued shift toward mandatory participation, greater financial accountability and measurable performance.

This symposium will provide a practical, experience-based framework to prepare arthroplasty surgeons for the realities of the looming Physician Fee Schedule cuts, CJR-X and TEAMS. Faculty will review the history of valuation of THA and TKA, prior interactions with the RUC and CMS and what it means for AAHKS surgeons and our patients today. We will review structure and methodology of CJR-X and TEAMS, including target pricing, attribution, quality metrics and reconciliation. The session will emphasize that without aligned incentives through gainsharing, sustained surgeon engagement and behavior change are unlikely to occur. Finally, the symposium will discuss how the impending reimbursement changes will affect private practice and employed arthroplasty surgeons alike.

A central focus of the symposium will be the role of data. Faculty will also review the extensive data used in CMS and RUC calculations to revalue the codes for THA and TKA and why their information is inherently flawed. High-performing bundled programs are also fundamentally data-driven, requiring timely, accurate and surgeon-specific reporting of cost, utilization and outcomes. Programs that lack robust data infrastructure consistently underperform, while those that invest in actionable analytics are able to improve length of stay, optimize post-acute care utilization and reduce complications and total episode cost.

Lessons learned from prior CMS initiatives, the TEAMS experience at an academic medical center and private payer bundled programs will be presented, highlighting both successful strategies and common pitfalls. The symposium will conclude with an interactive discussion focused on what AAHKS is doing to ensure access for our patients and combat some of the steepest yearly reimbursement declines in the history of the RUC, as well as how AAHKS members can help.

Learning Objectives:

1. Review the history of valuation of THA and TKA, learn how the recent Medicare reimbursement changes affect your practice, and understand what AAHKS is doing to help.
2. Understand the structure, methodology and key performance metrics of the CJR-X program and lessons learned from TEAMs.
3. Recognize the critical role of gainsharing in driving surgeon engagement and aligning incentives for success in bundled payment programs.

Outline:

Lessons Learned From Past Cuts: History of THA and TKA Valuation
Michael P. Bolognesi, MD

TEAMS: Academic Medical Center Experience
James I. Huddleston III, MD

CJR-X Nut and Bolts: Preparation and Performance
Christian A. Pean, MD

How Private Practice Can Combat Medicare Cuts
David S. Jevsevar, MD, MBA

A Call To Arms – What AAHKS Is Doing to Fight Back
P. Maxwell Courtney, MD

Discussion
All Faculty

Notes

Paper #22

Optimizing PROM Capture and Performance in Total Hip and Knee Arthroplasty Under CMS Payment Models

Kevin J. Bozic, MD, MBA, Lauren M. Shapiro, MD, MS, Niels Brinkman, PhD, Prakash Jayakumar, MD, PhD, Rebekah M. Kleinsmith, MDS

Introduction: Patient-reported outcome performance measures (PRO-PMs) are central to CMS outcome-aligned payment (OAP) initiatives — including the THA/TKA mandate, CJR-X, and TEAM — which tie payment thresholds to PROM capture rates. Despite their growing regulatory importance, national real-world capture rate data remain limited, particularly following recent OAP introductions. This study defines capture rates up to one year post-arthroplasty and identifies behavioral and organizational factors driving successful PROM implementation.

Methods: A mixed-methods evaluation was conducted across 676 U.S. facilities (2021–2024). Quantitative analysis assessed real-world and third-party vendor-able PROM capture rates at baseline, 3 months, and 1 year in adults undergoing THA or TKA. Qualitative analysis involved semi-structured interviews with 18 health system stakeholders, analyzed using the COM-B and Theoretical Domains Framework (TDF) to surface barriers, facilitators, and behavior change strategies.

Results: Across more than 1.8 million surveys (n=115,204 patients), pre-mandate (2021–2023) real-world capture rates were 79%, 76%, and 62% at baseline, 3 months, and 1 year, respectively. Following the 2024 CMS mandate, baseline capture rose to 88% (real-world) and 89% (vendor-able). Private practices led in early capture; academic centers excelled in long-term consistency. High-performing organizations shared three attributes: a clearly defined measurement purpose and OAP readiness; integrated clinical, technical, and operational workflows; and a culture of education, transparency, and patient-centered value. Ten theory-informed strategies were identified, including structured training, workflow integration, feedback loops, and PROM champion development.

Conclusion: Sustainable PRO-PM performance for OAP models requires both technical integration and deliberate organizational change. Optimal capture rates can be achieved using a service-based health outcome measurement approach, and early OAP models are having a positive impact on PROM capture in THA and TKA. The COM-B/TDF framework offers actionable guidance for health systems seeking to meet regulatory requirements in a new era of value-based musculoskeletal care.

Notes

Paper #23

Five-Year Real Devaluation of Hip and Knee Arthroplasty Work in a Large Independent Practice

Anthony J. Shaia, MD, **David S. Jevsevar, MD**, Paul M. Werth, PhD

Introduction: National analyses document sustained inflation-adjusted declines in Medicare reimbursement for hip and knee arthroplasty, while the 2021 Evaluation and Management code revaluation redistributed payments away from surgical services under budget neutrality. Less is known about how these trends manifest at the surgeon level. The purpose of this study was to characterize changes in productivity, reimbursement, and the real inflation-adjusted devaluation of work among hip and knee arthroplasty surgeons at a large independent orthopaedic practice between 2019 and 2024.

Methods: Retrospective paired analysis of hip and knee arthroplasty surgeons (n=25) within a 73-surgeon cohort with complete productivity and reimbursement data for full calendar years 2019 and 2024. The 2019 baseline preceded pandemic disruption; 2024 captured cumulative effects of recent payment policy. Outcomes included total work Relative Value Units (wRVUs), total payments, payment per wRVU, and office-vs.-surgery composition. Cumulative inflation (22.6%) was derived from Bureau of Labor Statistics Consumer Price Index data. Paired t-tests, chi-square testing, and logistic regression were used; significance was set at $p < 0.05$.

Results: Across the full 73-surgeon cohort, total wRVUs rose 29.2% and total payments rose only 15.5%, while nominal payment per wRVU declined 8.7% ($p < 0.001$). After inflation adjustment, real devaluation of payment per wRVU was 25.5% overall (95% CI: 21.2%-27.3%) and 26.5% (SD 12.5%, $p < 0.05$) for the 25 hip and knee arthroplasty surgeons. Practice-wide, the proportion of office-dominant physicians increased significantly (chi-square=25.4, $p < 0.001$), reflecting a rational shift toward office-based work in response to the 2021 fee schedule changes.

Conclusion: Hip and knee arthroplasty surgeons at this large independent practice experienced approximately 26% real inflation-adjusted devaluation in payment per wRVU over five years despite substantial productivity gains. Without payment policy correction, the financial sustainability of independent arthroplasty practice and patient access to hip and knee replacement are at serious risk.

Notes

Paper #24

Total Knee Revisions Cannot Afford to Go Outpatient: Implications of CMS Reimbursement Policies

Chad A. Krueger, MD, **David N. Kugelman, MD**, Ibaad Khan, BS, Paul M. Courtney, MD, Vaidehi Patel, BA

Introduction: With CMS's proposal to eliminate revision total knee arthroplasty (rTKA) from the Inpatient Only (IPO) list, the threat of misaligning reimbursement with true costs emerges. Furthermore, current reimbursement structures are indication-blind. The present study aims to analyze rTKA costs across hospital settings and revision indications to understand the impact of these reimbursement policies.

Methods: A retrospective analysis of 2,265 rTKA cases performed between 2017 and 2025 at a high-volume institution was conducted. Cases were stratified by hospital setting (tertiary, n=171; community, n=1,955; orthopedic specialty hospital, n=139) and revision indication (periprosthetic joint infection, PJI, n=1155; mechanical complication, n=702; aseptic loosening, n=303; and periprosthetic fracture, PPFx, n=105). Continuous variables were compared using t-tests or Mann–Whitney U tests. Categorical variables were analyzed using chi-square or Fisher's exact tests.

Results: PPFx had the highest median total cost ($100,558) compared to mechanical complication ($88,572; p=0.003), aseptic loosening ($87,415; p=0.003), and PJI ($77,659; p< 0.001). Specialty hospitals achieved lower median costs ($11,784) compared to community ($87,109; p< 0.001) and tertiary hospitals ($80,409; p< 0.001). Specialty hospitals managed lower-complexity cases compared to community and tertiary hospitals, with shorter mean LOS (1.24, 4.37, and 4.07 days; p< 0.001), lower CCI-age adjusted (3.36, 4.19, and 4.25; p< 0.001), and the lowest proportion of 2nd (0.72%, 15.7%, and 8.19%; p< 0.001) and 3rd-plus revisions (0%, 6.6%, and 2.34%; p< 0.001).

Conclusion: Median costs of all indications greatly exceed FY2026 inpatient DRG reimbursement (DRG 466: $35,146; DRG 467: $23,809; DRG 468: $18,555). Proposed PJI-specific inpatient DRGs 403/404 (~$39,165/~$21,068) also fall short of median PJI costs. Community and tertiary costs greatly exceeded DRG reimbursement rates. While specialty hospitals achieved costs well below the proposed 2026 OPPS rate of $13,254 (CPT 27487), they did so in carefully selected, lower-complexity patients. Taken together, blanket outpatient designations risk persistent negative margins and threaten access to complex revision care.

Notes

Paper #25

ENGAGE Arthroplasty: Preliminary Findings of Patient Willingness to Participate in Health Advocacy

Cesar E. Armas, BS, Reginald O. Chinweze, MD, ENGAGE Investigators, **Zachary C. Lum, DO**

Introduction: Orthopaedic advocacy increasingly influences reimbursement, prior authorization, value-based care, and patient access to musculoskeletal care. Hip and knee arthroplasty patients are a large, high-touch population with direct experience navigating care access, yet their health policy awareness and advocacy willingness remain poorly characterized. ENGAGE Arthroplasty evaluates whether brief patient-facing advocacy education can generate measurable patient engagement around access-sensitive arthroplasty policy issues.

Methods: ENGAGE Arthroplasty is an ongoing prospective patient-engagement study of adult hip and knee arthroplasty patients, initiated at a single academic institution with planned multicenter expansion. Patients received a standardized handout or brief surgeon-delivered scripted message addressing four advocacy priorities: prior authorization reform, preservation of value-based care, annual physician inflationary payment update, and prevention of further Medicare cuts to arthroplasty services. Outcomes included completion of congressional advocacy letters and survey measures of policy awareness, perceived access risk, surgeon-payment understanding, trust, and future advocacy willingness.

Results: Preliminarily, 55% of enrolled patients completed the primary advocacy action by sending letters to congressional representatives. Among survey respondents, >70% believed insurance rules make timely care more difficult, while 0% agreed that policymakers understand how payment and insurance rules affect patients. Perceived access risk was high: >70% were concerned payment cuts could reduce access, increase wait times, or affect timely surgery close to home. Baseline understanding of surgeon payment was limited; >60% disagreed that they previously understood how surgeons are paid, and >70% estimated that surgeons receive >10% of total joint replacement episode payment. Advocacy receptivity was favorable, with >60% supporting physician-patient advocacy, future engagement, and physician education about policy. No respondents reported feeling pressured.

Conclusion: Our findings suggest that arthroplasty patients are receptive to concise, nonpartisan advocacy education and can be mobilized to complete measurable advocacy actions. These early results support continued enrollment, objective action tracking, and multicenter validation of patient-engaged orthopaedic advocacy.

Notes

Paper #26

Temporal Trends in Preoperative PROMs Before TKA: Implications for Benchmarking and Value-Based Care

Chao Zhang, MS, Dimitri J. Mabarak, MD, Khaled A. Elmenawi, MD, Lakshmi S. Gudapati, MS, Nicolas S. Piuzzi, MD, **Robert M. Molloy, MD**, Shlok V. Patel, MD, Shujaa T. Khan, MD, Trevor G. Murray, MD

Introduction: Over the past decade, total knee arthroplasty (TKA) has undergone major changes in patient selection, perioperative optimization, and site of care, with rapid migration from inpatient hospitalization to outpatient surgery. These shifts may have changed not only where TKA is performed, but also the level of knee pain and functional limitation at which patients reach surgery. Although prior studies have characterized preoperative PROMs, longer-term trends in baseline pain and function during this period remain incompletely defined.

Methods: This study reviewed a prospectively collected cohort of 19,890 primary elective TKAs performed from 2016 to 2024 at a single integrated tertiary health care system. Baseline KOOS Pain, KOOS Physical Function Short Form (PS), KOOS Joint Replacement (JR), and VR-12 Mental Component Score were evaluated by operative year. Annual PROM values, pairwise year-to-year contrasts with 95% confidence intervals, and demographic, clinical, insurance, BMI, and care-setting characteristics were assessed.

Results: From 2016 to 2024, patients aged ≥65 years increased from 57.2% to 66.5%, CCI ≥3 increased from 11.8% to 20.3% (all $P < 0.001$). Outpatient TKA increased from 28.4% to 84.5% ($P < 0.001$), while median BMI decreased modestly. Despite increasing age and comorbidity, baseline PROMs improved. Compared with 2016, 2024 scores were higher for KOOS Pain by 2.66 points (95% CI: 0.98-4.34), KOOS-PS by 3.64 points (95% CI: 1.96-5.31), and KOOS-JR by 4.31 points (95% CI: 1.24-7.38). Lower baseline KOOS scores persisted among younger, female, Black, Medicaid-insured, higher-BMI, and inpatient patients.

Conclusion: Icross nearly a decade, primary elective TKA patients presented with less severe baseline pain and functional limitation despite increasing age, comorbidity, and outpatient use. These temporal shifts in preoperative severity should be considered in CMS PROM benchmarking, value-based reimbursement, and risk adjustment models.

Notes

The James A. Rand, MD, Young Investigator's Award

Functionally Aligned Vs. Mechanically Aligned Robotic TKA: A Double-Blinded Randomized Trial

Andreas Fontalis, MD, PhD, Babar Kayani, MD, PhD, Fares S. Haddad, MD, FRCS (ORTHO), Hugo Humphries, MD, Jenni Tahmassebi, BS, Sam Oussedik, FRCS, Thibault Magrangeas, MD, Warran Wignadasan, MBBS

Introduction: Functional alignment has gained increasing interest in robotic total knee arthroplasty, although comparative randomized data remain limited. This study compared the clinical and functional outcomes of robotic TKA performed using mechanically aligned (MA) and functionally aligned (FA) techniques.

Methods: A prospective double-blinded randomised controlled trial included 100 patients undergoing primary robotic TKA, randomised 1:1 to MA or FA alignment. Patients were assessed at 6 weeks, 6 months, 1 year and 2 years. Outcome measures included Oxford Knee Score (OKS), Forgotten Joint Score (FJS), Visual Analogue Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), and EQ-5D. Perioperative outcomes included surgical time, length of stay, physiotherapy sessions and opioid consumption.

Results: Baseline characteristics and preoperative patient reported outcome measures (PROMs) were comparable between groups. At 6 weeks and 6 months, no clinically meaningful differences were observed. At 1 year, FA demonstrated higher FJS (76.9 ± 21.2 vs. 67.4 ± 23.9, $p = 0.041$) and improved WOMAC stiffness ($p = 0.022$), function ($p = 0.044$) and total score ($p = 0.048$). At 2 years, FA demonstrated higher FJS (79.9 ± 21.9 vs. 70.2 ± 23.1, $p = 0.042$) and improved WOMAC pain ($p = 0.024$), stiffness ($p = 0.003$), function ($p = 0.007$), and total score ($p = 0.004$). KOOS and EQ-5D scores were comparable at all timepoints. There were no differences in length of stay, opioid consumption, or most perioperative variables. Surgical time was longer in the FA group (114.6 ± 27.0 vs. 104.8 ± 20.7 minutes, $p = 0.023$).

Conclusion: Functionally aligned robotic TKA was associated with improved patient-reported outcomes at mid-term follow-up, with no differences in perioperative recovery. These findings suggest that functional alignment may provide incremental clinical benefit without compromising perioperative safety, although longer-term follow-up is required.

Notes

AAHKS Surgical Techniques and Technologies Award

Cement-in-Cement Re-Revision TKA: Durable Survivorship at Long-Term Follow-Up?

Charles P. Hannon, MD, MBA, **Joshua P. Rainey, MD**, Katherine E. Mallett, MD, Mason F. Carstens, MS, Matthew P. Abdel, MD, Nicholas A. Bedard, MD, Rafael J. Sierra, MD, Tad M. Mabry, MD

Introduction: The incidence of re-revision total knee arthroplasty (TKA) continues to increase. In select scenarios, a well-fixed diaphyseal cement mantle can be retained and a new stemmed implant can be cemented into the retained mantle, avoiding morbidity of cement removal. The aims of this study were to evaluate implant survivorship, clinical outcomes, and radiographic results following cement-in-cement re-revision TKA.

Methods: We retrospectively reviewed 92 cement-in-cement re-revision TKAs (41% femur-only, 32% both, and 27% tibia-only) from 1997 to 2023. Mean age was 67 years, 54% were male, and mean BMI was 33 kg/m^2. Most common indications included aseptic loosening (45%), instability (28%), and mechanical failure (16%). Metaphyseal fixation was utilized in 84%. Constructs included hinge (63%), varus-valgus constrained (26%), and posterior-stabilized (11%) designs. Outcomes included cumulative incidence of aseptic and any re-revision and reoperation using competing risk analysis, Knee Society scores (KSS), and radiographic loosening. Mean follow-up was 7 years.

Results: The 1-, 5-, and 10-year cumulative incidences of aseptic re-revision were 1%, 5%, and 15%, respectively. Any re-revision was 4%, 10%, and 24%, and any reoperation was 8%, 19%, and 32% at the same time points, respectively. An increasing number of prior operations was associated with a higher risk of aseptic revision, any revision, and any reoperation. Outcomes did not differ based on indication, metaphyseal fixation, implant constraint, or number of components revised. Mean KSS improved from 50 to 74 at final follow-up ($p< 0.0001$). Radiographic loosening occurred in two unrevised knees.

Conclusion: Cement-in-cement re-revision TKA demonstrated durable long-term survivorship, significant improvement in KSS, and low rates of radiographic loosening. Despite an increased risk with surgical complexity, outcomes were not influenced by indication, construct, or extent of revision. In the setting of a well-fixed cement mantle, this technique represents a reliable and effective option particularly when combined with a metaphyseal cone.

Notes

AAHKS Clinical Research Award

Oral Methylprednisolone After TKA Does Not Improve Recovery: A Randomized Controlled Trial

Anne DeBenedetti, MS, Christine L. Zickler, MS, Craig J. Della Valle, MD, Denis Nam, MD, MSc, Matthew T. Weintraub, MD, Omar A. Behery, MD, Robert A. Burnett, MD, **Scott M. Sporer, MD**, Tad L. Gerlinger, MD, E. Bailey Terhune, MD, Vasili Karas, MD

Introduction: While intraoperative corticosteroids have been shown to enhance early recovery after total knee arthroplasty (TKA), the benefit of an extended oral methylprednisolone taper is less clear. This double-blind, placebo-controlled randomized trial evaluated whether an oral methylprednisolone taper starting postoperative day (POD) 1 reduces opioid consumption and improves recovery after primary TKA.

Methods: 449 patients undergoing TKA were randomized to a 6-day methylprednisolone taper (twenty-one 4-mg tablets) or an identical-appearing placebo starting POD 1. Of these, 402 patients had completed data and were analyzed (197 methylprednisolone, 205 placebo). Surgeons and patients were blinded, and all patients received the same standardized multimodal pain protocol. The primary outcome was cumulative morphine milligram equivalents (MME) consumption from POD one to seven. An a priori power analysis determined 147 patients were required per arm to detect a 20% decrease in cumulative opioid consumption at POD 7, assuming an alpha of 0.05 and power of 80%.

Results: Cumulative MME use did not differ between patients who received the oral steroid taper and placebo at 48 hours (98 vs. 102 MME; P=0.42) or within the first 7-days (293 vs. 281 MME; P=0.51). Daily pain at rest or with activity did not differ within one week (P=0.14-0.87). No differences were observed in daily sleep, nausea, or emesis within one week (P=0.08-0.98). At 3-weeks, patients who received the steroid taper reported higher single-day pain at rest (2.6 vs. 2.1; P=0.02), pain with activity (3.7 vs. 3.2; P=0.01), and 24-hour MME use (18 vs. 14 MME; P=0.009). At 6-weeks, 24-hour MME use, knee society scores and knee ROM did not differ (P=0.07-0.64).

Conclusion: An oral methylprednisolone taper starting on POD 1 after primary TKA was not associated with reduced cumulative MME use or improved early recovery, suggesting no additional clinical benefit within an established multimodal pain protocol.

Notes

Symposium VI

Optimizing Your Primary Arthroplasty Approach: Five Surgical Videos to Improve Hip and Knee Outcomes

Moderator: Ran Schwarzkopf, MD, MSc

Surgical approach selection in primary total hip and knee arthroplasty remains a key determinant of early recovery, complications and reproducibility. While multiple approaches are widely used, there is significant variability in execution, efficiency and outcomes. This video-based symposium will present five high-yield surgical approaches—table-based direct anterior, off-table direct anterior, posterior/STAR for total hip arthroplasty, and medial parapatellar and sub-vastus approaches for total knee arthroplasty. Each case will focus on technical pearls, common pitfalls and reproducible strategies to improve efficiency, soft tissue handling and component positioning. Faculty will highlight practical modifications that can immediately enhance surgeon performance regardless of practice setting.

Learning Objectives:

1. Compare commonly used surgical approaches in primary THA and TKA, including advantages, limitations, and indications.
2. Identify technical pearls to improve efficiency and reproducibility for each approach.
3. Recognize and avoid common complications associated with each surgical exposure.
4. Optimize soft tissue handling and component positioning through approach-specific strategies.
5. Select the most appropriate approach based on patient anatomy, surgeon experience and practice setting.

Outline:

Direct Anterior Approach (THA): Table-based and off-table approaches tips and tricks
Lucas A. Anderson, MD

The "STAR" Approach (THA): Superior Transverse Atraumatic Reconstruction, Preserving the Piriformis, Anatomical Reconstruction
Ran Schwarzkopf, MD, MSc

Medial Parapatellar Approach (TKA): Standard exposure done optimally, Avoiding extensor mechanism complications, Efficient balancing and exposure tips and When to extend exposure
Brett R. Levine, MD, MS

Sub-Vastus Approach (TKA): Indications and patient selection, Technical execution and limitations, Recovery advantages vs. trade-offs and Avoiding common pitfalls
Sebastien Parratte, MD, PhD

Discussion
All Faculty

Notes

Paper #27

Association of Femoral Stem Design and Surgical Indication with BCIS in Cemented Hip Arthroplasty

Audrey R. Byrne, BA, Carl L. Herndon, MD, Nana O. Sarpong, MD, MBA, **Stephen G. Devlin, MD**, Wyatt H. Buchalter, MD

Introduction: Bone cement implantation syndrome (BCIS) is a potentially life-threatening perioperative complication of cemented hip arthroplasty characterized by hypoxia, hypotension, and cardiovascular collapse. While patient-level risk factors for BCIS are well-described, the influence of femoral stem design and cementation technique on BCIS incidence and severity remains poorly understood. This study evaluated whether femoral stem design influences BCIS risk in patients undergoing cemented hip arthroplasty and compared outcomes between fracture and elective cohorts.

Methods: A retrospective cohort study of 343 consecutive patients undergoing cemented hemiarthroplasty or total hip arthroplasty at a single academic institution was performed. Femoral stems were categorized as composite beam, taper-slip, or canal-filling (French paradox). BCIS was graded using established criteria based on perioperative changes in oxygen saturation and systolic blood pressure. Primary outcomes were BCIS incidence and severity. Secondary outcomes included prolonged intubation, ICU admission, venous thromboembolism, and 30-day mortality.

Results: BCIS incidence did not differ significantly across stem design groups (composite beam 20.5%, canal-filling 25.7%, taper-slip 23.8%; P = 0.70), and severity distribution was similarly comparable (P = 0.79). Cement type and stem size were not associated with BCIS risk. Fracture patients experienced significantly higher BCIS incidence (32.4% vs. 18.6%, P = 0.0046) and greater severity (P = 0.0085) than elective patients. Fracture cases also demonstrated higher rates of ICU admission (3.6% vs. 0%, P = 0.010) and 30-day mortality (2.9% vs. 0%, P = 0.026).

Conclusion: Femoral stem design did not significantly influence BCIS incidence or severity in cemented hip arthroplasty. Fracture indication was associated with substantially higher BCIS rates and worse perioperative outcomes. Patient-level risk stratification, particularly surgical indication, may be more clinically actionable than implant selection in mitigating BCIS risk.

Notes

Paper #28

Fixation of Intraoperative Calcar Fractures in Primary THA Restored Survivorship to Matched Controls

Blake M. Padgett, BS, Charles P. Hannon, MD, MBA, **Daniel G. Meeker, MD, PhD**, Mark W. Pagnano, MD, Matthew P. Abdel, MD, Nicholas A. Bedard, MD, Rafael J. Sierra, MD

Introduction: Long-term survivorship data following intraoperative calcar fractures during primary total hip arthroplasty (THA) are lacking. The purpose of this study was to determine the incidence, management, and long-term survivorship of primary THAs complicated by intraoperative calcar fracture compared to matched controls.

Methods: We identified 227 intraoperative calcar fractures from 28,316 primary THAs performed between 2000-2023. Cases were matched 2:1 to 454 non-fracture controls on age, sex, body mass index (BMI), surgical approach, and American Society of Anesthesiologists class. Kaplan-Meier survivorship free of femoral revision, any revision, and any reoperation was compared between groups. Among fractures, 83% were in Dorr B femurs, 95% were fixed with cerclage, 28% received a collared stem, and stem geometry was changed in 7%. Mean age was 61 years, 69% female, mean BMI 29 kg/m2. Mean follow-up was 7 years.

Results: The incidence of intraoperative calcar fracture was 0.8%. The 10-year survivorship free of femoral revision, any revision, and any reoperation was 98%, 95%, and 90%, respectively, none of which differed from controls (all p>0.29). Among 31 revisions, the most common indications were dislocation (n=14), periprosthetic fracture (n=5), infection (n=3), and aseptic loosening (n=2). Postoperative periprosthetic fracture occurred in 7 (3%) fractures and 8 (2%) controls. Radiographic stem subsidence without revision occurred in 3 (1%) cases. Among fractures fixed with cerclage, placement below the lesser trochanter was associated with increased revision risk (HR 5.7; p=0.02). Stem class, cement status, collar presence, stem change, and postoperative weightbearing were not associated with revision or reoperation. Mean Harris Hip Score improved from 51 preoperatively to 90 at 2 years, comparable to controls (p=0.82).

Conclusion: Intraoperative calcar fractures occurred in less than 1% of primary THAs. With cerclage fixation, they demonstrated 10-year survivorship comparable to matched controls. When cerclage is required, placement above the lesser trochanter is recommended.

Notes

Paper #29

The Forgotten Five Degrees: Sagittal Stem Alignment Predicts Failure After THA

Adam M. Freedhand, MD, Ali Oliashirazi, MD, Alisina Shahi, MD, PhD,
David Rodriguez-Quintana, MD, Kenneth B. Mathis, MD, Robert Frangie, MD

Introduction: Postoperative assessment after total hip arthroplasty (THA) typically focuses on cup position, leg length, offset, and coronal stem alignment. Sagittal femoral stem position is rarely measured, despite its potential influence on functional version, impingement, and hip stability. We hypothesized that sagittal stem malalignment ≥5° is associated with postoperative instability and early failure after primary THA.

Methods: We retrospectively reviewed 4,784 primary THAs performed at a single institution with available postoperative AP and lateral radiographs. Sagittal stem alignment was measured using OrthoView software (Materialise, Leuven, Belgium) and defined as the angle between the femoral canal axis and the prosthetic stem axis on the lateral radiograph. Patients were stratified into malaligned (≥5°) and neutral (< 5°) cohorts. The primary outcome was postoperative instability, defined as dislocation or revision for instability. The secondary outcome was early aseptic failure within 12 months. Odds ratios with 95% confidence intervals were calculated for instability, and Fisher's exact test was used for early failure.

Results: Sagittal stem malalignment ≥5° was identified in 1,370 patients (28.6%). Instability occurred in 0.9% of malaligned hips compared with 0.06% of neutral hips (OR 15.1, 95% CI 3.4–67.4; p< 0.001). Early aseptic failure occurred in 0.9% of malaligned hips compared with no failures in the neutral cohort (p< 0.001).

Conclusion: Sagittal femoral stem malalignment ≥5° is associated with substantially higher odds of instability and early aseptic failure after primary THA. Routine assessment of sagittal stem position may identify a technical contributor to instability that is consistently overlooked on standard postoperative review.

Notes

Paper #30

DISTINCT RCT: Dual Mobility vs. Conventional Total Hip Arthroplasty in Femoral Neck Fractures

Chris Wall, MD, DISTINCT Study Group, Frances Garden, PhD, Helena Oakey, PhD, Ian Harris, PhD, **John E. Farey, FRACS**, Paul N. Smith, FRACS, Qunyan Xu, MS, Sam Adie, PhD, Sanja Lujic, PhD

Introduction: Dislocation is the leading cause of revision surgery when total hip arthroplasty (THA) is performed for femoral neck fracture (FNF). This study aimed to determine whether dual mobility (DM) THA reduced the risk of revision surgery compared with conventional THA in FNF.

Methods: We performed a multi-centre, cluster-randomized, crossover, open-label trial nested within the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR). Fifty hospitals in Australia were randomized to perform either conventional or DM THA. Patients aged > 50 years and eligible for treatment of FNF with a THA were enrolled. Recruitment occurred between February 1, 2021 and December 31, 2023. Final follow-up occurred on December 31, 2025. The primary outcome was revision for all-causes, dislocation, infection, fracture and loosening at 2 years. The primary analysis was intention to treat using cluster summary methods.

Results: A total of 2,440 eligible patients were enrolled (1,212 in the conventional THA group and 1,228 in the DM THA group). Mean [SD] age was 73 [8.9] years, 1,664 (68.2%) were female, and 1,474 (68.5%) received a posterior approach, 505 (23.5%) a lateral approach and 173 (8%) an anterior approach. There were 58 revisions (2.4%) during the study period. There was no difference in the risk of all-cause revision ($p = 0.35$), revision for dislocation ($p = 0.32$) or revision for fracture ($p = 0.07$) at 2 years comparing conventional and DM THA. There were too few revisions for infection and loosening to allow meaningful comparison between groups. The revision risk difference between conventional and DM THA did not vary between posterior and non-posterior approaches.

Conclusion: DM THA does not protect against revision surgery in FNF patients.

Notes

Paper #31

Isolating the Collar Effect on Periprosthetic Fracture Risk in Triple-Taper Cementless THA

Chukwuweike U. Gwam, MD, PhD, Jacob Stoebner, BA, **Matthew S. Hepinstall, MD**, Ran Schwarzkopf, MD, MSc, Vinay K. Aggarwal, MD

Introduction: Whether the lower periprosthetic femur fracture risk observed with collared cementless stems is attributable to the collar itself or to the triple-taper geometry that often accompanies, it remains unclear. We designed two propensity-weighted comparisons to isolate these contributions.

Methods: We identified 6,833 primary unilateral cementless total hip arthroplasties (THAs) performed with triple-taper femoral stems; 16 cases with intraoperative periprosthetic femoral fracture were excluded from comparative analyses, yielding an analytic cohort of 6,817 THAs. Comparison A contrasted a collared vs. collarless single implant (n = 3,346), holding stem geometry and design constant so that collar status was the only variable. Comparison B contrasted all collared triple-taper stems vs. a single collarless stem (n = 6,794). Both comparisons used inverse probability of treatment weighting with doubly robust Firth-penalized logistic regression and bootstrapped weighted risk differences as adjusted estimators.

Results: Postoperative PPF occurred in 34 cases (0.50%). Collar use in Comparison A was associated with a weighted risk difference of –0.55% (95% CI, –1.10% to 0.09%; p = 0.094) and a doubly adjusted Firth odds ratio of 0.357 (95% CI, 0.148 to 0.863; p = 0.022). In Comparison B, all collared triple-taper stems showed a weighted risk difference of –0.63% (95% CI, –1.08% to –0.18%; p = 0.006) and a doubly adjusted Firth odds ratio of 0.326 (95% CI, 0.127 to 0.841; p = 0.021).

Conclusion: Femoral stem collars provide protection against periprosthetic femur fracture that is independent from triple taper stem design. Prospective cohort studies are needed to validate our study findings.

Notes

Paper #32

In Vivo Impingement Risk During Activities of Daily Living Following Total Hip Arthroplasty

Brent A. Lanting, MD, MSc, FRCSC, James L. Howard, MD, MSc, FRCSC, **Matthew G. Teeter, PhD**, Shahnaz Taleb, BS

Introduction: Component-on-component impingement following total hip arthroplasty (THA) contributes to instability and implant failure. Navigation has been introduced to reduce impingement risk, but evidence remains limited as prior studies have not captured in vivo implant behavior during functional tasks. Using a validated RSA-based impingement measurement technique, this study compared impingement risk during activities of daily living in navigated vs. conventional THA, and examined the relative contributions of implant and patient factors in each group.

Methods: Fifty-six participants underwent THA through the direct anterior approach: 28 with intraoperative navigation and 28 matched controls (matched by age, sex, implant size, and offset), performed by one of two surgeons using identical implant systems. RSA examinations were performed at minimum six months post-operation in nine functional positions simulating activities of daily living. Minimum femoral neck-to-liner distances were calculated per position; a 1 mm threshold defined impingement based on prior phantom validation.

Results: Impingement risk did not differ between navigated and conventional cohorts ($p > 0.05$). External rotation carried the greatest impingement risk (1.2-10.6 mm); internal rotation the lowest (7.0-18.0 mm). In the conventional cohort, 32 mm heads and standard offset stems were associated with reduced neck-liner distances in multiple positions compared to 36 mm heads and lateralized stems. In the navigated cohort, increased cup inclination reduced neck-liner distance during gait and downstairs positions. Across cohorts, pre-operative pelvic tilt and sacral slope delta (standing to sitting) were the strongest predictors of impingement risk across multiple positions.

Conclusion: Navigation did not confer an overall functional advantage over conventional THA performed by high-volume surgeons. Factors driving impingement risk differed by group, suggesting navigation may be most valuable when implant geometry is constrained. Dynamic pelvic mobility emerged as the dominant predictor of impingement risk, underscoring the importance of pre-operative spinopelvic assessment regardless of navigation use.

Notes

Paper #33

Dynamic Impingement Modeling in Robotic THA Reduces Dislocation and Instability Revision

Carmelo Burgio, MD, David J. Mayman, MD, Eliana Asiedu, BS, **Eytan M. Debbi, MD, PhD**, Jonathan M. Vigdorchik, MD, Karlos Zepeda, DO, MS, Mathav Vignesh, BS, Peter K. Sculco, MD, Steven G. Persaud, BA, Tony S. Shen, MD

Introduction: Dislocation remains a leading cause of failure following primary total hip arthroplasty (THA). Contemporary robotic platforms allow preoperative impingement modeling, enabling patient-specific simulation of hip motion and identification of potential prosthetic and bony impingement before component implantation. We evaluated whether preoperative impingement modeling is associated with improved survivorship free from dislocation following primary THA.

Methods: We identified 29,277 primary THAs performed for primary osteoarthritis through a posterior approach at a single high-volume institution between 2016 and 2025. All patients had a minimum follow-up of 1 year. There were 6,647 robotic procedures with impingement modeling, 1,793 robotic procedures without impingement modeling, 5,190 computer-navigated procedures, and 15,647 manual procedures. The primary outcome was 3.5-year survivorship free from dislocation; the secondary outcome was survivorship free from revision for instability. Kaplan-Meier analysis was performed with log-rank testing. Multivariable Cox proportional hazards models adjusted for age, sex, body mass index, surgical year, femoral head size, and bearing construct. The mean follow-up was 5.5 years (range, 1 to 10 years).

Results: Survivorship free from dislocation was 99.8% (95% CI 99.7 to 99.9) for robotic THA with impingement modeling ($p< 0.001$). Relative to robotic THA with impingement modeling, adjusted dislocation risk was higher for manual THA (HR 4.7, 95% CI 1.5 to 14.7; p=0.007), computer-navigated THA (HR 3.9, 95% CI 1.2 to 12.3; p=0.022), and robotic THA without impingement modeling (HR 2.4, 95% CI 1.0 to 6.8; p=0.047). Similar trends were observed for revision for instability, with manual THA (HR 3.9, 95% CI 1.3 to 12.3; p=0.02) and computer-navigated THA (HR 3.5, 95% CI 1.1 to 11.0; p=0.03) demonstrating increased risk, compared to the impingement model group.

Conclusion: Preoperative impingement modeling was associated with superior dislocation-free and revision-free survivorship. These findings support patient-specific dynamic simulation as an important component of contemporary THA planning.

Notes

Paper #34

Does Imageless Navigation Add Value Beyond CT-Based 3D Planning in Primary THA? An RCT

Chuan K. Koh, MBBS, Duncan Bakke, PhD, George Grammatopoulos, MD, FRCS (ORTHO), Marco T. Schneider, PhD, Robert J. Feibel, MD, FRCSC, **Simon Garceau, MD**

Introduction: CT-based three-dimensional (3D) planning and use of intra-operative technology (e.g. navigation) are emerging strategies in contemporary THA. Whether adding imageless navigation to 3D planning meaningfully improves hip reconstruction accuracy and THA outcomes remains uncertain.

Methods: In this single-centre, three-surgeon, RCT, 106 patients undergoing primary uncemented THA for osteoarthritis were allocated to either CT-based 3D-planning alone (3D-Only; n=56) or 3D-planning augmented with intra-operative imageless navigation (3D-Nav; n=50). There were no demographic differences between groups and most underwent THA with anterior approach (n=85%, 80%). No intra-operative fluoroscopy was used. All cases underwent standardized, low-dose, pre- and post-operative CTs, enabling 3D superimposition of planned and delivered reconstructions to quantify centre-of-rotation (COR) restoration and component orientation. The primary outcome was absolute deviation between planned and delivered COR and component orientation. Secondary outcomes were the proportion of hips within predefined accuracy thresholds and changes in patient-reported outcomes (Oxford-Hip-Score [OHS], EQ-5D-5L) at 12 months.

Results: 3D-COR restoration and component orientations were similar between groups. Mean differences in acetabular inclination (0.3°±6.8 vs. –0.4°±6.4; p=0.644), acetabular anteversion (3.3°±9.6 vs. 4.9°±7.7; p=0.418), femoral version (–0.5°±8.0 vs. 1.3°±7.2; p=0.488), and combined anteversion (39.3°±13.0 vs. 43.5°±12.8; p=0.126) did not differ between 3D-Only and 3D-Nav groups. In both groups, 80–90% of hips met radiographic accuracy thresholds for cup/stem orientation. Three complications occurred (2 PJIs, requiring DAIR only and one fracture requiring revision). Improvements in OHS (3D-Only:25±9 vs. 3D-Nav: 25±10; p=0.8) and EQ-5D-5L (3D-Only:0.28 ± 0.17 vs. 3D-Nav:0.29 ±0.17; p=0.9) at 12 months were substantial and comparable between groups.

Conclusion: IIn routine primary THA performed with 3D-CT-based planning, imageless navigation did not provide added benefits in improving hip reconstruction accuracy or early functional outcomes. Findings indicate that 3D planning is of significant value secondary to visual cues and templated sizing accuracy; compound effects might be present with image-guided navigation/robotics thereafter.

Notes

Paper #35

Predicting Elevated Spinopelvic Tilt in THA Patients from Preoperative AP Radiographs

Cale A. Pagan, MD, David J. Mayman, MD, Jonathan M. Vigdorchik, MD, Mark Alan Fontana, PhD, Peter K. Sculco, MD, Seong Jun Jang, MD, **Seth A. Jerabek, MD**, Theofilos Karasavvidis, MD

Introduction: Spinopelvic alignment plays a critical role in total hip arthroplasty (THA) outcomes by influencing postoperative stability. Traditional spinopelvic tilt (SPT) assessments rely on adequate lateral radiographs, which depend on appropriate patient positioning and are influenced by factors such as BMI and prior hardware. We evaluated whether deep learning-derived measurements from anteroposterior (AP) radiographs could accurately estimate and classify SPT, potentially streamlining THA preoperative evaluation.

Methods: We retrospectively reviewed 1,824 patients who underwent THA and had preoperative standing AP and lateral radiographs. Using a deep learning algorithm, 19 pelvic landmarks were identified on AP radiographs to facilitate derivation of angles, distances, ratios, and pelvic obliquity indices. Linear regression models and Pearson correlation coefficients were used to assess relationships between derived AP parameters and SPT measured on lateral radiographs. Continuous prediction and binary classification models of SPT were developed using demographic variables (age, sex, BMI) and extracted AP radiographic parameters.

Results: An AP radiographic ratio involving the superior sacroiliac joints, obturator foramen, and ischial tuberosities demonstrated the strongest correlation with SPT ($r=0.74$, $p< 0.01$; male=0.73, female=0.78), surpassing traditional AP measurements. Continuous prediction models combining demographic variables with AP parameters demonstrated moderate accuracy (MAE=4.59, 95% CI: 4.16-5.00; RMSE=6.1; $R^2=0.57$). Of 1,824 patients, 521 had SPT >19°. Binary classification models excelled in identifying patients with SPT >19°, a threshold associated with instability risk after THA, with the top-performing model achieving an AUROC of 0.88 and AUPRC of 0.74.

Conclusion: Deep learning-derived AP radiographic parameters accurately estimated and classified elevated SPT in THA candidates. The binary model effectively identified patients with SPT >19°, a spinopelvic characteristic associated with instability risk after THA. Routine AP radiographs analyzed with deep learning may serve as a practical screening tool to identify patients who warrant further spinopelvic evaluation.

Notes

Paper #36

Prevalence and Early Postoperative Course of Pelvic Floor Disorders Following Total Hip Arthroplasty

Colleen Fitzgerald, MD, Daniel R. Schmitt, MD, David St. Etienne Jr, BA, Meredith J. Benson, BS, **Nicholas M. Brown, MD**, Sara Winfrey, MD, Stacey Bennis, MD

Introduction: Hip osteoarthritis and pelvic floor disorders (PFD), encompassing lower urinary tract symptoms (LUTS), colorectal symptoms, and pelvic organ prolapse (POP), commonly coexist in aging adults. Although the hip and pelvic floor share key musculature (obturator internus, piriformis), the effect of total hip arthroplasty (THA) on pelvic floor function remains poorly characterized, with prior prospective work confined to urinary incontinence (UI) in women. We sought to determine PFD prevalence at time of THA and characterize changes 3 months postoperatively across symptom domains and both sexes.

Methods: Prospective cohort study at a single academic center (planned interim analysis). Adults undergoing primary THA for hip osteoarthritis were enrolled; exclusions were revision, avascular necrosis, non-English speakers, and cognitive impairment. Participants completed the Pelvic Floor Distress Inventory (PFDI-20; females 0–300 [UDI-6, CRADI-8, POPDI-6], males 0–200 [UDI-6, CRADI-8]) at baseline and 3 months post-operatively. PFD was defined a priori as any subscale >24. The target of 108 female and 72 male paired observations provided 80% power to detect the female MCID (13.5) at a=0.05. Paired t-tests were stratified by sex.

Results: 109 patients (57 female, 52 male; 102 direct anterior, 7 posterior; age 64.8, BMI 32.0) were enrolled. At baseline, 52.3% met PFD criteria (59.6% females, 44.2% males). At 3 months (n=32 females, n=26 males), PFDI-20 decreased 34.5 points in females (p=0.0002), exceeding the MCID, and 9.8 in males (p=0.053). Females improved across all three subscales (p< 0.01). Among females with baseline PFD (n=20), 45% achieved resolution; among males (n=11), scores fell 25.2 points (p=0.018), with 73% resolution.

Conclusion: Over half of THA patients had clinically significant PFD preoperatively, and large proportion of patients of both sexes achieved resolution at 3 months. These findings support PFD assessment in preoperative counseling and reveal a previously unrecognized benefit of THA. Enrollment and follow-up are ongoing.

Notes

Paper #37

Does the Femoral Stem Collar Cause Iliopsoas Tendinitis in Primary Total Hip Arthroplasty?

Colin Elsinger, Henry Ho, MS, Keira McClanahan, Robert A. Sershon, MD, Robert H. Hopper, Jr., PhD, **William G. Hamilton, MD**

Introduction: There has been a significant increase in use of collared femoral implants over the past several years, and concern has been raised regarding an association between the collar to postoperative iliopsoas tendinitis (IPT). This study evaluated this association between the use of collared femoral stems and the incidence of IPT in primary total hip arthroplasty (THA)".

Methods: We queried our institutional database to identify a cohort of 8727 consecutive primary THA's using cementless femoral implants between 2016-2025 that were eligible for 1-year follow-up. There were 6491 hips with a collared stem and 2236 collarless stems in the cohort. Using this cohort, the database was queried for reports of IPT and additionally the electronic medical record was searched for any patients with the ICD-10 code M76.1 in the ipsilateral hip. We then compared the incidence of IPT between collared and collarless implants. Secondarily, we matched patients with collared implants 2:1 between asymptomatic patients and those with IPT. 4-week postoperative radiographs were measured to determine the amount of collar overhang to evaluate the association of collar overhang with IPT.

Results: There was no difference in demographics between the collared or collarless implants. There were a total of 257 cases of IPT (192 collared/65 collarless) for an incidence of 2.9% at mean 3.4 years mean follow-up. There was no statistical difference in iliopsoas tendinitis comparing collared (3.0%) vs. collarless (2.9%) stems (p=0.92). In the 2:1 matched cohort, we could not identify any relationship between the amount of collar overhang with the incidence of iliopsoas tendinitis.

Conclusion: There was no difference in the rate of IPT between collared and collarless stems, and no association between the amount of collar overhang and the incidence of IPT. Future prospective studies may help elucidate any relationship.

Notes

Paper #38

Indication of First Revision THA Dictates Re-Revision Risk in an AJRR Cohort

Cassie Monk, MPH, David Rodriguez-Quintana, MD, **Fong H. Nham, MD**, Ishan Patel, MD, Mouhanad M. El-Othmani, MD

Introduction: As THA volume rises, revision THA (rTHA) will symmetrically increase. While re-revision rates are high, evidence is limited regarding how specific failure mechanism affect long-term survival and temporal failure patterns. This study aims assessed trends, re-revision rates, and restricted mean survival times (RMST) of first-time aseptic rTHA based on the initial indication for revision.

Methods: Using the AJRR and CMS data (2012–2024), evaluation of patients aged > 65 years undergoing first-time, unilateral aseptic rTHA for osteoarthritis or osteonecrosis. Infection, modular necks, and metal-on-metal or ceramic-on-metal bearing surfaces were excluded. Primary revision indications were isolated hierarchically. Risk of all-cause second revision was evaluated using adjusted Cox proportion hazards modeling and 132-month restricted mean survival time (RMST).

Results: Among 5,812 patients, females comprised the majority of all revision groups except mechanical wear ($p < 0.001$). Periprosthetic fractures occurred acutely following primary THA (mean: 6.79 months), whereas aseptic loosening (21.30 months), dislocation (17.13 months), and wear (62.50 months) occurred later. All other indications demonstrated significantly lower risk of re-revision when compared to instability with dislocation (12.19% re-revision rate, $p < 0.01$): periprosthetic fracture (HR = 0.396), aseptic loosening (HR=0.484), pain (HR= 0.518), and mechanical complications (HR= 0.647). Dislocation revisions failed rapidly, reaching 11.16% re-revision rate at 1 year and plateauing by year 5 (14.40%). Dislocation had a significantly shorter RMST (112.72 months) than fracture (123.27 months), loosening (121.12 months), and pain (120.68 months) (all $p < 0.01$).

Conclusion: Instability with dislocation is the most aggressive driver of subsequent rTHA failure, characterized by clustering of re-revisions within the first postoperative year. Conversely, periprosthetic fractures carried the lowest re-revision risk and longest revision-free survival after revision. Although fractures present acutely in older, frailer female cohorts, surgical revision achieves stable mechanical outcomes. Revision for dislocation remains a profound clinical challenge requiring heightened postoperative follow-up.

Notes

Paper #39

Dual Mobility Reduces Instability After Cup-Cage Reconstruction for Severe Bone Loss

Carsten Perka, MD, Nele Wagener, MD, Olivia Schaffer, BS, Ran Schwarzkopf, MD, MSc, **Vinay K. Aggarwal, MD**

Introduction: Instability is a leading mode of failure after cup-cage reconstruction for severe acetabular bone loss; however, the effect of dual mobility (DM) bearings remains insufficiently defined. This multicenter study evaluated whether DM bearings reduce instability-related failure after cup-cage reconstruction.

Methods: We retrospectively analyzed 125 cup-cage reconstructions performed at two high-volume tertiary referral centers (mean follow-up, 32.6±23.3 months). The primary endpoint was instability-related failure, defined as any dislocation and/or re-revision for instability. Secondary endpoints included all-cause re-revision, periprosthetic joint infection (PJI), aseptic loosening, wound/hematoma complications, periprosthetic fracture, and patient-reported outcomes (PROMs). Firth-penalized logistic regression adjusted for center, pelvic discontinuity, Charlson Comorbidity Index (CCI), and age. Time-to-event and endpoint-definition sensitivity analyses tested robustness.

Results: DM was used in 60/125 reconstructions (48.0%). Pelvic discontinuity was more common in the DM group (60.0% vs. 43.8%; SMD=0.330). Instability-related failure occurred in 7/60 DM cases (11.7%) vs. 17/65 non-DM cases (26.2%). DM was associated with lower instability-related failure before adjustment (odds ratio [OR] 0.373, 95% confidence interval [CI] 0.142-0.977; p=0.044) and after adjustment (adjusted OR [aOR] 0.346, 95% CI 0.129-0.925; p=0.034); adjusted absolute risk difference, -15.8%). All-cause re-revision occurred less frequently in DM cases (23.3%) than non-DM cases (41.5%), although this was not significant after adjustment (aOR 0.46, 95% CI 0.21-1.01, p=0.054). With available numbers, PJI, aseptic loosening, wound complications, hematoma/seroma, and periprosthetic fracture did not differ significantly (p>0.05). Hip Disability and Osteoarthritis Outcome Score for Joint Replacement improved from 57.9±22.0 preoperatively to 76.0±24.8 at follow-up; among paired cases, 24/40 patients (60.0%) achieved the minimal clinically important difference (>=12 points).

Conclusion: In this high-risk multicenter cup-cage cohort, DM bearings were associated with a clinically meaningful and statistically significant reduction in instability-related failure. Functional recovery was clinically meaningful in most evaluable patients. These findings support consideration of DM bearings as a strategy to reduce instability during cup-cage reconstruction for severe acetabular bone loss.

Notes

Paper #40

Acetabular Revision Decreases Re-Revision for Instability Risk Compared to Head and Liner Exchange

Andrew Li, BA, Carsten Perka, MD, Dante Petruzziello, BA, Laith Bahlouli, BS, Mitchell F. Kennedy, BS, **Nele Wagener, MD**, Ran Schwarzkopf, MD, MSc, Vinay K. Aggarwal, MD

Introduction: Instability remains a leading indication for revision total hip arthroplasty (rTHA), yet no matched-cohort study has compared acetabular component revision (AC) with isolated head and liner exchange (HL). This propensity score-matched study compared re-revision for instability, first dislocation, and all-cause re-revision following AC vs. HL.

Methods: We reviewed 327 patients undergoing rTHA for instability (2011-2025) at two institutions (207 AC, 120 HL). Propensity score matching (1:1) on age, sex, BMI, ASA class, smoking status, institution, and number of prior revisions yielded 94 matched pairs. The primary outcome was re-revision for instability. Secondary outcomes included first dislocation and all-cause re-revision rates. Kaplan-Meier analysis estimated outcome-free survivorship, and multivariable Cox proportional hazards regression adjusted for bearing construct and number of prior revisions.

Results: After matching, cohorts were well-balanced (all SMDs ≤ 0.1). The HL cohort demonstrated higher rates of re-revision for instability (19.1% vs. 6.4%, P=0.025) and all-cause re-revision (33.0% vs. 23.4%, P=0.176). A greater proportion of HL patients experienced ≥1 dislocation (29.8% vs. 16.0%, P=0.037); dislocations not leading to re-revision were managed with closed reduction in both groups. At 5 years, survivorship free from re-revision for instability was 93.6% for AC vs. 80.9% for HL (P=0.033). Cox regression showed AC revision was associated with a lower hazard of re-revision for instability (HR=0.30, 95% CI:0.11–0.83, P=0.021) but not dislocation (HR=0.67, 95% CI:0.34–1.35, P=0.265) or all-cause re-revision (HR=0.69, 95% CI: 0.36–1.31, P=0.258). Prior revision was independently associated with higher risk of dislocation (HR=2.07, P=0.025) and all-cause re-revision (HR=2.02, P=0.006).

Conclusion: In this matched analysis, AC was associated with a lower hazard of re-revision for instability compared with HL, after adjustment for bearing construct and prior revisions. No significant difference was observed in the adjusted hazard of dislocation or all-cause re-revision. Revision strategy may be an important factor in instability-specific outcomes following rTHA.

Notes

Paper #41

First-Time Use of Dual Mobility vs. Prior Dual-Mobility Exposure in Revision THA

Carsten Perka, MD, Nele Wagener, MD, Olivia Schaffer, BS, **Ran Schwarzkopf, MD, MSc**, Vinay K. Aggarwal, MD

Introduction: Dual-mobility (DM) components are used in revision total hip arthroplasty (rTHA) to mitigate instability, but outcomes may differ depending on the prior construct. The purpose of this study was to evaluate the association of prior DM exposure vs. conversion from fixed-bearing with instability and re-revision risk following rTHA.

Methods: This retrospective dual-center study identified 332 rTHA procedures with DM bearings performed on 286 patients: 264 conversions from fixed-bearing, 53 with one prior DM exposure, and 15 second-time-or-greater DM revisions. Categorical variables were compared using chi-square or Fisher's exact tests; continuous variables utilized the Kruskal-Wallis test. Primary regressions used clustered Cox proportional hazards models with robust variance clustered by patient and adjusted for age, sex, center, and primary indication; Kaplan-Meier analyses used a collapsed comparison of fixed-bearing conversion vs. any prior DM exposure. Sensitivity models additionally adjusted for (1) femoral head size and (2) number of prior DM revisions.

Results: Cohorts were similar with regard to age, sex, center, and head size; indication and prior dual-mobility revision count differed across groups (both P< 0.001); indication was adjusted for in primary models. All-time re-revision risk differed significantly across the 3 cohorts (P=0.006). Kaplan-Meier analysis demonstrated worse re-revision-free survival (log-rank P=0.002) and dislocation-free survival (P< 0.001) with prior DM exposure. In clustered Cox models, prior DM exposure was associated with higher hazards of re-revision (HR 1.88, 95% CI [1.07–3.28], P=0.027) and instability events (HR 6.16, [1.67–22.67], P=0.006). These associations remained significant after additional adjustment for femoral head size (P=0.015, P=0.011, respectively). Both first-time DM revision (HR 5.43, [1.39–21.30], P=0.015) and second-or-greater DM revision (HR 8.02, [1.77–36.37], P=0.007) were associated with higher hazards of instability compared with fixed-bearing conversion.

Conclusion: Prior DM revision exposure was associated with higher hazards of re-revision and instability after rTHA with DM bearings.

Notes

Paper #42

Persistent Trochanteric Migration Despite Fixation: Contemporary Outcomes of Vancouver B2 Fractures

Jesse E. Otero, MD, PhD, **Josef E. Jolissaint, MD**, Kayla Hietpas, MPH, Manohar Devarasetty, MD, Matthew L. Hadley, MD, Stephen D. Graham, MD, MS, Turner Casey, BS, Zachary J. Sirois, MD

Introduction: Revision total hip arthroplasty (THA) is the standard treatment for Vancouver B2 periprosthetic femur fractures. Greater trochanter fractures commonly accompany these injuries and contribute to postoperative pain, abductor dysfunction, and reoperation. Contemporary data evaluating trochanteric migration and the effectiveness of fixation strategies remain limited. This study characterized radiographic trochanteric migration, fixation constructs, and postoperative complications following revision THA for Vancouver B2 fractures.

Methods: A retrospective review was performed of patients undergoing revision THA for Vancouver B2 periprosthetic femur fractures at a tertiary referral center. Demographic, surgical, radiographic, and complication data were collected. Greater trochanter migration was measured on serial radiographs in the superior, medial, lateral, and anterior-posterior directions. Trochanteric fixation methods and postoperative complications were analyzed. Variables were summarized using descriptive statistics and compared using chi-square/Fisher exact tests for categorical data and ANOVA tests for continuous data

Results: Ninety patients met inclusion criteria with a mean age of 73.5 ± 10.3 years. Seventy-five patients (82.4%) had an associated greater trochanter fracture; 68 (90.7%) underwent fixation using wires (n=51), cables (n=12), combination constructs (n=2), or claw plates (n=2), while 7 underwent no fixation. Mean superior migration was 8.8 ± 10.1 mm, anterior-posterior migration was 7.5 ± 7.7 mm, lateral migration was 2.6 ± 4.2 mm, and medial migration was 1.0 ± 2.6 mm. No fixation construct reduced migration in any plane and the rate of radiographic union was 25.6%. The overall complication rate was 27.8%, with 13.3% requiring reoperation. The most common complications were periprosthetic fracture, instability, and infection. Surgical approach was not associated with migration or complication rates.

Conclusion: Greater trochanter fractures are common in Vancouver B2 periprosthetic femur fractures and demonstrated substantial postoperative migration despite fixation. No fixation construct or surgical approach reduced migration, and complication and nonunion rates remained high, highlighting the need for improved management strategies.

Notes

Paper #43

Equivalent Outcomes with Stability Matched ORIF vs. Revision Arthroplasty for Vancouver B Fractures

Courtney E. Baker, MD, Gregory G. Polkowski, MD, John R. Martin, MD, Lauren Luther, MD, Reece I. Vesperman, MD, Stephen M. Engstrom, MD, Stephen W. Chenard, MS

Introduction: Vancouver B periprosthetic femur fractures are triaged by stem stability: dictating both the operative plan and whether trauma or arthroplasty teams manage the patient yet is confirmed intraoperatively. Whether outcomes differ between ORIF and revision when treatment is appropriately matched to stem stability, and accuracy of preoperative determination remains incompletely defined. This study compared clinical outcomes for Vancouver B fractures and assessed accuracy of preoperative stability predictions.

Methods: We retrospectively reviewed 87 patients with radiographically confirmed Vancouver B periprosthetic fractures at a single institution. All patients had minimum 90-day follow-up. Patients were grouped by index treatment: ORIF with stem retention (n=42) or revision arthroplasty (n=45). Stem stability was classified preoperatively and intraoperatively. Group comparisons used Mann-Whitney-U and Fisher-exact tests, while survivorship was assessed with Kaplan-Meier and log-rang testing.

Results: Median age was 69 years and median follow-up was 364 days. Preoperative stability prediction matched intraoperative findings in 83 of 85 patients. 44 of 45 loose stems were revised and 40 of 42 well-fixed stems underwent ORIF. Revision entailed significantly more operative time (median 249 vs. 148 minutes), blood loss (825 vs. 325 mL) and transfusions (70% vs. 45%). All-cause reoperation-free survival did not differ between ORIF and revision (83% vs. 86%) or between well-fixed and loose stems (p=0.996). Revision-free survival did not differ (85% vs. 95%). Dislocation, infection, nonunion, and mortality rates did not differ. Reoperation-free survival was higher for fractures managed by trauma than arthroplasty surgeons (97% vs. 76% at 1 year; p=0.021).

Conclusion: When treatment was matched to stem stability, ORIF and revision arthroplasty for Vancouver B periprosthetic femur fractures achieved equivalent reoperation-free and revision-free survival and comparable complication rates. Preoperative radiographic assessment predicted intraoperative stem stability with high accuracy (97.6%), suggesting conventional preoperative stability-based treatment algorithms reliably direct patients to an appropriate procedure with similar early outcomes.

Notes

Paper #44

Impact of a Hip–Spine Workflow on Dislocation Risk After Revision THA

Carmelo Burgio, MD, David J. Mayman, MD, Eliana Asiedu, BS, Eytan M. Debbi, MD, PhD, Jonathan M. Vigdorchik, MD, Karlos Zepeda, DO, MS, Mathav Vignesh, BS, Patrick R. Paszkowski, BS, Peter K. Sculco, MD, **Tony S. Shen, MD**

Introduction: Instability remains a leading cause of failure following revision total hip arthroplasty (rTHA), with spinopelvic pathology increasingly recognized as a key contributor through its influence on functional component orientation. We investigated whether implementation of a hip-spine workflow improves stability and survivorship following rTHA performed for instability.

Methods: We reviewed a consecutive cohort of patients who underwent rTHA between 2016 and 2024 for a primary indication of instability at a single high-volume institution, with minimum two-year follow-up. We identified 74 patients who underwent a standardized preoperative hip-spine workflow. These patients were propensity score matched 1:1 to a control cohort undergoing standard preoperative evaluation based on age, sex, body mass index, history of spinal fusion, and number of prior dislocations. Protocol patients underwent a standardized hip-spine workflow including standing and seated anteroposterior and lateral radiographs to assess spinopelvic mobility, sagittal balance, sacral slope, and anterior pelvic plane orientation. Patients were classified according to the Hip-Spine Classification, and component positioning and implant selection were individualized based on patient-specific spinopelvic parameters. Primary outcomes included dislocation-free and revision-free survivorship at four years, assessed using Kaplan-Meier analysis and multivariable Cox regression.

Results: Dislocation-free survival at four years was significantly higher in the hip-spine workflow group compared with controls (91.9% vs. 76.7%, P=0.013), corresponding to a reduced hazard of redislocation (adjusted HR 0.29, 95% CI 0.11 to 0.75). Revision-free survival at four years was similarly higher in the hip-spine workflow group (95.9% vs. 85.1%, P=0.024), with a reduced hazard of re-revision (adjusted HR 0.24, 95% CI 0.06 to 0.87).

Conclusion: In this matched cohort study, use of a hip-spine workflow was associated with significant reductions in redislocation and re-revision risk at four years following rTHA. These findings support routine integration of spinopelvic assessment into revision THA planning to optimize patient-specific alignment and reduce instability.

Notes

Symposium VII

Compartmental Solutions: Tailoring the Fix to the Anatomy

Moderator: Kevin B. Fricka, MD

Even though total knee arthroplasty (TKA) has excellent long-term success in treating patients with knee osteoarthritis, there still is a reported 10-20% dissatisfaction rate. The compartmentalist approach to knee arthroplasty views the knee as three distinct compartments and replaces only the symptomatic and arthritic compartment. Partial knee arthroplasty (PKA) is associated with more normal knee kinematics, better range of motion, better functional recovery, a medically safer surgery, and better patient satisfaction with only a slight decrease in survivorship. Occasionally this approach fails over time and partial knee replacement may require a conversion to a TKA. This symposium will cover the tips and techniques for partial knee arthroplasty and if these fail, tips and techniques for conversion to a TKA.

Learning Objectives:

1. Attendees will learn tips and techniques for adding partial knee replacement to your surgical practice.

Outline:

Introduction
Kevin B. Fricka, MD

Medial Unicondylar Knee Arthroplasty
Craig J. Della Valle, MD

Lateral Unicondylar Knee Arthroplasty: The Road Less Traveled
Martin W. Roche, MD

Patellofemoral Arthroplasty
Jess H. Lonner, MD

Conversion to TKA
Jeffrey A. Geller, MD

Discussion
All Faculty

Notes

Paper #45

Can Chronic Antibiotic Suppression After Two-Stage Exchange Arthroplasty Prevent Treatment Failure?

Brian M. Curtin, MD, MS, Dillon Graham, MD, Jesse E. Otero, MD, PhD, Kayla Hietpas, MPH, Stephen Graham, MD, MSc, Thomas K. Fehring, MD

Introduction: Chronic periprosthetic joint infection remains one of the most devastating complications of TJA. Two-stage exchange is the gold standard treatment, yet failure rates remain substantial. Recent evidence suggests that oral antibiotic suppression after reimplantation may improve outcomes, but definitive data on its efficacy remains limited.

Methods: We conducted a retrospective study of patients who underwent two-stage exchange for chronic PJI. Patients received a planned minimum of 6 months oral suppressive antibiotic after reimplantation, with the option for longer suppression. The primary outcome was failure, defined as reinfection requiring additional surgical intervention or active infection at time of final follow-up. Patients were stratified based on whether they were on oral suppressive antibiotic therapy at the time of failure or at final follow-up. Finally, we compared the overall duration of use of antibiotic suppression using logistic regression to determine the optimal minimum duration of oral antibiotic therapy after reimplantation.

Results: A total of 534 procedures in 512 patients were included. Of the 446 patients not on oral antibiotic suppression at final follow-up, 88 failed (19.7%). Of the patients on chronic antibiotic suppression at final follow-up, none failed ($P < 0.0001$). All patients receiving chronic antibiotic suppression achieved infection-free survival at median follow-up of 2.3 years. The average duration of antibiotic use for patients who did not experience failure was 13.0 months (IQR 7.0-34.0) compared to 7.2 months (IQR 4.2-52.1) in the failure of treatment group ($P = 0.0375$). In a regression analysis, the optimum minimum duration of oral antibiotic after reimplantation was 24 months ($P = 0.037$).

Conclusion: Oral antibiotic suppression after two-stage exchange arthroplasty was associated with significant reduction of treatment failure in this cohort. These findings provide strong evidence supporting the use of chronic postoperative antibiotic suppression of at least two years to improve outcomes following two-stage exchange procedures.

Notes

Paper #46

Cyclic Local Antibiotic Irrigation for PJI: 24-Month Treatment Outcomes from Two Randomized Trials

Andrew H. Glassman, MD, MS, Brian C. de Beaubien, MD, Bryan D. Springer, MD, Carlos A. Higuera, MD, Hari Parvataneni, MD, Kenneth L. Urish, MD, PhD, **Nicolas S. Piuzzi, MD**

Introduction: Periprosthetic joint infection (PJI) remains one of the most devastating complications following total joint arthroplasty, and a leading indication for revision surgery. As PJI incidence rises, outcomes remain limited by sub-optimal standard-of-care treatment options. We conducted two prospective, randomized, multi-center, FDA-regulated clinical trials evaluating a novel PJI treatment (VT-X7) that uses cyclic, local, antibiotic irrigation to deliver high concentrations of vancomycin and tobramycin directly to the infected joint.

Methods: Patients with chronic hip or knee PJI were randomized to receive the CLEAR (cyclic, local, expedited, antibiotic-irrigation regimen) protocol with VT-X7 or two-stage exchange arthroplasty (control) and followed for 24 months. CLEAR patients received 7 days of intra-articular irrigation: 80mg tobramycin once daily, then hourly 125mg vancomycin. The primary outcome was treatment success after explantation, defined as infection control - permanent reimplantation, no reoperation, no PJI, and survival - without suppressive antibiotics. Secondary outcomes included reimplantation rate, time to reimplantation, operative time, septic revision rate and mortality.

Results: Of 152 patients who underwent explantation (CLEAR: 76, 56.6% knee; Control: 76, 63.2% knee), 141(93.0%) completed 24-month follow-up. Treatment success was achieved in 74.0% of CLEAR patients and 51.4% of controls (51/69 vs. 37/72; nominal p=0.0058). CLEAR patients had higher reimplantation rates(100% vs. 87%), markedly shorter mean time to reimplantation(7 vs. 127 days), and shorter mean total operative time in the explant and reimplant surgeries(304 vs. 363 min). Controls had 83% more unplanned septic reoperations(22 vs.12) and higher 24-month mortality (9.7% vs.7.2%).

Conclusion: The CLEAR protocol with VT-X7 demonstrated superior outcomes at 24-months compared to two-stage exchange for chronic PJI. More CLEAR patients achieved treatment success and permanent reimplantation, in lesser time, with shorter operative time and fewer unplanned septic reoperations. These findings support the VT-X7 CLEAR protocol as a promising therapeutic strategy for the treatment of chronic PJI.

Notes

Paper #47

Single-Stage Revision for PJI Beyond Traditional Indications: Risk Modifiers, Not Exclusions

Javad Parvizi, MD, Li Cao, MD, **Wenbo Mu, PhD**

Introduction: Recent randomized evidence and consensus discussions have renewed debate over whether traditional relative contraindications should preclude single-stage exchange for periprosthetic joint infection (PJI). However, outcomes after single-stage revision beyond traditional indications remain incompletely defined. We evaluated whether expanded-indication features act as exclusions or cumulative risk modifiers for recurrence after single-stage PJI revision.

Methods: We retrospectively reviewed 498 patients who underwent standardized single-stage revision for chronic PJI from 2009 to 2023 at a specialized PJI center. Expanded-indication features were defined a priori as sinus tract, culture-negative infection, polymicrobial infection, fungal infection, or resistant organisms. The primary endpoint was infection recurrence. Patients with recurrence were included regardless of event timing; recurrence-free patients were required to have at least 2 years of follow-up. Patients were stratified by feature count: 0, 1, or ≥2 features. Cox regression was adjusted for age ≥65 years and ASA class ≥III.

Results: The final recurrence analysis included 448 patients. Recurrence occurred in 8 of 125 patients with 0 features (6.4%), 21 of 210 with 1 feature (10.0%), and 21 of 113 with ≥2 features (18.6%). Five- and 10-year recurrence-free survival were 93.7% and 92.2% with 0 features, 89.9% and 89.9% with 1 feature, and 79.8% and 77.0% with ≥2 features. Compared with 0 features, one expanded-indication feature was not significantly associated with recurrence (HR, 1.61; 95% CI, 0.71–3.64; P=0.251), whereas ≥2 features increased recurrence risk more than threefold (HR, 3.24; 95% CI, 1.43–7.35; P=0.005).

Conclusion: Single-stage revision beyond traditional indications achieved acceptable infection control in a specialized PJI center, but recurrence risk increased when multiple expanded-indication features accumulated. Traditional relative contraindications should be interpreted as cumulative risk modifiers rather than automatic exclusions.

Notes

Paper #48

Outcomes After Total Hip Arthroplasty Revisions and DAIR for PJI: An International Report

Carlos A. Higuera-Rueda, MD, Jesse E. Otero, MD, PhD, Jesus M. Villa, MD, Nicolas S. Piuzzi, MD, Tarek Haj Shehadeh, MD

Introduction: Most reports addressing results of surgical treatments for periprosthetic-joint-infection (PJI) after total-hip-arthroplasty (THA) are limited to data from single centers/countries. Therefore, this report from the Orthopaedic-Device-Infection-Network (ODIN), a collaboration of seven institutions across Australia, New Zealand, the Netherlands, Spain and United States using standardized data collection/centralized analysis, attempts to overcome that barrier and find an answer to these questions: At latest postoperative follow-up, after various surgical treatments for PJI, what are: (1) amputation rates, (2) death rates, and (3) results according to Musculoskeletal-Infection-Society (MSIS) outcome-reporting-tool (ORT)?

Methods: Data was collected at 4 institutions (United States [n=2], Netherlands [n=1], Australia [n=1]). Inclusion criteria was PJI after THA treated (2012-2025) with either (1) debridement-antibiotics-and-implant-retention (DAIR) (n=110), (2) single-stage exchange arthroplasty (n=17), (3) explantation-with-spacer-implantation with aim of two-stage (n=115), (4) explantation-without-spacer with aim of two-stage (n=10), or (5) Girdlestone (n=5). Patients who did not receive surgery (n=6) or underwent arthroscopic debridement (n=1) were excluded. Demographics and baseline surgical/infection characteristics were collected. Postoperative amputations, deaths, and results according to MSIS ORT were noted. Success was defined as either infection control off/on antibiotics while failure was defined as need for aseptic/septic revision. Follow-up range: 6 weeks-10 years.

Results: Most hips treated for PJI were primaries, had chronic infections, and the most common infecting organism was Staphylococcus aureus. Overall, only one patient (0.4%) underwent amputation and there were 37 deaths (14.4%). The overall success rate in the entire series was 77% (DAIR 77.27%, single-stage 82.35%, explantation-with-spacer 76.52%, explantation-without-spacer 80%, and Girdlestone 80%). In particular, septic revision rates ranged from 11.76% (single-stage) to 22.73% (DAIR).

Conclusion: The heterogenicity of an international cohort may be more representative of the current outcome after PJI treatment. Overall success was 77%. We observed that the highest failure rate of septic revisions was for DAIR while the lowest was for single-stage.

Notes

Paper #49

Wound Closure Marks the Major Skin Microbiome Shift During Primary Arthroplasty

Javad Parvizi, MD, Li Cao, MD, **Baochao Ji, MD**, Wenbo Mu, PhD

Introduction: Periprosthetic joint infection remains a devastating complication after total joint arthroplasty. However, the perioperative behavior of the skin immediately adjacent to the incision has not been directly characterized. We prospectively evaluated perioperative remodeling of the operative-site skin microbiome during primary hip and knee arthroplasty.

Methods: In this prospective longitudinal study, 100 patients undergoing primary hip or knee arthroplasty underwent paired operative-side and contralateral-side skin swabbing across 10 predefined perioperative states spanning admission, pre-OR, immediate post-antibiotic infusion, post-skin preparation, wound closure, and discharge, generating 1000 planned samples. Metagenomic sequencing was performed after quality control and host-read removal. Alpha diversity, beta diversity, mixed-effects modeling, distance-to-baseline analyses, and unsupervised clustering were used to characterize ecological trajectories.

Results: Baseline and pre-OR samples on both sides were dominated by typical skin-associated commensals, including Cutibacterium, Corynebacterium, Staphylococcus, and Malassezia, with no major side-to-side diversity difference before local skin preparation. No major operative-side ecological shift was observed from admission through the immediate post-antibiotic state. In contrast, the largest perturbation followed local skin preparation and surgical manipulation, with the greatest change at wound closure. Operative-side richness declined most prominently, and closure and discharge samples remained displaced from the admission baseline, indicating a predominantly local rather than bilateral effect. At discharge, a median of 5 days after surgery, operative-side richness and community structure remained incompletely restored relative to both baseline and the contralateral side. In parallel, contralateral discharge samples showed enrichment of environmental or hospital-associated taxa, including Achromobacter, Alcaligenes, and Comamonas. Unsupervised clustering identified 3 perioperative response phenotypes, with persistent dysbiosis as the predominant pattern (53.7%).

Conclusion: During perioperative infection prevention in primary arthroplasty, the operative-site skin microbiome undergoes staged local remodeling. The dominant ecological inflection follows local skin preparation and surgery rather than immediate post-antibiotic infusion, and recovery remains incomplete within the early postoperative discharge window.

Notes

Paper #50

Repeat Two-Stage Revision TKA for Recurrent PJI: Is There A Role for Intraosseous Vancomycin?

Austin E. Wininger, MD, Colin A. McNamara, MD, Jennifer W. Liu, MD, **Kwan Jun Park, MD**, Martin W. Lu, MD, Stephen J. Incavo, MD, Thomas C. Sullivan, BS, Timothy S. Brown, MD

Introduction: Two-stage revision total knee arthroplasty (rTKA) can treat periprosthetic joint infection (PJI), however reinfection rates remain high in these patients and repeat two-stage exchange rTKA may be considered. This study aimed to evaluate clinical outcomes following repeat two-stage exchange rTKA for recurrent knee PJI and to assess if intraosseous vancomycin (IOV) reduced reinfection rates after reimplantation compared to intravenous (IV) antibiotics alone.

Methods: We performed a retrospective review of 60 patients with recurrent knee PJI after prior two-stage rTKA at a single institution between 3/2016-9/2025. Ultimately, 47 patients underwent both stages of a two-stage rTKA. Of the 13 patients who didn't undergo reimplantation, 5 underwent above knee amputation, 3 died during the interstage period, 3 were lost to follow-up, 1 underwent knee fusion, and 1 patient with no evidence of persistent PJI elected to keep their well-functioning spacer. Twenty-one patients received IOV at reimplantation and 26 received only IV.

Results: Reinfection after reimplantation occurred in 19 (40.4%) patients. Patients who suffered reinfection after reimplantation had a higher BMI than those with did not (35.9 ± 8.8 vs. 30.6 ± 6.2, P=0.031), and fewer patients with reinfection received IOV (15.8% vs. 64.3%, P=0.001). The IOV at reimplantation group demonstrated a decreased but not statistically significant risk of reinfection compared to patients who received only IV antibiotics at 1-year (16.7% vs. 26.1%, P=0.706) and 2-years (16.7% vs. 47.8%, P=0.051) post reimplantation. However, the IOV group had statistically lower rates of reinfection after reimplantation at 3-years (18.8% vs. 59.1%, P=0.020) and 4-years (33.3% vs. 80.0%, P=0.032) post reimplantation.

Conclusion: Repeat two-stage rTKA for PJI was shown to have a high incidence of amputation and mortality during the interstage period, in addition to a high incidence of reinfection after reimplantation. Perioperative IOV at reimplantation may decrease risk of re-infection in this high-risk population.

Notes

Paper #51

Tirzepatide is Associated with Lower Joint Infection Risk vs. GLP-1s After Total Joint Arthroplasty

Chen-Ti Wang, MD, PhD, **Chia-Che Lee, MD**, Tzu-Hao Tseng, MD, PhD

Introduction: Periprosthetic joint infection (PJI) remains a serious complication following total joint arthroplasty. While GLP-1 receptor agonists (RAs) reduce PJI risk, the effect of tirzepatide, a dual GIP/GLP-1 RA, remains unclear.

Methods: This retrospective cohort study utilized the TriNetX network. Patients aged ≥50 years undergoing primary total hip or knee arthroplasty between 2022 and 2026 were identified. An active-comparator, new-user design compared perioperative (±1 year) tirzepatide users against other GLP-1 RA users. The primary outcome was PJI within 2 years. Secondary outcomes included 1-year PJI, all-cause revision arthroplasty, and 30-day complications. Multivariable Cox regression and logistic regression models were applied, with additional analyses including propensity score matching, head-to-head comparison with semaglutide, and landmark analysis.

Results: After propensity score matching, 6,964 patients were included in each group. Tirzepatide use was associated with a lower risk of PJI at 2 years (1.01% vs. 1.58%; hazard ratio [HR], 0.73; 95% confidence interval [CI], 0.54–0.99). Findings were consistent across sensitivity analyses. Tirzepatide was also associated with reduced risk of revision arthroplasty at 1 year (HR, 0.59; 95% CI, 0.41–0.86) and 2 years (HR, 0.61; 95% CI, 0.45–0.81). Short-term complications were similar between groups.

Conclusion: Tirzepatide use was associated with a lower risk of PJI and revision arthroplasty compared with other GLP-1 receptor agonists. These findings suggest a potentially incremental benefit of tirzepatide in patients undergoing total joint arthroplasty.

Notes

Paper #52

Same-Specimen NGS Vs. Culture and Biomarkers for Diagnosing PJI from Aspirated Synovial Fluid

Andrew Bennett, PhD, Craig D. Tipton, PhD, **Edward J. McPherson, MD, FACS**, Jacob Ancira, MS, Madhav Chowdhry, MBBS

Introduction: Next-generation sequencing (NGS) is increasingly used in preoperative synovial fluid aspiration to enhance microbial detection in periprosthetic joint infection (PJI), yet it has never been directly compared with culture and established biomarkers within the same clinical specimen. To our knowledge, this is the first such head-to-head comparison, evaluating same-specimen NGS, culture, and synovial biomarkers across 569 aspirates for accuracy in diagnosing PJI.

Methods: Preoperative hip and knee aspirations were performed by a single surgeon, with fluid split for parallel testing at two commercial laboratories. Measured parameters included NGS, culture, and synovial alpha-defensin, CRP, WBC, and PMN. PJI was defined using the 2018 ICM weighted biomarker criteria, that includes synovial CRP (≥6 is infected), and served as the reference standard to evaluate each parameter's sensitivity, specificity, and accuracy. Combinations of NGS or culture plus conventional biomarkers were assessed using an "either-positive" rule and a proof-of-concept latent class model. Training and validation cohorts were used for model fitting and evaluation by fitness and accuracy metrics.

Results: NGS showed higher sensitivity than culture (51% [95% CI 44–58] vs. 29% [95% CI 23–36]), with comparable specificity (94% [91–96] vs. 97% [95–98]) and accuracy (80% [77–83] vs. 75% [71–79]). NGS was 1.8× more sensitive than culture and provided greater depth and breadth of microbial detection. Simple two-biomarker "either-positive" combinations were constrained by the weaker marker's specificity. In latent class modeling, NGS modestly outperformed culture when combined with CRP, WBC, and PMN (odds ratio 201.6 vs. 168.3).

Conclusion: For preoperative synovial fluid analysis, NGS was 1.8× more sensitive than culture with comparable specificity and broader pathogen identification. These findings support incorporating NGS into PJI diagnostic algorithms and composite testing strategies. Ongoing work aims to refine the latent class model and develop a clinically meaningful PJI diagnostic score.

Notes

Paper #53

Infection is Now the Leading Cause of Failure Following TKA: A 23-Year Analysis of 20,523 Knees

Aryan Katyal, Chuan K. Koh, MBBS, Mark Zhu, MD, Mei Lin Tay, PhD, Scott M. Bolam, MD, **Simon W. Young, FRACS**

Introduction: Accurate characterization of total knee arthroplasty (TKA) failure mechanisms may inform strategies to reduce failure rates. National joint registries report revision causes, however these are limited by incomplete capture of acute procedures and non-standardized classification of revision indications. This study aimed to combine detailed patient chart review with a standardized failure characterization protocol to: 1) determine the cumulative incidence of failure indications following contemporary TKA, and 2) evaluate temporal trends over the last 23 years.

Methods: We analyzed 20,523 primary TKAs performed between 2000 and 2023 across three tertiary hospitals. Failure was defined as revision surgery or reoperation for confirmed periprosthetic joint infection (PJI). Clinical notes, radiographs, and laboratory investigations were reviewed to identify failures and characterize indications using a standardized protocol. Patients who underwent revision outside the study institutions were identified through national joint registry linkage, with external clinical records and imaging retrieved to ensure accurate capture and classification of failures. Competing-risk cumulative incidence analyses were performed.

Results: At 23 years, cumulative failure incidence was 10.7% (95% confidence interval (CI) 8.4-13.4). The most common cause of failure was PJI (2.9%, 95% CI 2.3-3.6), followed by aseptic loosening (1.5%, 95% CI 1.1-2.1) and patellofemoral arthrosis (0.8%, 95% CI 0.7-1.0). Compared with TKAs performed between 2001-2010, those performed between 2011-2020 showed a small increase in PJI incidence (2.2% vs. 2.0%) at 12-year follow-up, with small decreases in aseptic loosening (0.6% vs. 0.8%) and tibiofemoral instability (0.3% vs. 0.5%). Rates of patellofemoral arthrosis and polyethylene wear remained unchanged over time.

Conclusion: In this large cohort with comprehensive long-term follow-up, PJI is now the leading cause of TKA failure and has not improved over time despite reductions in mechanical failure mechanisms. These findings identify PJI as the key unresolved challenge in contemporary knee arthroplasty and reinforce the need for targeted prevention strategies.

Notes

Paper #54

Limited Predictive Value of CRP and ESR Kinetics in Two-Stage Hip Revision for PJI

Benjamin R. Paul, BS, David G. Deckey, MD, Jens T. Verhey, MD, **Joshua S. Bingham, MD**, Mark J. Spangehl, MD, Paul R. Van Schuyver, MD, Saad Tarabichi, MD, Zachary K. Christopher, MD

Introduction: During two-stage revision for total hip arthroplasty (THA) periprosthetic joint infection (PJI), serial C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) trends are used as surrogates for infection resolution prior to reimplantation. This study evaluated whether CRP and ESR kinetics predict reoperation after hip reimplantation.

Methods: A retrospective single-institution cohort (2018–2024) of 341 patients undergoing two-stage revision for chronic hip PJI was analyzed, of whom 272 (80%) underwent reimplantation (median age 64; 86% articulating spacers; 38% resistant organisms). The primary endpoint was reoperation after reimplantation for infection. Six interstage CRP and ESR features were assessed: pre-spacer value, peak, slope across the interstage interval, failure to normalize CRP (< 10 mg/L) by six weeks, residual value before reimplantation, and interval fluctuation or upward trend. Each was tested by Cox regression adjusted for age, ASA class, spacer type, and resistant organism.

Results: Reoperation-free survival was 82.0% at one year (95% CI, 75.6–86.8%) and 76.8% at two years (95% CI, 69.6–82.4%). No CRP feature predicted failure: residual CRP before reimplantation (adjusted HR 1.02 per SD; p = 0.86), slope (p = 0.41), fluctuation or upward trend (p = 0.77), peak CRP, and failure to normalize by six weeks were all non-predictive. A higher residual ESR was borderline predictive of failure after reimplantation (aHR 1.26 per SD; 95% CI, 1.00–1.59; p = 0.048). However, discrimination was poor (AUC 0.57); a non-elevated ESR (≤30 mm/hr) before reimplantation carried a negative predictive value of 81%. Likewise, inflammatory markers did not correlate with positive tissue cultures at reimplantation.

Conclusion: CRP and ESR kinetics, including trajectory, peak, normalization, fluctuation, and the residual value at reimplantation, did not reliably predict failure after two-stage hip revision or culture positivity at reimplantation. A single borderline ESR was weakly associated with reoperation for infection.

Notes

Paper #55

Failure to Progress to Reimplantation Following Two-Stage Revision TKA for PJI

Alexander Caughran, MD, Alexander G. Burbelo, BS, Christopher Schmidt, BS, **Matthew W. Bullock, DO**, Nicholas Scarl, BS, Robert A. Doyle, BS, Trace Clark, BS, Tyler Eirich, BS, William Stone, BS

Introduction: Failure to progress to reimplantation following two-stage revision total knee arthroplasty (TKA) for periprosthetic joint infection (PJI) remains an understudied but clinically consequential outcome. This study evaluated physiologic and social risk factors associated with failure to complete staged reconstruction.

Methods: A retrospective cohort study was performed on 122 patients undergoing intended two-stage revision TKA for chronic PJI between 2014 and 2026. Patients who completed reimplantation were compared with those who failed to progress. Demographics, laboratory values, perioperative variables, and social/behavioral factors were analyzed. Multivariable Firth logistic regression was performed to evaluate factors associated with noncompletion.

Results: Among 122 intended two-stage revisions, 59 patients (48.4%) completed reimplantation while 63 (51.6%) failed to progress. Reasons for noncompletion included chronic spacer retention (34.9%), medical unfitness (25.4%), death (14.3%), and amputation (12.7%). Patients who failed to progress demonstrated lower preoperative albumin (2.96 vs. 3.46 g/dL, $p < 0.001$), lower hemoglobin (10.81 vs. 11.87 g/dL, $p = 0.005$), and higher erythrocyte sedimentation rate (75 vs. 56 mm/hr, $p = 0.009$). Intravenous drug use (IVDU) was observed exclusively among non-completers (16% vs. 0%, $p < 0.001$). On multivariable analysis, lower albumin (OR 0.49, $p = 0.074$), higher ESR (OR 1.01, $p = 0.091$), and IVDU (OR 6.52, $p = 0.133$) demonstrated strong associations with failure to complete staged reconstruction. The overall model was significant ($p = 0.019$).

Conclusion: Failure to progress to reimplantation following two-stage revision TKA for PJI was associated with markers of physiologic compromise and social vulnerability, particularly hypoalbuminemia, systemic inflammation, and IVDU. These findings may help identify patients at elevated risk for failure to complete staged reconstruction.

Notes

Paper #56

Extended Oral Antibiotics After Primary Hip or Knee Arthroplasty Alter the Microbiology of Subsequent PJI

Brenna E. Blackburn, PhD, **Jeremy M. Gililland, MD**, Joshua P. Rainey, MD, Laura K. Certain, MD

Introduction: The practice of prescribing an extended course of oral antibiotics (EOA) after primary hip or knee arthroplasty (THA, TKA) has become increasingly common, based on observational data that in some high-risk patients this practice may reduce the risk of periprosthetic joint infection (PJI). One potential harm of this practice is that the excess antibiotic exposure will predispose patients to infection with more difficult-to-treat organisms. We sought to determine whether the use of EOA, specifically with a first-generation oral cephalosporin, would be associated with a change in the microbiology of subsequent PJI within one year.

Methods: Using a nationwide database, we identified patients who underwent THA or TKA, were subsequently diagnosed with PJI within one year, and had positive culture data available for their PJI. Use of EOA, culture microbiology, and organism-specific antibiotic susceptibility profiles were reviewed. The microbiology and antibiotic resistance rates were compared between patients with EOA and without EOA using Chi-squared and Fisher's Exact tests.

Results: A total of 1088 patients with PJI had available microbiology data, 25 of whom had received EOA. In the EOA group, 13 (52%) of patients had infection with a Gram-negative organism, compared to 270 (23%) in the non-EOA group (p=0.002). Patients in the EOA group had a three-fold rate of polymicrobial PJI compared to the non-EOA group (36% vs. 10%, p< 0.001). However, there was no significant difference in the rate of resistance to first-generation cephalosporins (46% EOA vs. 37% non-EOA).

Conclusion: Patients who were prescribed EOA had significantly different microbiology of their subsequent PJI. While our data does not indicate whether this shift led to worse outcomes, it is a useful reminder that antibiotic exposure alters a patient's microbiome, and therefore the organisms causing their infections.

Notes

Paper #57

Patellar Bone-Grafting for Severe Patellar Bone Loss During Revision TKA: An Updated Large Series

Charles P. Hannon, MD, MBA, Joshua P. Rainey, MD, Kevin I. Perry, MD, Mark W. Pagnano, MD, Mason F. Carstens, MS, **Matthew P. Abdel, MD**, Michael J. Taunton, MD, Nicholas A. Bedard, MD

Introduction: Patellar bone-grafting restores bone stock when resurfacing is not possible during revision total knee arthroplasty (TKA). The purpose of this study was to evaluate patellar survivorship, radiographic bone stock preservation, and clinical outcomes in an expanded cohort with longer-term follow-up.

Methods: We retrospectively reviewed 138 knees that underwent patellar bone grafting during revision TKA at a single institution from 1997 to 2023. Mean age was 69 years, 52% were male, and mean BMI was 31. Overall, 82% underwent femoral or tibial component revision at time of grafting, 27% were performed at knee reimplantation following treatment for infection, and 25% underwent prior failed attempt at patellar resurfacing. Intraoperative caliper thickness increased from a mean of 7 to 26 mm after patellar bone-grafting ($p < 0.01$). Kaplan-Meier methods determined survivorship free of patellar revision, any revision, and any reoperation. Radiographic analysis included patellar thickness, tracking, and remodeling, and Knee Society scores (KSSs) were evaluated. Mean follow-up was 7 years.

Results: Survivorship free of patellar re-revision was 98% at 10 years, all of which (3) were patellar resurfacings with a 3-peg all-polyethylene patellar button. Survivorship free of any re-revision was 74% at 10 years, while survivorship free of any reoperation was 73% at 10 years. Among re-revisions, 54% were for infection and 32% for non-patellar aseptic loosening. When comparing initial postoperative to final radiographs, patellar thickness decreased from 23 to 17 mm ($p < 0.01$). Following patellar bone-grafting, 79% had neutral patellar tilt, 60% demonstrated lateral patellar remodeling, and 31% had postoperative patellar fragmentation. Mean KSS improved from 50 to 85 points ($p < 0.01$).

Conclusion: Patellar bone-grafting provided reliable restoration of bone stock and demonstrated excellent durability with respect to patellar survivorship and radiographic thickness. Although revisions occur in this complex population, the risk of patellar revision is low, supporting its use when resurfacing is not feasible.

Notes

Symposium VIII

PJI Controversies: Winning Tough Cases Without Making the Wrong Move

Moderator: Antonia F. Chen, MD, MBA

Periprosthetic joint infection remains one of the most devastating problems in hip and knee arthroplasty, yet many of the most difficult treatment decisions occur in gray zones where standard algorithms offer limited help. Most arthroplasty surgeons understand the classic options of DAIR, one-stage exchange, two-stage exchange, chronic suppression and salvage. The challenge is knowing what to do when the patient does not fit neatly into any one box.

This video-based symposium is designed for practicing arthroplasty surgeons who treat PJI in the real world and need practical, evidence-informed guidance for challenging situations. Rather than reviewing basic definitions/indications, the session will focus on high-stakes decisions that change outcomes: when DAIR is still reasonable despite borderline timing or symptom duration; how surgeons who perform DAIR routinely perform a debridement, especially with implants obstructing posterior capsule; how much of an aggressive debridement must be performed in chronic infection; and where bacteria and biofilm are most likely to persist in hip and knee reconstructions, Faculty will provide tips and tricks regarding how much debridement to perform and how far to go in the posterior knee or intramedullary canal; when to decide on one-stage vs. two-stage and when to abandon one-stage intraoperatively; which cases have higher septic failure rates in one-stage; which adjuvant strategies are worth adding to surgery to help clear infection; and when chronic suppression, fusion or amputation become the most rational treatment rather than a perceived defeat.

Attendees will leave with a practical, evidence-informed framework for managing difficult PJI cases, including patient selection, operative strategy, use of adjunctive treatments and indications for salvage. The emphasis will be on clear, actionable principles that can be applied immediately in everyday arthroplasty practice.

Learning Objectives:

1. Recognize key clinical factors that influence management and treatment selection in challenging acute and chronic PJI cases, including DAIR, one-stage and two-stage indications/contraindications.
2. Identify practical decision points that determine whether DAIR, exchange, suppression or salvage is most appropriate in difficult PJI cases.
3. Review surgical principles for thorough debridement and component management in infected hip and knee arthroplasty.
4. Compare the role of adjuvant strategies, including irrigation choices, local antibiotic delivery, novel strategies and multidisciplinary coordination.
5. Recognize when limb- or implant-preserving ambition becomes counterproductive and when fusion, resection arthroplasty, amputation or lifelong suppression may offer the best patient-centered outcome.

Outline:

Introduction
Antonia F. Chen, MD, MBA

How Far Do You DAIR Go? Timing, Repeat Debridement and Best Practice Indications
Carlos A. Higuera-Rueda, MD

Chronic PJI: How Radical Is Radical Enough? Debridement Strategy, Biofilm and Implant Removal
Nicolas S. Piuzzi, MD

Adjuvant Treatment: What Actually Helps? Irrigation, Local Antibiotics and Adjunctive Strategies
Zachary C. Lum, DO

Salvage PJI: Suppression, Fusion or Amputation—Choosing the Least-Worst Option at the End Game
Nathanael D. Heckmann, MD

Discussion
All Faculty

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This year we are celebrating the 30th Anniversary of Operation Walk

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ANNUAL MEETING 26



Future AAHKS Meetings

2027 AAHKS Spring Meeting
April 29–May 1, 2027
JW Marriott Essex House New York
New York, NY

2027 AAHKS Annual Meeting
Nov. 4–7, 2027
Gaylord Texan Resort & Convention Center
Dallas, TX

2028 AAHKS Annual Meeting
Nov. 2–5, 2028
Gaylord Rockies Resort & Convention Center
Denver, CO



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