AAHKS 2023 ANNUAL MEETING

FINAL PROGRAM

DEVELOPED BY PEERS, GUIDED BY SCIENCE.

Gaylord Texan Resort & Convention Center

November 2–5 // Dallas, Texas

AAHKS 2023 ANNUAL MEETING

2023 AAHKS Annual Meeting Health and Well-Being

General Health Recommendations

- Wash hands often with soap and water
- Stay in your room if you feel sick

Wellness Rooms: offering privacy and quiet for attendee use

- Quiet room: a quiet space to pray, meditate, read, or relax
- Lactation room: available for mothers
- Islamic group prayer room: available on Friday

Dietary Restrictions

- Considerations for attendees with food allergies and special dietary restrictions

Women's Health Urgent Obstetric Care

- Board-certified OB-GYN available to provide guidance

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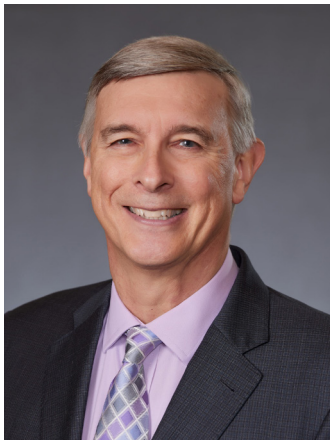

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EDUCATIONAL ACTIVITY SCOPE

The 2023 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 2023 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.

CONSENT AGREEMENT

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.

FDA STATEMENT

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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for their generous educational Grants to fund the AAHKS Resident Arthroplasty Course (Didactic)

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DISCLOSURE

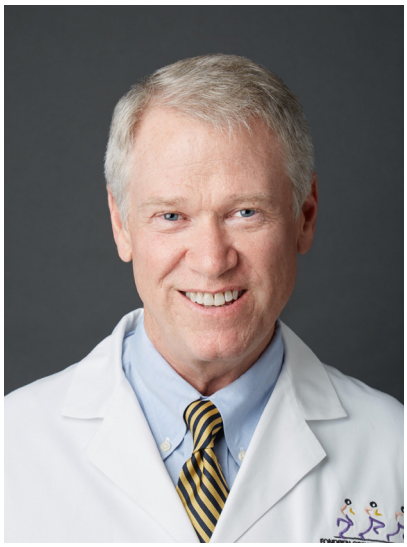
Each planner, presenter or contributor to the Annual Meeting has been asked to disclose if they have received something of value from a commercial company or institution, which relates directly or indirectly to the subject of their presentation.

AAHKS does not view the existence of these disclosed interests or commitments as necessarily implying bias or decreasing the value of the author's participation in the course. **Note that AAHKS takes measures to mitigate all relevant financial relationships.**

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

AAHKS 2023 ANNUAL MEETING

Presenting the 2023 Lawrence D. Dorr, MD Humanitarian Award to Gregory W. Stocks, MD



AAHKS is proud to present the 2023 Lawrence D. Dorr, MD Humanitarian Award to Gregory W. Stocks, MD. Dr. Stocks has had the privilege of working with Walk Strong since 2019, where he brings the state of the art, FDA approved, low-cost implants to surgeons and hospitals that provide humanitarian care for needy patients in Mexico, South America, Caribbean and Africa, specifically Ethiopia and Kenya. It was from his earlier work in Palestine and then in Africa that Dr. Stocks noticed that access to hip and knee replacement surgeries were very limited and for two reasons – the relatively high cost of implants and access to surgeons with adequate training to perform these operations. Walk Strong was started to address these barriers.

The joy Dr. Stocks feels from his work with Walk Strong is immeasurable. Recently, he trained three Ethiopian consultant surgeons on how to properly use lower-cost knee implants and after three weeks, they successfully performed 30 TKAs. Because of this success, 100 more sets of implants were ordered from Walk Strong at a fraction of the previous costs.

This new sustainable paradigm of providing high-quality low-cost implants and training local surgeons that work at appropriate charity hospitals, to use them, elegantly meets the needs of low- and middle-income countries.

This same model is currently being developed in Kenya. There will be an initial roll out at Tenwek Hospital, the largest missionary hospital in East Africa and Kijabe Hospital. Both hospitals are equipped with orthopaedic residency training programs and capable faculty surgeons. With these low-cost implants now in Kenya, access to hip and knee replacement surgery is significantly improved for the local population and hospitals are able to provide a life-changing operation and not lose money.

Dr. Stocks graduated from Baylor College of Medicine and completed his residency at Texas Tech University Health Sciences Center. He is fellowship trained in bone and joint research and major joint reconstruction.

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.**

AAHKS 2023 ANNUAL MEETING

Presenting the 2023 Presidential Award to Gregory G. Polkowski II, MD, MSc

AAHKS is proud to present the 2023 Presidential Award to Gregory G. Polkowski II, MD, MSc in recognition of his exceptional commitment and invaluable contributions to the organization. Since joining AAHKS in 2009, Dr. Polkowski has been an unwavering advocate for the advancement of hip and knee arthroplasty surgery and education.

Dr. Polkowski's journey with AAHKS commenced as an Annual Meeting abstract reviewer from 2012 to 2017, where a very thorough review process ensured the high quality of academic content presented at AAHKS events. This dedication extended into roles on the Program Committee and as faculty for the Resident Course, starting in 2012, significantly impacting the educational initiatives of the association.

In 2015, Dr. Polkowski assumed the pivotal role of Program Chair for the Annual Meeting, with involvement still to this day in subsequent roles on the Education and Communications Council. As the AAHKS delegate, he was the co-chair for the AAOS Clinical Practice Guidelines (CPG) for Hip Osteoarthritis from 2015 to 2017, demonstrating a commitment to shaping industry standards. He subsequently served again as AAHKS Delegate and co-chair for the AAOS CPG for Periprosthetic Joint Infections (PJI) from 2016 to 2018.

In honoring Dr. Polkowski with the 2023 Presidential Award, AAHKS acknowledges not only his extensive list of contributions but also the embodiment of leadership, dedication, and innovation. Dr. Polkowski has not only helped shape the educational landscape within AAHKS, but he has also demonstrated a commitment to the betterment of hip and knee arthroplasty surgery on a much larger level.

It is a great honor to recognize Dr. Polkowski as this year's Presidential Award recipient as he has exemplified a relentless pursuit in the advancement of hip and knee replacement surgery who advocates for patients, his colleagues and the profession.

AAHKS 2023 ANNUAL MEETING

Presenting the 2023 AAHKS Diversity Award to Mary I. O'Connor, MD

It is with great joy that we present the AAHKS Diversity Award to Mary I. O'Connor, MD. Dr. O'Connor is Professor Emerita of Orthopedics at Mayo Clinic and past Professor of Orthopaedics and Rehabilitation at Yale School of Medicine. She practiced at Mayo Clinic in Florida until 2015 during which time she served as chair of orthopedic surgery and an executive leader. In 2015, she became the inaugural Director of the Center for Musculoskeletal Care at Yale School of Medicine and Yale New Haven Health.

In February of 2021, she co-founded Vori Health, a virtual-first musculoskeletal medical startup company with an integrated care delivery model. She is a nationally recognized leader in health equity, chairing Movement is Life, a non-profit multi-stakeholder coalition committed to addressing musculoskeletal health disparities since its inception in 2010. Dr. O'Connor is also AAHKS' first woman president, serving in 2010.

"We are excited to honor Dr. O'Connor as the 2023 AAHKS Diversity Award recipient. She has been a long-standing champion for ethnic and gender diversity in orthopaedics, and specifically hip and knee arthroplasty. It is her ability to make minority and female surgeons-in-training feel not just competent and capable, but also included and important, that we wish to honor most," says Muyibat A. Adelani, MD, Co-Chair of the AAHKS Diversity Advisory Board (DAB).

AAHKS 2023 ANNUAL MEETING

Presenting the 2023 Women in Arthroplasty Empowerment Award to Antonia F. Chen, MD, MBA

It is with great pleasure that AAHKS presents the Women in Arthroplasty (WIA) Empowerment Award to Antonia F. Chen, MD, MBA. Dr. Chen is an inspiring and talented surgeon, mentor, and leader that goes out of her way to set an example for others to follow. She has made it clear, through her acts of service, that she supports women orthopaedic surgeons unconditionally. As the Program Chair of the 2021 AAHKS Annual Meeting, she strongly advocated for the inclusion of multiple symposia with women faculty. Something she has striven both privately and publicly at, to increase the representation of women in adult reconstruction.

In addition to being an accomplished surgeon, Dr. Chen has broken multiple barriers and glass ceilings while carrying women up the ladder with her. She continues to mentor and sponsor women in arthroplasty and is always thinking about how to incorporate women in leadership roles at AAHKS.

"Dr. Chen is tireless in her pursuit of excellence and lifts us all up as she rises in the world of orthopaedic surgery. She is quick to offer opportunities to everyone, especially women and underrepresented minorities who otherwise would not have been considered for presentations, collaborations, committees or other endeavors. She uses her esteemed credentials to give a voice to others. She is a powerful force in orthopedics and uses that power responsibly and with grace. We are grateful to Dr. Chen for her leadership and providing all of us a platform to be integral participants in orthopedics," says Rina Jain, MD, FRCSC, Chair of AAHKS Women in Arthroplasty (WIA).

Symposium I

What's New with Periprosthetic Femur Fractures? Technical Tips

Moderator: Elizabeth B. Gausden, MD, MPH
Faculty: Nicholas A. Bedard, MD, Jeremy M. Gililland, MD, George J. Haidukewych, MD

This symposium will present the contemporary, evidence-based approach to managing periprosthetic femur fractures. We will cover management of intraoperative femur fractures as well as postoperative femur fractures via multiple surgical approaches. The Vancouver classification system will be reviewed, as well as how to apply classifications to modern implant constructs. Finally, we will cover best practices for revision of Vancouver B2 and B3 periprosthetic femur fractures and modern fixation techniques for fractures around stable implants.

Learning Objectives:

1. Present optimal strategies for management of intraoperative calcar and/or trochanteric femur fractures.
2. Review the Vancouver classification system specifically in relation to modern implants.
3. Present best practices of revision THA for periprosthetic femur fractures and fixation techniques for periprosthetic fractures around stable implants.

Outline:

Introduction
Elizabeth B. Gausden, MD, MPH

Intraoperative Calcar and/or Trochanter Fractures: Now What?
Jeremy M. Gililland, MD

Vancouver Classification: What Is It and How Does It Guide Treatment?
Elizabeth B. Gausden, MD, MPH

Revision THA for Vancouver B2 and B3: The Role of Modular and Monoblock Fluted Tapered Stems
Nicholas A. Bedard, MD

Modern Techniques for Fixation of B1 and C Type Periprosthetic Femur Fractures: Tips for Success
George J. Haidukewych, MD

Discussion
All Faculty

Notes

Paper #1

Irradiation and Rotating-Hinge Revision for the Treatment of Severe Idiopathic Arthrofibrosis

Andrew M. Schneider, MD, Steven J. Rice, DO, Neil Lancaster, DO, Michael McGraw, DO, Yasser R. Farid, MD, PhD, Henry A. Finn, MD, FACS

Introduction: Severe idiopathic arthrofibrosis (SIA) after TKA is a challenging problem to treat. Low-dose irradiation may decrease fibroosseous proliferation, while rotating-hinge (RH) revision allows for distal femur shortening and collateral ligament sacrifice. The main purpose of this study was to report clinical outcomes and implant survivorship in patients treated with low-dose irradiation and RH revision for SIA following TKA.

Methods: Sixty consecutive patients were retrospectively reviewed. Mean follow-up was six years (range 2-14). Kaplan-Meier survivorship analyses were performed, and logistic regression was used to determine associations between preoperative patient characteristics and clinical outcomes.

Results: Median flexion contracture and median terminal flexion at presentation were 20° and 70°, respectively; at final follow-up, 59/60 patients (98%) had ≤10° flexion contracture and 49/60 patients (82%) had ≥90° of flexion. Ten-year survivorship free from reoperation for any reason (including manipulation under anesthesia (MUA)), revision for any reason and revision for aseptic loosening were 63%, 87% and 97%, respectively. Twenty-seven percent of patients underwent MUA postoperatively, which was the most common reason for return to the operating room. A greater number of prior surgeries was significantly associated with worse range of motion (ROM) at final follow-up (p=0.004). There were no known radiation-associated complications.

Conclusion: Patients with SIA following TKA treated with low-dose irradiation and RH revision maintained a gain in knee ROM of 60° with reliable flexion contracture correction at a mean six-year follow-up. MUAs were common in the post-operative period. Survivorship free from revision for aseptic loosening was excellent at ten years.

Notes

Paper #2

Marlex Mesh Reconstruction of the Extensor Mechanism: Mid-Term Follow-Up of 93 TKAs

Matthew P. Abdel, MD, Christopher N. Carender, MD, Nicholas A. Bedard, MD, Kevin I. Perry, MD, Mark W. Pagnano, MD, Arlen D. Hanssen, MD

Introduction: Marlex mesh reconstruction of the extensor mechanism following TKA has demonstrated excellent early results. However, data are limited on the mid-term results. The purpose of this study was to evaluate longer-term results of Marlex mesh reconstruction of the extensor mechanism in the largest series to date.

Methods: Ninety-three patients (93 TKAs) underwent extensor mechanism reconstruction with Marlex mesh between 2000-2015 at the institution where the technique was innovated. Seventy-seven reconstructions were aseptic, and 16 were performed as part of a two-stage exchange for infection. Mean age was 64 years, mean BMI was 35 kg/m2, and 63% were female. Twenty-four percent had a prior attempt at an extensor mechanism reconstruction, and 73% had components concurrently revised. Mean follow-up was 8 years.

Results: Seventy-six of 93 (82%) mesh reconstructions were free of mesh revision for mesh failure. Indications for mesh revision included eight patellar tendon re-ruptures, seven quadriceps tendon re-ruptures, and two cases of symptomatic lengthening. The 10-year cumulative incidence of mesh revision for mesh failure was 20%. There were seven additional cases of symptomatic lengthening treated non-operatively. The 10-year cumulative incidence of any mesh revision/removal was 27% (seven removed for the treatment of infection). The 10-year cumulative incidences of any revision and reoperation were 15% and 37%, respectively. Extensor lag improved by a mean of 28° with a mean extensor lag of 9° at most recent follow-up. Knee Society scores improved significantly ($p < 0.001$).

Conclusion: This is the first mid-term study, and in the largest numbers, to show that Marlex mesh reconstruction is a durable and reliable technique to treat both aseptic and septic disruptions of the extensor mechanism. The 10-year cumulative incidence of mesh revision was excellent in this complex patient cohort at 20%, and the mean improvement in extensor lag was good at nearly 30°.

Notes

Paper #3

Porous Metaphyseal Cones for Femoral and Tibial Bone Defects in Revision Total Knee Arthroplasty

Babar Kayani, MD, PhD, Michael E. Neufeld, MD, MSc, FRCSC, Lisa C. Howard, MD, Nelson V. Greidanus, MD, Bassam Masri, MD, Donald S. Garbuz, MD

Introduction: Porous tantalum metaphyseal cones may facilitate reconstructions of severe bone defects during revision TKA, but there remains a paucity of data on their intermediate-term outcomes. This study reports the component survivorship, patient satisfaction, functional outcomes, radiographic osseointegration and complications of revision TKA with porous tantalum metaphyseal cones at mid-term follow-up.

Methods: This study included 152 patients with a mean age of 66.9 +/- 9.3 years undergoing revision TKA with porous tantalum metaphyseal cones. Indications for surgery included aseptic loosening (n=87, 57.3%) second-stage reimplantation for infection (n=42, 27.6%); osteolysis with well-fixed components (n=20, 13.2%); and periprosthetic fracture (n=3, 2.0%). Component survivorship, clinical outcomes, radiographic outcomes and any complications were recorded. Mean follow-up time was 5.6 years (range, 2.2 to 13.7 years).

Results: Survivorship was 100% when the end point was revision of the metaphyseal cone (no cones were revised) and 83.8% (95%CI: 77.9% to 90.2%) when the end point was reoperation for any reason at five years follow-up. Reoperations were performed for infection (n=10), instability (n=4), periprosthetic fracture (n=2) and quadriceps rupture/dehiscence (n=3). Mean patient satisfaction score was 78.8 +/- 11.3 and mean Forgotten Joint Score was 62.2 +/- 16.7 at final follow-up. Preoperative median University of California at Los Angeles score improved from 2 points (interquartile range, 2-3 points) to 6 points (interquartile range, 5-6 points) ($p< 0.001$), and preoperative Oxford knee score improved from 15.2 +/- 3.8 points to 39.4 +/- 5.1 points ($p< 0.001$) at final follow-up. All metaphyseal cones showed radiographic evidence of osteointegration without any subsidence or loosening.

Conclusion: Porous tantalum metaphyseal cones enabled robust reconstructions of severe femoral and tibial bone defects during revision TKA. These reconstructions were associated with excellent survivorship, improvements in functional outcomes and reproducible radiographic osseointegration at mid-term follow-up. The most common reasons for reoperation were infection and instability.

Notes

Paper #4

Limb Lengthening in Revision Total Knee Arthroplasty

Sonia K. Chandi, MD, Yashes Srinivasan, BS, Simarjeet Puri, MD, Eytan M. Debbi, MD, PhD, Peter K. Sculco, MD, Brian P. Chalmers, MD

Introduction: In revision TKA, there is potential for substantial limb lengthening; however, there is little information on the magnitude of potential lengthening, risk factors for lengthening or its impact on patient reported outcome measures. We aimed to quantify functional and anatomic limb lengthening/shortening during revision TKA and assess risk factors for lengthening during revision TKA.

Methods: We identified 161 patients over a three-year period who underwent revision TKA and had preoperative and 4- to 8-week postoperative EOS films. Average patient age was 64 years old, 52.8% of patients were male, 68.3% had a pre-operative ipsilateral varus deformity and 20.5% had a pre-operative valgus deformity. Outcomes assessed included change in limb length, risk factors for lengthening and clinical outcome scores including Knee Osteoarthritis Outcome Score Joint Replacement (KOOS JR.), and the Veterans RAND 12-item Physical and Mental Component Survey (VR12 PS and VR12 MS) Scores.

Results: Of the 161 patients, 80.7% experienced functional limb lengthening and 71.4% experienced anatomic limb lengthening. Patients experienced an average functional limb lengthening of 7mm (±9mm) and an average anatomic limb lengthening of 5mm (±8mm). Patients undergoing revision for instability experienced significantly greater anatomic limb lengthening (7.7 vs. 4.1, p=0.018). Patients with greater than 10 degrees of deformity were more likely to be lengthened (94%) compared to patients with less than 10 degrees of deformity (77%) and had significantly greater average functional lengthening (12mm vs. 5mm; $p < 0.001$). There was no significant change in clinical outcome scores at six weeks and one year for any revision indication.

Conclusion: In conclusion, there is a large variability in the functional and anatomic potential for limb lengthening/shortening following revision TKA, with greater preoperative deformity being a risk factor for lengthening. Surgeons should keep this in mind when planning revision TKA and counsel patients appropriately.

Notes

Paper #5

Characterizing the Rotational Profile of the Distal Femur: A Roadmap for Distal Femoral Replacement

Matthew Chen, BA, Kevin C. Liu, BS, Matthew C. Gallo, MD, Nicholas Kusnezov, MD, Alexander B. Christ, MD, Nathanael D. Heckmann, MD

Introduction: Following extensive femoral bone loss or resection, references like the transepicondylar axis (TEA) are unavailable. We aimed to describe the rotational profile of the femoral osseous anatomy relative to the TEA.

Methods: Adult patients with computerized tomography (CT) scans of the bilateral lower extremities were screened. Referencing the TEA, 4 angles were measured in the axial plane using the following lines: a line (1) parallel to the anterior cortex (ACA), (2) parallel to the posterior cortex (PCA), (3) through the linea aspera bisecting the femoral canal (LAA), and (4) from the midpoint of the trochlear groove to the anterior-most aspect of the intercondylar notch (WL). Angles were assessed at 3, 5, 7, and 9 centimeters (cm) proximal to the joint line. The average of both legs was reported. External and internal rotation relative to the TEA were denoted as positive and negative, respectively.

Results: Forty-five patients (90 femora) were included with an average age of 62.1±14.3 years and BMI of 25.2±5.7 kg/m2. Near the joint line, WL was nearly perpendicular to the TEA (89.8±2.7°). More proximally, the anterior cortex became increasingly internally rotated (3-cm ACA: -12.9±3.5°, 9-cm ACA: -20.8±6.4°), while the posterior cortex became increasingly externally rotated (3-cm PCA: -6.7±2.5°, 9-cm PCA: 9.4±6.2°). WL remained nearly perpendicular to the TEA (3-cm WA: 88.9±2.3°, 5-cm WA: 90.2±3.8°, 7-cm WA: 91.6±4.5°) but could not be measured reliably at ≥7 cm proximal to the joint line. The LAA was measurable beyond 5 cm proximal to the joint line and became increasingly internally rotated (5-cm LAA: -31.5±14.3°, 9-cm LAA: -44.0±14.2°).

Conclusion: Distally, Whiteside's line is an accurate anatomic landmark for femoral component rotation. More proximally, orthopaedic surgeons should avoid using the linea aspera, which may lead to gross femoral component internal rotation. The posterior cortex may be a valuable rotational landmark proximally.

Notes

Paper #6

National Trends in Two-Year Revision for Periprosthetic Joint Infection After Total Knee Arthroplasty

Anthony K. Chiu, BS, Amil R. Agarwal, BA, Correggio L. Peagler, BS, Thomas Fraychineaud, MD, Alex Gu, MD, Gregory J. Golladay, MD, Savyasachi C. Thakkar, MD

Introduction: Due to the high morbidity associated with periprosthetic joint infections (PJI) following TKA, there has been a surge to identify and implement interventions to reduce the incidence and burden of PJI. It is unknown whether these methods have reduced PJI rates nationally. Therefore, the purpose of this study was to observe the trends in 2-year PJI-indicated revision rates in all TKA patients and those at increased risk for PJI.

Methods: A retrospective trends analysis of patients who underwent TKA was conducted using a national database. Two-year PJI-indicated revision incidence rates were observed from 2010 to 2019. A multivariable logistic regression analysis, controlling for age, gender, and Charlson comorbidity index (CCI), was performed to compare the odds ratios of 2-year PJI-indicated revision rates from 2011 to 2019 to the reference year of 2010. Linear regression was also used to compare the change in the 2-year PJI-indicated revision rate in the high-risk sub-analysis groups.

Results: The 2-year PJI-indicated revision rate decreased from 0.75% in 2010 to 0.69% in 2019 ($p=0.049$). After controlling for confounders, the likelihood of 2-year PJI-indicated revision decreased starting from 2011 when compared to 2010. In high-risk patients, the PJI-indicated revision rate decreased from 1.04 to 0.80 ($p=0.004$), specifically decreasing in those with diagnoses of drug abuse, psychoses, heart failure, anemia, liver disease, tobacco use and obesity ($p< 0.05$ for all).

Conclusion: This study demonstrates a national reduction in the 2-year PJI rate in all TKA patients, with an even larger decrease in those at high-risk for PJI. This suggests current preventative methods may be efficacious on a national scale. Further research is needed to identify more modalities to reduce the national incidence of this morbid and costly complication.

Notes

Symposium II

Tips and Tricks to Save You During Revision TKAs: Video-Based Demonstrations

Moderator: Matthew P. Abdel, MD
Faculty: Daniel J. Berry, MD, James A. Browne, MD, Ran Schwarzkopf, MD, MSc

This symposium will provide the latest information on managing patients with failed TKAs that require complex exposures, metaphyseal fixation to manage bone loss and improve biologic fixation, intraoperative stability and extensor mechanism reconstructions.

Learning Objectives:

1. Understand how to safely expose complex revision TKAs with a variety of surgical techniques based on video demonstrations.
2. Understand the principles and surgical techniques behind utilizing metaphyseal sleeves, metaphyseal cones and stems to manage bone loss during revision TKAs.
3. Understand the technical features related to VVC, RH TKAs and extensor mechanism reconstruction with Marlex mesh.

Outline:

1. **Introduction**
   Matthew P. Abdel, MD
2. **Exposures and Component Removal: It Is an Art!**
   Ran Schwarzkopf, MD, MSc
3. **Cones, Sleeves and Stems: How to Manage Bone Loss and Optimize Fixation**
   Daniel J. Berry, MD
4. **Vargus-Valgus Constraint (VVC) and Rotating Hinge TKA: Why, When and How**
   James A. Browne, MD
5. **Extensor Mechanism Disruptions: A Synthetic Mesh Reconstruction**
   Matthew P. Abdel, MD
6. **Discussion**
   All Faculty

Notes

Paper #7

Chronic Anticoagulation: Increased Complications Following Revision Total Hip Arthroplasty

Kevin Y. Heo, BS, Rahul K. Goel, MD, Jeffrey S. Holmes, MD, Corey A. Jones, MD, Anthony Karzon, MD, Ayomide Ayeni, BS, George N. Guild II, MD, Ajay Premkumar, MD, MPH

Introduction: With an aging population and higher number of patients living with primary THA, the incidence of revision THA (rTHA) is expected to significantly increase. While patients undergoing primary THA who require chronic anticoagulation (CA) have been associated with increased postoperative complications, to our knowledge, less is known about the impact of CA status on postoperative complications in the rTHA setting.

Methods: This was a retrospective cohort study utilizing the IBM MarketScan database to query patients ≥18 who underwent rTHA between 2014 and 2019. Patients were divided into two cohorts based on preoperative CA status (i.e., having an anti-coagulation prescription filled six months prior to and following surgery). Information on patient demographics, comorbidities and anesthesia type (general vs. regional) utilized during surgery was collected. Ninety-day and 2-year postoperative complications were compared between cohorts utilizing univariate and multivariate analyses, controlling for potential confounders.

Results: 10,213 patients were included, among which 2,100 were on preoperative CA (20.6%). At 90-days, CA patients had increased odds of prosthetic joint infections (PJI) (OR 3.75, $p< 0.001$), surgical site infections (SSI) (OR 2.55, $p< 0.001$), sepsis (OR 2.02, $p=0.04$) and mechanical prosthesis complications (OR 3.13, $p< 0.001$), which included aseptic loosening and implant dislocation. At two years, CA patients had increased odds of PJI (OR 3.59, $p< 0.001$) and mechanical prosthesis complications (OR 3.01, $p< 0.001$). CA patients were also at increased risks for needing subsequent revision procedures within 2 years after initial rTHA (OR 3.24, $p< 0.001$).

Conclusion: Patients on CA have significantly higher odds of 90-day and 2-year complications after rTHA. In particular, the increased odds of PJI, SSI, sepsis and mechanical prosthesis complications should be noted given their associated morbidity. Patients receiving CA who undergo rTHA should be counseled on the risk-benefit ratio of their CA in a multidisciplinary setting to optimize their outcomes.

Notes

Paper #8

Trunnionosis in Metal-on-Polyethylene Total Hip Replacement: Outcomes & Risk Factors for Re-Revision

Michael E. Neufeld, MD, MSc, FRCSC, Erden Ali, MD, Lisa C. Howard, MD, Bassam Masri, MD, Nelson V. Greidanus, MD, Donald S. Garbuz, MD

Introduction: The outcomes of revision for adverse local tissue reaction due to trunnionosis in metal-on-polyethylene (MoP) THA are reported in small series with limited follow-up, and risk factors for re-revision remain relatively unknown. The aim of this study was to report the re-revision free survival and functional outcomes in this patient population, and to identify risk factors for re-revision.

Methods: We retrospectively identified all patients who underwent revision for trunnionosis in primary MoP THA at our institution between 2012-2020. Eighty hips (79 patients) were included with a mean follow-up of 4.6 years (range 2.0-9.4) post trunnionosis revision. Mean age was 71.9 years, BMI was 27.9, and 63% were female. Sixty-seven hips (84%) had intraoperative or pathologic evidence of pseudotumor and 64% underwent head/liner exchange only. Kaplan-Meier analysis was used to determine survival and patient reported outcomes were collected. Multivariate logistic regression was used to identify risk factors for re-revision.

Results: Twenty-one hips (26%) underwent re-revision at mean 8.0 months after the index trunnionosis revision, 12 for instability, 8 for infection and 1 for unexplained pain. The 2- and 5-year all-cause re-revision free survival was 75.0% and 73.2%, respectively. The mean Oxford Hip Score was 33.7 and 24% were dissatisfied with their hip. Multivariate analysis identified not undergoing a cup revision (p=0.046) and earlier time from primary THA to the index trunnionosis revision (p=0.023) as risk factors for re-revision.

Conclusion: The risk of early re-revision following revision for trunnionosis in primary MoP THA is high (26%) at midterm follow-up, mostly due to infection and instability, and functional outcomes are fair. This may reflect the high burden of pseudotumor in our study. Retaining the acetabular component and shorter time from primary THA are risk factors for re-revision, emphasizing the importance of early diagnosis and cup revision when indicated.

Notes

Paper #9

Modular Dual-Mobility Constructs Outperformed Large Femoral Heads in 299 Revision THAs at 10 Years

Christopher N. Carender, MD, Michael J. Taunton, MD, Kristin M. Fruth, BS, Mark W. Pagnano, MD, Matthew P. Abdel, MD

Introduction: There is a paucity of mid-term data on modular dual-mobility (MDM) constructs versus large (≥40 mm) femoral heads (LFH) in revision THAs. The purpose of this study was to directly compare MDM and large femoral heads in revision THA at 10 years, with specific emphasis on survivorship free of re-revision for dislocation, any re-revision, dislocation and the risk of metal-related complications.

Methods: We identified 299 revision THAs performed at a single tertiary care academic institution from 2011 to 2014. Aseptic loosening of the acetabular component (n=65), dislocation (n=58), and reimplantation as part of a two-stage exchange protocol (n=57) were the most common reasons for index revision. Dual-mobility constructs were used in 123 cases, and LFH were used in 176 cases. Mean age was 66 years, mean BMI was 31 kg/m2, and 45% were female. Mean follow-up was seven years.

Results: The 10-year survivorship free of re-revision for dislocation was 99% in the MDM cohort and 91% in the LFH cohort with a significantly increased risk of re-revision for dislocation in the LFH cohort (HR 10.4; p=0.02). The 10-year survivorship free of any re-revision was 92% in the MDM cohort and 84% in the LFH cohort with a significantly increased risk of any re-revision in the LFH cohort (HR 2.9; p=0.03). The 10-year survivorship free of any dislocation was 95% in the MDM cohort and 87% in the LFH cohort with a significantly increased risk of any dislocation in the LFH cohort (HR 2.6; p=0.04). There were no re-revisions for corrosion in the MDM cohort.

Conclusion: In this head-to-head comparison, revision THA with a dual-mobility construct safely and effectively lowered the risk of re-revision for dislocation, any re-revision and any dislocation compared to LFH at 10 years. There were no re-revisions for corrosion in the MDM cohort.

Notes

Paper #10

Isolated Bearing Exchange for Management of Hip Instability Following Primary Total Hip Arthroplasty

Ryan Cheng, BA, Jason L. Blevins, MD, Eytan M. Debbi, MD, PhD, Yu-Fen Chiu, MS, Alejandro Gonzalez Della Valle, MD, Gwo-Chin Lee, MD

Introduction: Instability following THA is a leading cause for revision. Isolated ball and liner exchanges (IBLE) can be performed in order to increase hip joint stability, but historical results have been mixed due to lack of head size options or dual mobility articulations. The purpose of this study is to evaluate the contemporary results of IBLE in patients with instability following primary THA.

Methods: We reviewed the records of 65 primary THA from 2016 with hip instability undergoing IBLE (n=52) or conversion to dual mobility articulation (n=13). There were 31 men and 34 women with an average age of 70.7 years. Radiographic factors including acetabular component orientation, reproduction of hip joint offset, leg lengths, as well as clinical outcomes such as recurrent instability requiring subsequent revision and PROMS were recorded and compared.

Results: Twelve hips managed with IBLE or conversion to dual mobility experienced subsequent instability and required another revision (17.3% IBLE vs. 23.1% dual mobility articulation, p=0.615). The mean time to re-revision for instability was 17.1 months (range: 0.56 – 61.9 months). There were no significant differences in acetabular component anteversion (30.2 vs. 26.5, p=0.25) or reduced hip joint offset (38% vs. 42%, p=0.87) in patients who required another revision for instability compared to those who did not. At one year, patients undergoing IBLE reported higher HOOS JR (p=0.002) and VR-12 physical component (p=0.023) scores compared to those who underwent a conversion to dual mobility articulation. Increasing age at the time of surgery was associated with increased risk for dislocation [OR 7.2, CI 1.2 – 43.7, p=0.032].

Conclusion: Isolated bearing exchanges for instability following THA remained at high risk for subsequent instability. Conversion to dual mobility articulations did not reduce the risk for reoperation. Understanding the functional cup position for these patients can refine indications.

Notes

Paper #11

Surgical Approach Does Not Influence Instability Risk in Revision Total Hip Arthroplasty

Eric S. Secrist, MD, Kelly Boutelle, MS, David C. Neal, MD, Murillo Adrados, MD, Joseph T. Moskal, MD, Benjamin R. Coobs, MD

Introduction: Although the direct anterior (DA) approach has increased in popularity for primary THA, there is limited evidence regarding its use for revision THA. It is unknown whether the dislocation benefit seen in the primary setting translates to revision cases.

Methods: This retrospective review compared patients undergoing revision THA through direct anterior vs. posterolateral (PL) approaches at a single institution from 2011-2021. The primary outcome was dislocation rate. Exclusion criteria included revision for instability, >2 prior revisions, approaches other than DA or PL, and placement of dual-mobility or constrained liners.

Results: 182 hips in 173 patients met inclusion criteria. Demographics were similar. Average follow-up was 6.5 years with a minimum of two years. There was a trend towards more both-component revisions being performed through the PL approach. Observed dislocation rates for all DA revisions were 8.1% (5/62), with 9.3% (4/43) and 5.3% (1/19) following index primary DA and PL THAs, respectively. Observed dislocation rates for all PL revisions were 7.5% (9/120), with 4.5% (1/22) and 8.2% (8/98) following index primary DA and PL THAs, respectively. The incidence of dislocation between DA and PL revisions was not statistically significant (8.1% vs. 7.5%, p=0.999). Discordant approaches had a lower dislocation rate than concordant approaches (4.9% vs. 8.5%); however, this difference was not statistically significant (p=0.740). There was no significant difference in return to the OR between groups (17.7% DA vs. 24.2% PL, p =0.422).

Conclusion: Dislocation rates following revision THA did not differ between DA and PL approaches irrespective of the primary approach. Surgeons should not choose their revision approach based solely on minimizing instability risk.

Notes

Symposium III

Traumaplasty: When and How to Perform Acute Arthroplasty for Fractures Around the Hip

Moderator: James D. Slover, MD, MS
Faculty: Michael Blankstein, MD, MSc, FRCSC, David C. Landy, MD, PhD, Linda I. Suleiman, MD, Jesse I. Wolfstadt, MD

This symposium will review current practices in the treatment of fractures about the hip, including femoral neck and acetabular fractures. We will discuss the decision-making process regarding fixing or replacing the hip when treating the various fracture types. We will also review the relative risks and benefits of various construct options for managing these injuries and will discuss the perioperative management principles. This symposium will involve interactive audience response questions to survey practice patterns and treatment choices.

Learning Objectives:

1. Understand important factors for consideration when determining the optimal surgical management plan for fractures about the hip.
2. Gain an appreciation for the challenges and pitfalls in treating fractures about the hip with arthroplasty and for the strategies and techniques available to appropriately manage and avoid them.

Outline:

Introduction
James D. Slover, MD, MS

To Fix or Replace: That Is the Question
Jesse I. Wolfstadt, MD

Hemiarthroplasty vs. Total Hip Arthroplasty
David C. Landy, MD, PhD

Why is Anyone Still Press-Fitting These?
Michael Blankstein, MD, MSc, FRCSC

Acute Total Hip Arthroplasty for Acetabular Fractures: When and How?
Linda I. Suleiman, MD

Discussion
All Faculty

Notes

Paper #12

Hemiarthroplasty Is Not Associated with Increased Complications in Patients at Least 80 Years Old

Andrew Poole, MD, Peter Everson, MD, Dean Weich, DO, Baker Mills, MD, Stephanie Tanner, MS, Kyle J. Adams, MS, Kyle J. Jeray, MD, James B. Jackson, MD, John D. Adams, MD

Introduction: Due to previously reported increased intra-operative fracture risk, the current AAOS CPGs recommend cemented hemiarthroplasty for fracture in patients over 80 years old. However, this recommendation is primarily based on older literature with older implant designs. In addition, studies have shown that cementing increases OR time and intra-operative mortality. With newer implant designs and more familiarity with cementless techniques, we sought to evaluate complication rates between cemented and cementless hemiarthroplasty techniques for fracture patients at least 80 years old.

Methods: All hemiarthroplasties performed at two Level I Trauma Centers from January 2012 – December 2017 were reviewed retrospectively. Patients were included if they underwent hemiarthroplasty for fracture and were at least 80 years old. Patients with pathologic fractures were excluded. Patient demographics, surgical data, post-operative clinical and radiographic outcomes, re-operations and mortality up to one year were recorded. Subgroup analyses by Dorr classification were also performed.

Results: 307 cementless and 214 cemented hemiarthroplasties were included. There were no differences in intra-operative fracture rates between the cementless (2.28%) and cemented groups (1.40%) ($p=0.54$). Operative time was shorter in the cementless group (87.2 vs. 108.9 minutes, $p< 0.01$). There were no differences in reoperation rates, implant subsidence, infection, estimated blood loss or mortality between groups (all $p>0.05$). Subgroup analysis of Dorr C femurs included 57 patients in the cemented group and 52 in the cementless group. There were no intra-operative fractures in the cemented Dorr C group and one intra-operative fracture in the cementless Dorr C group ($p=0.48$). Additionally, reoperation rates on Dorr C femurs were similar in both groups ($p=1.00$).

Conclusion: In patients at least 80 years old, cementless hemiarthroplasty for fracture appears to have similar complication rates to cemented techniques, including patients with Dorr C femurs. This data challenges the dogma of cemented hemiarthroplasty for all patients over 80.

Notes

Paper #13

Body Mass Index Does Not Drive the Risk for Postoperative Instability After Total Hip Arthroplasty

Alexander J. Acuña, MD, Enrico M. Forlenza, MD, Joseph Serino, MD, E. Baile Terhune, MD, Craig J. Della Valle, MD

Introduction: Instability remains the leading cause of revision following THA. However, it remains unclear how elevated body mass index (BMI) influences the risk of dislocation. The objective of the present investigation was to determine whether BMI is associated with the risk of dislocation after primary THA.

Methods: The PearlDiver Mariner database was queried for patients undergoing elective, primary THA for osteoarthritis between 2010 and 2022. Patents undergoing THA for femoral neck fracture were excluded. International Classification of Disease (ICD) 9th and 10th revision codes were utilized to separate patients into the following BMI cohorts: 25-29.9 (n=3,192), 30-34.9 (n=3,060), 35-39.9 (n=2,557), 40-44.9 (n=1,962), 45-49.9 (n=939) and 50-59.9 (n=297). Patients were matched 1:1 based on age, sex, and Elixhauser Comorbidity Index (ECI) to the control cohort of patients with BMI 20-24.9. A multivariate logistic regression controlling for age, sex, ECI and additional risk factors for dislocation (history of spinal fusion, neurodegenerative disorders, and alcohol abuse) was utilized to evaluate dislocation rates at 30-days, 90-days, six months, one year and two years. Rates of revision for instability were similarly compared at one year and two years post-operatively.

Results: No significant differences in dislocation rate were observed between control patients and each of the evaluated BMI classes at all evaluated post-operative intervals (all p-values >0.05). Similarly, the risk of revision for instability was comparable between the normal weight cohort and each evaluated BMI class at one year (all p-values >0.05) and two years (all p-values >0.05) post-operatively.

Conclusion: Controlling for comorbidities and known risk factors for instability, the present analysis demonstrates no difference in rates of dislocation or revision for instability between normal weight patients and those in higher BMI classes.

Notes

Paper #14

Increased Patient BMI Is Associated with Increased Surgeon Physiologic Stress During THA

Itay Ashkenazi, MD, Kyle W. Lawrence, BS, Ittai Shichman, MD, Alana Prinos, BS, Jonathan L. Katzman, BA, Claudette Lajam, MD, Ran Schwarzkopf, MD, MSc, Joshua C. Rozell, MD

Introduction: While increased body mass index (BMI) in patients undergoing THA increases surgical complexity, there is a paucity of objective studies assessing the impact of patient BMI on the cardiovascular stress experienced by surgeons during THA. Furthermore, the majority of the 22-modifiers appended to the operative Current Procedural Terminology code, which indicate increased operative work, are due to patient obesity. The aim of this study was to assess the impact of patient BMI on surgeon cardiovascular strain during THA.

Methods: We prospectively evaluated three fellowship-trained arthroplasty surgeons performing a total of 115 THAs. A smart-vest worn by the surgeons recorded mean heart rate, stress index (correlate of sympathetic activation), respiratory rate, minute ventilation and energy expenditure throughout the procedures. Patient demographics as well as perioperative data including surgical approach, surgery duration, number of assistants and the timing of the surgery during the day were collected. Linear regression was utilized to assess the impact of patient characteristics and perioperative data on cardiorespiratory metrics.

Results: Average surgeon heart rate, energy expenditure and stress index during surgery were 98.50 beats/minute, 309.49 calories/hour, and 14.10, respectively. Higher patient BMI was significantly associated with increased hourly energy expenditure (slope: 4.71; standard error: 2.10, P=0.027), mean heart rate (slope: 0.24; standard error: 0.11, P=0.037), and stress index (slope: 0.08; standard error: 0.04 P=0.027) independent of surgical approach. Respiratory rate and minute ventilation were not associated with patient BMI. The number of assistants and time of surgery during the day did not impact cardiorespiratory strain on the surgeon.

Conclusion: The physiologic burden on surgeons during primary THA significantly increases as patient BMI increases. Current and future reimbursement models should account for higher physical strain on surgeons as an indicator for case complexity and difficulty.

Notes

Paper #15

High Readmission Risk After THA Regardless of Functional Status in Patients Discharge to SNF

Ignacio Pasqualini, MD, Matthew E. Deren, MD, Joshua L. Tidd, BS, Alison K. Klika, MS, Joshua K. Johnson, PhD, Nicolas S. Piuzzi, MD

Introduction: Patients discharged to skilled nursing facilities (SNFs) following TH) have consistently exhibited higher readmission rates compared to those discharged to their home health care (HHC). However, research examining the influence of patient functional status on readmission rates has been limited. The aim of this study was to compare the risk of 30- and 90-day readmission following THA for patients discharged to SNF versus HHC to determine whether discharge disposition was independently associated readmission while accounting for functional status, age, sex, diagnosis (Osteoarthritis (OA) vs. non-OA), Charlson comorbidity index (CCI), availability of caregiver assistance, Area Deprivation Index (ADI) and insurance.

Methods: This was a retrospective cohort study of patients undergoing THA at any of 11 hospitals in a single, large, academic health care system between 2017 and 2022 who were discharged to SNF or HHC. A total of 13,262 patients were included. The primary outcomes assessed in this study were 30- and 90-day hospital readmissions. Functional status was measured with the Activity Measure for Post-Acute Care (AM-PAC) 6-Clicks basic mobility short form. The adjusted relative risk of readmission was estimated using modified Poisson regression models.

Results: The overall incidence of hospital readmission within 30 days and 90 days were 2.9% and 5.9 %, respectively. SNF showed the highest readmission rates. After adjusting for confounders, patients discharged to SNF were more likely to be readmitted within 30 and 90 days compared to HHC after THA (OR 1.57 [CI 1.2-2]; $p < 0.001$; OR 1.46 [CI 1-2.1]; $p < 0.046$, respectively).

Conclusion: Discharge to a SNF is an independent risk factor for readmission following THA even after controlling for mobility status, available caregiver support among other covariates. Consequently, within the prevailing value-oriented health care paradigm, discharging suitable patients to their homes may constitute a more secure, economically efficient and high-caliber alternative.

Notes

Paper #16

Dysplastic Hips that Are Too Late for PAO Are Not Too Early for Total Hip Arthroplasty

Emily A. Treu, MD, Eleanor Sato, MD, Olaoluwa Omotowa, BS, Tanner Heaton, BS, Jill A. Erickson, PA-C, Brenna E. Blackburn, PhD, Christopher L. Peters, MD, Lucas A. Anderson, MD

Introduction: THA is often performed in symptomatic patients with developmental dysplasia of the hip (DDH) who do not qualify for periacetabular osteotomy (PAO). The impact of osteoarthritis (OA) severity on postoperative outcomes in DDH patients who undergo THA is not well described. We hypothesized that DDH patients who undergo THA with mild OA have slower initial recovery postoperatively, but similar one-year patient reported outcome measures (PROMs) when compared to DDH patients with severe OA.

Methods: We performed a retrospective review at a single academic institution over a six-year period of patients with DDH who underwent primary THA and compared them to patients without DDH who underwent THA. Within the DDH cohort, we compared PROMs stratified by DDH severity and OA severity. Diagnosis of DDH was verified using radiographic lateral center edge angle (LCEA). Minimum one-year follow-up was required. PROMs were collected through one-year postoperatively. Logistic and linear regression models were used adjusting for age, sex, body mass index and Charlson Comorbidity Index.

Results: 263 patients with DDH were compared to 1,225 THA patients without DDH. No significant differences were found in postoperative PROMs or revision rates ($p=0.49$). When stratified by DDH severity, patients with LCEA< 10° had worse preoperative pain ($p=0.01$), mental health ($p< 0.01$) and physical function ($p=0.03$) scores but no significant difference in postoperative PROMs. Within the DDH group, when stratified by OA severity, patients with Grade 3 Tonnis score had worse preoperative pain ($p=0.04$) but no significant difference in postoperative PROMs. Recovery curves in DDH patients based upon severity of DDH and OA were not significantly different at 2-weeks, 6-weeks and 1-year.

Conclusion: DDH patients who have mild OA have similar recovery curves compared to those with severe OA. THA is reasonable in symptomatic DDH patients who have mild arthritis and do not qualify for PAO.

Notes

Paper #17

Outcomes Following Intraoperative Calcar Fractures During Cementless Total Hip Arthroplasty

Eric J. Wilson, MD, Alexander V. Strait, MS, Kevin B. Fricka, MD, William G. Hamilton, MD, Robert A. Sershon, MD

Introduction: Intraoperative calcar fractures (IOCF) are an established complication of cementless THA. Prompt recognition and intraoperative management of IOCF may prevent subsequent postoperative complications. This study aimed to evaluate outcomes and revision rates of THAs with IOCFs identified and managed intraoperatively.

Methods: This retrospective cohort study examined 11,438 patients undergoing primary cementless THA at a single North American institution from 2009 to 2022. Prospectively collected data on cases with intraoperative calcar fracture were compared to cases without the complication. Continuous data was analyzed utilizing Independent Samples t-Tests, and categorical data with Chi-square or Fishers Exact tests. The calcar fracture group had lower body mass index (BMI) (26.9 kg/m2 vs 28.9 kg/m2; P=0.01). Patient age, sex and mean follow-up (3.2 years (0-12.8) vs. 3.5 years (0-14); P=0.45) were similar between groups.

Results: IOCF occurred in 62 (0.54%) cases. The direct anterior approach experienced the lowest rate of fractures (31, 0.4%) compared to posterolateral (27, 0.7%; P=0.03) and lateral (4, 2.4%; P< 0.01) approaches. Of the IOCFs, 48 (77%) were managed with cerclage cabling, 4 (6.5%) with intraoperative stem design change and cabling, 4 (6.5%) with isolated postoperative weight-bearing restrictions and 6 (9.7%) with no modification to the standard postoperative protocol. The IOCF group experienced 1 postoperative component subsidence. No patients in the IOCF cohort required revision surgery, and all-cause revision rates were similar between groups (0, 0% vs 215, 1.9%; P=0.63). Postoperative HOOS, JR scores were similar between IOCF and control groups (85.7 vs 86.4; P=0.80).

Conclusion: This study observed cementless THA complicated by IOCFs to have similar rates of postoperative revisions and PROMs at mid-term follow-up when compared to patients not experiencing this complication. Surgeons may use this data to provide postoperative counseling on expectations and outcomes following these rare intraoperative events.

Notes

Paper #18

Surgical Approach and BMI Impact Risk of Wound Complications Following Primary THA

Harold I. Salmons, MD, Dirk R. Larson, MS, Cory G. Couch, MD, Joshua S. Bingham, MD, Cameron K. Ledford, MD, Robert T. Trousdale, MD, Michael J. Taunton, MD, Cody C. Wyles, MD

Introduction: Previous studies have suggested that wound complications may differ by surgical approach after THA, with particular attention to direct anterior approach (DAA) compared to laterally based incisions. There is a paucity of data documenting wound complication rates by surgical approach and the impact of concomitant patient factors, namely body mass index (BMI). The purpose of this study was to determine rates of wound complications by surgical approach and identify BMI thresholds that portend differential risk.

Methods: This multicenter study used an institutional total joint registry to evaluate all primary THA patients from 2010 – 2022. Patients were classified by skin incision as laterally based approach (posterior or lateral approach) or DAA (longitudinal incision). We identified 17,111 patients with 11,585 laterally based (68%) and 5,526 (32%) DAA THA. Mean age was 65 years, 52% were female and mean BMI was 30. Logistic regression and cut point analyses were performed to identify an optimal BMI cutoff, overall and by approach, with respect to the risk of wound complications at 90-days.

Results: The 90-day risk of wound complications was higher in the DAA group versus the laterally based group with an absolute risk of 3.6% vs 2.6% and a multivariable adjusted odds ratio of 1.5 ($p < 0.001$). Cut point analysis demonstrated that the risk of wound complications increased steadily for both approaches, but most markedly above a BMI of 33.

Conclusion: Wound complications are higher after primary THA with longitudinal incision DAA compared to laterally based approaches with a 1% higher absolute risk and adjusted odds ratio of 1.5. Furthermore, BMI is an independent risk factor for wound complications, regardless of surgical approach, with an optimal cutpoint BMI of 33 for both approaches. These data can be used by surgeons to help consider risks and benefits of approach selection.

Notes

Paper #19

Surgical Vest Decreases Contamination with Sterile Surgical Helmet Systems

Andrew P. Konopitski, MD, Hugh L. Jones, BS, Kenneth B. Mathis, MD, David Rodriguez-Quintana, MD

Introduction: Sterile surgical helmet systems (SSHS) are frequently utilized when performing total joint arthroplasty in order to protect the surgeon and maintain the sterile field. Many surgeons use a standard gown in combination with the SHSS. The positive pressure created by the SHSS in combination with an uncovered back seam may result in contamination of the surgical field directly behind the surgeon and assistants. The goal of this study was to determine if pairing a surgical vest with the SSHS would result in reduced contamination.

Methods: In a custom sterile isolation chamber, an orthopaedic fellow donned the SHSS with one of three surgical gown configurations: 1.) Standard gown (SG) with no vest 2.) Standard gown with a surgical vest (SG+V) 3.) Toga style (TS) gown. Surgical movements were simulated for 1 hour by sawing and cutting on a sterilized polyethylene block. Contamination was measured with agar settle plates positioned directly behind the subject. Agar plates would be incubated and CFUs later counted. Power analysis required that each gown configuration be tested 12 times. CFU averages were compared with student t-test and analysis of variance (ANOVA) with $p < 0.05$ indicating significance.

Results: Both the addition of a sterile vest to a standard surgical gown, or use of a toga style gown, resulted in less contamination than a standard surgical gown alone. Standard gowning grew 331.7 +/- 52 CFU/m2/hr, Toga style grew 170.5 +/- 41.9 CFU/m2/hr, and Standard + Vest grew 182.2 +/- 30.8 CFU/m2/hr (SG vs. TS $p = 0.01$; SG vs SG+V $p = 0.02$, TS vs SG+V $p > 0.05$).

Conclusion: In order to reduce contamination of the surgical field directly behind the surgeon and assistants, all surgical participants should cover the back seam of a standard gown with a vest or don a toga style gown.

Notes

Paper #20

Early vs. Late Periprosthetic Infection After Total Knee Arthroplasty: Do Patient Differences Exist?

Brian T. Muffly, MD, Ayomide Ayeni, BS, Janice Bonsu, MD, PhD, Kevin Y. Heo, BS, Ajay Premkumar, MD, MPH, George N. Guild II, MD

Introduction: Periprosthetic joint infection (PJI) is a devastating complication following TKA. This diagnosis is accompanied by significant psychosocial implications for the patient as well as a financial burden on the health care system. Little evidence exists comparing those with early vs. late PJI. The purpose of the study was to determine comorbidity profile differences between patients with early vs. late PJI).

Methods: 72,659 patients undergoing primary TKA from 2009-2021 were identified from the IBM MarketScan database. Subjects diagnosed with PJI were categorized as either "early" (within 90 days of index procedure) or "late" (>2 years after index arthroplasty). Non-infected patients within these same enrollment periods served as control groups following 1:4 propensity score matching on other extraneous variables. Logistic regression analyses were performed comparing comorbidities between groups.

Results: Patients were significantly younger in the late compared to the early infection group (58.1 vs. 62.4 years, P = < 0.001). When compared to those with early PJI, patients with chronic kidney disease (13.3% vs. 4.1%; OR 5.17, P = 0.002), malignancy (20.4% vs. 10.5%; OR 2.53, P = 0.009), uncomplicated diabetes (40.8% vs. 30.6%; OR 2.00, P = 0.01), rheumatoid arthritis (9.2% vs. 3.3%; OR 2.66, P = 0.04) and hypertension (88.8% vs. 81.6%; OR 2.17, p=0.04) were all significant predictors of developing a late PJI.

Conclusion: When compared to patients diagnosed with early PJI following primary TKA, the presence of chronic kidney disease, malignancy, uncomplicated diabetes, rheumatoid arthritis and hypertension were independent risk factors for the development of late PJI. Those with late PJI were also significantly younger. Younger patients with these comorbidities may be targets for preoperative optimization interventions that minimize the risk of PJI.

Notes

Paper #21

Different Codes Needed for Septic Total Join Arthroplasty Revisions: A Vast Difference in Mortality

Jesus M. Villa, MD, Katherine Rajschmir, BS, Vivek Singh, MD, Shu Lin, BS, Tejbir S. Pannu, MD, Carlos A. Higuera-Rueda, MD

Introduction: Revision arthroplasty is currently coded depending on what components are revised regardless of cause. However, septic revisions are more expensive and exhibit higher morbidity than aseptic revisions, even though reimbursement is similar. Thus, we sought to determine: (1) impact on mortality of revision THA/TKA for periprosthetic joint infection (PJI) when compared to aseptic revisions, and (2) mortality predictors in PJI patients.

Methods: Retrospective chart review of 978 consecutive patients who underwent revision THA/TKA in a single institution (Jan. 2015-Nov. 2020). All revisions performed at any point in time were evaluated for each patient and it was determined whether patients had a revision for PJI or not. Two groups were set apart: (1) patients who had septic-revision(s) at any point in time (n=350), and (2) patients who only underwent aseptic revision(s) (n=628). Demographics, number of revisions underwent by each patient and mortality status at latest follow-up (mean 3-years, range 0-18 years, from first revision) were assessed. Multivariate Cox proportional hazard regression analysis was used to determine whether PJI was an independent mortality predictor. Subsequently, in PJI patients, potential mortality predictors were evaluated (univariate/multivariate analyses).

Results: Overall, 65 patients (6.6%) died. Demographics were not significantly different between both groups except for sex and American Society of Anesthesiologist (ASA): PJI cohort had more males (56.6% vs. 41.9%, p< 0.0001) and more ASA-IV patients (4.3% vs. 0.8%, p< 0.0001). Mean number of revisions underwent by PJI and aseptic revision patients were 2.7 and 1.2, respectively (p< 0.0001). Mortality rates were 10.9% and 4.3%, respectively (p< 0.0001). After controlling for sex, ASA and number of revisions, PJI was a significant predictor of mortality (Hazard-Ratio_2.69, 95%CI_1.5-4.7, p=0.001). In PJI patients, age (HR_1.05, 95%CI_1.01-1.08, p=0.009) and ASA (HR_4.02, 95%CI_1.67-9.67, p=0.002) were independent predictors.

Conclusion: Having a revision due to PJI is associated with increased mortality (2.5 times the rate of aseptic revision patients). More accurate unique coding that captures the complexity and morbidity of septic revisions is needed

Notes

Paper #22

Commercial Synovial Antigen Testing Is Not Superior to Traditional Culture for the Diagnosis of PJI

Saad Tarabichi, MD, Roseann M. Johnson, BS, Nicole D. Quinlan, MD, Douglas A. Dennis, MD, Javad Parvizi, MD, FRCS, Jason M. Jennings, MD

Introduction: Despite its limitations, culture remains the "gold standard" for pathogen identification in patients with periprosthetic joint infection (PJI). Recently, a synovial fluid antigen test has been introduced by a commercial entity. The purpose of this multicenter study was to determine the accuracy of said antigen test in the diagnosis of PJI.

Methods: This retrospective study identified 613 patients undergoing revision TKA that had undergone preoperative synovial fluid analysis. PJI was defined using the 2018 International Consensus Meeting (ICM) criteria. Patients with an extended time (>180 days) from aspiration to revision procedure (n=62), those presenting within 90 days of their index arthroplasty procedure (n=17) and patients with an inconclusive ICM score (n=8) were excluded. Using receiver operator characteristic curves analyses, we examined the utility of the microbial identification (MID) antigen test and any positive culture (either preoperative or intraoperative) in the diagnosis of PJI.

Results: A total of 526 patients were included. Of these, 125 (23.8%) were ICM positive and 401 (76.2%) were ICM negative. Culture demonstrated an AUC of 0.864, sensitivity of 75.2%, and specificity of 97.5%. On the other hand, the MID test exhibited an AUC of 0.802, sensitivity of 61.6%, and specificity of 98.8%. The AUC of culture was significantly higher than that of the MID test (p=0.037). MID test was positive in 41.9% of culture negative PJI cases. We also observed a high rate of discordance (29.7%) when both culture and the MID test were positive in the ICM positive group.

Conclusion: Synovial fluid antigen testing does not provide additional clinical benefit when compared to traditional cultures for the diagnosis of PJI. The antigen test had low sensitivity in the diagnosis of PJI and a relatively high rate of discordance with culture.

Notes

Paper #23

24-Hour Intra-Articular Antibiotic Levels Fall Below MIC for Most Bacteria After Primary TKA

Juan D. Lizcano, MD, Diana Fernandez Rodriguez, MD, Graham S. Goh, MD, David E. DeMik, MD, Javad Parvizi, MD, FRSC, Paul M. Courtney, MD, James J. Purtill, MD, Matthew S. Austin, MD

Introduction: The prophylactic use of antibiotic-loaded bone cement (ALBC) in primary TKA is controversial. There is a paucity of in vivo data on the elution characteristics of ALBC. The purpose of this study was to determine if the antibiotic concentration of two commercially available ALBCs exceeded the minimum inhibitory concentration (MIC) and minimum biofilm eradication concentration (MBEC) of common infecting organisms.

Methods: Forty-five patients undergoing TKA were randomized to receive bone cement without antibiotics (n=5) or a commercially available formulation containing 1g of tobramycin (n=20) or 0.5g of gentamicin per 40g (n=20). Patients receiving a spacer using high-dose ALBC for infection (n=5) were recruited as positive controls. Intraarticular drain fluid was collected at 4 and 24 hours. An automated immunoassay measuring antibiotic concentration was performed and compared against MIC and MBEC thresholds. Descriptive statistics and correlation analysis were performed.

Results: The mean antibiotic concentration at 4 and 24 hours was 59.3 [0-156] µg/mL and 18.5 [0-43] µg/mL for tobramycin and 40.6 [0-87] µg/mL and 18.5 [0-70] µg/mL for gentamicin, respectively. Time and antibiotic concentration exhibited a negative linear correlation coefficient (r=-0.512). Most reference MIC levels were reached at 4 hours. However, a considerable percentage of patients were below the MIC at 24 hours for many common pathogens, including Staphylococcus epidermidis (gentamycin: 67-100%, tobramycin: 85%), methicillin-sensitive Staphylococcus aureus (gentamycin: 8-92%), Streptococcus species (gentamycin: 8-100%) and Cutibacterium acnes (gentamycin: 8-67%, tobramycin: 100%). Ranges reflect MIC of different strains of each organism. MBEC threshold values were reached at 4 hours for only the least virulent strains of Staphylococcus aureus and Escherichia coli.

Conclusion: Elution of antibiotics from commercially available ALBC decreases rapidly following TKA, and mean antibiotic concentration exceeds MIC only at 4 hours for many pathogens. Use of commercially available ALBC may not provide substantial antimicrobial prophylaxis following TKA.

Notes

Paper #24

One-Stage vs. Two-Stage Treatment for Prosthetic Joint Infection: A Prospective, Randomized Trial

Thomas K. Fehring, MD, Jesse E. Otero, MD, PhD, Keith A. Fehring, MD, Brian M. Curtin, MD, MS, Bryan D. Springer, MD, Alexis N. Ready, BS, Taylor M. Rowe, BA, Susan M. Odum, PhD

Introduction: A two-stage approach is most commonly used to treat prosthetic joint infection. Successful one-stage studies are underpowered, lack a two-stage comparative group and exclude patients with comorbidities or resistant organisms. Given the morbidity and expense of two-stage treatment, we conducted a multicenter, randomized trial to compare the results of one- and two-stage treatment for chronic PJI, specifically including patients with comorbidities and resistant organisms.

Methods: Chronically infected primary hip and knee arthroplasties defined by MSIS criteria with a known organism were included. Exclusions were revision patients, fungal infections, immunosuppressed patients or soft tissue involvement precluding wound closure. Patients were classified according to MSIS host staging system. Success at one year was defined as no reoperation for PJI. All patients underwent a double surgical setup, similar irrigation protocols, six weeks of IV antibiotics initially and six months of oral antibiotics post-reimplantation. A total of 321 patients (n=164 one stage; n=157 two stage) were randomized. Groups were similar with respect to demographics and host classification. To date, 50 of 321 (16%) patients are lost to follow-up, and 26 (8%) patients have not completed the study. For this interim, one-year analysis, 245 patients (n=128 one-stage; n=117 two-stage) were included in the comparison of success rates.

Results: Overall, the one-year success rate of one-stage treatment was 98% (125/128) while the success of two-stage treatment was 94% (110/117) (p=.15). Compared to the two-stage group, the one-stage group had a 61% reduced relative risk of failure (RR .39; 95% CI.10, 1.4). After adjusting for age and MSIS host classification, relative risk of failure was 1.02 (95% CI .99, 1.04). Adverse event rates were also similar between groups [one-stage 32% (53/164) vs two-stage 38% (60/157); p=.27].

Conclusion: Interim results of this RCT indicate that the success rate of one and two-stage treatment for PJI is similar.

Notes

Paper #25

Periprosthetic Joint Infections: Is An Ipsilateral Uninfected Total Joint Arthroplasty at Risk?

Harold I. Salmons, MD, Daniel Karczewski, MD, Nicholas A. Bedard, MD, Daniel J. Berry, MD, Matthew P. Abdel, MD

Introduction: Periprosthetic joint infections (PJI) of a THA or TKA may occur in the setting of an uninfected ipsilateral prosthetic joint. However, the risk to that uninfected ipsilateral joint is unknown. We analyzed the survivorship free from PJI in THAs and TKAs following treatment of an ipsilateral knee or hip PJI, respectively.

Methods: Using our institutional total joint registry, we identified 205 patients who underwent treatment for PJI (123 THAs, 83 TKAs) between 2000 and 2019. All had a clinically uninfected ipsilateral TKA (123) or THA (83) at the time of their other joint PJI. The mean age was 70 years, 47% were female, and the mean BMI was 32 kg/m2. Index procedures primarily consisted of two-stage exchange (61%) and debridement, antibiotics and implant retention (DAIR; 25%). Kaplan-Meier survivorship analyses were performed. Mean follow-up was 6 years.

Results: The five year survivorships free of PJI in the ipsilateral in situ THAs and TKAs were 97% and 99%, respectively. Three PJIs occurred (2 THAs and 1 TKA), all over one year from the index ipsilateral PJI. One of the two newly infected ipsilateral THAs resulted when the corresponding TKA failed to have source control (same organism as at index two-stage exchange). The other hip PJI was an acute hematogenous PJI with a different organism than at index DAIR. The new knee PJI developed after its corresponding THA had recurrence of its PJI (same organism as at index two-stage exchange).

Conclusion: When diagnosed with PJI in a single joint, the risk of PJI in an ipsilateral prosthetic joint within five years was low (1-3% risk). In the rare event of an ipsilateral infection, all occurred greater than one year from the index PJI, and 2 of 3 were with the same organism when source infection control failed.

Notes

Symposium IV

Practice Management Strategies Among Current Members of the American Association of Hip and Knee Surgeons

Moderator: Jay R. Lieberman, MD

A survey will be conducted regarding the practice management strategies of members of the American Association of Hip and Knee Surgeons. The membership will be polled at the Annual Meeting using an audience response system (ARS) and the results will be reviewed in real time. The results of the survey will be compared to prior membership surveys to determine if there have been changes in practice patterns.

Learning Objectives:

1. Learn the present practice strategies of AAHKS members.
2. Identify any changes in practice patterns compared to prior surveys.

Outline:

Introduction

Survey of Members

Discussion

Notes

Paper #26

The Evolution of Revision Total Hip Arthroplasty and Impact on Trainee's Experience

Stefano Muscatelli, MD, Henry Ho, MS, Robert H. Hopper, Jr., PhD, John R. Dunn, BS, Robert A. Sershon, MD, Kevin B. Fricka, MD, William G. Hamilton, MD

Introduction: Advances in THA have resulted in evolving revision indications and intraoperative techniques, which can influence the exposure of residents and fellows to complex cases. The goal of this study is to report three decades of revision experience from a tertiary referral center that trains fellows, comparing the reasons for revision and complexity of revisions over time.

Methods: We retrospectively reviewed all revision THA performed at our institution from 1990-2022. Revision diagnosis, components revised, types of revision implants used and exposure techniques were collected. A "complex" revision was defined as a case that involved an extended trochanteric osteotomy (ETO), triflange/cup-cage construct or acetabular augment.

Results: 3556 THA revisions were identified, with an average of 108 revisions/year. Aseptic loosening was the most common indication in 1990-1999 (average 45/year) but decreased to 28.3/year in 2010-2019. From 1990-1999 to 2010-2019, fracture increased from 3.1/year to 7.3/year, infection from 2.9/year to 16.9/year, and metallosis from 0.1/year to 13.2/year. Both components were most commonly revised in 1990-1994 (42.6/year), while polyethylene exchange was most common in 2010-2019 (43.3/year). A decrease was observed in "complex" cases over time: 14.8 ETOs/year were performed in 2000-2004 compared to 5.4/year in 2018-2022, 4.5 triflange/cup-cage constructs/year were utilized in 2004-2007 compared to 0.8/year in 2018-2022, and 4 acetabular augments/year were utilized in 2009-2012 compared to 1/yr in 2018-2022.

Conclusion: Our data show that indications for revision have changed over the decades while the number of "complex" revisions has gradually decreased, presumably due to advances in implants and materials. If this trend extends to other training institutions, the next generation of arthroplasty surgeons will have less exposure to complex revisions during their training.

Notes

Paper #27

Does Preoperative Resilience Correlate with Regret and Patient-Reported Clinical Outcomes in TKA?

Timothy C. Horan, DO, Michael R. Baer, MD, William D. Bugbee, MD, Steven N. Copp, MD

Introduction: Patient psychosocial parameters are of increasing interest in TKA. Resiliency, defined as the ability to recover from or adjust easily to misfortune or change, is one patient characteristic that has received limited attention. The purpose of this study was to assess if patients' preoperative resilience correlated with postoperative treatment decision regret and clinical outcomes following TKA.

Methods: 1,269 patients who underwent a primary unilateral TKA were included. Average age was 71 and 60% were female. Preoperative resilience was measured using the Brief Resilience Scale. Postoperatively, patients completed the Decision Regret Scale, Knee Injury and Osteoarthritis Outcome Score Joint Replacement (KOOS JR), and Patient-Reported Outcomes Measurement Information System (PROMIS-10).

Results: Preoperatively, 8% of patients had low resilience, 67% had normal resilience and 25% had high resilience. Females were more prone to report low resilience compared to males (11% and 4% respectively, $p < 0.001$). At one month postoperatively, 13% of patients had moderate/severe regret regarding their decision to undergo TKA. Patients with low resilience were more likely than patients with normal and high resilience to have moderate/severe regret (23%, 15% and, 5% respectively, $p < 0.001$), and this association continued throughout the first postoperative year. Patients with high resilience had higher postoperative KOOS JR scores ($p < 0.05$) and PROMIS-10 mental and physical scores ($p < 0.001$) than patients with low and normal resilience.

Conclusion: Among patients undergoing TKA, preoperative resilience was associated with postoperative regret and clinical outcomes. Patients who had high resilience had less treatment decision regret throughout the first postoperative year, as well as higher outcome scores measuring knee stiffness, pain, function and activities of daily living, as well as global physical and mental health. Patient resilience is a psychosocial parameter that may be used by surgeons to counsel patients regarding postoperative expectations.

Notes

Paper #28

Is Preoperative Weight Loss in Patients with BMI>40 Associated with Fewer Complications After THA?

Scott M. LaValva, MD, Jacqueline A. Grubel, BS, Justin Ong, BS, Yu-Fen Chiu, MS, Lisa A. Mandl, MD, MPH, Alejandro Gonzalez Della Valle, MD, Michael L. Parks, MD

Introduction: Given the heightened risk of postoperative complications associated with obesity, delaying THA in patients with body mass index (BMI) > 40 to promote weight loss has been supported by AAHKS and has been widely adopted. While the benefits of this strategy are not well understood, previous studies have suggested that a 5% reduction in BMI may be associated with reduced complications after THA.

Methods: We performed a retrospective cohort study by identifying 613 patients who underwent primary THA in a single institution during a seven year period, and who had a BMI of > 40 within one year of surgery. They were stratified into three cohorts based on whether that baseline BMI decreased by 5% (147 patients-24%), was unchanged (within 5%) (336 patients-55%) or increased by 5% (130 patients-21%) on the day of surgery. The rate of 90-day Hip Society complications was compared between these cohorts. There were significant differences between the cohorts with respect to baseline American Society of Anesthesiologists Class ($p< 0.001$) and hemoglobin A1C ($p=0.011$), which were accounted for in a multivariable regression analysis.

Results: On univariate analysis, there was a lower incidence of readmission ($p=0.025$) and total complications ($p=0.004$) in the increased BMI cohort. The overall complication rate was 19.7% in the decreased BMI cohort, 19% in the unchanged cohort and 7.7% in the increased cohort. However, multivariable regression analysis controlling for confounders revealed that preoperative change in BMI was not associated with a difference in the risk of 90-day complications or readmission ($p>0.05$).

Conclusion: Patients with BMI>40 who achieved a clinically significant (>5%) BMI reduction prior to THA did not have a lower risk of 90-day complications. Thus, delaying THA in these patients to encourage weight loss may result in restricting access to a potentially beneficial surgery without conferring substantial benefit.

Notes

Paper #29

Low-Dose Enteric-Coated and Chewable Aspirin Are Not Equally Effective in Preventing VTE in TJA

Taylor D'Amore, MD, Nicholas F. Cozzarelli, BS, Ryan Sutton, MD, Jess H. Lonner, MD, Yale A. Fillingham, MD

Introduction: Low-dose aspirin is an effective venous thromboembolism (VTE) prophylactic medication in primary TJA, but the efficacy and safety of the different formulations of chewable and enteric-coated have not been compared. The purpose of this study was to investigate the VTE rates and gastrointestinal (GI) complication rates in chewable and enteric-coated 81mg aspirin BID for VTE prophylaxis in primary TJA.

Methods: A retrospective, single-institution cohort study was performed on patients who underwent primary THA and TKA from 2017 to 2021. Comparisons were made between 4,844 patients who received chewable non-coated aspirin 81mg to 4,388 patients who received enteric-coated 81mg aspirin. Power analysis demonstrated that 1,978 and 3,686 patients were needed per group to achieve a power of 80% for 90-day VTE rates (utilizing inferiority testing) and GI complications (utilizing superiority testing), respectively. Patients had similar baseline characteristics. Statistical analysis was done utilizing T-tests and Chi-Square tests, with statistical significance defined as a p-value < 0.05.

Results: There were no significant differences in the incidences of postoperative VTE (0.31% versus 0.55%; P = 0.111) or GI complications (0.14% versus 0.14%; P = 1.000) between patients who received either chewable or enteric-coated 81mg aspirin BID in the overall comparison that included both THA and TKA patients combined, or THA patients alone. However, the VTE incidence for TKA patients alone was significantly lower with chewable than enteric-coated aspirin (0.22% versus 0.62%; P = 0.037) with no difference in GI complications (0.13% versus 0.19%; P=0.277).

Conclusion: Low-dose aspirin in enteric-coated formulation is inferior to chewable aspirin for VTE prophylaxis in primary TKA, but not inferior in THA patients. Both formulations have a similar GI complication rate. Therefore, it is reasonable to consider a transition from enteric-coated to uncoated chewable low-dose aspirin.

Notes

Paper #30

Perioperative Cefazolin for Total Joint Replacement Patients with a Penicillin Allergy: Is it Safe?

Brandon R. Bukowski, MD, Ricardo J. Torres-Ramirez, BS, Daniel K. Devine, BA, Alberto V. Carli, MD, FRCSC, Daniel B. Maalouf, MD, Enrique A. Goytizolo, MD, Andy Miller, MD, Jose A. Rodriguez, MD

Introduction: Cefazolin is the standard of care for perioperative antibiotic prophylaxis in total joint replacement in the United States. The potential allergic cross-reactivity between cefazolin and penicillin causes uncertainty regarding optimal antibiotic choice in patients with a reported penicillin allergy (PCNA). The purpose of this study was to determine the safety of perioperative cefazolin in PCNA patients undergoing total joint replacement.

Methods: We identified all patients (n=49,842) undergoing THA (n=25,659) or primary TKA (n=24,183) from 2016-2022 who received perioperative intravenous antibiotic prophylaxis. Patients with a PCNA (n=5,508) who received cefazolin (n=4,938, 89.7%) were compared to PCNA patients who did not (n=570, 10.3%) and to patients with no allergy history (n=43,359). The primary outcome was the rate of allergic reactions within 72 hours postoperatively. Secondary outcomes included the rates of superficial infections, deep infections, and Clostridium difficile infections within 90 days.

Results: The rate of allergic reactions was 0.1% (n=5) in PCNA patients who received cefazolin compared to 0.2% (n=1) in PCNA patients who did not (p=0.61) and 0.02% (n=11) in patients with no allergy history (p=0.005). Allergic reactions were mild in all 5 PCNA patients and were characterized by cutaneous symptoms (n=4) or dyspnea in the absence of respiratory distress (n=1) that resolved promptly with antibiotic discontinuation and administration of antihistamines and/or corticosteroids. There were no differences in the rates of superficial infections (0.1% vs. 0.2%, p=0.84), periprosthetic joint infection (0.3% vs. 0.4%, p=0.77), or Clostridium difficile infections (0.04% vs. 0%, p=0.63) within 90 days in PCNA patients who received cefazolin versus alternative perioperative antibiotics.

Conclusion: In this series of over 5,500 patients with PCNA undergoing total joint replacement, perioperative prophylaxis with cefazolin resulted in a 0.1% incidence of allergic reactions that were clinically indolent. Cefazolin can safely be administered independent of penicillin allergy statusl.

Notes

Paper #31

Is Aspirin Effective for Venous Thromboembolism Prophylaxis After Revision Hip and Knee Arthroplasty?

Mehmet K. Yilmaz, MD, Ahmad Abbaszadeh, MD, Camilo Restrepo, MD, Ibrahim Azboy, MD, Javad Parvizi, MD, FRSC

Introduction: The optimum agent for venous thromboembolism (VTE) prophylaxis after revision TJA is not clear. The aim of this study is to compare aspirin and other potent prophylaxis agents, namely warfarin, LMHW, factor Xa, UFH, direct thrombin inhibitors, fondaparinux and combination, regarding symptomatic VTE events and periprosthetic joint infection (PJI) rates after revision TJA.

Methods: We reviewed our prospectively collected institutional arthroplasty database to identify patients who underwent revision hip and knee arthroplasty between 2008 and 2020. The study included 4,575 consecutive patients. Of these, 2,091 patients received aspirin and 2,484 patients received other anticoagulant agents. Demographic data, BMI, CCI, operation time, administration of tranexamic acid and blood transfusion were collected. The incidence of symptomatic VTEs and PJI were investigated. Aspirin and other anticoagulants were compared regarding VTE and PJI. A logistic regression model was created to identify risk factors for VTE and PJI events.

Results: The overall incidence of symptomatic VTE was 1.62% in the total cohort of revision TJA and it was significantly higher in other anticoagulant group at 2.54% (63 out of 2,484) compared with 0.53% (6 out 2,091) in the aspirin group ($p < .001$). The rate of PJI was similar between aspirin and other anticoagulants group (2.3% and 2.9%, respectively; $p=0.238$). Logistic regression analyses demonstrated that aspirin was a strong predictor for VTE prevention in patients undergoing revision TJA (odds ratio, 0.26; 95% confidence interval, 0.12-0.51; $p < .001$). Blood transfusion was identified as a risk for both for VTE (odds ratio, 2.72; 95% confidence interval, 1.64-4.47; $p < .001$) and PJI (odds ratio, 2.13; 95% confidence interval, 1.41-3.18; $P=.001$).

Conclusion: This large cohort study clearly demonstrated that aspirin is more effective than other prophylaxis agents in preventing VTE after revision TJA. Aspirin may be preferred in revision TJA as a VTE prophylaxis.

Notes

Paper #32

Discharge to Skilled Nursing Facility After Hip Fracture Results in Higher Rates of PJI

Emily A. Treu, MD, Jeffrey Frandsen, MD, Graham Dekeyser, MD, Brenna E. Blackburn, PhD, Lucas A. Anderson, MD, Jeremy M. Gililland, MD

Introduction: Femoral neck fractures (FNF) in elderly patients are associated with significant morbidity and mortality. The influence of postoperative discharge location on recovery and outcomes after arthroplasty for hip fractures is not well understood.

Methods: A multi-site retrospective cohort from nine academic centers identified patients with FNF treated with hemiarthroplasty (HA) or THA between 2010 and 2019. Patients with diagnoses of dementia, stroke, or age>80 were excluded. Discharge location was identified, including home with home health (HH), inpatient rehabilitation center (IPR) or skilled nursing facilities (SNF). Rates of reoperation, prosthetic joint infection (PJI) and mortality were compared between cohorts. Multivariate logistic regression was performed adjusting for age, American Society of Anaesthesiologists (ASA) score and body mass index. Statistical significance was defined as $p< 0.05$.

Results: 763 patients (361 HH, 169 IPR, 233 SNF) were included in this study. Average follow-up was 30.2 months. The SNF cohort was significantly older ($p< 0.0001$) with higher ASA scores ($p< 0.0001$) than the HH cohort. In a logistic regression model adjusting for age, ASA score and BMI, the SNF cohort had higher mortality rates than the HH cohort ($p=0.0337$) and were more likely to have PJI within 90 days (OR=4.24, 95% CI=1.41, 12.76) and within 1 year (OR=3.05, 95% CI=1.14, 8.17). Time to PJI was significantly shorter in the SNF cohort (SNF 37 days vs HH 231 days, $p=0.0151$). No differences were seen in dislocation or reoperation rates between SNF and HH cohorts. No differences were seen in complication rates between IPR and HH cohorts.

Conclusion: Discharge to a SNF after HA or THA for FNF is associated with increased mortality and higher rates of PJI. Hip fracture care pathways that uniformly discharge patients to SNFs may need to be re-evaluated and surgeons should consider discharge to home with HH when possible.

Notes

The James A. Rand Young Investigator's Award

Keeping It Simple: Are All MSIS Tests Useful to Diagnose Periprosthetic Joint Infection?

Jason Kreinces, BS, Ittai Shichman, MD, Mackenzie A. Roof, MD, MBA, Hayley Raymond, BS, Alana Prinos, BS, Itay Ashkenazi, MD, Ran Schwarzkopf, MD, MSc, Vinay K. Aggarwal, MD

Introduction: Current data evaluating the clinical value and cost-effectiveness of advanced diagnostic tests for periprosthetic joint infection (PJI) diagnosis, including alpha-defensin and synovial C-reactive protein (CRP), is conflicting. This study aimed to evaluate the adequacy of preoperative and intraoperative PJI workup without the utilization of these tests.

Methods: This retrospective analysis identified all patients who underwent revision THA or TKA for suspected PJI between 2018 and 2020 and had a minimum follow-up of two years. Perioperative data and lab results were collected, and cases were dichotomized based on whether they met the 2018 Musculoskeletal Infection Society (MSIS) criteria for PJI. In total, 204 rTKA and 158 rTHA cases suspected for PJI were reviewed.

Results: Nearly 100% of the cases were categorized as "infected" for meeting the 2018 MSIS criteria without utilization of alpha-defensin or synovial CRP (rTKA: n=193, 94.6%; rTHA: n=156, 98.7%). Most cases were classified as PJI preoperatively by meeting either the major MSIS or by a combinational minor MSIS criteria of traditional lab tests (rTKA: n=177, 86.8%; rTHA: 143, 90.5%). A subset of cases was classified as PJI by meeting combinational preoperative and intraoperative MSIS criteria (rTKA: 16, 7.8%; rTHA: 13, 8.2%). Only 3.6% of all cases were considered "inconclusive" using preoperative and intraoperative data.

Conclusion: Given the high rate of cases satisfying PJI criteria during preoperative workup using our available tests, the synovial alpha-defensin and synovial CRP tests may not be necessary in the routine diagnostic workup of PJI. We suggest that the primary PJI workup process should be based on a stepwise algorithmic approach with the most economical testing necessary to determine a diagnosis first. The use of advanced, commercialized and costly biomarkers should be utilized only when traditional testing is indeterminate.

Notes

AAHKS Surgical Techniques and Technologies Award

Inferior Screw Fixation in Revision Acetabular Reconstruction Decreases Acetabular Component Failure

Amy Z. Blackburn, BA, Ashish Mittal, MD, Brian Velasco, MD, Colin M. Baker, DO, Nicholas Vandal, BA, Saad Tarabichi, MD, Paul M. Courtney, MD, Neil P. Sheth, MD, Hany S. Bedair, MD, Christopher M. Melnic, MD

Introduction: Adjunctive screw fixation has been shown to be reliable in achieving acetabular component stability in revision THA. While biomechanical studies have shown inferior screw fixation in the ischium or superior pubic ramus may improve abduction stability of the acetabular component, data examining clinical differences in re-revision rates based on screw placement is limited. The purpose of this study was to assess the effect of inferior screw placement on acetabular component failure following revision THA. We hypothesize that inferior screw fixation will decrease acetabular failure rates.

Methods: We reviewed 250 patients with Paprosky Type II or III defects who underwent acetabular revision between 2001-2021 across 4 institutions. Demographic factors, the number of screws, location of screw placement (superior versus inferior), use of augments and/or cup-cage constructs, Paprosky classification and presence of discontinuity were documented. Inferior screw placement was defined as placement in the superior pubic ramus or ischium based on radiographs. Multivariate regression was performed to identify the independent effect of inferior screw fixation on primary outcome of aseptic re-revision of the acetabular component.

Results: At mean follow-up of 53.4 months (range, 12 to 261 months), 16 patients (6.4%) required re-revision for acetabular loosening. There were 140 patients (56.0%) with inferior screw fixation, all without neurovascular complication during screw placement. Patients with inferior screws had a lower rate of acetabular re-revision than those with only superior screw fixation (2.1% vs. 11.8%, p=0.0030). Multivariate regression demonstrates that inferior screw fixation decreased the likelihood of re-revision for acetabular loosening when compared to superior screw fixation only (OR: 0.22, CI: 0.05-0.77; P=0.0289). No other risk factors were identified.

Conclusion: Inferior screw fixation is a safe and reliable technique to reduce acetabular component failure following revision THA in cases of severe acetabular bone loss.

Notes

AAHKS Clinical Research Award

Postoperative Oral Tranexamic Acid in Total Knee Arthroplasty: A Randomized Controlled Trial

Mateo J. Kirwan, MD, Zachary R. Diltz, MD, Derek T. Dixon, BS, Carlos A. Rivera-Peraza, BS, Christal J. Gammage, PhD, William M. Mihalko, MD, PhD, James W. Harkess, MD, James L. Guyton, MD, John R. Crockarell, MD, Marcus C. Ford, MD

Introduction: Perioperative tranexamic acid (TXA) use with TKA is widely accepted today. Recently, few international groups have published on the safety and outcomes of extending TXA use in the postoperative period. Through a double-blinded, randomized control trial, we aimed to investigate the safety and clinical efficacy of extended postoperative oral TXA use in TKA performed in an American, free-standing ambulatory surgery center (ASC).

Methods: Based on a power analysis, 40 patients undergoing primary TKA were randomized into two groups: extended oral TXA vs. placebo. Both groups received a standard 1g intravenous TXA dose prior to incision and at the time of closure. The extended TXA group received an additional 1.95g oral TXA dose following ambulation the day of surgery, plus postoperative day 1, 2, and 3. Patients with a history of venous thromboembolism (VTE) or cancer were excluded. All patients received twice-daily 81mg aspirin for VTE prophylaxis. Patients were followed on post-op day 3, 2 weeks and 6 weeks. Paired t-tests determined statistical significance.

Results: Extended TXA patients showed significantly increased knee flexion at 6 weeks (116.05 vs. 106.5, p=.0308), improved VAS at 2 (2.5 vs. 3.85, p=0.039) and 6 weeks (1.35 vs. 2.8, p=0.011) and superior KOOS JR at 2 (66.87 vs. 60.63, p=0.03) and 6 weeks (73.33 vs. 62.47, p=0.0019) compared to placebo patients. No significant differences were found for change in hemoglobin levels or terminal knee extension at any time points. No adverse events were noted in either cohort.

Conclusion: When compared to placebo, the extended use of oral TXA in the postoperative period may safely result in early improved motion, pain and functional scores. Further investigation on long-term outcomes and the duration/dosing of postoperative TXA use is warranted.

Notes

Symposium V

Cementless Total Knee Replacement: A Resurgence – Who, When, Where and How?

Moderator: Kevin B. Fricka, MD
Faculty: Michael P. Bolognesi, MD, Arthur L. Malkani, MD, R. Michael Meneghini, MD, Julius K. Oni, MD

Cementless fixation is a growing trend being used for TKA. This symposium will define the patient characteristics for success when using cementless TKA. It will also detail the options available for all three components and discuss long-term outcomes of cementless fixation.

Learning Objectives:

1. Understand the role and benefits of cementless fixation in TKA.

Outline:

Introduction
Kevin B. Fricka, MD

Define the "Who" and "Who Not"
Michael P. Bolognesi, MD

The Cementless Femur
Julius K. Oni, MD

The Cementless Tibia
R. Michael Meneghini, MD

Cementless Patella vs. Non-Resurfacing
Arthur L. Malkani, MD

Discussion
All Faculty

Notes

Paper #33

Does Melatonin Improve Subjective Sleep Quality After TKA? A Randomized, Placebo-Controlled Trial

Drake G. Lebrun, MD, Jacqueline A. Grubel, BS, Justin Ong, BS, Yu-Fen Chiu, MS, Jason L. Blevins, MD, Steven B. Haas, MD, Jose A. Rodriguez, MD, Elizabeth B. Gausden, MD, MPH, Alejandro Gonzalez Della Valle, MD, Brian P. Chalmers, MD

Introduction: Sleep disturbance is a common problem following TKA. The objective of this study was to determine if exogenous melatonin improves sleep quality following primary TKA.

Methods: A randomized, double-blind, placebo-controlled trial was conducted. One hundred seventy-two patients undergoing unilateral TKA for primary knee osteoarthritis were randomized to receive either 5mg melatonin (n=86) or 250mg vitamin C placebo (n=86) nightly for six weeks (Figure 1). The primary outcome was the Pittsburgh Sleep Quality Index (PSQI) at six weeks and 90 days postoperatively. Secondary outcomes included morphine milligram equivalents (MMEs) prescribed, adverse events, medication compliance and six week and 90-day patient-reported outcome measures (PROMs). The sample size was sufficiently powered to identify a minimal detectable difference in PSQI of 2.0.

Results: PSQI scores worsened at six weeks before returning to the preoperative baseline at 90 days in both groups. There were no differences in PSQI scores between melatonin and placebo groups at six weeks (10.2±4.2 vs. 10.5±4.4, p=0.66) or 90 days (8.1±4.1 vs. 7.5±4.0, p=0.43). Treatment did not affect Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOS-JR), Lower Extremity Activity Scale (LEAS), Visual Analog Scale (VAS) for pain, or Veterans Rand 12 (VR-12) Physical Component Score (PCS) or Mental Component Score (MCS) (p>0.05 for all PROMs). Poor sleep quality was associated with worse PROMs at 6 weeks and 90 days on univariate and multivariable analyses, but melatonin did not modify these associations (all p>0.05). There were no differences in MMEs prescribed, adverse events, medication compliance or 90-day readmissions between both groups (all p>0.05).

Conclusion: Exogenous melatonin supplementation did not improve subjective sleep quality or PROMs at six weeks or 90 days following TKA. Poor sleep quality was associated with worse physical function and pain. Our results do not support the routine use of melatonin supplementation after TKA.

Notes

Paper #34

10-Year Results of Randomized Controlled Trial: Mechanical vs. Kinematic Total Knee Arthroplasty

John P. Gibbons, FRCS, Nina Zeng, PhD, Ali Bayan, FRACS, William Farrington, FRCS, Matthew Walker, FRACS, Simon W. Young, FRACS

Introduction: There is a lack of long-term data comparing the outcomes of kinematic alignment (KA) versus mechanical alignment (MA) philosophies in TKA. This paper presents 10-year outcomes of a single center, multi-surgeon, randomized controlled trial (RCT) comparing KA vs. MA, reporting on patient-reported outcome measures (PROMs), rates of revision and reoperation, and the incidence of radiolucent lines (RLLs).

Methods: Ninety-nine primary TKAs for osteoarthritis were randomized to either the MA (n=50) or KA (n=49) group. Computer navigation was used in the MA group, and patient-specific cutting blocks were used in the KA group. At 10 years, 82 patients were available for follow-up (39KA and 43MA). Multiple PROMs were assessed, including Knee Society Score, Oxford Knee Score, Forgotten Joint Score and EuroQol 5D. Survivorship free from reoperation and revision was determined via Kaplan-Meier analysis. Radiographs were assessed for signs of aseptic loosening by a single blinded observer.

Results: At ten years there was no difference in any PROM between the two groups. The ten year survivorship free of revision was 96.1% (standard error [SE]=2.75%) for the MA group and 91.4% (SE=4.14%) for the KA group (log rank test p=0.383) There were 2 revisions in the MA group (periprosthetic fracture, deep infection) and 4 in the KA group (2 secondary patella resurfacing, 2 deep infection). Survivorship free of reoperation at 10 years was 90.2% (SE=4.18%) for the MA group and 85.7% (SE=5.15%) for the KA group (p=0.519). There was no statistical difference with regards presence of static RLLs (35.7% MA, 36.1% KA) or progressive RLLs (0% MA, 2.8% KA), on radiographic review (x^2=1.305 p=0.52).

Conclusion: 10-year follow-up for this RCT demonstrated no functional/radiological difference between MA and KA TKA. There were no revisions for aseptic loosening in either group.

Notes

Paper #35

Intraosseous Versus Intravenous Vancomycin in Tourniquetless Primary Total Knee Arthroplasty

Pradyumna Gurusamy, MD, Austin Wininger, MD, Thomas C. Sullivan, BS, Stefano Serpelloni, MS, Francesca Taraballi, PhD, Timothy S. Brown, MD

Introduction: Intraosseous (IO) administration of vancomycin during TKA has been shown to be safe and more effective than intravenous (IV) administration at preventing early prosthetic joint infection. Previous studies have relied on thigh tourniquet inflation to mitigate systemic release. It is unknown whether IO administration of vancomycin prior to tourniquetless TKA is a similarly effective method for antibiotic prophylaxis. The purpose of this study is to compare local and systemic levels of vancomycin after IO administration vs. IV administration during tourniquetless TKA.

Methods: This is a prospective, single-blinded, randomized trial with eight patients, four in each arm. The IV group received weight-dosed vancomycin in the pre-operative period one hour before incision and weight-dosed cefazolin immediately prior to incision. The IO group received cefazolin in similar fashion and 500mg IO vancomycin into the proximal tibia at incision. Systemic samples for vancomycin levels were taken prior to incision and at initiation of closure. Bone and soft tissue samples were taken from the distal femoral cut, tibial cut and suprapatellar synovium at start of incision closure.

Results: Significant differences in systemic vancomycin levels (ug/mL) were found at the start of the case: IV= 32.7±9.0, IO= 0±0, $p< 0.01$; and at the end of the case: IV= 18.7±3.4, IO= 8.3±1.0, $p< 0.03$. No significant differences were seen in the average vancomycin concentration in the distal femur: IV= 72.4±23.1, IO= 79.2±6.5 $p=0.79$; or in the proximal tibia: IV= 59.7±29.9, IO= 73.9±28.8, $p=0.74$; or in synovium: IV= 11.45±6.8, IO= 10.4±3.8, $p=0.9$. There were no complications of vancomycin administration in either group.

Conclusion: Our study shows that similar local tissue concentrations of vancomycin in femur, tibia and synovium can be achieved using a standard 500mg IO vancomycin dose in tourniquetless TKA compared to IV administration of vancomycin while maintaining lower systemic vancomycin levels in the IO group.

Notes

Paper #36

No Difference in Functional Outcomes Between Robotic-Assisted and Conventional TKA

Juan D. Lizcano, MD, Santiago Restrepo, BS, Peter A. Gold, MD, Arjun Saxena, MD, MBA, Matthew S. Austin, MD

Introduction: Optimizing soft tissue balancing and alignment in TKA may improve patient-reported outcomes and survivorship. Robotic-assisted TKA (raTKA) may allow for more reproducible balancing and implant positioning. However, few randomized controlled trials (RCTs) have directly compared modern raTKA to conventional TKA (cTKA). The purpose of this study was to compare early functional outcomes of raTKA and cTKA.

Methods: In this double-blind RCT, 60 patients were randomized to raTKA or cTKA without the use of any technology. All care was otherwise standardized. The primary outcome measures were the timed-up-and-go (TUG) and stair climbing test (SCT) collected by a blinded observer preoperatively, one and six months postoperatively. Secondary outcome measures were KOOS, EQ-5D, VAS scores, opioid use, complications, radiographic measurements and operative time. Standard bivariate statistical analysis was conducted.

Results: There was no difference in preoperative demographics, and both cohorts demonstrated functional outcome improvement at six months. There was no difference in one-month TUG between raTKA and cTKA (13.9 vs. 14.1s; p=0.26) or SCT (24.4 vs. 25.6s; p=0.8) and six-month TUG (11 vs. 10.8s; p=0.89) and SCT (17.3 vs. 15.5s; p=0.8). The raTKA group demonstrated improved KOOS pain (65.4 vs. 55.9; p=0.01) and symptoms (67.7 vs. 60.3; p=0.03) at one month only. Operative time was longer in the raTKA group (78.4 vs. 68.8 min; p< 0.001). The mean hip-knee-ankle angle was 178° for both groups, and there was one outlier (alignment >4° of neutral mechanical axis) in each group. There were no other differences in any other outcomes.

Conclusion: This RCT comparing raTKA to cTKA found no significant difference in functional outcome scores. KOOS pain and symptom scores were better for raTKA at one month, but operative time was 10 minutes longer. This study demonstrates that raTKA and cTKA provide comparable functional, radiographic and patient-reported outcomes at six months.

Notes

Paper #37

Stemless Tibial Component Failure Among Patients with Morbid Obesity: Who Can Benefit from a Stem?

Spencer A. Ward, BS, Itay Ashkenazi, MD, Akram A. Habibi, MD, Claudette Lajam, MD, Joshua C. Rozell, MD, Ran Schwarzkopf, MD, MSc

Introduction: Morbid obesity (body mass index >40kg/m2) is a known risk factor for complications following TKA, including increased rates of aseptic tibial component loosening. Our study aimed to determine an optimal weight cutoff for tibial component failure and further evaluate the role of stemmed implants in these patients.

Methods: We retrospectively reviewed patients with morbid obesity who underwent primary, elective TKA at a single academic center between August 2012 and January 2021. Patients with stemmed tibial component or <2 years of follow-up were excluded from the initial analysis, resulting in 699 patients. A multiple independent binary logistic regression analysis was utilized to identify risk factors for aseptic tibial failure. Receiver operating characteristic (ROC) was utilized to determine a weight cutoff predicting failure. Further analysis to examine the impact of weight on tibial component failure was performed with 50 additional patients with stemmed tibial components.

Results: Weight was independently associated with an increased risk of tibial component failure (RR 1.027, p< 0.001). ROC curve analysis demonstrated a cutoff point of 118 kg predicting aseptic tibial failure. A Kaplan Meier survival analysis demonstrated a statistically significant lower survival rate of stemless TKA among patients weighing >118 kg when compared to patients <118 kg, respectively (87.7 vs. 93.8% at 5 years, p=0.024). Freedom from aseptic tibial loosening in the comparison group of 50 patients with stemmed tibial components was comparable between patients over and under 118 kg, respectively (96.0 vs. 100.0% at 5 years, p=0.308).

Conclusion: This study suggests that a tibial stem should be considered in morbidly obese patients undergoing TKA who weigh >118 kg. The findings of this study may help guide surgical decision-making in TKA patients with morbid obesity in order to reduce the risk of tibial component failure.

Notes

Paper #38

Quantifying Patient Expectations for TKA: Is It Time to Rethink MCID or Reset Expectations?

Nicholas C. Arpey, MD, Joseph E. Tanenbaum, MD, PhD, Linda I. Suleiman, MD, Patricia D. Franklin, MD, Alpesh A. Patel, MD, MBA, Adam I. Edelstein, MD

Introduction: Achieving a minimal clinically important difference (MCID) in patient-reported outcomes (PROs) following TKA is common, yet up to 20% patient dissatisfaction persists. Unmet expectations may explain post-TKA dissatisfaction. No prior studies have quantified patient expectations using the same PRO metric used for MCID to allow direct comparison.

Methods: This was a prospective study of patients undergoing TKA with five fellowship-trained arthroplasty surgeons at one academic center. Baseline PROMIS Physical Function (PF) and Pain Interference (PI) domains were assessed. Expected PROMIS scores were determined by asking patients to indicate the outcomes they were expecting at 12 months postoperatively. Predicted scores were generated from a predictive model validated in the FORCE-TJR dataset. T-tests were used to compare baseline, expected and predicted PROMIS scores. Expected scores were compared to PROMIS MCID values obtained from the literature. Regression models were used to identify patient characteristics associated with high expectations.

Results: There were 93 patients included. Mean age was 67.1+/-8.9 years and 55% were female. Mean baseline PROMIS PF and PI was 34.4+/-6.7 and 62.2+/-6.4, respectively. Patients expected significant improvement for PF of 1.9 times the MCID (MCID=11.3; mean expected improvement=21.6, 95%CI 19.6-23.5, P< 0.001) and for PI of 2.3 times the MCID (MCID=8.9; mean expected improvement=20.6, 95%CI 19.1-22.2, P< 0.001). Predicted scores were significantly lower than expected scores (mean difference=9.5, 95% CI 7.7-11.3, P< 0.001). No unique patient characteristics were associated with high expectations (p>0.05).

Conclusion: This study is the first to quantify preoperative patient expectations using the same metric as MCID to allow for direct comparison. Patient expectations for improvement following TKA are ~2x greater than MCID and are significantly greater than predicted outcome scores. This discrepancy challenges currently accepted standards of success after TKA and indicates a need for improved expectation setting prior to surgery.

Notes

Paper #39

Prospective Randomized Blinded Intraoperative Sensor-Balanced TKA Study Assessed by Wearable Sensors

Alexander P. Sah, MD

Introduction: Complications reported by post-TKA patients include pain, instability and joint stiffness, which are problems possibly attributable to soft-tissue imbalance. Use of a tibial trial with pressure sensors allows objective intraoperative load measurements to guide releases to achieve knee pressure balance between the medial and lateral compartments, throughout the knee range of motion. The purpose of this study is to use wearable sensor technology to assess initial recovery outcomes after using intraoperative load sensors.

Methods: This prospective, randomized, patient-blinded study of 80 patients undergoing primary TKA with use of an intraoperative soft-tissue balance sensor was performed in Group 1 of 40 patients with soft-tissue releases performed to achieve company's recommended goal pressures. Group 2 of 40 patients had knee balance achieved by surgeon technique only, without use of sensor influence, and pressure data collected at the end of procedure with the surgeon blinded to results.

Results: Intraoperative and final postoperative knee motion was similar between groups. Group 1 sensor patients achieved ROM goals sooner, with less reported pain up to 6 weeks ($p < 0.02$). Patients discontinued narcotics sooner, with fewer total pills used in sensor group. Sensor-balanced patients ambulated with less aids, and unassisted sooner. Group 1 had greater percentage of pressure-balanced knees and avoided low/high extremes of Group 2 ($p < 0.002$).

Conclusion: In this prospective randomized study, TKA balanced with intraoperative compartment pressure measurements to guide releases showed less reported pain, lower and shorter narcotic requirement, earlier unassisted ambulation and more rapid exercise progression. Intraoperative sensor technology seems to more reliably achieve relative compartment pressure similarities better than conventional surgeon manual assessment. Immediate recovery benefits of a load-sensing technology warrant larger studies, with wearable technology possibly revealing these earlier outcome differences.

Notes

Symposium VI

Technology in TKA: Why and How I Actually Use It in 2023

Moderator: Jonathan M. Vigdorchik, MD, FAAOS
Faculty: Anna R. Cohen-Rosenblum, MD, MSc, Charles P. Hannon, MD, MBA, Adolph V. Lombardi Jr., MD

There have been many technologies released for TKA, and a growing body of clinical evidence comparing technology to manual techniques in terms of many different outcome measures. In order to make an appropriate decision for their patients, surgeons should understand all technologies on the market, how to use them, what to do when they fail and possible reasons why not to use them.

Learning Objectives:

1. Understand the latest technology for total knee replacement.
2. Understand what could go wrong using technology and how to manage those situations.
3. Understand why we should not use technology and to compare/contrast technology vs. tried-and-true manual techniques.

Outline:

Introduction
Jonathan M. Vigdorchik, MD, FAAOS

Computer-Assisted Navigation: Simple, Cost-Effective Solutions
Anna R. Cohen-Rosenblum, MD, MSc

Robotics: An Overview of the Many Options
Jonathan M. Vigdorchik, MD, FAAOS

Technology Gone Wrong: What Can Go Wrong and How to Manage
Charles P. Hannon, MD, MBA

Ocular Navigation: Why I Have Not Adopted Technology in the Past, but Why I Might in 2023
Adolph V. Lombardi Jr., MD

Discussion/Q&A
All Faculty

Notes

Paper #40

The Impact of Medicare Advantage on Traditional Medicare Claims Data: Long-Term THA Survivorship

Xiao T. Chen, MD, Amy E. Glasgow, MA, Elizabeth B. Habermann, PhD, Nathanael D. Heckmann, MD, John J. Callaghan, MD, David G. Lewallen, MD, Daniel J. Berry, MD, Nicholas A. Bedard, MD

Introduction: The American Joint Replacement Registry (AJRR) utilizes traditional Medicare (TM) data to report long-term THA survivorship. The purpose of this study was to determine whether the large number of patients leaving TM for Medicare Advantage (MA) has compromised the fidelity of TM data used to evaluate long-term THA survivorship.

Methods: We identified 11,010 Medicare-eligible patients who underwent primary THA from 2000-2020 at a single institution. Insurance type was analyzed over time, and 83% of patients had TM at time of THA. Survivorship free of any reoperation and any revision were calculated at 5- and 10-years for patients with TM. The same survivorship endpoints were then re-calculated with censoring performed when a patient transitioned to a MA plan after surgery to model the impact of losing this patient from the TM dataset. Differences in survivorship were compared. Mean follow-up was 9 years.

Results: From 2000-2020, there was decrease in TM insurance (93% to 73%) and corresponding increase in MA insurance (0% to 19%) amongst THA patients. Following THA, 23% of TM patients switched to an MA plan. Patients who switched from TM to MA trended towards worse survivorship free from revision compared to those who stayed with TM (97% vs. 98% at 5-years and 96% vs. 97% at 10-years; p=0.13), though this was not significant. Reoperation-free survivorship was significantly higher (96% vs. 97% at 5-years and 94% vs. 95% at 10-years; p=0.04) after excluding patients who switched to MA.

Conclusion: Approximately 1 in 4 patients left TM for MA after primary THA, effectively making them lost to follow-up within TM datasets. The mass exodus of patients out of TM appears to influence reoperation data and trended towards significance for long-term survivorship free from revision. If MA continues to grow exponentially, efforts to obtain MA data will become even more important.

Notes

Paper #41

Outcomes in Total Hip Arthroplasty vs. Education and Exercise Using Matched Observational Data

James J. Young, PhD, Michael G. Zywiel, MD, Vinod Chandran, MD, J. Rod Davey, MD, FRCSC, Rajiv Gandhi, MD, Nizar Mahomed, MD, Khalid Syed, MD, Christian Veillette, MD, Raja Rampersaud, MD, Anthony V. Perruccio, PhD

Introduction: It is suggested that patient education and exercise programs (EduEx) have the potential to defer and possibly altogether avoid THA in patients with hip osteoarthritis (OA). However, no trial data are available to evaluate this claim. This study estimates the treatment effect of EduEx vs. THA using matched observational data from two prospective cohorts.

Methods: Patients with hip OA from the GLA:D Canada registry (EduEx) and LEAP-OA registry (THA) with complete data were merged. EduEx and THA patients were matched using a propensity score algorithm. Covariates in the algorithm included age, sex, BMI, education, employment status, living status, smoking status, medical comorbidities, musculoskeletal comorbidities, anxiety/depression symptoms, medication use and pain, function, and quality of life scores. Between-group differences (treatment effects) in pain, function and quality of life (Hip disability and Osteoarthritis Outcome Score 12-item version subscales, all scored 0 worst to 100 best) improvements from baseline to 3 and 12 months were estimated using linear mixed models for repeated measures

Results: 778 patients (303 EduEx, 475 THA) were included, of which 266 (133 in each treatment group) were matched. After matching, all pre-treatment covariates were balanced except for opioid use. Analysis of treatment effects revealed statistically significant differences in favor of THA over EduEx for pain (3 months: 26.1, 95% CI 22.1 to 30.1; 12 months: 35.4, 95% CI 31.4 to 39.5), function (3 months: 20.8, 95% CI 16.6 to 25.0; 12 months: 30.7, 95% CI 26.5 to 34.9), and quality of life (3 months: 17.0, 95% CI 12.2 to 21.9; 12 months: 33.4, 95% CI 28.6 to 38.3). These between-group differences at 12 months are considered clinically significant.

Conclusion: In this well-matched sample, we found a clinically significant effect in favor of THA over EduEx across all outcomes. Future research is warranted to confirm results and further explore individual-level (vs. group-level) treatment responses.

Notes

Paper #42

Comparing Common Risk Assessment Tools to Predict Outcomes In Total Knee Arthroplasty

Travis M. Kotzur, BS, Aaron Singh, BA, Lindsey N. Peng, BS, Ahmed Makhani, MD, Ali Seifi, MD, Chance Moore, MD

Introduction: A number of tools exist to aid surgeons in risk assessment, including the Charlson Comorbidity Index (CCI), the Elixhauser Comorbidity Index (ECI), and various measures of frailty, such as the Hospital Frailty Risk Score (HFR). While all of these tools have been validated for general use, the best risk assessment tool is still debated. Risk assessment is particularly important in elective surgery, such as TJA. The aim of this study is to compare the predictive power of the CCI, ECI, and HFR in the setting of TKA.

Methods: All patients who underwent TKA were identified via ICD-10 code from the National Readmissions Database, years 2016-2019. Patient demographics, perioperative complications and hospital associated outcomes were recorded. Receiver Operating Characteristic (ROC) curves were created and Area Under the Curve (AUC) evaluated to gauge the predictive capabilities of each risk assessment tool (CCI, ECI, and HFR) across a range of outcomes.

Results: 1,930,803 patients undergoing TKA were included in our analysis. For mortality, ECI was most predictive (0.95 AUC), while HFR and CCI were 0.75 and 0.74 AUC, respectively. For periprosthetic fractures, ECI was 0.78 AUC, HFR was 0.68 AUC, and CCI was 0.66 AUC. For joint infections, ECI was 0.78 AUC, HFR was 0.63 AUC, and CCI was 0.62 AUC. For 30-day readmission, ECI was 0.79 AUC, while HFR and CCI were 0.6 AUC. For 30-day reoperation, ECI was 0.69 AUC, while HFR was 0.58 AUC and CCI was 0.56 AUC.

Conclusion: Our analysis shows that ECI is superior to CCI and HFR for predicting short-term postoperative outcomes following TKA. Surgeons should consider assessing patients using ECI prior to TKA.

Notes

Paper #43

Outcomes of Acute vs. Delayed Total Hip Arthroplasty Following Acetabular Fractures

Aymen Alqazzaz, MD, Ashleigh N. Bush, MD, Thompson Zhuang, MD, Bijan Dehghani, MD, Emmanuel Gibon, MD, PhD, Charles L. Nelson, MD

Introduction: Surgical management of acetabular fractures in older patients remains controversial, with THA often performed after failed open reduction internal fixation (ORIF). There is recent interest in performing acute THA for these fractures. The purpose of this study was to compare outcomes of acute vs. delayed THA for acetabular fractures.

Methods: A large, national administrative claims database containing diagnostic, procedural and demographic records from over 157 million patients was analyzed. We identified patients undergoing primary THA continuously enrolled in the database for at least 2 years. Patients with an initial diagnostic code for acetabular fracture occurring within 7 days before the THA were classified as acute THA (aTHA). Patients with an initial acetabular fracture diagnostic code occurring at least 6 months before THA were classified as delayed THA (dTHA). The control group was patients undergoing THA without a history of acetabular fracture. There were 426,734 patients in the control primary THAs, 235 aTHAs and 1,255 dTHAs.

Results: Patients with aTHA had higher rates of revision (9.8% vs. 5.6%, p = 0.02), dislocations (8.9% vs. 6.4%, p = 0.20) and periprosthetic fracture (5.1% vs. 2.3%, p = 0.03) compared to dTHA. After adjusting for age, sex, region and comorbidities, receiving an aTHA increased the odds of revision (OR = 3.65 [95% CI: 2.30-5.49]), dislocation (OR = 4.09 [95% CI: 2.53-6.27]) and periprosthetic fracture (OR = 4.29 [95% CI: 2.26-7.36]) compared to primary THA. Receiving a dTHA significantly increased the odds of revision (adjusted OR = 1.80 [95% CI: 1.40-2.27]), dislocation (adjusted OR = 2.50 [95% CI: 1.97-3.13]) and periprosthetic fracture (adjusted OR = 1.99 [95% CI: 1.34-2.83]) compared to primary THA.

Conclusion: Patients undergoing acute THA in the treatment of an acetabular fracture have significantly increased rates of revision, periprosthetic fracture and dislocation compared to delayed THA.

Notes

Paper #44

Time to MCID in Primary THA: Comparison of Anterior and Posterior Surgical Approaches

Mehdi S. Salimy, BS, Aris Paschalidis, BS, Jacquelyn A. Dunahoe, MD, Antonia F. Chen, MD, MBA, Kyle Alpaugh, MD, Hany S. Bedair, MD, Christopher M. Melnic, MD

Introduction: There is much debate about differences in outcomes between anterior and posterior THA. This study aimed to compare the time to achieve the minimal clinically important difference (MCID) for the Hip Disability and Osteoarthritis Outcome Score-Physical Function Short Form (HOOS-PS) and the Patient-Reported Outcomes Measurement Information System (PROMIS) Global-Physical for patients who underwent anterior and posterior surgical approaches in primary THA.

Methods: Patients from 2018 to 2021 with preoperative and postoperative HOOS-PS or PROMIS Global-Physical questionnaires were grouped by approach. Demographic and MCID achievement rates were compared, and survival curves with and without interval censoring were used to assess the time to achieve the MCID by approach. Log-rank and weighted log-rank tests were used to compare groups, and Weibull regression analyses were performed to assess potential covariates.

Results: A total of 2,725 patients (1,054 anterior/1,671 posterior) were analyzed. Anterior THA patients had a lower BMI (28.0±5.6 vs. 28.6±5.8, p=0.05) and Charlson Comorbidity Index (6.1±2.8 vs. 6.6±3.1, p< 0.001) than posterior THA patients. There were no significant differences in median MCID achievement times for the HOOS-PS (anterior: 5.9 months, 95% CI: 4.6-6.4 months; posterior: 4.4 months, 95% CI: 4.1-5.1 months, p=0.65) or the PROMIS Global-Physical (anterior: 4.2 months, 95% CI: 3.5-5.3 months; posterior: 3.5 months, 95% CI: 3.4-3.8 months, p=0.08) between approaches. Interval censoring revealed earlier times of achieving the MCID for both the HOOS-PS (anterior: 1.509-1.511 months; posterior: 1.7-2.3 months, p=0.874) and the PROMIS Global-Physical (anterior: 3.0-3.1 weeks; posterior: 2.7-3.3 weeks, p=0.180) for both surgical approaches.

Conclusion: The time to achieve MCID did not differ by surgical approach. Most patients will achieve clinically meaningful improvements in physical function much earlier than previously believed. Choosing which surgical approach should be based on the patient's specific condition and the surgeon's expertise and preferences.

Notes

Paper #45

Collecting Long-Term Patient-Reported Outcome Measures Is Unnecessary for Total Knee Arthroplasties

Pedro J. Rullan, MD, Ignacio Pasqualini, MD, Alison K. Klika, MS, Jianhua Shen, MS, Manoshi Bhowmik-Stoker, PhD, Emily Hampp, PhD, Robert M. Molloy, MD, Viktor E. Krebs, MD, Matthew E. Deren, MD, Nicolas S. Piuzzi, MD

Introduction: The clinical relevance ratio (CRR) was developed to account for the loss of follow-up in clinical studies reporting patient-reported outcomes measures (PROMs). However, no study has tested its use with original outcome data for TKA. Therefore, this study aimed to (1) determine the proportion of patients that had a clinically significant improvement in PROMs at each follow-up visit following TKA; and (2) calculate the CRR over time for PROMs following TKA.

Methods: Four independent studies reporting PROMs at baseline to 10 years for 1,416 patients who underwent primary TKA in Europe or the United States were aggregated. 1,587 TKAs performed from 2005 to 2017 were included. A distribution-based minimal clinically important difference (MCID) threshold was used to determine which patients had a clinically significant improvement in PROMs. The CRR was calculated by dividing the number of cases that met the MCID threshold by the number of cases at the beginning of the study. The maximum follow-up time was ten years.

Results: The proportion of cases with clinically significant improvements in PROM scores for TKA was stable after a short period of fluctuations at early follow-up visits. Disease-specific PROMs had the highest percentage improvement for cases. In contrast, general health PROMs had the lowest percentages of score improvements. Overall, the CRR decreased over time for all PROMs reported in the TKA studies. The tipping point where the CRR began decreasing was mainly at the 1-year follow-up time point for TKA studies.

Conclusion: The clinical relevance ratio for PROMs decreases significantly after short-term follow-up periods for TKA patients. Long-term PROM collection at 5 to 10 years and subsequent analysis may be unnecessary following TKA. Arthroplasty surgeons should focus on 1-year PROMs to assess clinically significant improvements after TKA.

Notes

Paper #46

Hypothyroidism Impacts Clinical and Healthcare Utilization Outcomes After Primary THA

Sumanth R. Chandrupatla, Kranti C. Rumalla, BA, Jasvinder A. Singh, MD

Introduction: Most data on the effect of comorbidities on primary THA outcomes is focused on conditions that directly impact joint health, or on one underlying cause, such as osteoarthritis (OA), but there is little comparison between underlying causes of THA. This study aimed to assess the association of hypothyroidism with outcomes of primary THA, stratified by the primary underlying cause.

Methods: We identified all patients undergoing primary THA in the 2019 national inpatient sample. These patients were stratified based on primary diagnoses into hip OA (N=405691), avascular necrosis (AVN; N=17060), fracture (N=104265), inflammatory arthritis (IA; N=5720) and "other" (N=59155). We identified hypothyroidism and complications using secondary diagnoses. Complications codes were specified to be initial encounters, when possible. We performed multivariable-adjusted regression analyses adjusted for race, age, sex, hospital bed size, census region and teaching status with clinical and health care utilization outcomes as endpoints.

Results: Total cohort population was 591,891. Mean age was 68.8, mean length of stay (LOS) was 2.7 days and 58.2% were female. Overall, hypothyroidism was significantly associated with increased LOS, non-routine discharge, acute renal failure (ARF) and anemia ($p \leq 0.003$ for each), and decreased risk of pneumonia ($p=0.031$). In the OA cohort, hypothyroidism was associated with increased LOS, non-routine discharge, anemia and ARF ($p \leq 0.008$ for each). Hypothyroidism was associated with increased blood transfusion ($p=0.049$) in the AVN cohort. In the fracture cohort, hypothyroidism was associated with increased odds of non-routine discharge and anemia ($p \leq 0.020$ for each), but decreased odds of deep veinous thrombosis ($p=0.034$).

Conclusion: Hypothyroidism was associated with clinical and health care utilization outcomes in a nationally representative sample of patients who underwent primary THA, especially in OA, AVN and fracture cohorts. Interventions of tailored patient management strategies for hypothyroidism in THA peri-operative period should be tested for their efficacy to improve peri-operative outcomes.

Notes

Paper #47

Periprosthetic Fractures: A Rising Tide of Total Hip Arthroplasty Failures Noted in the AJRR

Adam A. Sassoon, MD, MS, Ryan D. Stancil, MD, Darryl F. Cannady, MD, Jeremiah Taylor, MD, Emily Jimenez, MPH, Ayushmita De, PhD

Introduction: Periprosthetic fractures (PPFx) have been previously noted to represent a common mode of failure for THA. This failure is commonly seen following cementless fixation and in patients with poor bone stock. Despite this, the use of cemented femoral components seems less common. This study utilized the AJRR to evaluate the rate of cement utilization and compare this to the rate of PPFx failures.

Methods: All primary cemented THA procedures, ages 65+, from 2012 to 2021 were analyzed. The following variables were added to the study dataset: age, gender, race, region, teaching status, year, Charlson Comorbidity Index (CCI) and institution bed size. Analysis compared fixation types for THA on all-cause linked revision and PPFx. Logistic regression models were used to analyze the odds ratios for all-cause linked revision and PPFx for any follow-up time as well as for 90-day revision. The logistic regression models were also adjusted for the above listed variables.

Results: During the study period, the rate of cement utilization as a percentage of primary THAs performed and reported to the AJRR increased from 4.43% to 8.27%. The rate of THA failure for PPFx increased from 11.39% to 33.33%. When both fixation groups were compared in the univariate analysis, there was a significant difference in CCI and age ($p< 0.001$). There were also significant associations between the additional variables ($p< 0.001$). The logistic regression model for PPFx linked revision and early linked revision showed a significant difference between fixation types for THA (OR: 0.456, 95% CI: 0.347; 0.599, $p < 0.0001$ and OR: 0.342, 95% CI: 0.237; 0.493, $p < 0.0001$), favoring cemented stems.

Conclusion: Periprosthetic fractures are becoming a leading failure mode for THAs in AJRR. Given cemented fixation's relative resistance to this failure mode when compared to cementless fixation, we should consider increasing utilization of this technique.

Notes

Paper #48

A PearlDiver Analysis of Trends in Periprosthetic Joint Infection After Total Hip Arthroplasty

Caleb R. Durst, BS, Kenny Chang, BS, Anderson Lee, BS, Sean S. Rajaee, MD, MS, Andrew I. Spitzer, MD

Introduction: The number of THAs performed each year in the United States has increased considerably over the past decade. The purpose of this study was to analyze incidence rates of component revision for periprosthetic joint infection (PJI) within one year of primary THA over a ten-year period.

Methods: Medicare patients who underwent unilateral, primary THA between 2010 to 2019 were identified within the PearlDiver database. Only patients treated for primary OA with minimum one-year follow-up were included. Patients were grouped according to the year of the index procedure. Rates of component revision for PJI within one year of the index procedure were compared to THAs performed in 2010. Aseptic revision rates and mean Charlson Comorbidity Index (CCI) and Elixhauser Comorbidity Index (ECI) scores were analyzed as well. Categorical variables were compared using the chi-squared test. Continuous variables were compared using independent samples t-test.

Results: 151,433 patients were included in this study. In 2010, one-year septic and aseptic revision rates were 0.4% and 1.8%, respectively. Septic revision rates increased to 0.6% in 2015 ($p = 0.016$) and later to 0.7% in 2019 ($p = 0.005$). Conversely, there were no significant changes in aseptic revision rates relative to 2010 during the study period. Mean ECI scores increased each year during the study period, from 1.6 in 2010 to 4.1 in 2015 ($p< 0.001$) and 5.3 in 2019 ($p < 0.001$) With the exception of 2017, mean CCI scores also increase each year, from 0.7 in 2010 to 1.4 in 2015 ($p< 0.001$) and 1.8 in 2019 ($p < 0.001$).

Conclusion: During the 2010-2019 study period, we observed a significant increase in one-year revision rates for PJI while aseptic revision rates remained stable. Moreover, our findings demonstrate an increasing comorbidity burden in Medicare patients seeking THA.

Notes

Paper #49

Outpatient Total Joint Arthroplasty at a High-Volume Academic Center: Analysis of Failure to Launch

Logan Radtke, MD, Claire Kapron, BS, Brenna E. Blackburn, PhD, Jeremy M. Gililland, MD, Lucas A. Anderson, MD, Christopher L. Peters, MD, Michael J. Archibeck, MD, Christopher E. Pelt, MD

Introduction: Unanticipated failure to discharge home (failure to launch, FTL) following scheduled same-day discharge (SDD) total joint arthroplasty is problematic for the surgical facility with respect to staffing, care coordination and insurance concerns. The aim of this study is to review rates, etiology and contributing factors for FTL in SDD TJA.

Methods: All patients who underwent primary TJA between February 2021 to February 2023, were retrospectively reviewed. Patients scheduled for SDD were identified and compared to patients who successfully discharged. Of those scheduled for SDD, risk factors for FTL were compared with successful SDD patients using chi-squared, t-tests and multivariable logistic regression.

Results: During the study period, there were 3,093 consecutive primary joint replacements performed, of which 2,840 (92%) were scheduled as an SDD. In the SDD group, the average age was 63 years, the average BMI was 30.6 kg/m2 and 57.6% were female. Overall, SDD was successful in 94.6% (n=2686) of patients with an FTL rate of 5.4%. SDD was successful in 92% of THA (n=1130), 96.1% (n=1413) of TKA patients and 98.7% of UKA patients. Surgical factors that significantly increased the risk of FTL included the use of general anesthesia vs. spinal anesthesia ($p< 0.0001$), later surgery start time ($p< 0.0001$), longer surgical time ($p=0.0046$) and higher EBL ($p=0.0002$). Demographic factors that significantly increased the risk of FTL included female gender ($p=0.0019$), younger age ($p=0.0385$) and lower pre-operative mental health patient-reported outcomes scores ($p=0.0039$).

Conclusion: With a comprehensive multidisciplinary approach dedicated to the goal of improving same-day discharges at an academic medical center, we have seen successful SDD in over 90% of all primary TJA, with a FTL of less than 5%. Interventions to help decrease FTL include the use of spinal anesthetics and earlier scheduled surgery times.

Notes

Symposium VII

Revision for Periprosthetic Joint Infection: Video-Based Techniques

Moderator: Javad Parvizi, MD, FRCS
Faculty: Henry D. Clarke, MD, Gregory G. Polkowski II, MD, MSc, Joshua C. Rozell, MD, Bryan D. Springer, MD

This symposium will bring together recognized and respected faculty who will demonstrate, using video techniques, the various steps involved in prevention and surgical management of acute and chronic PJI.

Learning Objectives:

1. Outline important strategies for prevention of PJI using videos to explain each step.
2. Discuss the recent developments related to the use of planned DAIR (second DAIR) that appears to offer better infection control. The technique, timing and planning steps will be described.
3. Describe the steps involved in performing a thorough debridement of infection during resection arthroplasty.
4. Demonstrate how an articulating spacer can be fabricated in the operating room for both the hip and the knee.

Outline:

Introduction
Javad Parvizi, MD, FRCS

Prevention of PJI: Optimization, Screening, Antibiotics and Irrigations
Gregory G. Polkowski II, MD, MSc

Try to Eradicate Acute PJI: I Double DAIR You!
Henry D. Clarke, MD

Resection Arthroplasty: Getting the Clear Margins
Bryan D. Springer, MD

Fabricating an Articulating Hip and Knee Spacer
Joshua C. Rozell, MD

Discussion
All Faculty

Notes

Paper #50

Financial Trends in Total Knee Arthroplasty for High Comorbidity Patients from 2013 to 2021

Jeremiah J. Thomas, BS, Itay Ashkenazi, MD, Garrett Ruff, BS, Jonathan L. Katzman, BA, Muhammad Haider, BS, Armin Arshi, MD, Claudette M. Lajam, MD, Ran Schwarzkopf, MD, MSc

Introduction: The utilization of TKA continues to rise in patients with a high comorbidity burden (HCB). With changes in reimbursement models over the past decade, it is essential to assess the financial impact of HCB TKA on health care systems. This study aimed to examine trends in revenue and costs associated with TKA in HCB patients over time.

Methods: Of 14,978 TKAs performed between 2013 and 2021, we retrospectively analyzed HCB patients (Charlson comorbidity index [CCI] ≥ 5 and American Society of Anesthesiology [ASA] scores of 3 or 4). A total of 1,156 HCB TKA patients with complete financial data were identified. Patient demographics, perioperative data, revenue, costs and contribution margin (CM) were collected per patient. Changes in these financial values over time, as a percentage of 2013 values, were analyzed. Linear regression was performed with a trend analysis to determine significance.

Results: From 2013 to 2021, the percentage of HCB TKAs per year increased from 4.2% in 2013 to 16.5% in 2021 ($p < 0.001$). The revenue of TKA in HCB patients remained steady ($P=0.093$). Direct costs increased significantly (32%; $P=0.015$), resulting in a decline of CM to a low of 82.3% of the 2013 values, although not statistically significant ($P=0.130$). There was no significant change in rates of 90-day complications or home discharge following HCB TKA during the study period.

Conclusion: The results of this study indicate a significant rise in cost for TKA among HCB patients, without a corresponding rise in revenue. As more patients with HCB become candidates for TKA, the negative financial impact on institutions should be considered. Payments to institutions do not adequately reflect patient complexity. Re-evaluation of institutional payments for medically complex TKA patients is warranted to maintain patient access to these procedures.

Notes

Paper #51

Prior Authorization Leads to Administrative Burden and Delays in Treatment in TJA Patients

Juan D. Lizcano, MD, Graham S. Goh, MD, Saad Tarabichi, MD, Chad A. Krueger, MD, Matthew S. Austin, MD, Paul M. Courtney, MD

Introduction: Prior authorization (PA) is commonly requested by Medicare Advantage and commercial insurance plans to evaluate the appropriateness of a requested service. Physicians often criticize the PA process, citing extensive administrative work and unnecessary delays in treatment. The effects of PA policies in THA and TKA have not been well studied. The purpose of this study is to analyze the use of PA in our institution.

Methods: We reviewed prospectively collected data for a consecutive series of 28,857 primary THA and TKA procedures performed between 2020 and 2023 across four states. Our institution's PA team recorded demographic data, whether the payer approved the procedure, time to approval or denial, number of initial denials, number of peer reviews or addendums, and reasons for denial.

Results: Of the total cohort, 15,959 (55%) patients required PA for surgery, with a mean time to approval of 30.2 ±38.7 days. There was a request for an addendum in 1,373 (9%) patients to overturn denials (20%) and provide additional clinical information (80%). Of a total of 1,014 initial denials (6%), a peer-to-peer was requested in 114 patients (0.7%), and only 62 (0.4%) denials were upheld after the PA process, with a mean time to denial of 58.2±88.1 days. The most common reasons for denial were unspecified by the payer (38%), poor clinical documentation (19%), lack of coverage (17%), not medically fit (15%) and medical necessity not met (10%).

Conclusion: The use of prior authorization to approve elective THA and TKA leads to delays in surgical waiting times and generates a high administrative burden for surgeons and their staff. With over 99 percent of cases ultimately approved, payers and policymakers should exempt practices with a low denial rate in order to reduce administrative work and allow patients access to timely arthroplasty care.

Notes

Paper #52

Risk vs. Reward: Hospitals Incentivized More Than Surgeons to Care for Riskier Arthroplasty Patients

Jack M. Haglin, MD, Joseph C. Brinkman, MD, Zachary K. Christopher, MD, David G. Deckey, MD, Joshua S. Bingham, MD

Introduction: The purpose of this study was to assess the relationship between risk and reimbursement for both surgeons and hospitals among Medicare patients undergoing primary TJA.

Methods: The "2021-Medicare-Physician-and-Other-Provider" and "2021-Medicare-Inpatient-Hospitals" files were utilized. Patient comorbidity profiles were collected, including the mean patient-hierarchal-condition-category (HCC) risk score, which is a standardized metric accounting for comorbidities. Surgeon data included all primary TJA procedures (inpatient + outpatient) billed to Medicare in 2021, while hospital data included all inpatient episodes of primary TJA billed to Medicare in 2021. Surgeon and hospital reimbursement were collected. All episodes were split into a "sicker-cohort" with HCC risk score of 1.5 or greater, and a "healthier-cohort" with HCC risk scores less than 1.5. Variables were compared across cohorts.

Results: In 2021, 386,355 primary THA and TKA procedures were billed to Medicare and were included. The mean surgeon reimbursement among the sicker cohort was $1,021.91, which was less than for the healthier cohort of $1,060.13 ($p< 0.001$). Meanwhile, for the hospital analysis, 112,012 Medicare patients were admitted as an inpatient for primary TJA in 2021 and included. The mean reimbursement to hospitals was significantly greater for the sicker cohort at $13,950.66, compared to the healthier cohort of $8,430.46. For both the surgeon and hospital analysis, the sicker patient cohorts had a significantly higher rate of all comorbidities assessed ($p< 0.001$).

Conclusion: This study demonstrates that mean surgeon reimbursement was lower for primary TJA among sicker patients in comparison to their healthier counterparts, while hospital reimbursement was higher for sicker patients. This represents a discrepancy in the incentivization of care for complex patients, as hospitals receive increased renumeration for taking on extra risk, while surgeons get paid less on average for performing TJA on sicker patients. Such data should inform future policy to assure continued access to arthroplasty care among complex patients.

Notes

Paper #53

Patient "No-Show" Increases Risk of 90-Day Complications Following Primary Total Hip Arthroplasty

Jeffrey S. Mun, BA, Matthew W. Parry, MD, Alex Tang, MD, Jesse J. Manikowski, MS, Cory Crinella, PA-C, John Mercuri, MD

Introduction: Patients who "no-show" (NS) to clinical appointments are at a higher risk of adverse health outcomes. The objective of this study was to evaluate and characterize the relationship between patients' number of NS prior to primary THA and 90-day complication risk after THA.

Methods: We retrospectively reviewed 4,147 consecutive patients undergoing primary THA. Patients were divided based on whether they NS at least one appointment vs. always attended (AA) appointments. We defined an NS as a clinical appointment that was not rescheduled or canceled ≤2 hours before the appointment in which the patient did not show. Information collected included total number of follow-up appointments, patient demographics, comorbidities and 90-day post-operative complications. Regression analyses were run to identify relationships between NS status and postoperative outcomes, as well as factors that would predict NS status.

Results: Patients who NS appointments pre-operatively had a greater rate of experiencing a post-operative complication than those who AA appointments (25.7% vs. 20.5%, p< 0.0001). Moreover, compared to AA patients, NS patients had an increased odds of having any post-operative complication [Odds Ratio (OR):1.27, p=0.0005], specifically for an anemia-related complication (OR:1.34, p=0.0004). Patients with greater odds to miss clinical appointments were < 65-years-old (OR:1.50, p< 0.0001), current smokers (OR:1.88, p< 0.0001), African American (OR:1.99, p=0.021), female (OR 1.17, p=0.03), had a BMI >30 (OR:1.26, p=0.022), had a Charleston Comorbidity Index (CCI) >3 (OR:4.35, p< 0.001), and/or had private insurance (OR:1.34, p=0.01).

Conclusion: There was an increased risk for complications, specifically anemia-related complications, in THA patients who NS pre-operatively. Age, insurance status, smoking status, race, BMI, gender and CCI were associated with higher odds of not attending a scheduled clinical appointment. The results suggest orthopaedic surgeons should consider NS data to preemptively assess risk for post-operative complications following THA.

Notes

Paper #54

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

Ellen L. Tsay, MD, Kelechi Nwachuku, MD, Preetinder Bhullar, MD, Brandon J. Kelly, MD, Derek Ward, MD, Jeff Barry, MD

Introduction: In this age of value-based care and bundled payment options, there is concern over the inherent systemic pressure to preferentially provide care to healthier, less-risky patients. This study examines whether "lemon-dropped" primary hip and knee total joint arthroplasty (pTJA) patients, or patients passed over and referred to tertiary care centers equipped for higher-level medical/surgical complexity, have worse outcomes and increased costs.

Methods: This is a retrospective cohort study of all pTJAs performed at a single tertiary care center in 2022. Bilaterals, acute fractures, oncologic cases and conversion hips were excluded. Patients were classified as simple (self, standard or internal referral) or complex (referred by outside provider to a higher level of care, specifically due to surgical and/or medical complexity). Ninety-day outcomes were assessed via EMR review and analyzed via Fisher's exact tests and unpaired Welch's t-tests.

Results: 641 pTJAs (322 hips, 319 knees) met inclusion criteria: 65 complex, 576 simple. The complex group had greater proportions of racial minority patients (42% vs. 31%, $p< 0.001$) and non-primary osteoarthritis diagnoses (59% vs. 12%, $p< 0.001$). Complex patients were more likely to have 90-day ED visits (OR 2.15, $p=0.04$), 90-day complications (OR 2.79, $p< 0.001$) and require placement (OR 2.65, $p=0.005$). Complex cases had higher mean relative implant costs (1.31x, $p< 0.001$), in-room time (181 vs. 158 min, $p< 0.001$), surgery length (125 vs. 106 min, $p< 0.001$) and LOS (3.2 vs. 1.7 days, $p=0.006$).

Conclusion: Primary arthroplasty patients "lemon-dropped" to a tertiary care center have worse early clinical outcomes and higher health care utilization. This is true despite a control group that includes patients complex enough to utilize a tertiary care center as their primary medical home. Reimbursement models need to account for risk and cost differences amongst primary arthroplasty patients, particularly those refused by other practices owing to complexity and which do not meet "cherry-picker" criteria.

Notes

Paper #55

Patient Demographic Factors Affect Response Rates to PROMs for THA Patients

Yixuan Tong, MD, Vinaya Rajahraman, BS, Rajan K. Gupta, BA, Casey Cardillo, BS, Hayley Raymond, BS, Roy I. Davidovitch, MD, Ran Schwarzkopf, MD, MSc, Joshua C. Rozell, MD

Introduction: The Hip Disability and Osteoarthritis Outcome Score (HOOS JR) is a widely used patient-reported outcomes questionnaire for THA. However, as not all patients complete HOOS JR, a subset of the THA population may be underrepresented. This study aims to investigate the association between patient demographic factors and HOOS JR response rates.

Methods: This was a retrospective cohort study of adult, English-speaking patients who underwent primary THA by a fellowship-trained arthroplasty surgeon between 2017 and 2023 at a single, high-volume academic institution. HOOS JR completion status—complete or incomplete—was recorded for each patient within 90 days from surgery. Standard statistical analyses were performed to assess completion against multiple patient demographic factors.

Results: Of the 2,908 total patients, 2,112 (72.6%) had complete and 796 (27.4%) incomplete HOOS JR questionnaires. Multivariate analysis yielded statistical significance ($P < 0.05$) for distribution of patient age, race, insurance, marital status and income quartile with respect to questionnaire completion. There was no significance for patient sex or religion. Specifically, when compared to the overall completion rate, completion rates were significantly higher (all $P < 0.001$) for patients ages 60 to 79 (75.4%), who identified as white (76.7%), had Medicare insurance (81.4%), were married (78.3%) and were in the highest income quartile (76.2%). Conversely, failure to complete HOOS JR (all $P < 0.001$) was associated with patients ages 18 to 39 (59.8%), who identified as black (36.4%) or "other" race (39.6%), were never married (38%) and were in the lower half income quartiles (43.9%, 35.9%) when compared to overall incomplete rate.

Conclusion: Multiple patient demographic factors may affect HOOS JR response rate. Overall, our analyses suggest that older patients who identify as white and are of higher socioeconomic status are more likely to participate in the questionnaire. Efforts should focus on capturing those patient groups less likely to participate.

Notes

Paper #56

Stagnant Physician Reimbursement As Hospital Reimbursement Increases for Total Knee Arthroplasty

Gloria Coden, MD, John Mazzocco, MD, David A. Mattingly, MD

Introduction: As inflation, new technology and rising costs continue to strain health care in the United States, it is important to understand the trends in insurance reimbursement. We sought to evaluate commercial insurance reimbursement for patients undergoing inpatient primary TKA based on technology utilized and over time.

Methods: We retrospectively reviewed a commercial claims database for 76,329 inpatient primary TKAs performed with cemented or uncemented components between 1/1/2016 and 12/31/2021. All patients had private commercial insurance and procedure codes for both the hospital and physician were present. Records were reviewed for technology used and financial reimbursement, without adjusting for inflation. Independent-samples T-test and analysis of variance were performed.

Results: Hospital reimbursement increased from $26,202.44 per TKA in 2016 to $28,918.66 in 2021 ($p< 0.001$). Physician reimbursement remained similar, from $2,263.98 per TKA in 2016 to $2,251.22 in 2021 ($p=0.2$). These trends persisted when evaluating patients with length of stay of only 1 day (hospital reimbursement $25,207.65 to $28,291.10, $p< 0.001$, physician reimbursement $2,368.25 to $2,279.70, $p=0.1$). Cemented TKA was associated with increased hospital reimbursement compared to uncemented TKA ($27,520.38 vs. $26,210.07, $p< 0.001$), but similar physician reimbursement ($2,312.53 vs. $2,300.86, $p=0.7$). Robotic cemented TKA had the higher hospital reimbursement ($29,761.23) than manual cemented TKA ($27,259.62), manual uncemented ($26,105.73) and robotic uncemented ($26,481.39, $p< 0.001$). Robotic cemented TKA had the higher physician reimbursement ($2,434.24) than manual cemented TKA ($2,298.37), manual uncemented ($2,263.76), and robotic uncemented ($2,397.32, $p< 0.001$).

Conclusion: Physician reimbursement has remained similar for primary TKA from 2016 to 2021, despite hospital reimbursement increasing independent of length of stay and inflation increasing the cost of living over this time. We believe that physician reimbursement should increase each year to reflect the increased cost of living caused by inflation. In addition, robotic cemented primary TKA provides the highest reimbursement for both hospitals and physicians.

Notes

Paper #57

Predicting Perioperative ED Visit, Readmission and Costs of Revision Total Joint Arthroplasty

Michael P. Murphy, MD, Amir Boubekri, MD, Nicholas M. Brown, MD

Introduction: Revision THA and TKA are complex procedures that impose a significant burden on hospital resources. This study evaluated factors associated with perioperative costs including emergency department (ED) visits, readmission and total cost-of-care within 90 days following revision surgery.

Methods: A total of 1,005 revision TKAs and THAs were identified among 839 subjects between January 2007 and December 2019. Cost data was available from January 2015 to December 2019, with 418 cases and 350 subjects having cost data available. Patient factors including comorbidities, demographic information and pre-operative ASA score were collected. Mixed effects univariable and multivariable linear regression models were used to investigate the association of preoperative factors with post-operative 90-day ED visit, 90-day readmission and hospital cost-of-care.

Results: Among revision TKA and THAs, 101 had ED admissions while 241 required in-person readmissions. Higher odds of 90-day ED readmission were associated with liver disease [OR: 1.91 (1.03 to 3.54), p=0.041], while BMI was not associated. With univariate analysis, BMI>40 showed increased odds of in-person readmission [OR: 1.66 (1.12 to 2.44), p=0.011]. However, this association between BMI and in-person readmission lost significance with multivariate analysis. Revision THA, compared to revision TKA, showed decreased odds and COPD showed increased odds of 90-day in-person readmission [OR: 0.48 (0.34 to 0.66), p< 0.001 and 1.53 (1.07 to 2.20) p=0.020, respectively]. With univariate analysis, increased BMI was associated with increased cost (p=0.046). Multivariate analysis revealed lower cost-of-care for THA revisions and increased cost for those with kidney disease [mean (standard-error): -$6,050.5 ($971.3), p< 0.001 and $2,697.3 ($1,335), p=0.049].

Conclusion: Revision THA and TKA presents a current challenge in health care with elevated costs, resources and the majority of cases an overall loss of hospital revenue. This study highlights the importance of considering select patient factors in patient management and resource allocation.

Notes

Symposium VIII

Advanced Concepts in Outpatient Total Joint Arthroplasty

Moderator: William G. Hamilton, MD
Faculty: Michael P. Ast, MD, Charles A. DeCook, MD, Craig J. Della Valle, MD, Robert A. Sershon, MD

This symposium will provide members with the latest practice patterns and perioperative management for outpatient TJA. Audience members will leave with a high-level understanding of the growing body of data supporting outpatient replacement, discover avenues to improve optimization of perioperative processes at standalone surgery centers and learn about expanding indications for patients and procedures in the outpatient setting.

Learning Objectives:

1. Understand the current data supporting outpatient TJA practice patterns.
2. Learn about the most recent evidence supporting outpatient patient selection criteria and how to choose the most appropriate operative setting for each patient.
3. Learn about case selection and planning for revision outpatient TJA.
4. Learn the key metrics and action items to achieve OR efficiency.

Outline:

Introduction
William G. Hamilton, MD

Outpatient TJA: What Does the Data Tell Us?
Craig J. Della Valle, MD

Outpatient TJA in the Historically "Unhealthy": Is It Safe?
Robert A. Sershon, MD

Revision Outpatient TJA: Who, Where, How and When?
Michael P. Ast, MD

Achieving Efficiency in the Outpatient Arena: It's About Time
Charles A. DeCook, MD

Discussion
All Faculty

Notes

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