

AAHKS

2017 ANNUAL MEETING

November 2-5 | Dallas, Texas

2017

FINAL PROGRAM



AAHKS

2018 SPRING MEETING

MAY 4 – 5, 2018 • MIAMI, FLORIDA, USA

SAVE THE DATE

The InterContinental Miami

- Case-based learning
- Small-group setting
- Peer-to-peer education
- Expert faculty

Visit www.AAHKS.org
for meeting details



On the Cover: Porcelain Vase, Hilton Anatole Art Collection



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Leadership

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Education

EDUCATIONAL ACTIVITY SCOPE

The 2017 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 disease.

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 healthcare policy



The American Society of Regional Anesthesia (ASRA) takes part in a co-branded symposium, “Managing the Opioid Epidemic: The Role of the Orthopaedic Surgeon and Anesthesiologist” on Saturday, November 4, 2017.



ACCREDITATION AND CREDIT DESIGNATION

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.

The American Association of Hip and Knee Surgeons (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.

DISCLAIMER

The material presented at this Annual Meeting has been made available by AAHKS for educational purposes only. This material is not intended to represent the only, nor necessarily the best methods or procedures appropriate for the medical situations discussed; but rather, is intended to present an approach, view, statement or opinion of the faculty, which may be helpful to others who face similar situations. AAHKS disclaims any and all liability for injury or other damages resulting to any individual attending a course and for all claims, which may arise out of the use of the techniques, demonstrated there in by such individuals, whether these claims shall be asserted by a physician or any other person.

CONTENT AGREEMENT

By attending in 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, 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 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.

Education

DISCLOSURE

Each participant in the Annual Meeting has been asked to disclose if he or she has received something of value from a commercial company or institution, which relates directly or indirectly to the subject of their presentation. These are the disclosure categories:

- Nothing to disclose
- Royalties from a company or supplier
- Speakers bureau/paid presentations for a company or supplier
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- Medical/Orthopaedic publications editorial/governing board
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An indication of the participant's disclosure appears after his or her name as well as the commercial company or institution that provided the support. 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. A complete list of disclosures can be found at www.AAHKS.org/Meeting.

Educational Grants

AAHKS wishes to thank

DePuy Synthes
Smith & Nephew
Stryker

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for their generous educational grants that make the Annual Meeting possible.

Schedule

Wednesday, November 1, 2017

10:00 a.m.–5:00 p.m.	Exhibit Set-Up	Exhibit Hall/ Learning Center
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Thursday, November 2, 2017

6:30 a.m.–8:00 p.m.	Registration	Peacock Foyer
10:00 a.m.–5:00 p.m.	Exhibit Set-Up	Exhibit Hall/ Learning Center
1:00–5:00 p.m.	Poster Set-Up	Exhibit Hall/ Learning Center

Industry Symposia

Industry sponsored events are separate from the official program planned by the AAHKS Annual Meeting Program Committee and DO NOT offer AMA PRA Category 1 Credit™, unless noted.

7:30–9:30 a.m.	Hip Fracture: Pain Management Impacting Delirium, Morbidity, and Mortality <i>Halyard Health</i>	Grand Ballroom E
10:00 a.m.–12:00 p.m.	An Evidence-Based Update on Closed Incision Negative Pressure Therapy for High-Risk Surgical Incision <i>Acelity</i>	Grand Ballroom B
10:00 a.m.–12:00 p.m.	Site of Service and Trends in Total Joint Commercial Bundles <i>Surgical Care Affiliates</i>	Grand Ballroom E
12:30–2:30 p.m.	Enhancing Patient Care and Surgeon Quality of Life through Industry Partnerships: The Era of Value-Driven Decisions <i>DJO Global</i>	Grand Ballroom D
12:30–2:30 p.m.	Optimizing the Episode: Improving Total Joint Outcomes and Cost in the Era of Bundled Payments <i>Medtronic</i>	Grand Ballroom E
3:00–5:00 p.m.	Change the Face of the Opioid Landscape One Patient at a Time with Multimodal Treatment Approach <i>DePuy Synthes/Pacira Pharmaceuticals</i>	Grand Ballroom B
3:00–5:00 p.m.	Same-Day Surgery: Transitioning to Outpatient Total Joints <i>Medtronic</i>	Grand Ballroom E
3:00–5:00 p.m.	From Theory to Reality: Successfully Delivering Value-Based TJA in a Non-Hospital Setting <i>Muve Health</i>	Grand Ballroom A
3:00–5:00 p.m.	How to Fix the US Health Care System: The Value Agenda from Different Perspectives <i>Stryker</i>	Grand Ballroom D
4:00–5:30 p.m.	International Reception (invitation only) Co-Hosted by AAHKS, the Colombian Orthopaedic and Traumatology Society and The European Hip Society	Topaz Room
5:00–7:00 p.m.	AAHKS Board of Directors Meeting (invitation only)	Wedgwood Ballroom
7:00–7:15 p.m.	FARE Board of Directors Meeting (invitation only)	Wedgwood Ballroom

Schedule

Friday, November 3, 2017

6:00 a.m.–7:30 p.m.	Registration	Peacock Foyer
6:00–8:00 a.m.	Breakfast for All Attendees	Exhibit Hall/ Learning Center
6:00 a.m.–2:55 p.m.	AAHKS and Guest Society Poster Exhibition Thank you, Corporate Partner Stryker	Exhibit Hall Learning Center
6:00 a.m.–2:55 p.m.	Exhibit Hall/Learning Center Open	Exhibit Hall/ Learning Center
6:00 a.m.–9:00 p.m.	Surgical Technique Video Viewing	Rotunda
7:00 a.m.–2:30 p.m.	Orthopaedic Team Member Course Co-Chair: Jason M. Hurst, MD Co-Chair: James A. Browne, MD	Cortez
7:00 a.m.–2:30 p.m.	The Business of Total Joint Replacement: Surviving and Thriving Co-Chair: Jay R. Lieberman, MD Co-Chair: William A. Jiranek, MD, FACS	Wedgwood Ballroom
7:00 a.m.–2:30 p.m.	AAHKS Resident Course Thank you, Corporate Partners DePuy Synthes and Stryker Chair: Gregory G. Polkowski II, MD, MSc Co-Chair: Samuel S. Wellman, MD	Senators Lecture Hall

Industry Symposia

7:30–9:30 a.m.	Why 3D Weightbearing Planning from EOS Images can Drive Better Clinical Outcomes in THA <i>EOS Imaging</i>	Grand Ballroom A
7:30–9:30 a.m.	Novel Non-Opioid Techniques for Chronic Knee and Hip Pain for Non-Operative Patients <i>Halyard Health</i>	Grand Ballroom E
7:30–9:30 a.m.	Tackling Your Toughest Cases in the Changing Healthcare Landscape <i>MicroPort</i>	Grand Ballroom D
10:00 a.m.–12:00 p.m.	Outpatient Total Joint Arthroplasty: Economics, Protocols, and Challenges <i>Corentec</i>	Grand Ballroom A
10:00 a.m.–12:00 p.m.	Technology Advancements in Anterior Approach <i>DePuy Synthes Hip</i>	Grand Ballroom B
10:00 a.m.–12:00 p.m.	Closing the Gap on Patient Satisfaction: Hand-Held Robotic Assisted Knee Solutions <i>Smith & Nephew Orthopaedics</i>	Grand Ballroom E
10:00 a.m.–12:00 p.m.	Mako Total Knee: Live Robotic-Arm Assisted Surgery <i>Stryker</i>	Metropolitan Ballroom Mezzanine Level
9:45–11:30 a.m.	Resident Course Breakouts	
	Life after Residency: Choosing a Practice	Opal
	Revision TKA	Coral
	Revision THA	Emerald
	FAI, DDH, and Hip Preservation	Governors
	Principles of Primary TKA	Sapphire
	Principles of Primary THA	Topaz

11:00 a.m. – 1:00 p.m.	Lunch for All Attendees	Exhibit Hall/ Learning Center
12:00 – 12:45 p.m.	Reception to Honor Senator John Barrasso, MD (RSVP required)	Room TBD
12:45 – 2:00 p.m.	Ask the Experts Case Sessions <i>Thank you, Corporate Partner United Surgical Partners</i>	Grand/Chantilly Ballrooms
	Primary Hip Panelists: William J. Hozack, MD; Thomas K. Fehring, MD; Adolph V. Lombardi Jr., MD; Daniel J. Berry, MD; Rafael Perez, MD	
	Primary Knee Panelists: Trevor G. Murray, MD; Scott M. Sporer, MD; Kirby D. Hitt, MD; Cesar Rocha, MD	
	Revision Hip Panelists: David G. Lewallen, MD; Wayne G. Paprosky, MD; John J. Callaghan, MD; Craig J. Della Valle, MD	
	Revision Knee Panelists: Bryan D. Springer, MD; Javad Parvizi, MD; Robert M. Molloy, MD; Raymond H. Kim, MD	
	Joint Preservation Panelists: Christopher L. Peters, MD; Stephen T. Duncan, MD; Cecilia Pascual-Garrido, MD; Joel E. Wells, MD	
12:45 – 2:30 p.m.	Resident Course Breakouts	
	Life after Residency: Choosing a Practice	Opal
	Revision TKA	Coral
	Revision THA	Emerald
	FAI, DDH, and Hip Preservation	Governors
	Principles of Primary TKA	Sapphire
	Principles of Primary THA	Topaz
2:30 – 2:55 p.m.	Break	Exhibit Hall/ Learning Center
2:55 p.m.	President's Welcome to the 2017 AAHKS Annual Meeting Mark I. Froimson, MD, MBA	Trinity Ballroom
3:00 – 3:15 p.m.	Advocacy Address by US Senator John Barrasso, MD	Trinity Ballroom
3:15 – 4:23 p.m.	Session One: Complications Moderators: R. Michael Meneghini, MD and Jay R. Lieberman, MD	
3:15 p.m.	Paper #1 Mobile Patient Engagement Platforms May Help Reduce 30-Day Readmission Rates in Arthroplasty Patients	Stefano A. Bini, MD San Francisco, California
3:21 p.m.	Paper #2 Low-Dose Aspirin is as Safe and Effective a Prophylaxis as High-Dose Aspirin for Venous Thromboembolism after Total Hip Arthroplasty	Mhamad Faour, MD Cleveland, Ohio
3:27 p.m.	Paper #3 Tranexamic Acid in Total Joint Arthroplasty: Safe and Effective for All Patients?	Yale A. Fillingham, MD Chicago, Illinois
3:33 p.m.	Paper #4 Complications and Mortality Following Total Hip Arthroplasty in Octogenarians: An Analysis of a National Database	Anthony J. Boniello, MD Philadelphia, Pennsylvania

Schedule

Friday, November 3, 2017

3:39 p.m.	Discussion	
3:49 p.m.	Paper #5 Race, Medicaid Insurance, BMI and Female Gender Correlated with Consistently Lower HOOS JR Scores	Kwesi St. Louis, MD Pittsburgh, Pennsylvania
3:55 p.m.	Paper #6 Press Ganey Patient Satisfaction Scores do not Correlate with Patient Reported Outcomes after Joint Replacement	Jeremy M. Gililland, MD Salt Lake City, Utah
4:01 p.m.	Paper #7 Psychological Factors Associated with Failure to Complete a Short-Stay Total Hip Arthroplasty Protocol	Adam I. Edelstein, MD Chicago, Illinois
4:07 p.m.	Paper #8 Treated vs. Un-Treated Depression in Total Joint Arthroplasty Impacts Outcomes	Christopher E. Pelt, MD Salt Lake City, Utah
4:13 p.m.	Discussion	
4:23–4:25 p.m.	Guest Society Recognition Colombian Orthopaedic and Traumatology Society and European Hip Society	Presented by Mark I. Froimson, MD, MBA and Stefano A. Bini, MD
4:25–5:25 p.m.	Symposium I Through the Looking Glass: What Does the Future Hold for Arthroplasty?	Moderator and Introduction: Mark I. Froimson, MD, MBA
	Telehealth From Video Visits to Holograms, from Virtual ICUs to Patient Engagement Platforms: Tele-Orthopaedics is Going to Change Where and How We Deliver Care	Jonathan L. Schaffer, MD, MBA
	3D Printing From Printing Prosthetics to Bioscaffolds, from Printing Instruments to Living Tissue: What Can We Print Now That We Could Only Dream of Building Before? The 3D Revolution is Here	Kenneth B. Trauner, MD
	Robotics and Automation From Robotic-Assisted Surgery to Humanoid Cyborgs: Providing Empathetic Care, from Neurally-Activated Prosthetics to Futuristic Exoskeletons: Was Huxley Right?	Brian S. Parsley, MD
	Artificial Intelligence and Machine Learning From Decision Support to Deep Neural Networks, from Predictive Analytics to Learning Algorithms: What Does Watson Have in Store for Us?	Stefano A. Bini, MD
	Discussion	Mark I. Froimson, MD, MBA
5:25–5:29 p.m.	AAHKS Humanitarian Award	Presented by Brian S. Parsley, MD

5:29–6:29 p.m.	Symposium II Lessons Learned from Effective Models of Joint Replacement Care in the United States	Moderator and Introduction: Christopher L. Peters, MD
	Focusing on Value in an Academic Environment: The Utah Experience	Christopher E. Pelt, MD
	Maximizing Physician-Hospital Alignment: The Rothman Experience	William J. Hozack, MD
	Outpatient-Focused Joint Replacement is the Future: The Midwest Center for Joint Replacement Experience	Michael E. Berend, MD
	Joint Replacement in a Capitated Single-Payer System: The Kaiser Experience	Monti Khatod, MD
	Discussion	Christopher L. Peters, MD
6:30–7:30 p.m.	Poster Reception for All Attendees	Exhibit Hall/ Learning Center
6:30–7:30 p.m.	Exhibit Hall/Learning Center and Poster Exhibition Open	

Saturday, November 4, 2017

6:00 a.m.	5K Fun Run & 1-Mile Walk Benefitting FARE Thank you sponsor, ConforMIS	Trinity Strand Trail – Start on Wycliff Ave. between the Anatole and Hilton Garden Inn
6:00 a.m.–7:30 p.m.	Registration	Peacock Foyer
6:00–7:00 a.m.	Breakfast	Exhibit Hall/ Learning Center
6:00–7:00 a.m.	Committee Informal Meetings	Exhibit Hall/ Learning Center
6:00 a.m.–7:30 p.m.	Exhibit Hall/Learning Center Open	
6:00 a.m.–7:30 p.m.	AAHKS and Guest Society Poster Exhibition Thank you, Corporate Partner Stryker	Exhibit Hall/ Learning Center
6:55–7:00 a.m.	Program Chair Welcome Robert M. Molloy, MD	Trinity Ballroom
7:00–7:56 a.m.	Session Two: Primary Total Hip Arthroplasty Moderators: Scott M. Sporer, MD and Douglas A. Dennis, MD	
7:00 a.m.	Paper #9 THA Patients with Fixed Spinopelvic Alignment from Standing to Sitting at Higher Risk of Hip Dislocation	David J. Mayman, MD New York, New York
7:06 a.m.	Paper #10 Lumbar Fusion Involving the Sacrum Increases Dislocation Risk Eight-Fold in Total Hip Arthroplasty	Kevin I. Perry, MD Rochester, Minnesota
7:12 a.m.	Paper #11 Short-Term Complication Rates Following Outpatient Total Hip Replacement Equivalent or Better than Those of Inpatient Total Hip Replacement with the Implementation of Institutional Protocols	Mitchell C. Weiser, MD New York, New York
7:18 a.m.	Discussion	
7:28 a.m.	Paper #12 Home Health Services are not Required Following Total Hip Arthroplasty	Roy I. Davidovitch, MD New York, New York

Schedule

Saturday, November 4, 2017

7:34 a.m.	Paper #13 Pre-Operative Opioid Use Independently Predicts Increased Risk of Early Revision of THA	Nicholas A. Bedard, MD Iowa City, Iowa
7:40 a.m.	Paper #14 When do Patient Reported Outcome Scores Peak After Primary Unilateral TKR and THR?	David C. Ayers, MD Worcester, Massachusetts
7:46 a.m.	Discussion	
7:56–8:56 a.m.	Symposium III Prevention and Treatment of Instability Following THA: A Case-Based Symposium	Moderator: Fares S. Haddad, MD
	Prevention of Dislocation Following THA	Fares S. Haddad, MD
	Investigation of the Unstable THA	R. Michael Meneghini, MD
	Dual Mobility in THA	Matthew P. Abdel, MD
	Constrained Liners	Stephen A. Jones, MD
	Discussion	Fares S. Haddad, MD
8:56–9:52 a.m.	Session Three: Infection Moderators: Bryan D. Springer, MD and Craig J. Della Valle, MD	
8:56 a.m.	Paper #15 A Decade of Protocol Developments for SSI Prevention: Intraoperative Betadine Irrigation Prevails	Matthew S. Austin, MD Philadelphia, Pennsylvania
9:02 a.m.	Paper #16 Dual-Agent Antibiotic Prophylaxis Using Single Dose Vancomycin Effectively Reduces Prosthetic Joint Infection Rates with Minimal Renal Toxicity Risk	John R. Burger, DO Columbia, Missouri
9:08 a.m.	Paper #17 Reduction of Total and Viable Particles in the OR Setting by Using Ultraviolet In-Room Air Disinfection and Recirculation Units	Gannon L. Curtis, MD Cleveland, Ohio
9:14 a.m.	Discussion	
9:24 a.m.	Paper #18 Reconsidering the Strategies to Manage Chronic Periprosthetic Total Knee Infections: Using Decision Analytics to Find the Optimal Strategy between One-Stage and Two-Stage Total Knee Revision	Karan Srivastava, MD, MBA Detroit, Michigan
9:30 a.m.	Paper #19 Extended Oral Antibiotic Prophylaxis in High Risk Patients Substantially Reduces Primary Total Hip and Knee Arthroplasty 90-Day Infection Rate	R. Michael Meneghini, MD Indianapolis, Indiana
9:36 a.m.	Paper #20 What is the Optimal Criteria to use for Detecting Prosthetic Joint Infections in Total Joint Arthroplasty?	Preetesh D. Patel, MD Weston, Florida
9:42 a.m.	Discussion	
9:52–10:07 a.m.	Break	Exhibit Hall/ Learning Center

10:07–11:03 a.m.	Session Four: Health Policy Moderators: Richard Iorio, MD and Kevin J. Bozic, MD, MBA	
10:07 a.m.	Paper #21 90-Day Costs, Reoperations and Readmissions for Primary Total Knee Arthroplasty Patients of Varying BMI Levels	Edward M. Vasarhelyi, MD MSc, FRCSC London, ON, Canada
10:13 a.m.	Paper #22 Cost-Effectiveness of Total Knee Arthroplasty vs. Nonoperative Management in Non-Obese, Overweight, Obese, Severely-Obese, Morbidly-Obese and Super-Obese Patients	Karthikeyan E. Ponnusamy, MD London, ON, Canada
10:19 a.m.	Paper #23 Are Medicare's Comprehensive Care for Joint Replacement Bundled Payments Stratifying Risk Adequately?	Mark A. Cairns, MD, MS Durham, North Carolina
10:25 a.m.	Discussion	
10:35 a.m.	Paper #24 No Optimal Antibiotic-Free Period Prior to Reimplantation for Periprosthetic Joint Infection	Timothy L. Tan, MD Philadelphia, Pennsylvania
10:41 a.m.	Paper #25 Should Medicare Remove Total Knee Arthroplasty from Its Inpatient Only List? A Total Knee Replacement Is Not a Partial Knee Replacement	P. Maxwell Courtney, MD Chicago, Illinois
10:47 a.m.	Paper #26 A Comparison of Relative Value Units in Primary vs. Revision Total Knee Arthroplasty: Which Provides the Better Bang for Your Buck?	Michael A. Mont, MD Cleveland, Ohio
10:53 a.m.	Discussion	
11:03–11:45 a.m.	Keynote Address	
11:45 a.m.–12:45 p.m.	Lunch for All Attendees	Exhibit Hall/ Learning Center
12:45–1:41 p.m.	Session Five: Revision Total Hip and Knee Arthroplasty Moderators: William A. Jiranek, MD, FACS and Ryan M. Nunley, MD	
12:45 p.m.	Paper #27 Fretting Corrosion and Polyethylene Damage Mechanisms in Modular Dual Mobility Total Hip Arthroplasty	Hannah Spece, BS Philadelphia, Pennsylvania
12:51 p.m.	Paper #28 What is the Impact of Smoking on Revision Total Hip Arthroplasty?	John J. Callaghan, MD Iowa City, Iowa
12:57 p.m.	Paper #29 High Rate of Failure Following Revision of a Constrained Liner	Michael D. Hellman, MD St. Louis, Missouri
1:03 p.m.	Discussion	
1:13 p.m.	Paper #30 Revision Total Knee Replacement for Arthrofibrosis	John R. Martin, MD Weddington North Carolina
1:19 p.m.	Paper #31 Revision of UKA to TKA: Is it as Good as a Primary Result?	Adolph V. Lombardi Jr. MD, FACS New Albany, Ohio
1:25 p.m.	Paper #32 Extensor Mechanism Reconstruction with Synthetic Mesh: Large Series of 77 Total Knee Arthroplasties	Matthew P. Abdel, MD Rochester, Minnesota
1:31 p.m.	Discussion	

Schedule

Saturday, November 4, 2017

1:41–1:51 p.m.	AAHKS Health Policy Fellow Reports	Chancellor F. Gray, MD Roshan P. Shah, MD, JD Juan C. Suarez, MD
1:51–2:00 p.m.	AAHKS Presidential Award	Presented by Mark I. Froimson, MD, MBA
2:00–2:45 p.m.	Symposium IV Practice Management Strategies of AAHKS Members	Moderator: Jay R. Lieberman, MD
2:45–2:51 p.m.	American Joint Replacement Registry Update	Daniel J. Berry, MD
2:51–3:19 p.m.	AAHKS Award Papers	
2:51 p.m.	The James A. Rand Young Investigator's Award Battling the Opioid Epidemic with Prospective Pain Threshold Measurement Brian T. Nickel, MD, Durham, North Carolina	Presented by James A. Rand, MD
2:57 p.m.	Discussion	
3:02 p.m.	The Lawrence D. Dorr Surgical Techniques & Technologies Award "Running Two Rooms" Does Not Compromise Outcomes or Patient Safety in Total Joint Arthroplasty William G. Hamilton, MD, Alexandria, Virginia	Presented by Lawrence D. Dorr, MD
3:08 p.m.	Discussion	
3:13 p.m.	The AAHKS Clinical Research Award Intraosseous Regional Prophylaxis Provides Higher Tissue Concentrations in High BMI Patients in Total Knee Arthroplasty: A Randomized Trial Simon W. Young, MBChB FRCS, Auckland, New Zealand	Presented by William A. Jiranek, MD, FACS
3:19 p.m.	Discussion	
3:24–3:38 p.m.	Break	Exhibit Hall/ Learning Center
3:38–4:38 p.m.	Symposium V Managing the Opioid Epidemic: The Role of the Orthopaedic Surgeon and Anesthesiologist <i>AAHKS and the American Society of Regional Anesthesia and Pain Medicine</i>	Moderator: William A. Jiranek, MD, FACS
	Predictive Factors of TKA Patients to Develop Chronic Pain	Asokumar Buvanendran, MD
	The Role of the Orthopedic surgeon for Opioid Reduction in the Hospital and Post-Acute	Lawrence D. Dorr, MD
	Blocks vs. Local Anesthetic Injections for Hip and Knee Arthroplasty?	Mark J. Spangehl, MD
	Managing Prolonged Pain after TJA: Examining the Role of Opioids	Eugene Viscusi, MD
	Discussion	William A. Jiranek, MD, FACS
4:38–5:34 p.m.	Session Six: Primary Knee Moderators: Gregory G. Polkowski, MD and Matthew S. Austin, MD	

4:38 p.m.	Paper #33 Does a Balanced TKA Produce a More Forgotten Joint?	Thomas L. Bradbury, MD Atlanta, Georgia
4:44 p.m.	Paper #34 Cell Count and Differential of Aspirated Fluid in Immunosuppressed Patients in the Diagnosis of Total Knee Arthroplasty Prosthetic Joint Infections: A Case Series	David W. Fitz, MD Chicago, Illinois
4:50 p.m.	Paper #35 A Computer Model of Mid-Flexion Instability in Balanced Cruciate Retaining or Posterior Stabilized Total Knee Arthroplasty	Ran Schwarzkopf, MD, MSc New York, New York
5:06 p.m.	Paper #36 Total Knee Arthroplasty in the Osteoporotic Tibia: A Biomechanical Evaluation of the Role of Stem Extensions and Cementing Techniques	Christopher P. Walsh, MD Houston, Texas
5:12 p.m.	Paper #37 High Rate of Early Revision Following Custom Made Unicondylar Knee Replacement	Carl Talmo, MD Boston, Massachusetts
5:18 p.m.	Paper #38 Results of Cemented vs. Cementless Primary Total Knee Arthroplasty Using the Same Implant Design	Anthony W. Feher, MD Indianapolis, Indiana
5:24 p.m.	Discussion	
5:34–6:30 p.m.	Symposium VI Choices, Compromises, and Controversies in Total Knee Arthroplasty	Moderator and Introduction: Adolph V. Lombardi Jr., MD, FACS
	My Approach to Metal Sensitive Patient: Ignore It	Mark W. Pagnano, MD
	Modifiable Risk Factors: What You Need to Know	C. Lowry Barnes, MD
	DVT Prophylaxis: State of the Art	Jay R. Lieberman, MD
	My Postoperative Algorithmic Approach for Postoperative Complications	Giles R. Scuderi, MD
	Discussion	Adolph V. Lombardi Jr., MD, FACS
6:30–7:30 p.m.	Reception for All Attendees	Exhibit Hall/ Learning Center
7:30–8:00 p.m.	AAHKS and Guest Society Poster Take Down	
Sunday, November 5, 2017		
6:00–10:00 a.m.	Registration	Peacock Foyer
6:00–7:00 a.m.	Breakfast for All Attendees	Trinity Foyer
7:00–7:15 a.m.	AAHKS Business Meeting Members nominate and vote on Board positions and vote on changes to AAHKS Bylaws	
7:15–8:11 a.m.	Session Seven: Revision Total Hip Moderators: Javad Parvizi, MD and William B. Macaulay, MD	
7:15 a.m.	Paper #39 Association between Pseudotumor Formation and Patient Factors in Metal-on-Metal Total Hip Arthroplasty Population	Daniel E. Goltz, BS Durham, North Carolina

Schedule

7:21 a.m.	Paper #40 Mechanical Complications Following Total Hip Arthroplasty Based on Surgical Approach: A Large Single Institution Cohort Study	Andrew N. Fleischman, MD Philadelphia, Pennsylvania
7:27 a.m.	Paper #41 Sensitivity and Specificity of Metal Ion Level in Predicting Head-Neck Taper Corrosion in Metal-on-Polyethylene Total Hip Arthroplasty	Yun Peng, MD Boston, Massachusetts
7:33 a.m.	Discussion	
7:43 a.m.	Paper #42 Early Outcomes of Revision Surgery for Head-Neck Taper Corrosion of Metal-on-Polyethylene THA with Pseudotumors in 43 Patients	Young-Min Kwon, MD, PhD Boston, Massachusetts
7:49 a.m.	Paper #43 Impaction Force Influences Taper-Trunnion Stability in Total Hip Arthroplasty	Jonathan R. Danoff, MD Great Neck, New York

Sunday, November 5, 2017

7:55 a.m.	Paper #44 Intraoperative Evaluation of Acetabular Cup Position During Anterior Approach Total Hip Arthroplasty: Are We Accurately Interpreting?	Dimitri E. Delagrammaticas, MD Chicago, Illinois
8:01 a.m.	Discussion	
8:11–9:11 a.m.	Symposium VII The New Disease: Taper Corrosion After THA—A State of the Art 2017 Update for AAHKS Members	Moderator: Daniel J. Berry, MD
	Diagnosing Taper Corrosion: When is it the Taper, When Is It Something Else?	Craig J. Della Valle, MD
	Why have We Seen More Taper Corrosion in the Last 5 Years? The Implants? The Surgery? Metal Testing?	Joshua J. Jacobs, MD
	Management of the Implant with Taper Corrosion: What to Change and What to Change it to	Michael P. Bolognesi, MD
	Preventing Complications Associated with Operating on Taper Corrosion	Tad M. Mabry, MD
	Discussion	Daniel J. Berry, MD
9:11–9:57 a.m.	Session Eight: Non-Arthroplasty Moderators: Christopher Peters, MD and Rafael J. Sierra, MD	
9:11 a.m.	Paper #45 Impingement-Free Hip Range of Motion in Asymptomatic Young Adult Females	Michael C. Mahan, MD Detroit, Michigan
9:17 a.m.	Paper #46 Does Severity of Dysplasia Influence Clinical Outcomes Following the Periacetabular Osteotomy (PAO)? A Case Control Study	Paul E. Beaulé, MD Ottawa, Canada
9:23 a.m.	Paper #47 The Fate of the Contralateral Hip in Patients Undergoing a Periacetabular Osteotomy: Are there Risk Factors for Disease Progression?	John C. Clohisy, MD St. Louis, Missouri
9:29 a.m.	Paper #48 Are There Disease-Specific Articular Cartilage Wear Patterns in Various Pre-Arthritic Hip Disorders?	Cecilia Pascual Garrido, MD St. Louis, Missouri

9:35 a.m.	Paper #49 Mid-Term Results of Patients Treated with Porous Tantalum Acetabular Components for Non-Primary Periacetabular Lesions	David G. Lewallen, MD Rochester, Minnesota
9:41 a.m.	Paper #50 Do Focal Chondral Defects Lead to Worse Outcomes after Periacetabular Osteotomy?	Rafael J. Sierra, MD Rochester, Minnesota
9:47 a.m.	Discussion	
9:57 – 10:57 a.m.	Symposium VIII New Technologies in Knee Replacement	Moderator: Robert M. Molloy, MD
	Accuracy and Soft Tissue Protection of Robotic Total Knee Arthroplasty	Michael A. Mont, MD
	A Review of Hand-Held Surgical Navigation	Seth A. Jerabek, MD
	Robotic Partial Knee Replacement	Steven B. Haas, MD
	Next Generation Robotic Technology	Jess H. Lonner, MD
	Discussion	Robert M. Molloy, MD
10:57 – 11:53 a.m.	Session Nine: Primary Knee Moderator: Thomas K. Fehring, MD	
10:57 a.m.	Paper #51 Two-Year Results of a Randomized Trial of Robotic Surgical Assistance vs. Manual Unicompartamental Knee Arthroplasty	Mark Blyth, D, FRCS Glasgow, United Kingdom
11:03 a.m.	Paper #52 Patients at Risk: Preoperative Opioid Use Affects Opioid Prescribing, Refills and Outcomes after Total Knee Arthroplasty	Nicholas M. Hernandez, MD Rochester, Minnesota
11:09 a.m.	Paper #53 Effectiveness of Novel Adjuncts in Multimodal Pain Management Following Total Knee Arthroplasty	Juan C. Suarez, MD Weston, Florida
11:15 a.m.	Discussion	
11:25 a.m.	Paper #54 Factors Influencing Reoperation of Total Knee Arthroplasty in Vasculopathic Patients	Maxwell K. Langfitt, MD Winston Salem, North Carolina
11:31 a.m.	Paper #55 Formal Physical Therapy may not be Essential Following Unicompartamental Knee Arthroplasty: A Randomized Clinical Trial	Brian T. Darrith, BS Chicago, Illinois
11:37 a.m.	Paper #56 Novel Immuno-Based Microbial ID Assays for Organism Detection in Synovial Fluid	Carl A. Deirmengian, MD Philadelphia, Pennsylvania
11:43 a.m.	Discussion	
11:53 a.m.	Concluding Remarks	Mark I. Froimson, MD, MBA
12:00 p.m.	Adjourn	

AAHKS

2017 ANNUAL MEETING

November 2-5 | Dallas, Texas



The 2017 AAHKS Humanitarian Award

The American Association of Hip and Knee Surgeons congratulates Lawrence D. Dorr, MD on receiving the 2017 AAHKS Humanitarian Award. Dr. Dorr received the award in recognition of his founding role and continuing participation in Operation Walk missions.

Dr. Dorr is a pioneer and leader in joint replacement surgery in the United States. He was inspired at the age of five to become a surgeon and his passion to take care of others has never wavered. While on a teaching trip to Russia, he realized that he could better teach physicians by demonstrating surgery. He also realized that he could bring surgical skills and healing processes to the poorest of the world's poor while teaching in-country physicians. This inspired his idea for Operation Walk.

Dr. Dorr quickly recruited a team of surgeons, internal medicine doctors, anesthesiologists, nurses, and physical therapists to join him in the first Operation Walk trip to Havana, Cuba. The team spent eight months getting all of the implants, medications, surgical supplies and postoperative supplies ready to be transported to Havana. All supplies were donated, and physicians paid their own way.

On that first trip to Cuba, 45 joints were successfully replaced in three days—allowing patients to walk again after many years of immobility. Hip replacements made it possible for one woman to have a child whom she named, “Larry.” The team was exhilarated and full of enthusiasm to plan the next Operation Walk. Over the next ten years, Operation Walk teams returned to Cuba six times, helping more than 250 patients. Dr. Dorr has created 14 teams in Operation Walk’s 20 years and still finds each trip as thrilling as the first.

The AAHKS 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.

Nominations for the 2018 AAHKS Humanitarian Award are now being accepted through April 15, 2018 at www.AAHKS.org/Humanitarian.



Symposium I

Through the Looking Glass: What Does the Future Hold for Arthroplasty?

Moderator: Mark I. Froimson, MD, MBA

Faculty: Jonathan L. Schaffer, MD, MBA, Kenneth B. Trauner, MD, Brian S. Parsley, MD, Stefano A. Bini, MD, Mark I. Froimson, MD, MBA

Objectives:

1. To provide a working understanding of four major trends in digital health and technology that are likely to impact their practice over the next five years.
2. To introduce the breadth and depth of the technological revolution that is bringing health care into the 21st century.

Outline:

Telehealth

From Video Visits to Holograms, from Virtual ICUs to Patient Engagement Platforms: Tele-Orthopaedics is Going to Change Where and How We Deliver Care, Jonathan L. Schaffer, MD

3D Printing

From Printing Prosthetics to Bioscaffolds, from Printing Instruments to Living Tissue: What Can We Print Now That We Could Only Dream of Building Before? The 3D revolution is Here., Kenneth B. Trauner, MD

Robotics and Automation

From Robotic-Assisted Surgery to Humanoid Cyborgs: Providing Empathetic Care, from Neurally-Activated Prosthetics to Futuristic Exoskeletons: Was Huxley Right?, Brian S. Parsley, MD

Artificial Intelligence and Machine Learning

From Decision Support to Deep Neural Networks, from Predictive Analytics to Learning Algorithms: What Does Watson Have in Store for Us?, Stefano A. Bini, MD

Notes

Symposium II

Lessons Learned from Effective Models of Joint Replacement Care in the United States

Moderator: Christopher L. Peters, MD

Faculty: William J. Hozack, MD, Michael E. Berend, MD, Monti Khatod, MD

Understand the development and evolution of individual care models and the primary driving forces for development of each model.

Objectives:

1. A variety of effective joint replacement care delivery models are currently employed in the US. Participants should understand the development and evolution of individual care models and the primary driving forces for development of each model.
2. Differing strengths and weaknesses are evident within each model of joint replacement care. Participants should gain appreciation for the unique relationships between institutions and care providers within each model of care.
3. Each model of care has importantly and primarily emphasized improvement of the overall patient experience within individual systems. Participants should gain appreciation for the processes and mechanisms each model has utilized in improving the patient experience with joint replacement.

Outline:

Focusing on Value in an Academic Environment: The Utah Experience, Christopher E. Pelt, MD

Maximizing Physician-Hospital Alignment: The Rothman Experience, William J. Hozack, MD

Outpatient-Focused Joint Replacement is the Future: The Midwest Center for Joint Replacement Experience, Michael E. Berend, MD

Joint Replacement in a Capitated Single-Payer System: The Kaiser Experience, Monti Khatod, MD

Notes

Paper #9

THA Patients with Fixed Spinopelvic Alignment from Standing to Sitting are at Higher Risk of Hip Dislocation

Christina I. Esposito, PhD, Kaitlin M. Carroll, Peter K. Sculco, MD, Douglas E. Padgett, MD, **Seth A. Jerabek, MD**, David J. Mayman, MD

Introduction: Sitting radiographs have been used as a preoperative tool to consider an ideal, patient-specific THA component position that would improve hip stability. This study sought to determine whether patients who dislocated following THA have different spinopelvic alignment or different sitting acetabular component position compared to patients that did not dislocate.

Methods: From 2014 to 2017, all patients undergoing primary THA by two surgeons underwent standing and sitting radiographs from the thoracolumbar junction to the ankles using the EOS imaging system. We compared 12 patients (1% of all patients) who dislocated within the first year of surgery to 150 patients who did not dislocate, and subcategorized patients as having normal spines or spine disease. Alignment parameters, including lumbar lordosis and sacral slope, were measured as well as spine flexion and hip flexion from standing to sitting positions. Postoperative cup alignment was measured in standing and sitting positions.

Results: Dislocators had less spine flexion (13° vs 21° ; $p < 0.001$), less change in pelvic tilt (9° vs 16° ; $p < 0.001$), and more hip flexion (72° vs 67° ; $p = 0.003$) from standing to sitting positions compared to patients with normal spines. Similarly, patients with spine disease had less spine flexion ($p < 0.001$), less change in pelvic tilt ($p < 0.001$) and more hip flexion ($p < 0.001$) than patients with normal spines. There was no difference in sitting pelvic tilt or sitting acetabular component position among patient groups.

Conclusion: This study shows patients with fixed spinopelvic alignment from standing to sitting position are at higher risk of hip dislocation. We did not find a sitting “safe zone” for acetabular component position for low risk of dislocation. Imaging patients from standing to sitting position in a consistent fashion can provide valuable information on whether a patient has fixed spinopelvic alignment with postural changes and is therefore at higher risk of dislocation.

Notes

Paper #10

Lumbar Fusion Involving the Sacrum Increases Dislocation Risk Eight-Fold in Total Hip Arthroplasty

Christopher G. Salib, MD, Nicolas Reina, MD, PhD, **Kevin I. Perry, MD**, Michael J. Taunton, MD, Daniel J. Berry, MD, Matthew P. Abdel, MD

Introduction: Limited data exist on concurrent spine and hip pathologies in the context of primary total hip arthroplasty (THA). This study examines the impact of lumbar spine fusions on dislocation risk after primary THAs.

Methods: From 16,453 THAs, we identified 58 patients (67 THAs) between 1998 and 2015 who had spine fusions prior to primary THA at our institution. Patients were stratified into three groups: i) one level of lumbar fusion, ii) two or more levels of lumbar fusion, or iii) any fusion involving the sacrum. Mean age was 69 years, with mean follow-up of 5 years. Patients were 2:1 matched to patients with primary THAs without any previous spine fusion. Hazard ratios (HR) were calculated.

Results: Risk of dislocation in the fusion group was 6% at 1 year, vs. 1.6% in the control group (HR=4). The HR for dislocation was 3 in the one level fusion group ($p=0.4$), 1.4 ($p=0.8$) in the two or more level fusion group, and 8 ($p=0.03$) in the fusion to sacrum group, with a one year dislocation rate of 14%. Patient demographics and surgical characteristics of the THA (i.e. operative approach, femoral head diameter, and cup diameter) did not significantly impact dislocation risk ($p>0.05$). Mean cup anteversion was 19° in the sacral fusion group vs. 23° and 26° in the groups with one or multiple levels of lumbar fusion, respectively ($p=0.06$). Five-year KM survivorships free of any revision was 97% in the fusion group and 95% in the controls ($p=0.4$).

Conclusions: Lumbar spine fusions prior to THA increase the risk of early dislocation. Fusions involving the sacrum notably increased the risk of postoperative dislocation compared to a control group and other lumbar fusions, regardless of number of levels fused. Surgeons should be cognizant of cup positioning, and may consider high-stability implants in this cohort.

Notes

Paper #15

A Decade of Protocol Developments for SSI Prevention: Intraoperative Betadine Irrigation Prevails

Andrew N. Fleischman, MD, Camilo Restrepo, MD, Karan Goswami, MD, Javad Parvizi, MD,
Matthew S. Austin, MD

Introduction: Due to its significant morbidity and high costs, surgeons have always strived to reduce and even eliminate surgical site infection (SSI) following TKA. Our aim was to compare the efficacy of intraoperative measures introduced over the last decade to prevent SSI.

Methods: We identified 10,949 consecutive primary TKA performed from 2006-2017. Over the course of the study period, several step-wise measures were implemented heterogeneously, including (1) intraoperative dilute betadine irrigation, (2) skin closure with subcuticular monofilament sutures instead of staples, and (3) application of an occlusive dressing. Patients also received systemic and local antibiotic prophylaxis. All SSIs (CDC definition) were identified within 90 days of the index procedure. Statistical analyses were performed with logistic regression accounting for both patient and surgical factors.

Results: During the study period, 19.4% of patients (n=2,124) received betadine irrigation (0.24% SSI), 27.1% of patients (n=2,964) had monofilament suture closure (0.37% SSI), 22.0% of patients (n=2,411) received an occlusive dressing (0.33% SSI), and 70.0% of patients (n=7,665) received none of the aforementioned measures (0.60% SSI). Based on univariate analysis, betadine irrigation was the only measure that significantly reduced the incidence of infection (odds ratio [OR] 0.38, 95% CI 0.15–0.96). Even after accounting for ten variables, the SSI risk reduction with the use of betadine irrigation was nearly significant (OR 0.28, 95% CI 0.07–1.1; p=0.067) and was independently significant on omnibus testing (p=0.044). Further, suture closure (OR 1.17, 95% CI 0.31-4.5), application of an occlusive dressing (OR 0.64, 95% CI 0.15-2.7), and year of surgery were not significantly associated with a reduction in SSI.

Conclusion: While the implementation of multiple measures may have contributed to improvements in SSI prevention, intraoperative betadine irrigation appears to have played the greatest individual role. Our experience supports the addition of betadine irrigation to the perioperative armamentarium.

Notes

Paper #16

Dual-Agent Antibiotic Prophylaxis Using Single Dose Vancomycin Effectively Reduces Prosthetic Joint Infection Rates with Minimal Renal Toxicity Risk

John R. Burger, DO, Benjamin J. Hansen, MD, Ajay Aggarwal, MD, James A. Keeney, MD

Introduction: First generation cephalosporins provide effective prophylaxis against most skin flora but may not adequately cover low virulence organisms, including coagulase negative staphylococcus. We performed this study to assess the relative effectiveness of PJI prophylaxis using a first-generation cephalosporin (Ancef) alone, ancef + vancomycin (A-V) or ancef + gentamicin (A-G), and the associated risks of renal impairment.

Methods: After obtaining IRB approval, we retrospectively reviewed 3,337 consecutive primary and revision lower extremity total joint arthroplasties, including 1,428 patients receiving Ancef alone (A), 1,178 patients receiving cefazolin and a single dose of vancomycin (A-V), and 731 patients receiving cefazolin and a single dose of gentamicin (A-G). A chart review was performed to determine patient demographic characteristics, physiological response to surgery, and incidence of subsequent septic or aseptic surgical procedures. Statistical assessment was accomplished using a paired student's T-test or Fisher's Exact Test, with a p-value < 0.05 accepted as significant.

Results: Dual-agent A-V prophylaxis had substantially lower infection rates during the first 2 years after primary TJA compared with patients receiving either A or A-G prophylaxis (1.6% vs 2.9%, p=0.04) and after revision THA also (1.1% vs 12.5%, p=0.04). Patients who received Ancef alone and sustained a periprosthetic infection were more likely to have polymicrobial infections (25% vs 10%, p=0.05) or MRSA infection (13.8% vs 2.8%, p=0.04) than patients who received either dual-antibiotic PJI prophylaxis. There was a trend towards a proportion of patients with uncorrected creatinine elevation > 1.5 mg/dl (0.4% vs 0.07%, p=0.06), but no patients in the A-V group required hemodialysis.

Conclusion: While first generation cephalosporins lower PJI infection rates, infections with low virulence organisms may still occur. In our institution, the addition of a single dose of Vancomycin effectively reduced PJI infection rates in primary TJA and revision THA with a low risk of renal impairment.

Notes

Paper #17

Reduction of Total and Viable Particles in the OR Setting by Using Ultraviolet In-Room Air Disinfection and Recirculation Unit

Gannon L. Curtis, MD, Mhamad Faour, MD, Michael Jawad, BS, Alison K. Klika, MS, Wael K. Barsoum, MD, Carlos A. Higuera, MD

Introduction: Postoperative infection is a major concern in total joint arthroplasty. It has been shown that the air is a major source of surgical wound contamination. Finding solutions to reduce airborne bioburden during surgery is critical.

Methods: A viable particle counter was deployed in an empty, positive-pressure operating room (OR) to measure total and viable particle counts (TPC and VPC). It was placed at the usual position of the surgical table during TJA cases. Over an 11-minute period, 8 air samples were taken. Five seconds before the 3rd and 6th sample occurred, someone walked in from the sub-sterile corridor to mimic a person entering the OR and then leaving during surgery. Ten experiments were performed as controls, and 10 experiments were performed with a crystalline ultraviolet C (C-UVC) unit actively circulating air for more than 30 minutes. Independent t-tests were used to determine statistical differences in TPC and VPC.

Results: After the first walk through occurred, TPC at the 4.5-minute mark measured 15,653 particles/m³ in the control cases, while it only measured 2,841 particles/m³ in the C-UVC cases ($p=0.001$). Also, overall TPC in the C-UVC cases were significantly lower compared to the control cases (36,310 vs 16,192 particles/m³; $p=0.015$). VPC in the C-UVC cases were also significantly decreased compared to the control cases following the first door opening as well (1,272 vs 120 particles/m³; $p=0.01$). Although, overall VPC was not significantly different between the groups ($p=0.091$). Similarly, TPC ($p=0.267$) and VPC ($p=0.417$) were not significantly different following the second door opening at the 7.5-minute mark.

Conclusion: C-UVC filtration has shown to be capable of significantly reducing TPC and VPC in a controlled OR setting. Further studies are needed to measure its impact on the TPC and VPC during regular TJA cases.

Notes

Paper #20

What is the Optimal Criteria to use for Detecting Prosthetic Joint Infections in Total Joint Arthroplasty?

Sumit Kanwar, MD, Manisha Chand, MD, Ahmed Al-Mansoori, MBBS, Juan C. Suarez, MD,
Preetesh D. Patel, MD

Introduction: Intraoperative culture (IC) are considered gold standard for diagnosing prosthetic joint infections (PJI), but still have a 30% false negative rate. To improve diagnostic accuracy for PJI, Musculoskeletal Infection Society (MSIS) criteria was developed and newer assays such as Alpha-defensin (AD) have been developed to further improve diagnostic accuracy. The purpose of our study was to evaluate the accuracy of AD when compared to MSIS criteria in diagnosing PJI.

Methods: A retrospective analysis of 217 hip and knee joint aspirations performed between 2014- 2017. One hundred aspirates (46%) had revision surgery with IC obtained. Sensitivity (Sn), Specificity (Sp), Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were calculated for MSIS criteria and AD in comparison to IC for all the intraoperative aspirations. Chi Square tests were performed for comparisons.

Results: Our results showed 33 positives for AD, 33 met MSIS criteria, and 17 had positive IC, which was significantly different between the groups ($p < 0.001$). Based on comparison with IC the Sn of AD was calculated to be 94.1%; Sp: 78.3%; PPV: 47.1%; NPV: 98.5%. When comparing MSIS criteria with IC results showed a Sn of 94.1%, Sp: 79.5%; PPV: 48.5%; NPV: 98.5%. Phi test showed strong positive association between AD and MSIS criteria ($F=1, p=0.001$)

Conclusion: According to our results MSIS and AD have a strong positive association for diagnosing PJI, with a high sensitivity and negative predictive value. The addition of AD did not improve our accuracy beyond MSIS criteria alone.

Notes

Paper #21

90-Day Costs, Reoperations and Readmissions for Primary Total Knee Arthroplasty Patients of Varying BMI Levels

Karthikeyan E. Ponnusamy, MD, Jacquelyn Marsh, PhD, Richard W. McCalden, MD, Lyndsay Somerville, PhD, **Edward Vassarhelyi, MD**

Introduction: The purpose of this study is to compare 90-day costs and outcomes for primary total knee arthroplasty (TKA) patients between a non-obese (BMI 18.5-24.9) versus overweight (25-29.9), obese (30-34.9), severely-obese (35-39.9), morbidly-obese (40-44.9), and super-obese (50+) cohorts.

Methods: We conducted a retrospective review of an institutional database of primary TKA patients from 2006-2013, including patients with a minimum of three-year follow-up. Sixty-five super-obese patients were identified, and five other cohorts were randomly selected in a 2:1 ratio (total n = 715). Demographics, 90-day outcomes (costs, reoperations, and readmissions), and outcomes after three years (revisions and change scores for SF12, KSS, and WOMAC) were collected. Costs were determined using unit costs from our institutional administrative data for in-hospital resource utilization. Comparisons between the non-obese and other groups were made with Kruskal-Wallis tests for non-normal data and chi-square and Fisher's exact test for categorical data.

Results: The 90-day costs in the morbidly-obese (\$11,568±1,960 mean±standard deviation, p <0.01) and super-obese (\$14,021±7,903, p <0.01) cohorts were statistically significantly greater than the non-obese cohorts (\$10,262±2,545). Only the super-obese cohort had statistically greater 90-day reoperation rates than the non-obese cohort (9.2% vs 2.3%, p =0.03). There was no difference in 90-day readmission rates. The septic revisions after 3 years were greater in the super-obese cohort compared to the non-obese cohort 6.2% vs 0.8% (p = 0.04). There were no other statistical differences between the other cohorts with the non-obese cohort at 90-days or after 3 years. Improvements in KSS and SF12 were comparable in all cohorts. The super-obese had a greater improvement in WOMAC scores than the non-obese (38 vs 26, p<0.01).

Conclusion: Policy changes may place super-obese patients at risk of losing arthroplasty care due to greater risks and costs compared to non-obese patients, but also lose access to comparable or better quality-of-life improvements.

Notes

Paper #22

Cost-Effectiveness of Total Knee Arthroplasty vs. Nonoperative Management in Non-Obese, Overweight, Obese, Severely-Obese, Morbidly-Obese and Super-Obese Patients

Karthikeyan E. Ponnusamy, MD, Edward Vasarhelyi, MD, Richard W. McCalden, MD, Lyndsay Somerville, PhD, Jacquelyn Marsh, PhD

Introduction: The purpose of this study is to estimate the cost-effectiveness of performing total knee arthroplasty (TKA) versus nonoperative management (NM) in non-obese (BMI 18.5-24.9), overweight (25-29.9), obese (30-34.9), severely-obese (35-39.9), morbidly-obese (40-49.9), and super-obese (50+) patients.

Methods: We constructed a state-transition Markov model to compare the cost-utility of TKA and NM in the six above mentioned BMI groups over a 15-year time period. Model parameters for transition probability (i.e. risk of revision, re-revision, death), utility, and costs were estimated from the literature. Direct medical costs of managing knee arthritis were accounted in the model. Indirect societal costs were not included. A 3% annual discount rate was used for costs and utilities. The primary outcome was the incremental cost-effectiveness ratio (ICER) of TKA versus NM. One-way and probabilistic sensitivity analysis of the model parameters were performed to determine the robustness of the model.

Results: Over the 15-year time period, the ICERs for the TKA versus NM for the different BMI categories were non-obese (\$4,269/QALY), overweight (\$3,757/QALY), obese (\$3,841/QALY), severely-obese (\$4,393/QALY), morbidly-obese (\$6,155/QALY), and super-obese (\$12,196/QALY). The higher BMI groups tended to have higher incremental QALYs, and also higher incremental costs. The probabilistic sensitivity analysis with an ICER threshold of \$25,000/QALY, showed that TKA would be cost-effective in 100% of non-obese, overweight, obese, and severely-obese; 99.99% of morbidly obese; and 98.18% of super-obese simulations.

Conclusion: The average Medicare bundled payments is approximately \$25,000 for 90 days of care. At this payment value, our model showed that in the vast majority of cases TKA would be cost effective for all obesity levels, and that BMI cut-offs for TKA may lead to unnecessary loss of healthcare access.

Notes

Paper #23

Are Medicare's Comprehensive Care for Joint Replacement Bundled Payments Stratifying Risk Adequately?

Mark A. Cairns, MD, MS, Scott M. Eskildsen, MD, MS, Peter T. Moskal, MD, Robert F. Ostrum, MD, R. Carter Clement, MD, MBA

Introduction: Without adequate risk stratification, bundled payments may be inequitable to providers and restrict access to care for certain patients. The Comprehensive Care for Joint Replacement (CJR) program incorporates risk-adjustment for Diagnosis-Related Group (DRG), geography and cases performed for hip fractures. The goal of this study was to assess additional factors that could improve risk stratification for this program.

Methods: A 20% random sample of Medicare patients spanning 2008-2012 was queried. 95,024 patients were identified who met CJR inclusion criteria (DRG 469, or 470). Reimbursement was used as a proxy for costs of care, and was determined for each patient over the bundle period (including 90 days of post-discharge care). Multi-variable regression examined demographics, comorbidities, geography, and specific types of surgery and fractures to identify associations with reimbursement.

Results: Average reimbursement was \$18,786 ± 12,386. Older age was associated with higher payments compared to patients aged 65-69 (p < 0.05). Dementia was associated with \$781 ± 172 lower reimbursement (p < 0.01). The highest reimbursement was noted for end stage renal disease, patients with AIDS and acute peptic ulcer disease (PUD). There was considerable variation in payments by state. Cases performed for hip fractures earned higher reimbursement. Male gender was associated with \$8,832 higher reimbursement (p = 0.02) compared to females. Patients in DRG 469 tend to cost \$7,277 more than those in DRG 470. Risk stratification incorporating individual comorbidities displayed greater accuracy than current methods in the CJR program, which uses DRG, presence of fracture, and geography (R2 = 0.23 vs. 0.17).

Conclusion: These results suggest that CJR bundled payments should incorporate a more robust risk-stratification to ensure fair reimbursement and maintain access to care for all patients. In addition to DRG, cases performed for hip fractures, and geography, risk-adjustment calculations should include individual comorbidities and demographics.

Notes

Paper #24

No Optimal Antibiotic-Free Period Prior to Reimplantation for Periprosthetic Joint Infection

Timothy L. Tan, MD, Michael Kheir, MD, Jaiben George, MBBS, Carlos A. Higuera, MD, Antonia F. Chen, MD, MBA, Javad Parvizi, MD

Introduction: Two-stage exchange arthroplasty is the gold standard for management of periprosthetic joint infection (PJI) in the United States. An antibiotic-free period is often advocated by some surgeons prior to reimplantation, as this period serves as a clinical proxy of infection control by allowing surgeons to evaluate if there is any clinical worsening while the patient is off antibiotics. However, there is currently no conclusive evidence supporting the utility or duration of this common practice. Thus, the purpose of this study was to determine the utility and optimal duration of the antibiotic-free period prior to reimplantation.

Methods: The electronic infection databases of two institutions was retrospectively reviewed to identify 409 patients from 2000 to 2014. Total joint arthroplasties that met the Musculoskeletal Infection Society criteria for PJI, had less than a 60-day antibiotic-free period, and had a minimum of one-year follow-up were included. The following variables were collected: age, body mass index, gender, Charlson comorbidities, surgical and antibiotic treatment, antibiotic holiday duration, microorganisms, and other relevant information Treatment success was defined according to the Delphi consensus criteria. A multivariate analysis was performed.

Results: The duration of the antibiotic-free period was not significantly associated with reinfection following reimplantation (odds ratio [OR] 0.94 per week, $p=0.38$) after controlling for potential confounders, such as joint involvement, gender, institution, and comorbidities. However, the duration of spacer implantation was significantly associated with reinfection (OR 1.05 per week, $p=0.002$). Of the patients that failed treatment, 41.5% (39/94) failed on antibiotics while 58.5% (55/94) failed during the antibiotic holiday period at a mean of 26.1 days.

Conclusion: The duration of an antibiotic-free period does not appear to significantly affect the PJI rate after reimplantation; however, the study demonstrates that many patients fail during the antibiotic holiday period.

Notes

Paper #25

Should Medicare Remove Total Knee Arthroplasty from Its Inpatient Only List? A Total Knee Replacement Is Not a Partial Knee Replacement

P. Maxwell Courtney, MD, R. Michael Meneghini, MD, Gwo-Chin Lee, MD, Mark I. Froimson, MD, MBA, Craig J. Della Valle, MD

Introduction: The Centers for Medicare and Medicaid Services (CMS) have solicited public comments for the 2017 Proposed Rule to consider removing TKA from the Inpatient Only List. Concerns exist that if TKA is reclassified as an outpatient procedure like unicompartmental knee arthroplasty (UKA), CMS may no longer reimburse facilities for an inpatient stay. The purpose of this study is to determine whether Medicare-aged patients undergoing TKA were comparable to UKA patients with regard to rate of complications and length of stay.

Methods: We queried the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) database for all patients over age 65 who underwent elective TKA or UKA from 2014-2015. Demographic variables, medical comorbidities, length of stay, 30-day complication, and readmission rates were compared between UKA and TKA patients. A multivariate logistic regression analysis was then performed to identify independent risk factors for complications and hospital length of stay greater than 1 day. Statistical significance was set at $p < 0.05$.

Results: Of the 50,487 patients in the study, there were 49,136 (97%) TKA patients and 1351 UKA patients (3%). Medicare-aged TKA patients had a longer mean length of stay (2.97 vs. 1.57 days, $p < 0.001$), a higher complication rate (9% vs. 3%, $p < 0.001$), and were more likely to be discharged to a rehabilitation facility (31% vs. 9%, $p < 0.001$) than Medicare-aged UKA patients. When controlling for demographic factors and medical comorbidities, TKA patients were more likely to experience a complication (OR 2.562, 95% CI 1.904-3.447, $p < 0.001$) and require a hospital stay greater than 1 day (OR 14.679, 95% CI 13.094-16.455, $p < 0.001$) than UKA patients.

Conclusions: In the Medicare population, TKA patients have higher complication rates and require longer lengths of stay than UKA patients. When considering removing TKA from the Inpatient Only List, policymakers should use caution when extrapolating UKA data to TKA patients.

Notes

Paper #26

A Comparison of Relative Value Units in Primary versus Revision Total Knee Arthroplasty: Which Provides the Better Bang for Your Buck?

Michael A. Mont, MD, Nipun Sodhi, BA, Anton Khlopas, MD, Morad Chughtai, MD, Kim L. Stearns, MD, Jared M. Newman, MD, Assem Sultan, MD, George A. Yakubek, DO, Jaiben George, MBBS

Introduction: Relative value units (RVUs) are utilized to determine the effort required for providing a service (or procedure) to a patient, and ultimately for compensation. The purpose of this study was to compare the: 1) RVUs; 2) length-of-surgery; and 3) RVU per unit of time between primary and revision total knee arthroplasty using a national database.

Methods: We utilized the American College of Surgeons, National Surgical Quality Improvement Program database from 2008 to 2015 to identify patients who underwent either a primary (CPT code 27447) or revision (CPT code 27487) TKA. There were 165,538 patients who underwent a primary and 8,099 who underwent a revision total knee arthroplasty. The mean RVUs, length of surgery (in minutes), and RVU per minute were calculated. T-tests were used to compare variables between primary and revision TKA. A p-value of less than 0.05 was used to determine statistical significance.

Results: There was a significant difference in the mean RVUs between primary and revision total knee arthroplasty (22 vs. 27 RVUs, $p=0.001$). There was a significant difference in the mean length of surgery between primary and revision total knee arthroplasty (95 vs. 150 minutes, $p=0.001$). The mean RVU per minute was significantly higher in primary versus revision TKA (0.3 vs. 0.2 RVUs per minute, $p=0.001$).

Conclusion: It appears that despite revision total knee arthroplasty being a longer, more technically challenging procedure, there is a significantly lower RVU per minute assigned for performance. Therefore, orthopaedic surgeons are reimbursed at a higher rate per minute for primary cases compared to revision total knees. It can be argued that there needs to be a shift to increase the RVU per unit time for revision TKAs, as they are more time-consuming, technically-challenging procedures.

Notes

Paper #28

What is the Impact of Smoking on Revision Total Hip Arthroplasty?

Nicholas A. Bedard, MD, S. Blake Dowdle, MD, Jessel M. Owens, MD, Kyle R. Duchman, MD, Yubo Gao, MD, **John J. Callaghan, MD**

Introduction: There is a paucity of literature evaluating the impact of smoking on revision arthroplasty procedures. The purpose of this study was to identify the effect of smoking on complications after revision total hip arthroplasty (THA).

Methods: We queried the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database to identify patients who underwent revision THA between 2006 and 2014. Patients were divided into current smokers and nonsmokers according to NSQIP definitions. Each cohort was compared in terms of demographic data, preoperative co-morbidities and operative time. Multivariate logistic regression analysis was utilized to adjust for confounding variables and calculate adjusted odds ratios (OR) and associated 95% confidence intervals (95% CI) for the outcomes of any wound complication, deep infection and re-operation within 30-days of revision TKA.

Results: In total, 8,327 patients had undergone a revision TKA procedure. Of these patients, 14.7% were current smokers and 85.3% were nonsmokers. Univariate analyses demonstrated that smokers had a higher rate of any wound complication (4.1% vs 3.0%, $p = 0.04$), deep infection (2.0% vs 1.0%, $p = 0.003$) and re-operation (6.9% vs 4.8%, $p = 0.003$) compared to nonsmokers undergoing revision THA. Multivariate analysis controlling for confounding demographic, comorbidity and operative variables identified current smokers as being at a significantly increased risk of deep infection (OR 1.6, 95% CI 1.04-2.36) and re-operation (OR 1.4, 95% CI 1.03-1.86) after revision THA.

Conclusion: This study demonstrates that smoking significantly increases the risk of infection and re-operation after revision THA. The results are even more magnified for revision procedures compared to published effects of smoking on primary THA complications. Further research is needed regarding the impact of smoking cessation on mitigation of these observed risk.

Notes

Paper #29

High Rate of Failure Following Revision of a Constrained Liner

Michael D. Hellman, MD, David J. Kaufman, MD, Scott M. Sporer, MD, Wayne G. Paprosky, MD, Brett R. Levine, MD, Craig J. Della Valle, MD

Introduction: Revision to a constrained liner is one option for managing the unstable total hip arthroplasty. Little is known, however, about the results of revision surgery for a failed constrained liner. The purpose of this study was to examine the outcomes of repeat revision following failure of a constrained liner.

Methods: We reviewed 1,212 consecutive revisions and identified 74 (6%) performed for a failed constrained liner in 46 patients. The cohort consisted of 34 women and 12 men with a mean age of 65 years old. The most common reasons for revision of a constrained liner were recurrent instability (64.9%) and infection (25.7%). The mean number of previous hip surgeries was 3.6 (range, 3 to 7). Sixteen patients had abductor insufficiency (34.8%). Patient and procedural characteristics associated with failure were tested using bivariate Cox-regression analysis. A p-value of 0.05 was considered significant; 0.004 with Bonferroni correction.

Results: At a mean of 35 months (range, 1 to 87 months) 42 of the 74 hips (57%) required repeat revision. KM estimated revision free survival was 43% at 5 years (95%CI, 29–56%) and 24% at 10 years (95%CI, 10–39%). Thirty-two of the 74 revisions (43%) had a dislocation event after the index revision. KM estimated cumulative dislocation-free survival was 49% at 5 years (95%CI, 34–63%) and 43% at 10 years (95%CI, 27–59%). There was a higher failure rate among the 34 patients with abductor deficiency (HR 1.90, 95%CI, 1.06–3.43; p=0.032). With the numbers available, no revision strategy, including conversion to a large diameter femoral head or dual-mobility construct, conferred a significant reduction in the failure rate.

Conclusion: Patients undergoing revision of a failed constrained liner have a very high likelihood of recurrent dislocation and repeat revision surgery. Additional studies are needed to identify optimal management strategies for this complicated subset of patients.

Notes

Paper #30

Revision Total Knee Replacement for Arthrofibrosis

Richard Woodson Rutherford, MD, Jason M. Jennings, MD, Daniel L. Levy, BS, Thomas J. Parisi, MD, **John R. Martin, MD**, Douglas A. Dennis, MD

Introduction: Arthrofibrosis after total knee arthroplasty (TKA) is a difficult problem for patients and surgeons. Although relatively uncommon, it is a significant cause of patient dissatisfaction when it occurs. The purpose of this study was to evaluate outcomes after revision TKA for arthrofibrosis.

Methods: We report the results of 65 patients who underwent revision TKA for arthrofibrosis. Infected cases were excluded from this analysis. All patients underwent full revision TKA performed by one of 5 fellowship trained arthroplasty surgeons at a single institution between 2007 and 2015. Preoperative and postoperative range of motion (ROM), as well as Knee Society Scores (KSS) were recorded. Average follow-up was 47 months with minimum 2-year follow-up.

Results: Mean extension, flexion, KSS pain, KSS function, Knee scores and Total scores improved to a statistically significant extent after full revision TKA for arthrofibrosis. Mean preoperative flexion improved from 89.5 degrees to 103.3 degrees. Mean flexion contracture improved from 10.6 degrees to 3.4 degrees. BMI, age and gender were not statistically significant predictors of successful treatment, except that females had a modest but greater improvement in extension when compared to males. Patients who underwent revision for unidentified causes of arthrofibrosis in this study achieved similar improvements in ROM and KSS to patients who had identified causes such as malalignment or oversized components. We did not find that the time to revision surgery was a significant factor in our patients' outcomes, which is contrast to previous reports.

Conclusions: This is the largest series of complete revision TKA performed for arthrofibrosis to our knowledge. While arthrofibrosis after TKA can be a difficult problem to manage, consistent improvements in ROM, function and quality of life can be achieved with revision TKA.

Notes

Paper #31

Revision of UKA to TKA: Is it as Good as a Primary Result?

Adolph V. Lombardi, Jr., MD, FACS, Keith R. Berend, MD, Michael J. Morris, MD, David A. Crawford, MD, Joanne B. Adams, BA

Introduction: Unicompartmental knee arthroplasty (UKA) is touted as a more conservative, bone- and tissue-sparing procedure than total knee arthroplasty (TKA). Likewise, revision of UKA to TKA is generally a simpler procedure than revision of TKA to TKA and can be accomplished with primary TKA components in most cases. The purpose of this study was to review a consecutive series of patients undergoing revision of failed UKA to TKA to determine if etiology is similar to that reported in recent literature, and evaluate if the results align more with primary TKA versus revision of TKA to TKA.

Methods: A query of our private practice registry revealed 174 patients underwent 180 revisions of failed UKA from 1996 to 2014. Mean age at revision was 63.3 years (37-86), BMI was 32.3 kg/m² (20-58), and interval after UKA was 4.9 years (0-35). Most prevalent indications for revision of UKA were aseptic loosening (45%) arthritic progression (17%) and tibial collapse (13%).

Results: At 4 years mean follow-up, 5 knees (2.8%) have required re-revision, which is similar to what we recently reported at 5.5 years in a group of patients who underwent primary TKA (6 of 189; 3.2%), and much lower than what we observed at 6.0 years in a recent study of patients who underwent aseptic revision TKA (35 of 278; 12.6%). In the study group, Knee Society Clinical and Function scores improved from 50.8 and 50.7 preoperatively to 81.6 and 62.7 at most recent. Re-revisions were for instability (2), and 1 each aseptic loosening, infection, and arthrofibrosis.

Conclusions: Compared to published individual institution and national registry data, re-revision rates of failed UKA are equivalent to revision rates of primary TKA and substantially better than re-revision rates of revision TKA. These data should be used to counsel patients undergoing revision UKA to TKA.

Notes

Paper #32

Extensor Mechanism Reconstruction with Synthetic Mesh: Large Series of 77 Total Knee Arthroplasties

Matthew P. Abdel, MD, Christopher G. Salib, MD, Kristin C. Mara, MS, Mark W. Pagnano, MD, Kevin I. Perry, MD, Arlen D. Hanssen, MD

Introduction: Extensor mechanism disruptions after total knee arthroplasties (TKAs) are debilitating, with a variety of results reported after numerous reconstructive options. We previously reported the early results on 13 patients reconstructed with synthetic mesh. The purpose of the current study was to assess the results in a larger cohort, with emphasis on success of the mesh, clinical results, and functional outcomes.

Methods: Between 2000 and 2015, 77 patients (77 TKAs) underwent synthetic mesh reconstruction for an extensor mechanism disruption (28 for quadriceps tendon disruptions, 42 for patellar tendon disruptions, and 7 for patellar fractures) at a single tertiary care academic institution. The mean age at time of reconstruction was 66 years, with 69% being female. The mean BMI was 35 kg/m², and mean follow-up was 4 years. Eighteen underwent mesh reconstruction with primary TKAs in situ, while 59 had mesh reconstructions at the time of revision TKA. Twenty patients (26%) had previous attempts at extensor mechanism reconstructions at outside institutions. The mean time between disruption and reconstruction was 7 months.

Results: Of 77 mesh reconstructions, 65 were in situ at last follow-up (84%). Twelve failures required mesh revision due to patellar tendon re-rupture (5/12), quadriceps tendon re-rupture (5/12), and symptomatic lengthening (2/12). Four mesh failures were treated non-operatively with bracing. Survivorship free of mesh revision was 83% at 2 years in patients with no prior reconstruction, and 90% at 2 years in patients with previous attempts at non-synthetic mesh extensor mechanism procedures. Knee Society Scores significantly improved ($p < 0.0001$). Extensor lags improved by a mean of 28° with a mean postoperative extensor lag of 9° ($p < 0.0001$).

Conclusions: Extensor mechanism reconstruction with synthetic mesh is a viable option in patients with catastrophic disruption after TKA. At most recent follow-up, 84% were in situ, and the functional outcomes were excellent.

Notes

Symposium IV

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

Moderator: Jay R. Lieberman, MD

Dr. Lieberman will conduct a poll of attendees using the audience response system with real-time display of results and commentary.

Notes

The James A. Rand Young Investigator's Award

Battling the Opioid Epidemic with Prospective Pain Threshold Measurement

Brian T. Nickel, MD, Mitchell R. Klement, MD, William A. Byrd, MD, David E. Attarian, MD, Thorsten M. Seyler, MD, PhD, Samuel S. Wellman, MD

Introduction: Responsible analgesic prescribing is paramount in the opioid epidemic era yet there exists no standardized outpatient prescription regimen with total joint arthroplasty. We aim to: (1) quantify and correlate the amount of outpatient opioid needed after total knee and hip arthroplasty (TKA/THA) with preoperative objective pain pressure thresholds (PPT) and subjective pain measures (2) report incidence of non-surgical opioid prescription in the six-week postoperative period.

Methods: Prospectively, PPTs were measured using an algometer with a maximum force of 20 pounds in 160 consecutive patients undergoing arthroplasty (90 TKA/70 THA). Two locations tested: operative joint (medial epicondyle for TKA or lateral iliac crest for THA) and contralateral olecranon for systemic threshold. Visual Analog Score (VAS), Pain Severity Score (PSS), Pain Interference Score (PIS), and subjective pain threshold also obtained. Six-week outpatient narcotic consumption in morphine equivalents recorded and prescriptions cross checked with North Carolina Controlled Substance Reporting System. Multivariate analysis was performed to evaluate local and systemic PPT and subjective measures with narcotic consumption.

Results: Average operative site and systemic PPT were 6.91 and 7.72 pounds force, respectively. Subjective averages were: VAS 7.14, PSS 5.05, PIS 5.16, and perceived threshold 6.77. Six-week average outpatient narcotic consumption was 314.9 morphine equivalents or 125 five milligram oxycodone pills. On average patients required narcotics for 29 days and 20% received opioids from outside providers. Linear regression revealed a negative correlation between operative site PPT (-0.26; $p=0.047$) and systemic PPT (-0.31; $p=0.021$) while all subjective pain metrics failed to meet significance.

Conclusion: This novel, prospective study demonstrated a statistically significant negative correlation between preoperative pain threshold and outpatient narcotic consumption. 20% of patients received opioid prescriptions outside orthopaedic providers in the six weeks following surgery highlighting the importance of interdisciplinary communication. This information may prove vital in the development of a standardized prescribing policy.

Notes

The Lawrence D. Dorr Surgical Techniques & Technologies Award

“Running Two Rooms” Does Not Compromise Outcomes or Patient Safety in Total Joint Arthroplasty

William G. Hamilton, MD, Henry Ho, MS, Nancy L. Parks, MS, James F. McDonald, III, BS, Robert H. Hopper, Jr., PhD, Nitin Goyal, MD, Kevin B. Fricka, MD, C. Anderson Engh, MD

Introduction: There has been recent scrutiny from the media and federal government regarding the safety of one surgeon doing cases in two operating rooms (ORs) on the same day, but little data exists to address potential concerns. Over the past 11 years, surgeons at our institution have done total joint cases in one of two ways: either consecutively in one OR on a given day or overlapping using two ORs. This study reviews cases done via these two different methods with a focus on comparing revisions and complications between the two groups.

Methods: Using an institutional database, all primary hip and knee arthroplasties from 2006 thru 2016 were identified. Six surgeons performed a total of 16,950 cases, including 7,530 total hips and 9,420 knee arthroplasties. 7,065 (42%) were consecutive cases (CCs) and 9,885 (58%) were overlapping cases (OCs). The database was queried to compare the incidence of any component revision and complications within 90 days of surgery between the CC and OC groups.

Results: There was no difference in 90-day component revision rates among the CC and OC groups (0.6% vs. 0.8% respectively for all cases, $p=0.20$; 0.7% vs. 1.1% respectively for hips, $p=0.12$; 0.5% vs. 0.5% respectively for knees, $p=0.79$). There was also no difference in 90-day complication rates among the CC and OC groups (3.4% vs. 3.7% respectively for all cases, $p=0.36$; 4.2% vs. 4.0% respectively for hips, $p=0.70$; 2.9% vs. 3.5% respectively for knees, $p=0.17$).

Conclusions: This large study from a single institution with multiple surgeons over an 11-year period shows no compromise in patient safety or outcomes when comparing cases done in either consecutive or overlapping rooms.

Notes

The AAHKS Clinical Research Award

Intraosseous Regional Prophylaxis Provides Higher Tissue Concentrations in High BMI Patients in Total Knee Arthroplasty: A Randomized Trial

Simon W. Young, MBChB FRCS, Joon Chin, MBBS, Grant Moore, BS, Mei Zhang, PhD, Henry D. Clarke, MD, Mark J. Spangehl, MD

Introduction: Obesity is an established risk factor for deep infection following total knee arthroplasty (TKA). Low-dose vancomycin via intraosseous regional administration (IORA) obtains tissue concentrations 6-10 times greater than systemic administration, and provided more effective prophylaxis in an animal model of TKA. Enhancing prophylaxis is appealing in the higher-risk obese patient, but the pharmacodynamics of IORA in this population group are unknown. This study compared low-dose vancomycin via the IORA versus a body-weight adjusted systemic IV dose in primary TKA in obese patients.

Methods: Twenty-two patients with a body mass index >35 undergoing TKA were randomized into two groups. The IV group received 15mg/kg (maximum of 2g) of systemic IV prophylactic vancomycin over a two-hour infusion into an arm vein, timed to finish immediately prior to incision. The IORA Group received 500mg vancomycin in 150ml saline as a bolus injection into a tibial intraosseous cannula, below an inflated thigh tourniquet, immediately before skin incision. Subcutaneous fat and bone samples were taken at regular intervals until skin closure. Tissue antibiotic concentrations were measured using high performance liquid chromatography.

Results: The mean BMI was 41.1 (range 37-52) in the IORA group and 40.1 (range 35-52) in the IV systemic group. The overall mean tissue concentration in subcutaneous fat was 39.3ug/g in the IORA group and 4.4ug/g in the IV systemic group ($p < 0.01$), and in bone were 34.4ug/g in the IORA group and 6.1ug/g in the IV systemic group ($p < 0.01$). Two patients in the IV systemic group developed superficial wound infections, no deep infections occurred in either group.

Conclusion: Low-dose IORA was effective in the high-BMI population group, providing tissue concentrations of vancomycin 6-8 times higher than systemic administration. This was despite an IORA unadjusted dose of 500mg, compared to a weight-adjusted systemic dose.

Notes

Symposium V

Managing the Opioid Epidemic: The Role of the Orthopaedic Surgeon and Anesthesiologist

Co-branded by AAHKS and the American Society of Regional Anesthesia and Pain Medicine

Moderator: William A. Jiranek, MD

Faculty: Asokumar Buvanendran, MD, Lawrence D. Dorr, MD, Mark J. Spangehl, MD, Eugene Viscusi, MD

I. Predictive Factors of TKA Patients to Develop Chronic Pain, Asokumar Buvanendran MD

- A.** Preoperative factors
- B.** Postoperative factors

II. The Role of the Orthopedic surgeon for Opioid Reduction in the Hospital and Post-Acute, Lawrence D. Dorr, MD

- A.** Decreasing narcotics in the floor
- B.** Decreasing narcotics on the discharge

III. Blocks vs. Local Anesthetic Injections for Hip and Knee Arthroplasty? Mark J. Spangehl, MD

- A.** Placing pre- or postop?
- B.** Keeping out of the surgical field
- C.** Home indwelling catheters–does it make sense?
- D.** Risk to nerves with infusions

IV. Managing Prolonged Pain after TJA: Examining the Role of Opioids, Eugene Viscusi, MD

- A.** I just gave him a refill–predicting med requirements
- B.** When and who to ask for help?
- C.** Any role for sympathetic blocks? Peripheral blocks
- D.** Denervation?
- E.** When does it become CRPS?

Discussion and Questions, William A. Jiranek MD

Notes

Paper #33

Does a Balanced TKA Produce a More Forgotten Joint?

Viktor E. Krebs, MD, Gregory J. Golladay, MD, Alexander C. Gordon, MD, Preetesh D. Patel, MD, Juan C. Suarez, MD, Ivan Fernandez-Madrid, MD, **Thomas L. Bradbury, MD**, Wael K. Barsoum, MD, Carlos A. Higuera, MD

Introduction: Patient reported outcome measures are increasingly recognized as important in quantifying the clinical success of TKA. One such metric is the Forgotten Joint Score, which measures the ability of a patient to forget about their joint following surgery. Two of the primary technical goals of TKA surgery are to align the components properly and balance the soft tissues as these factors are thought to contribute to the clinical success (and lack of joint awareness) following TKA. The aim of this study was to measure post-operative joint awareness in patients with and without a balanced knee following primary TKA.

Methods: Eligible patients were randomized to one of two patient groups: sensor-guided TKA or surgeon-guided TKA. Intraoperative sensors were utilized in all cases. The validated Forgotten Joint Score-12 was assessed at 6 weeks and 6 months post-operatively. For the purposes of this study, the two randomized subject groups were pooled and stratified by their state of soft-tissue balance. "Balanced" knees were defined as having a mediolateral load differential of less than 15 lbf and "unbalanced" knees were defined as having any mediolateral load differential greater than 15 lbf. 149 subjects had 6-week data and 87 subjects had 6-month data.

Results: Of the 149 patients with 6-week data, 83 were balanced and 66 were unbalanced. Of the 87 subjects with 6-month data, 51 were balanced and 36 were unbalanced. At both 6 weeks and 6 months, the balanced group of patients reported being less aware of their joint replacement compared to the unbalanced group (Balanced 6wk 33.2 +/-9.9; Unbalanced 6wk 36.2 +/-11.6; p=0.040); (Balanced 6m 20.4 +/-12.6; Unbalanced 6m 26.5 +/-13.6; p=0.021).

Conclusions: The results of this study demonstrate that patients with quantitatively balanced TKA have statistically significantly lower Forgotten Joint Scores than patients with unbalanced TKA.

Notes

Paper #34

Cell Count and Differential of Aspirated Fluid in Immunosuppressed Patients in the Diagnosis of Total Knee Arthroplasty Prosthetic Joint Infections: A Case Series

David W. Fitz, MD, Cort D. Lawton, MD, Bennet A. Butler, MD, Daniel Li, BS, Earvin S. Balderama, PhD, Michael D. Stover, MD

Introduction: Prosthetic joint infection (PJI) is a deleterious complication of total knee arthroplasty (TKA). A mainstay of diagnosing PJI is the synovial aspirate. While the Musculoskeletal Infection Society (MSIS) has provided cutoff values for synovial leukocyte count and neutrophil percentage, it is unknown if these values are valid in patients with compromised immune systems. We sought to assess whether the accepted cutoff values for synovial leukocyte count and neutrophil percentage are valid in targeted immunosuppressed individuals.

Methods: We retrospectively analyzed synovial aspirates from 17 patients who had previously undergone a TKA and had one of a number of targeted diagnoses indicative of immunosuppression; 5 were found to be infected, 12 were not. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated using the MSIS cutoff values as well as various combinations with serum erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP).

Results: The median synovial fluid leukocyte count (26,000 compared with 314 cells/10-3cm³; p <0.001) and neutrophil percentage (84% compared to 26%; p=0.002) were significantly higher in patients with PJI. Applying the defined cutoff value for leukocyte count (>1100 cells/10-3cm³) and neutrophil percentage (>64%) to our cohort, we found identical sensitivities and specificities of 100% (95% confidence interval, 56.6% to 100%) and 83.3% (95% confidence interval, 55.2% to 95.3), respectively.

Conclusion: The present study suggests that a synovial fluid cell count of >1100 cells/10-3cm³ and a neutrophil percentage >64% are adequate cutoff values to differentiate between TKA with and without infection in targeted immunosuppressed individuals.

Notes

Paper #35

A Computer Model of Mid-Flexion Instability in Balanced Cruciate Retaining or Posterior Stabilized Total Knee Arthroplasty

Ran Schwarzkopf, MD, Scott Laster, MS, Nathaniel Lenz, MS, Neil P. Sheth, MD, Perry Evangelista, MD

Introduction: Total knee arthroplasty (TKA) surgical techniques target equal flexion and extension gaps to produce a well-balanced knee. Some patients have mid-flexion instability despite stability at 0 degrees and 90 degrees of flexion. This study aims to determine the effects of TKA stability while changing femur implant size and position.

Methods: A computational analysis was performed simulating knee flexion of posterior stabilized (PS) or cruciate retaining (CR) TKA designs using previously validated software. Deviations from the ideal TKA implant position were simulated by adjusting tibiofemoral proximal-distal position and femur anterior-posterior position as well as implant size. Forces in ligaments connecting the femur and tibia were collected. Anterolateral and posteromedial bundles of the PCL were also measured for CR designs. Total tibiofemoral ligament load for mid-knee flexion of 15-75° was analyzed versus proximal-distal implant position, implant size, implant design, and knee flexion for PS and CR knees. PCL load was also analyzed for CR knees.

Results: Total tibiofemoral ligament load was significantly reduced by a more proximal tibiofemoral and anterior femur position ($p < .001$). Implant size did not have a significant effect on tibiofemoral ligament load ($p > 0.1$). Implant design and knee flexion significantly influenced total tibiofemoral ligament load ($p < .001$), but the interactions with implant proximal-distal position were not significant ($p > 0.2$), indicating that implant proximal-distal position had a similar effect across the 15°-75° knee flexion range for both studied PS and CR implant designs.

Conclusion: PS and CR TKA can be well-balanced at 0° and 90° knee flexion and have instability in mid-flexion. Elevating the joint line and shifting the femur anteriorly can cause the knee to be too loose in mid-flexion. If the knee is too tight in mid-flexion, resecting more distal and posterior femur, downsizing the femoral if necessary, and increasing the tibial insert thickness can provide stability.

Notes

Paper #36

Total Knee Arthroplasty in the Osteoporotic Tibia: A Biomechanical Evaluation of the Role of Stem Extensions and Cementing Techniques

Christopher P. Walsh, MD, Shuyang Han, PhD, Colin Douglas Canham, MD, Jasmine L. Gonzalez, Philip C. Noble, PhD, Stephen J. Incavo, MD

Introduction: When total knee arthroplasty(TKA) is performed in the osteoporotic patient, poor functional outcomes and aseptic loosening increase, primarily due to compromised fixation of the prosthetic components. This may be addressed by adding stem extensions to the components, however, little data exists to support this practice. In this biomechanical study, we evaluate the impact of a stem extension on the stability of tibial fixation in the osteoporotic patient.

Methods: A standard design of tibial tray was implanted in a modified replica of the male osteoporotic tibia previously validated for fixation testing studies. Twenty-four implantations were performed using 3 variations of implant and cementing (8 surrogate tibias per group): 1) Primary implant (34mm keel) with surface cementing only, 2) Primary implant with full cementing, 3) Same as #2 with addition of a 30mm stem extension. Each construct was mounted in an MTS load frame and subjected to 500 cycles of multi-axial loading simulating walking. The 3D components of tray-tibia micromotion were measured at medial and lateral sites using digital image correlation (DIC) analysis.

Results: Total interface motion of the primary implants was $25.9\mu\text{m}\pm 14.7\mu\text{m}$ with surface cementing and $10.6\mu\text{m}\pm 7.6\mu\text{m}$ with full cementing ($p=0.001$). In comparison, the 3D motion of the fully cemented primary implants with a stem extension was only $4.4\mu\text{m}\pm 3.9\mu\text{m}$. This is only 17% of the surface cemented case ($p<0.0001$) and 42% of the fully cemented components without a stem extension ($p<0.009$).

Conclusion: As tibial components displayed greater stability when fully cemented, we do not recommend cementing of only the proximal surface of the osteoporotic tibia. As we observed the least micromotion after addition of a stem extension to the primary implant, we believe that the use of a longer stem may provide an advantage in osteoporotic TKA.

Notes

Paper #37

High Rate of Early Revision Following Custom Made Unicondylar Knee Replacement

Carl Talmo, MD, Marie C. Anderson, BS, Brian McKeon, MD, Jason Rand, PA, Claire E. Robbins, PT, Eliot Jia, BS

Introduction: There is recent interest in custom knee implants which provide patient specific instrumentation and potentially a better fit of the prosthesis. While many Unicondylar knee replacements (UKR) have demonstrated excellent durable results, there is little evidence on the track-record of newer custom-made implants.

Methods: We performed a retrospective review of all custom medial compartment UKR performed at our institution by a single surgeon from 2008-2014. A detailed review of patient factors, operative reports, clinical/radiographic follow-up was performed. The incidence of revision, radiographic and clinical failures was calculated at a minimum of 2 years. An analysis of risk factors was performed, including side, age, gender, BMI, ROM, and tibial insert thickness. Regression was used to compare continuous variables. Fischer exact test was used to determine correlation of categorical variables to incidence of revision.

Results: 115 consecutive custom medial UKR from a single manufacturer were performed during the study period. At an average of 32 months follow-up, 25 (21.7%) of the UKR had been revised to TKR. Of these revisions, 9 (36%) were revised for loosening of the femoral component, 6 (24%) were revised for loosening of the tibial component, 4 (16%) for loosening of both components, 3 (12%) for osteoarthritis, 2 for infection, and 1 for a dislodged polyethylene insert. Overall, 19 (17%) of the UKR in this series were revised for aseptic loosening and 13 (11.3%) of these involved the femoral component. We found no significant relationship between aseptic or femoral component loosening and any of the study variables.

Conclusion: In this series of custom medial compartment UKR, we found a high rate of aseptic loosening and femoral component loosening at relatively short-term follow-up. While a larger study may help to verify these findings, we recommend careful consideration of use of this implant based on our experience.

Notes

Paper #38

Results of Cemented vs. Cementless Primary Total Knee Arthroplasty Using the Same Implant Design

Adam J. Miller, BS, Jeffrey D. Stimac, MD, **Anthony W. Feher, MD**, Langan S. Smith, BS, Arthur L. Malkani, MD

Introduction: Although cemented TKA continues to be the gold standard, there are patient populations with higher failure rates with cemented TKAs, including obese and younger active patients. Patients are also living longer which makes the use of cementless or biologic fixation more attractive. The purpose of this study was to compare the results of cemented versus cementless TKA using the same design implant.

Methods: 200 patients undergoing primary cementless TKA using a highly porous tibial baseplate with mean age of 64 years (range: 42 to 88), mean BMI of 33.9 and mean follow-up of 27.6 months were compared with 200 cemented baseplates of the same design with mean age of 64 (range: 43 to 87), mean BMI of 33.1 and mean follow-up of 63.4 months. Clinical and radiographic results were compared including complications and revisions.

Results: There was no difference in age, BMI, and pre-op Knee Society scores between the groups. Cementless group demonstrated significantly higher 2-year knee scores compared to the cemented group ($p<.005$). Cementless group had one case of aseptic tibial component loosening (.05%), whereas the cemented group had 5 cases of aseptic loosening (2.5%). Overall revisions and complications were similar in both groups. Dense areas of spots welding were noted primarily around the pegs of the cementless tibial baseplate.

Conclusions: Results of cementless TKA using a highly porous tibial baseplate appear promising with early data at least equivalent to cemented TKA. Once biologic fixation is achieved, it is unlikely that cementless implants would fail due to aseptic loosening. As patient demographics undergoing TKA change to include younger, active, and obese patients along with increased life expectancy, the role of cementless TKA has increased. Longer follow-up is required to determine if benefits of biologic fixation using a highly porous implant will demonstrate improved survivorship versus cemented implants.

Notes

Symposium VI

Choices, Compromises, and Controversies in Total Knee and Total Hip Arthroplasty

Moderator: Adolph V. Lombardi, Jr., MD, FACS

Faculty: Mark W. Pagnano, MD, C. Lowry Barnes, MD, Jay R. Lieberman, MD, Giles R. Scuderi, MD

Objectives:

1. Appreciate current controversies in total knee arthroplasty and develop an analytical approach to assessment of these controversies.
2. Understand the subtle differences of opinions on various choices and compromises in total knee arthroplasty.
3. Understand the various repercussions of different choices in performing total knee arthroplasty and develop a personal approach.

Outline:

- Case 1
My Approach to Metal Sensitive Patient: Ignore It,
Mark W. Pagnano, MD
- Case 2
Modifiable Risk Factors: What You Need to Know,
C. Lowry Barnes, MD
- Case 3
DVT Prophylaxis: State of the Art,
Jay R. Lieberman, MD
- Case 4
My Postoperative Algorithmic Approach for Postoperative
Complications, Giles R. Scuderi, MD

Notes

Paper #39

Association between Pseudotumor Formation and Patient Factors in Metal-on-Metal Total Hip Arthroplasty Population

Lindsay Kleeman, MD, **Daniel E. Goltz, BS**, Joseph G. Mammarappallil, MD, PhD, Thorsten M. Seyler, MD, PhD, Samuel S. Wellman, MD, Michael P. Bolognesi, MD

Introduction: Pseudotumor formation following metal-on-metal (MoM) total hip implants can be a devastating complication predisposing to instability and infection. Our study was to determine if there is a relationship between pseudotumor type and specific patient factors, metal ion levels, implant parameters, and patient outcomes.

Methods: We retrospectively reviewed patients who underwent primary total hip arthroplasty (THA) with a MoM implant at our institution between 2002-2013 (minimum 2 years follow-up). Patients who underwent hip MRI (with MARS sequencing) following surgery were included in our review. MRI images were independently reviewed by a fellowship-trained radiologist with pseudotumors graded using a validated classification system. Statistical significance was calculated using an unpaired two-tailed t-test for continuous variables and a chi-square test for categorical variables.

Results: Our institution performed 966 MoM THAs in 830 patients. We identified 207 hips with a post-operative MRI. Evidence of pseudotumor was present in 107 hips (52%), with an average size of 113.8 cm³. Of these, 65 (61%) were cystic with a wall thickness less than 3 mm, 22 (21%) were cystic with a wall thickness greater than 3 mm, and 20 (19%) were predominantly solid masses. Patients with thick-walled cystic or solid masses had significantly higher cobalt and chromium levels than those with a thin-walled pseudotumor ($p < 0.001$). Patients with pseudotumor had larger cup sizes, high offset stems, and were more likely to be revised than those without evidence of pseudotumor (all $p < 0.05$). Patients with thick-walled cystic or solid masses were more likely to be revised than those with thin-walled cystic masses ($p < 0.001$).

Conclusion: Pseudotumor formation following metal-on-metal total hip arthroplasty is high, seen in 52% of our patients who underwent an MRI following their surgery. Risk factors for development of a pseudotumor include elevated cobalt levels, larger implant head size and high.

Notes

Paper #40

Mechanical Complications Following Total Hip Arthroplasty Based on Surgical Approach: A Large Single Institution Cohort Study

Andrew N. Fleischman, MD, Majd Tarabichi, MD, Zachary Magner, PhD, Javad Parvizi, MD, Richard H. Rothman, MD, PhD

Introduction: With a renewed interest in surgical approach, our aim was to perform the first single institution study on the risk for early operative and non-operative mechanical complications after THA based on approach.

Methods: A retrospective observational study was conducted on 16,186 consecutive primary THA cases performed by 17 surgeons from 2010-2016. Revision or conversion THA and cases performed for hip fracture, with a recalled prosthesis, or during a surgeon's learning period were excluded. THAs were performed using a direct anterior (DA; n=5,465), direct lateral (DL; n=8,561), or posterolateral approach with soft tissue repair (PL; n=2,160). All mechanical complications, including instability/dislocation, periprosthetic fracture, loosening, and prosthesis failure, within the first two years were identified with an extensive manual review of institutional records. The primary analysis was performed with time to event Cox regression, accounting for patient and surgeon characteristics.

Results: Compared with the DL approach, the risk for mechanical complications was higher for both the DA (hazard ratio [HR] 2.4) and PL (HR 2.0) approaches. Instability accounted for the greatest risk increase, especially for PL patients (HR 10.0), with adjusted 2-year incidences of 0.17%, 0.74%, and 1.74%, respectively, for the DL, DA, and PL approaches. While occurring at similar rates for the PL and DL approaches, the risk for periprosthetic fracture and loosening were increased for the DA approach (HR 2.3 and 1.7, respectively). Thus, femoral failure, including fracture or loosening requiring reoperation, occurred more frequently for DA patients, with an adjusted incidence of 1.20% compared with 0.58% and 0.47%, respectively, for the DL and PL approaches.

Conclusion: Even with soft tissue repair, instability continues to plague the PL approach. While reducing dislocation, a higher risk of femoral failure with DA THA must also be considered. Nevertheless, the DL approach appears to confer the lowest overall risk for mechanical complications.

Notes

Paper #42

Early Outcomes of Revision Surgery for Head-Neck Taper Corrosion of Metal-on-Polyethylene THA with Pseudotumors in 43 Patients

John MacAuliffe, MS, Yun Peng, PhD, Paul G. Arauz, PhD, **Young-Min Kwon, MD, PhD**

Introduction: Recently, adverse local tissue reactions (pseudotumors) due to tribocorrosion of head-neck taper junctions in contemporary THA are emerging as an important reason for failure requiring revision surgery. The purpose of this study was to report early complication rates and outcome of revision surgery for head-neck taper corrosion in patients with metal-on-polyethylene (MoP) THA.

Methods: A total of 44 revision surgeries in 43 patients (M:18, F:25) with MoP THA with an average age of 68.2 years were evaluated. The time between index surgery and revision surgery was 77 months (range: 7-264). The follow-up period after revision was a minimum of 12 months (range: 12-45). The index femoral head size was 28mm (4), 32mm (15), 36mm (19), 40mm (5), and 46mm (1). The indication for revision surgery was the presence of symptomatic pseudotumours on MRI with elevated metal ion levels.

Results: At mean follow up of 13 months, at least one complication had occurred in 6 patients of the 44 revisions (14%): recurrent dislocations, acetabular component aseptic loosening, and infections. The overall re-operation rate was 7% (3 of 44 hips). The mean serum levels of cobalt decreased from 7.7 µg/L (2–56.1 µg/L) pre-revision to 3.0 µg/L (0.2–14.0 µg/L) post-revision. The mean serum levels of chromium were at similar levels with 2.0 µg/L (0.2–16.4 µg/L) pre-revision and 2.0 µg/L (0.2–8.3 µg/L) post revision.

Conclusion: The current study is one of the largest cohorts follow-up to date on the clinical outcomes of revision due to head-neck taper corrosion in MoP THA. A high rate of early complications (14%) and re-revisions (7%) was observed after revision of pseudotumour associated with head-neck taper corrosion. This information provides clinically useful information for pre-operative counseling of THA patients undergoing revision surgery for head-neck taper corrosion.

Notes

Paper #43

Impaction Force Influences Taper-Trunnion Stability in Total Hip Arthroplasty

Jonathan R. Danoff, MD, Jason Longaray, MS, Raga Rajaravivarma, MS, Ananthkrishnan Gopalakrishnan, MD, Antonia F. Chen, MD, MBA, William J. Hozack, MD

Introduction: Lack of uniformity in femoral head-trunnion assembly protocols and higher offset femoral heads may be associated with increased complication rates, possibly due to insufficient taper-trunnion engagement. This study investigated the influence of femoral head impaction force, number of head strikes/energy sequence, and head offset on the strength of the taper-trunnion junction.

Methods: Thirty titanium-alloy trunnions were mated with 36-mm zero-offset cobalt-chromium femoral heads of corresponding taper angle and preloaded with 10N. Each was mounted below a drop tower calibrated to impact the head with 2.5J or 8.25J, resulting in approximately 6kN or 14kN impaction force, respectively, in a single strike or combinations of 6kN+14kN or 14kN+14kN. Additionally, ten 36-mm heads with -5 and +5 offset were impacted with sequential 14kN+14kN strikes. Heads were subsequently disassembled utilizing a screw-driven mechanical testing frame and peak distraction force was recorded. Statistical calculations were performed using one-way ANOVA and Student's t-tests with statistical significance set to $p < 0.05$.

Results: Femoral head pull-off force was 45% the strike force, and heads struck with a single 14kN impact showed a pull-off force twice that of the 6kN group. Two head strikes with the same force did not significantly differ from those struck once for either 6kN ($p=0.09$) or 14kN ($p=0.9$). If the forces of the two impactions varied, but either impact measured 14kN, a 50% higher pull-off force was found compared to impactions of either 6kN or 6kN+6kN. Femoral head offset did not significantly change the pull-off force among -5, 0, and +5 heads ($p=0.37$).

Conclusion: Femoral head impaction force significantly determines femoral head stability, while offset does not affect pull-off force. Multiple head strikes do not add additional strength, as long as a single strike achieves 14kN force at the mallet-head impactor interface. Insufficient impaction force may lead to inadequate engagement of the trunnion-taper junction.

Notes

Paper #44

Intraoperative Evaluation of Acetabular Cup Position During Anterior Approach Total Hip Arthroplasty: Are We Accurately Interpreting?

Dimitri E. Delagrammaticas, MD, MS, George Ochenjele, MD, Brett D. Rosenthal, MD, Benjamin Assenmacher, MD, David W. Manning, MD, Michael D. Stover, MD

Introduction: Intraoperative radiographic evaluation during total hip arthroplasty (THA) has shown to improve the accuracy of acetabular component placement, however, differences in interpretation based on radiographic technique has not been established. This study aims to determine if differences exist in the interpretation of acetabular component abduction and anteversion between intraoperative fluoroscopic posterior-anterior hip (FH), intraoperative fluoroscopic posterior-anterior pelvis (FP), and postoperative anterior-posterior pelvis (PP) radiographs.

Methods: 55 consecutive direct anterior THAs in 49 patients over a 6-month period were prospectively enrolled. Target anteversion and abduction was defined by the Lewinnek zone. Fluoroscopy was used to direct acetabular component placement intraoperatively. After final cup implantation, fluoroscopic posterior-anterior hip and pelvis images were obtained for analysis. At the completion of the procedure, an anterior-posterior plain pelvis radiograph was obtained in the operating room. Acetabulum component abduction and anteversion were postoperatively determined using specialized software on each of the three image acquisition methods.

Results: Average acetabular cup abduction for FH, FP, and PP was 40.95 ± 2.87 , 38.87 ± 3.82 , and 41.73 ± 2.96 degrees, respectively. Target abduction was met on 100%, 100%, and 98% of FH, FP, and PP, respectively. The FP tended to underestimate acetabular cup abduction compared to both the FH and PP ($p < 0.0001$). Average acetabular cup anteversion for FH, FP, and PP was 19.89 ± 4.87 , 24.38 ± 5.31 , and 13.36 ± 3.52 degrees, respectively. Target anteversion was met on 87%, 64%, and 100% of FH, FP, and PP, respectively. Both the fluoroscopic hip and fluoroscopic pelvis overestimated anteversion compared to the AP pelvis, with a 6.38-degree greater mean value measurement for FH ($p < 0.0001$), and an 11-degree greater mean value measurement for FP ($p < 0.0001$).

Conclusions: Fluoroscopic technique and differences between radiographic projections may result in discrepancies in component position interpretation. Our results support the use of the posterior-anterior hip as the choice fluoroscopic imaging technique.

Notes

Symposium VII

The New Disease: Taper Corrosion After THA – A State of the Art 2017 Update for AAHKS Members

Moderator: Daniel J. Berry, MD

Faculty: Craig J. Della Valle, MD, Joshua J. Jacobs, MD, Michael P. Bolognesi, MD, Tad M. Mabry, MD

Objectives:

1. Understand the current consensus on most common clinical and implant factors associated with taper corrosion.
2. Understand the best diagnostic tests for taper corrosion and how to exclude other diagnoses that may masquerade as taper corrosion.
3. Understand optimal operative methods to treat taper corrosion and to prevent associated complications.

Outline:

Diagnosing Taper Corrosion: When is it the Taper, When Is It Something Else?, Craig J. Della Valle, MD

Why have We Seen More Taper Corrosion in the Last 5 Years? The Implants? The Surgery? Metal Testing?, Joshua J. Jacobs, MD

Management of the Implant with Taper Corrosion: What to Change and What to Change it To, Michael P. Bolognesi, MD

Complications Associated with Operating on Taper Corrosion, Tad M. Mabry, MD

Notes

Impingement-Free Hip Range of Motion in Asymptomatic Young Adult Females

Charles C. Yu, MD, **Michael C. Mahan, MD**, Rachel Shields, MD, Marnix Van Holsbeeck, MD, Ira Zaltz, MD

Introduction: Femoroacetabular impingement is a recognized cause of early hip osteoarthritis. This is attributed to either a cam impingement caused by a non-spherical head or a pincer impingement caused by excessive acetabular coverage. Although many surgical techniques aim to improve hip range of motion, little normative data exist on dynamic impingement-free hip range of motion (ROM) in asymptomatic individuals. Hip ultrasound can effectively measure ROM by dynamically identifying labral anatomy and femoral morphology. The purpose was to measure impingement-free hip ROM until labral deflection is observed and the maximum degree of sagittal plane hip flexion when further flexion is limited by structural femoroacetabular abutment.

Methods: Fifty-five asymptomatic adult female volunteers between the ages of 21 and 34 years underwent bilateral dynamic hip ultrasound examination. Femoral morphology was characterized and midsagittal flexion passive ROM was measured at two points: (1) at the initiation of labral deformation; and (2) at maximum flexion when the femur impinged on the acetabular rim. Additionally, AP pelvis x-ray was taken to correlate any pathological morphology. The mean age of the subjects was 26 ± 3 years and the mean body mass index was 23 ± 3 kg/m².

Results: In asymptomatic females, mean impingement-free hip passive flexion measured from full extension to initial labral deflection was $72^\circ \pm 8^\circ$ (95% confidence interval [CI], 70–74). Mean maximum midsagittal passive flexion, measured at the time of bony impingement, was $101^\circ \pm 11^\circ$ (95% CI, 99–103). There was a statistically significant correlation between impingement-free hip flexion and maximum midsagittal flexion ($R = 0.665$, $p < 0.001$).

Conclusions: Using dynamic ultrasound, we found that passive ROM in the young asymptomatic female hip was approximately 100° , much less than the motion reported in the literature. Surgical procedures that treat femoroacetabular impingement should be evaluated based on these precise normative data.

Notes

Paper #46

Does Severity of Dysplasia Influence Clinical Outcomes Following the Periacetabular Osteotomy (PAO)? A Case Control Study

George Grammatopoulos, MD, Cecilia Pascual Garrido, MD, Jeffrey J. Nepple, MD, Paul E. Beaulé, MD, Anchor Group, John C. Clohisy, MD

Introduction: Factors that improve chances of PAO success include: young age at surgery, absence of intra-articular disease and joint congruency. The aims of this case-control study from were to assess whether the severity of acetabular dysplasia has an effect on outcome following PAO and/or the ability to achieve desired acetabular correction.

Methods: This is an IRB-approved query of a prospective, multicentre, longitudinal cohort of consecutive PAOs. Of the available 381 cases, 61 hips had pre-PAO radiographic features of mild-dysplasia ($AI < 15^\circ$ and $LCEA > 15^\circ$) and comprised the cases. The cases were matched for age ($p=0.7$), gender ($p=1$), BMI ($p=0.9$), Tönnis grade pre-PAO ($p=0.6$) and joint congruency ($p=0.9$) with a group of controls ($n=183$) obtained from the remainder of the cohort. Clinical outcomes and complications were compared between the groups. Lastly, the post-PAO LCEA/AI were compared between study cases and controls; optimum correction was LCEA: 22° – 37° and AI: -5° – $+10^\circ$.

Results: At a mean follow-up of $4(\pm 1.5)$ years, the mean improvement in HHS and HOOS were $23(\pm 20)$ and $28(\pm 23)$ respectively. 3 hips had undergone a THA and 13 had undergone further procedures. There were 21 major complications. Mildly dysplastic hips had slightly inferior HOOS compared to controls, both pre- (52 Vs. 59) and post-operatively (73 Vs. 78); however, similar improvements in HHS and HOOS were seen between the groups. No difference in ability to adequately correct acetabulum was seen (67 Vs. 73% , $p=0.4$). There was no difference in the complication rate between groups ($p=0.5$). More major complications were seen in the controls ($p=0.01$); 19/21 major complications occurred in the controls [excision of HO(3), nerve injury(4), non-union(6), stress fracture(3)].

Conclusion: Functional improvement post-PAO and the ability to achieve optimum fragment correction are independent of preoperative severity of dysplasia. The lack of major nerve injuries, non-unions or ischial stress-fractures in the mildly dysplastics may be related to the smaller degree of fragment mobilization required.

Notes

Paper #47

The Fate of the Contralateral Hip in Patients Undergoing a Periacetabular Osteotomy: Are there Risk Factors for Disease Progression?

Cecilia Pascual Garrido, MD, Perajit Eamsobhana, MD, Anita Sadhu, MD, Jeffrey J. Nepple, MD, James Egan, BS, **John C. Clohisy, MD**

Introduction: The purpose of the current study was to determine (1) the rate of initial and subsequent symptom development in the contralateral hip of patients with symptomatic ipsilateral DDH undergoing a PAO and 2) to identify predictors of the development of symptomatic contralateral hip pain.

Methods: The contralateral hip of 207 consecutive patients presenting for primary surgical treatment of DDH were included prospectively. At baseline clinical presentation and follow-up time points, patients completed outcome questionnaires, including the presence of symptoms in the contralateral hip. Radiographically, Lateral center to edge (LCEA), acetabular inclination (AI) and alpha-angle on the non-operative hip were investigated.

Results: The mean age was 26.8 years. There were 177 females (85%). The mean follow up was 3.1 years (range 2-8 years). The mean LCEA of the contralateral hip was 14.30 (range 0-260), the AI was 13.50 (range -5-260) and the mean alpha angle was 51.60 (range 31.4-1020). Fifty-nine patients (28.5%) presented with symptoms in the contralateral hip at index PAO. At final follow-up, a total of fifty-two patients (25%) underwent a contralateral PAO. These included 23 patients (44%) with contralateral hip symptoms and 29 patients (18%) who were asymptomatic at index PAO. The subgroup of patients who ended with contralateral surgery were younger (24 vs 29 years old) ($p=0.004$) and had lower LCEAs (16.710 vs 11.870, $p=0.001$). Risk factors for disease progression included: hip pain at index PAO ($p=0,007$), positive FADER test ($p=0,001$) and LCEA <150 ($p=0.001$).

Conclusions: Patients with contralateral hip pain, a positive FADER test and radiographic feature of severe dysplasia, were at highest risk of disease progression in the contralateral hip. Approximately 28.5% of patients undergoing a PAO, present with symptoms in the contralateral hip. Almost half of these patients (44%) will require a contralateral hip surgery in the following 2 years.

Notes

Paper #48

Are There Disease-Specific Articular Cartilage Wear Patterns in Various Pre-Arthritic Hip Disorders?

Cecilia Pascual Garrido, MD, George Grammatopoulos, MD, Perajit Eamsobhana, MD, Anchor Group, Jeffrey J. Nepple, MD, Paul E. Beaulé, MD, FRCSC, John C. Clohisey, MD

Introduction: The aim of this study was to determine the disease-specific patterns of articular cartilage damage in patients undergoing hip arthroscopy for the treatment of FAI, DDH or combined FAI/DDH pathologies.

Methods: A multicenter longitudinal cohort was utilized to identify 1358 patients who underwent a hip arthroscopy (alone or in common with an open procedure) for the treatment of acetabular DDH or/and FAI. The mean patient's age at the time of surgery was 30.5 (range: 8–68) and there were 944 females (70%). The average BMI was 25 (range: 17–53). Acetabular and femoral head chondromalacia was classified arthroscopically by location and severity. Only lesions grade =2 (malacia, debonding, cleavage and defect) were reported. Radiographic evaluation included: acetabular inclination (AI), lateral center edge angle (LCEA) and alpha angle. Hips were categorized as: DDH (n:466) (LCEA <25-alpha angle <55), DDH+Cam (n: 101) (LCEA <25 and alpha angle >55), Cam FAI (n:466) (LCEA >25-alpha angle >55), Pincer FAI (n:42) (LCE >35) and Combined Cam/Pincer FAI (n:283) (LCEA >35 and alpha >55).

Results: Overall, articular cartilage damage was observed in 90% of the hips. Patients over 20-years-old had significantly more cartilage wear at the acetabulum and femoral head (99% vs 83%) (11% vs 2%) ($p < 0.001$). For all groups, the most commonly affected area was the anterior and superolateral areas in the acetabulum and the anterolateral aspect of the femoral head. Patients with CAM lesions presented significantly ($p < 0.001$) higher wear in the posterior aspect of the acetabulum. The DDH group presented significantly more wear in the posteromedial femoral head ($p = 0.01$).

Conclusion: This study shows that there are specific articular cartilage wear patterns in various pre-arthritic hip diseases. A posterior acetabular wear was pathognomonic of Cam lesions. Patients with DDH had a specific pattern of wear in the posteromedial aspect of the femoral head.

Notes

Paper #51

Two-Year Results of a Randomized Trial of Robotic Surgical Assistance vs. Manual Unicompartmental Knee Arthroplasty

Mark Blyth, MD, FRCS (ORTHO), Bryn Jones, MD, FRCS (ORTHO),
Angus MacLean, MD, FRCS (ORTHO), Philip Rowe, PhD

Introduction: We have carried out the first Randomised Controlled Trial (RCT) comparing robotic-assisted and manual Unicompartmental Knee Arthroplasty (UKA). We previously reported that robotic assistance produces significantly more accurate implant positioning, early post-op pain is decreased, and better function at 3 months. We now report on the 2-year clinical outcomes.

Methods: 139 patients were randomised to receive UKA with/without the aid of robotic assistance. Patients were assessed at 3 months and 1, 2 years post-op. Outcome was assessed using the American Knee Society Score (AKSS), Oxford Knee Score (OKS), Pain VAS, Forgotten Joint Score (FJS), complications and adverse events. Subgroup analysis was performed which examined the outcome in more active patients (UCLA Activity Score >5, n=31, 22.3%). Multivariable analysis investigated whether there were any other independent predictors of outcome, other than treatment assignment.

Results: No difference in outcome observed between robotic and manual groups at 2 years for the AKSS (p=0.92). There were no significant differences in either FJS (p=0.94), Pain VAS (p=0.53) or OKS (p=0.97). In patients who were more active prior to surgery, OKS was better in the robotically assisted group at two years (p=0.04). The VAS stiffness (p=0.019) and FJS scores (p=0.017) were also better in the robotic group.

Conclusion: Robotic-assisted surgery in UKA resulted in better early post-operative pain and clinical outcomes, but this difference was not present at two years. The subgroup of patients with increased pre-operative activity levels had improved functional outcomes observed in the robotic assisted UKA group which persisted to 2 years. This is the first RCT to demonstrate functional superiority of robotically assisted UKA in a more active subgroup of patients undergoing surgery for unicompartmental osteoarthritis. The study is limited by the inherent problems associated with subgroup analysis, in a study of this size.

Notes

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