

AAHKS

26th ANNUAL MEETING

November 10–13, 2016 | Dallas, Texas



Through the Arch, Hilton Anatole Art Collection



2016 Final Program

AAHKS

2017 SPRING MEETING

MAY 5 – 6 • SAN FRANCISCO

Do you enjoy the fall meeting but miss the intimate interactions of AAHKS meetings of the past? Are you looking to get your questions answered by leading experts in a small group setting? Then the AAHKS Spring Meeting is for you!

The meeting will be centered around a case-based discussion format in small groups with a maximum of 10 participants per faculty member and symposia on important topics ranging from the business of orthopaedics to perioperative optimization and management. The meeting will facilitate the ideal learning atmosphere for the practicing hip and knee surgeon wanting to learn more about primary and revision hip and knee arthroplasty.

Friday, May 5 – Saturday, May 6, 2017

The Westin St. Francis
San Francisco on Union Square

- Limited attendance
- Instructional Course Lectures (ICL)
- Small group breakouts with faculty



Log in to register for the
meeting at www.AAHKS.org

Leadership

BOARD OF DIRECTORS

William A. Jiranek, MD, FACS, President
Mark I. Froimson, MD, MBA, 1st Vice President
Craig J. Della Valle, MD, 2nd Vice President
C. Lowry Barnes, MD, Treasurer
Michael P. Bolognesi, MD, Secretary
Jay R. Lieberman, MD, Immediate Past President
Brian S. Parsley, MD, Past President
Joseph T. Moskal, MD, Member-at-Large
Ryan M. Nunley, MD, Member-at-Large
Javad Parvizi, MD, FRCS, Member-at-Large
Scott M. Sporer, MD, Member-at-Large

COUNCIL CHAIRS

Richard Iorio, MD, Health Policy Council
Bryan D. Springer, MD,
Education and Communications Council
Ryan M. Nunley, MD, Membership Council
Javad Parvizi, MD, FRCS, Membership Council

COMMITTEE CHAIRS

Richard Iorio, MD, Advocacy
Mark I. Froimson, MD, MBA, Committee on Committees
William P. Barrett, MD, Education
Adolph J. Yates Jr., MD, Evidence Based Medicine
Christopher L. Peters, MD, Fellowship Match
C. Lowry Barnes, MD, Finance
Jonathan L. Schaffer, MD, MBA, Industry Relations
Stefano A. Bini, MD, International
Jay R. Lieberman, MD, Leadership Development,
Nominating, Quality Measures
Daniel A. Oakes, MD, Member Outreach
David F. Dalury, MD, Patient and Public Relations
Frank R. Voss, MD, Practice Management
John C. Clohisy, MD, Program
Harpal S. Khanuja, MD, Publications
Javad Parvizi, MD, FRCS, Research
Jeffrey A. Geller, MD, Web/Social Media

AMA DELEGATES

Chris J. Dangles, MD, AMA Delegate
Edward C. Tanner, MD, Alternate

PROGRAM COMMITTEE

John C. Clohisy, MD, 2016 Chair
Robert M. Molloy, MD, 2017 Chair
Matthew P. Abdel, MD, 2018 Chair
Gregory G. Polkowski, MD, MSc, Past Chair, Guest Editor
Bryan D. Springer, MD, Education Council Chair
Jonathan L. Schaffer, MD, MBA, I&E Liaison

ABSTRACT REVIEWERS

Matthew P. Abdel, MD
Jeffrey A. Ackerman, MD
Muyibat A. Adelani, MD
Kshitijkuma M. Agrawal, MD
Hari Bezwada, MD
Michael Blankstein, MD
James A. Browne, MD
Antonia F. Chen, MD, MBA
H. John Cooper, MD
Paul Maxwell Courtney, MD
Michael B. Cross, MD
Brian M. Curtin, MD
David F. Dalury, MD
Stephen R. Davenport, MD
Charles M. Davis III, MD, PhD
Garen Daxton Steele, MD
Daniel Del Gaizo, MD
Douglas A. Dennis, MD
Claudio A. Diaz Ledezma, MD
Stephen T. Duncan, MD
Orry Erez, MD
David W. Fabi, MD
Jared R.H. Foran, MD
Devon D. Goetz, MD
Gregory Golladay, MD
Alejandro Gonzalez Della Valle, MD
Nitin Goyal, MD
Erik N. Hansen, MD
Michael H. Huo, MD
Harry W. Schmaltz, MD
Carlos A. Higuera, MD
Derek L. Hill, DO

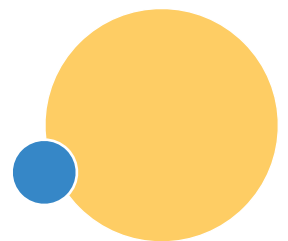
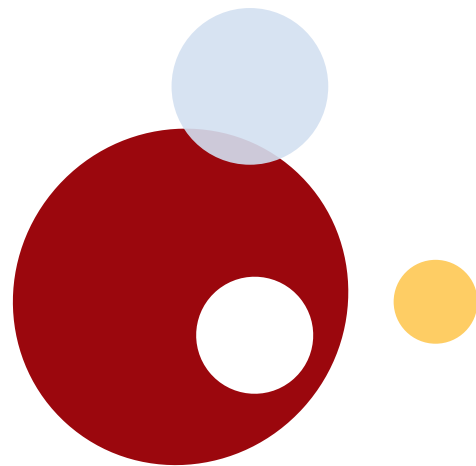
Leadership

ABSTRACT REVIEWERS (CONTINUED)

Jason R. Hull, MD
Thomas K. John, MD
Niraj V. Kalore, MD
Kenneth Urish, MD, PhD
Yair David Kissin, MD
Brian A. Klatt, MD
David J. Kolessar, MD
Jason E. Lang, MD
Brett R. Levine, MD
Theodore T. Manson, MD
J. Bohannon Mason, MD
David J. Mayman, MD
Morteza Meftah, MD
Menachem M. Meller, MBBS
R. Michael Meneghini, MD
Yogesh Mittal, MD
S. M. Javad Mortazavi, MD
Denis Nam, MD, MSc
Hari K. Parvataneni, MD
Javad Parvizi, MD, FRCS
Brett C. Perricelli, MD
Gregory G. Polkowski II, MD, MSc
Jonathan L. Schaffer, MD
David T. Schroder, MD
Ran Schwarzkopf, MD
Juan C. Suarez, MD
Krishna R. Tripuraneni, MD
Brent W. Whited, MD
Jonathan L. Schaffer, MD, MBA

STAFF

Michael J. Zarski, JD, Executive Director
Sharon M. Creed,
Accounting Coordinator & Meeting Registrar
Jean Furlan, Manager of Corporate Relations
Joshua Kerr,
Director of Advocacy and International Activities
Eileen M. Lusk, Director of Membership
Renalin J. Malvar-Ledda,
Director of Operations
Patti Rose, Membership Specialist
Denise Smith Rodd,
Manager of Communications & Web Content
Sigita Wolfe, Director of Education & Research



Education

MEETING SCOPE

The 26th 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

At the conclusion of the course, 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

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 the 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.

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 pharmaceutical and/or medical device he or she wishes to use in clinical practice. 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

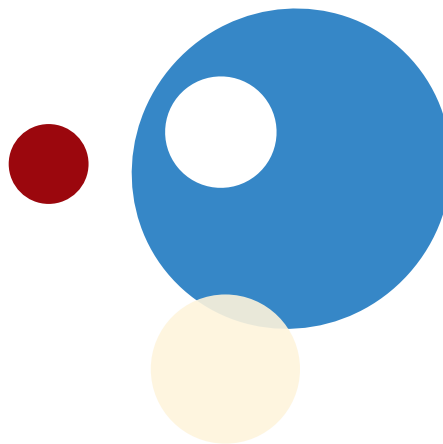
Each participant in the Annual Meeting has been asked to disclose if he or she has received something of value from a commercial company or institution, which relates directly or indirectly to the subject of their presentation. These are the disclosure categories:

- Nothing to disclose (n.)
- Royalties from a company or supplier;
- Speakers bureau/paid presentations for a company or supplier;
- Paid employee for a company or supplier;
- Paid consultant for a company or supplier;
- Unpaid consultant for a company or supplier;
- Stock or stock options in a company or supplier;
- Research support from a company or supplier as a PI
- Other financial or material support from a company or supplier
- Royalties, financial or material support from publishers
- Medical/Orthopaedic publications editorial/governing board
- Board member/committee appointments for a society

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.

Educational Grants

AAHKS wishes to thank **DePuy Synthes, Smith & Nephew, Stryker** and **Zimmer Biomet** for their generous educational grants that make the Annual Meeting possible.



Schedule

Wednesday, November 9, 2016

10:00 a.m. – 5:00 p.m.	Exhibit Set Up	Trinity Exhibit Hall/ Learning Center
------------------------	-----------------------	--

Thursday, November 10, 2016

6:30 a.m. – 8:00 p.m.	Registration	Peacock Foyer
-----------------------	---------------------	---------------

10:00 a.m. – 5:00 p.m.	Exhibit Set Up	Trinity Exhibit Hall/ Learning Center
------------------------	-----------------------	--

11:30 a.m. – 12:00 p.m.	Lunch	Chantilly Foyer
-------------------------	--------------	-----------------

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(s)[™], unless noted otherwise.

7:30 – 11:30 a.m.	Value Based Care and Its Implications: Preparing for Bundled Payments and CJR <i>Labrador Healthcare Consulting sponsored by Pacira Pharmaceuticals, Inc.</i>	Coral
-------------------	--	-------

9:30 – 11:30 a.m.	Protecting Your Patients: Incision Management Following Complex Primary and Revision Joint Arthroplasty <i>Acelity/KCI</i>	Sapphire
-------------------	---	----------

12:00 – 2:00 p.m.	Multimodal Pain Management for Total Hip and Knee Arthroplasty Patients: Current Concepts and Controversies 2016 <i>Mallinckrodt Pharmaceuticals</i>	Emerald
-------------------	---	---------

12:00 – 2:00 p.m.	Creating Value with Optimal Outcomes and Premier Patient Experience in Total Knee Arthroplasty <i>DJO Global</i>	Sapphire
-------------------	---	----------

12:00 – 2:00 p.m.	A Common Sense Approach to Legal Tools: The Key to Lawsuit Prevention and Tax Reduction <i>Legally Mine</i>	Topaz
-------------------	--	-------

2:30 – 4:30 p.m.	Outpatient Joint Replacement: More than Just a Surgical Approach <i>Corentec</i>	Sapphire
------------------	---	----------

2:30 – 4:30 p.m.	Collaboration and Outcomes in the Era of Bundled Payments <i>Halyard Health</i>	Topaz
------------------	--	-------

2:30 – 4:30 p.m.	Same-Day Surgery: The Road to Outpatient Total Joint Replacement <i>Medtronic</i>	Emerald
------------------	--	---------

5:00 – 7:00 p.m.	Managing the Episode of Care: Less Pain Means More Gain <i>Pacira Pharmaceuticals, Inc.</i>	Coral
------------------	--	-------

5:00 – 7:00 p.m.	TJA Today – Recipe for BPCI/CJR Success <i>Smith & Nephew</i>	Sapphire
------------------	--	----------

7:00 – 9:00 p.m.	Improving Patient Satisfaction in TKA with Vanguard ID and Persona Medial Congruent <i>Zimmer Biomet</i>	Topaz
------------------	---	-------

5:30 – 8:00 p.m.	AAHKS Board of Directors Meeting (invitation only)	Wedgwood Ballroom
------------------	---	-------------------

8:00 – 8:30 p.m.	FARE Board of Directors Meeting (invitation only)	Wedgwood Ballroom
------------------	--	-------------------

Schedule

Friday, November 11, 2016

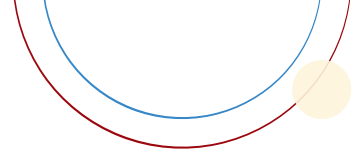
6:00 a.m.–8:00 p.m.	Registration	Peacock Foyer
6:00–8:00 a.m.	Breakfast for All Attendees	Chantilly Foyer
6:00 a.m.–12:00 p.m.	AAHKS and Guest Society Poster Set up	Chantilly Foyer and Trinity Exhibit Hall/Learning Center
8:00 a.m.–2:55 p.m.	Exhibit Hall/Learning Center Open	Trinity Exhibit Hall
6:55 a.m.–2:30 p.m.	Orthopaedic Team Member Course Chair: David F. Dalury, MD Co-Chair: Jason M. Hurst, MD	Grand Ballroom
7:00 a.m.–2:00 p.m.	The Business of Total Joint Replacement: Surviving and Thriving Co-Chair: Mark I. Froimson, MD Co-Chair: Jay R. Lieberman, MD Thank you Corporate Partner, Reflexion Health	Wedgwood Ballroom
7:00 a.m.–2:30 p.m.	AAHKS Resident Course Chair: Matthew S. Austin, MD Co-Chair: Gregory G. Polkowski, MD, MSc Thank you Corporate Partner, DePuy Synthes, Smith & Nephew, Stryker and Zimmer Biomet	Monet

Industry Symposia

7:30–9:30 a.m.	Outpatient Treatment Considerations via the Anterior Approach <i>DePuy Synthes</i>	Topaz
7:30–9:30 a.m.	The First ITB-Sparing Approach to THA: Active Patients, Fewer Complications, Lower Cost of Care Arthroplasty <i>Microport</i>	Sapphire
7:30–9:30 a.m.	Ahead of the Curve: A Multidimensional Perspective on Value-based Care and its Impact on Hip and Knee Replacement Surgeries <i>Surgical Care Affiliates (SCA)</i>	Coral
7:30–9:30 a.m.	Transforming your Orthopedic Practice in an Evolving Health Care Environment <i>Stryker Performance Solutions</i>	Emerald
10:00 a.m.–12:00 p.m.	Ceramics in THR: What's New? What's True? <i>CeramTec</i>	Coral
10:00 a.m.–12:00 p.m.	Current Trends in the Healthcare Economics: How to Increase Value <i>DePuy Synthes</i>	Topaz
10:00 a.m.–12:00 p.m.	Optimizing the Episode: Improving Total Joint Outcomes and Cost in the Era of CJR <i>Medtronic</i>	Sapphire
10:00 a.m.–12:00 p.m.	Live Robotic-Arm Assisted Surgery Demonstration: Mako™ Total Knee <i>Stryker</i>	Emerald

9:45–11.30 a.m.	Resident Course Breakouts	
	Breakout 1	Ming
	Breakout 2	Madrid
	Breakout 3	Manchester
	Breakout 4	Metropolitan Boardroom
	Breakout 5	Miro
	Breakout 6	Morocco
11:00–11:40 a.m.	Orthopaedic Team Course Lunch	Grand Ballroom
11:30 a.m.–12:00 p.m.	Business Course Lunch	Wedgwood Ballroom
11:30 a.m.–12:30 p.m.	Lunch for All Attendees	Trinity Exhibit Hall/ Learning Center
11:30 a.m.–12:30 p.m.	Exhibit Hall/Learning Center Open	Trinity Exhibit Hall
11:30 a.m.–12:45 p.m.	Resident Course Lunch	Monet
12:00–5:30 p.m.	Speaker Ready Room	Milan
12:00–9:00 p.m.	AAHKS and Guest Society Poster Exhibition	Chantilly Foyer and Trinity Exhibit Hall/ Learning Center
12:45–2:00 p.m.	Ask the Experts Case Sessions–Primary Hip Panelists: William J. Hozack, MD; William P. Barrett, MD; Jeremy M. Gililland, MD; Brian M. Curtin, MD; Javad Parvizi, MD, FRCS; Thomas P. Vail, MD; <i>Thank you Corporate Partner, Corentec</i>	Coral
12:45–2:00 p.m.	Ask the Experts Case Sessions–Primary Knee Panelists: Douglas A. Dennis, MD; Mark W. Pagnano, MD; Giles R. Scuderi, MD; C. Lowery Barnes, MD; Bryan D. Springer, MD <i>Thank you Corporate Partner, Corentec</i>	Governors Lecture Hall
12:45–2:00 p.m.	Ask the Experts Case Sessions–Revision Hip Panelists: David G. Lewallen, MD; Wayne G. Paprosky, MD; John J. Callaghan, MD; Michael D. Ries, MD; Michael Taunton, MD <i>Thank you Corporate Partner, Corentec</i>	Topaz
12:45–2:00 p.m.	Ask the Experts Case Sessions–Revision Knee Panelists: Thomas K. Fehring, MD; Scott M. Sporer, MD; Kevin L. Garvin, MD; William G. Hamilton, MD; Craig J. Della Valle, MD <i>Thank you Corporate Partner, Corentec</i>	Sapphire
12:45–2:30 p.m.	Resident Course Breakouts	
	Breakout 1	Ming
	Breakout 2	Madrid
	Breakout 3	Manchester
	Breakout 4	Metropolitan Ballroom
	Breakout 5	Miro
	Breakout 6	Morocco

Schedule



Friday, November 11, 2016

2:30–2:55 p.m.	Break	Trinity Exhibit Hall/ Learning Center
2:55 p.m.	President’s Welcome to the 26th AAHKS Annual Meeting William A. Jiranek, MD, FACS	Trinity Ballroom
3:00–4:08 p.m.	Session One: Primary Total Knee Arthroplasty Moderators: Jay R. Lieberman, MD and Stefano A. Bini, MD	
3:00 p.m.	Paper #1 Causes and Temporal Distributions of Readmissions after Total Knee Arthroplasty: A Large Database Study	Robert M. Molloy, MD, Cleveland, OH
3:06 p.m.	Paper #2 Continued Inpatient Care After Primary Total Knee Arthroplasty Increases 30-day Post-Discharge Complications: A Propensity Score-Adjusted Analysis	Douglas E. Padgett, MD, New York, NY
3:12 p.m.	Paper #3 Relationship Between Patient Expectations, Satisfaction, and Patient Reported Outcomes in Total Knee Arthroplasty: A Prospective Multi-Center Study	Deeptee Jain, MD, San Francisco, CA
3:18 p.m.	Paper #4 Administrative Databases Can Yield False Conclusions—an Example of Obesity in Total Joint Arthroplasty	Jaiben George, MBBS, Cleveland, OH
3:24 p.m.	Discussion	
3:34 p.m.	Paper #5 A Large 3-Arm RCT of Peripheral Nerve Blocks, Periarticular Ropivacaine or Liposomal Bupivacaine in Total Knee Arthroplasty	Matthew P. Abdel, MD, Rochester, MN
3:40 p.m.	Paper #6 Intraoperative Variability with Load Sensing Technology During Total Knee Arthroplasty	Alejandro Gonzalez Della Valle, MD, New York, NY
3:46 p.m.	Paper #7 Comparing the Incidence of Patellofemoral Complications in a New Total Knee Arthroplasty System vs. Currently Available Products in Two World-wide, Multi-Center Prospective Clinical Studies	Sean D. Toomey, MD, Seattle, WA
3:52 p.m.	Paper #8 Intra-Articular Injection of an Extended-Release Formulation of Triamcinolone Acetonide Provided Significant Improvement in Pain, Stiffness, and Function in Patients with Knee Osteoarthritis	Andrew I. Spitzer, MD, Los Angeles, CA
3:58 p.m.	Discussion	
4:08–4:12 p.m.	Guest Society Recognition Indian Society of Hip & Knee Surgeons and European Knee Society	Presented by William A. Jiranek, MD, FACS and Stefano A. Bini, MD

4:12 p.m.–5:12 p.m.	Symposium I Common Hip Arthroplasty Problems: Useful Alternative Solutions from “Across the Pond”	Moderator: Fares S. Haddad, FRCS
	Introduction	Fares S. Haddad, FRCS
	Even Cementless Surgeons Use Cement	Andrew R. Manktelow, MD
	Impaction Grafting Made Easy	Stephen A. Jones, MD
	Single Stage Revision for Infection—a Potential Avenue	Fares S. Haddad, FRCS
	Registry Data—Valuable Lessons, but Beware the Confounders	Jonathan Skinner, FRCS
	Discussion	
5:12–5:16 p.m.	AAHKS Humanitarian Award	Presented by Adolph V. Lombardi, Jr., MD, FACS
5:16–6:16 p.m.	Symposium II It’s a Brave New World: Alternative Payment Models and Value Creation in Total Joint Replacement	Moderator: Richard Iorio, MD
	Introduction: The Five Pillars of Value for Total Joint Replacement	Richard Iorio, MD
	Creating Value for Total Joint Replacement, Quality and Cost Effectiveness Programs	Joseph A. Bosco III, MD
	Private Bundles: The Nuances of Contracting and Managing Total Joint Replacement Episodes	Owen O’Neill, MD
	Gainsharing Strategies, Physician Champions, Getting Physician Buy-in	Ryan M. Nunley, MD
	The Arkansas Experience in Bundling, Everybody’s in the Pool	C. Lowry Barnes, MD
	Discussion	
6:16–6:20 p.m.	AAHKS Presidential Award	Presented by William A. Jiranek, MD, FACS
6:20–6:30 p.m.	AAHKS Business Meeting - Members nominate and vote on Board positions	
6:30–8:30 p.m.	Welcome Reception for All Attendees	Trinity Exhibit Hall/ Learning Center
6:30–8:30 p.m.	Exhibit Hall/Learning Center and Poster Exhibition Open	

Saturday, November 12, 2016

6:00 a.m.	5K Fun Run and 1 Mile Walk Thank you, ConforMIS and Pacira Pharmaceuticals, Inc.	Trinity Strand Trail Start on Wycliff Ave. between the Anatole and Hilton Garden Inn
6:00 a.m.–6:00 p.m.	Registration	Peacock Foyer
6:00 a.m.–6:00 p.m.	Speaker Ready Room	Milan
6:00–7:00 a.m.	Breakfast	Trinity Exhibit Hall/ Learning Center
6:00–7:00 a.m.	Exhibit Hall/Learning Center Open	Trinity Exhibit Hall
6:00 a.m.–8:30 p.m.	AAHKS and Guest Society Poster Exhibition Open	Chantilly Foyer and Trinity Exhibit Hall
7:00 a.m.–3:00 p.m.	OITE	Grand Ballroom

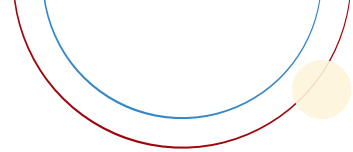
Schedule

Saturday, November 12, 2016

6:55–7:00 a.m.	Program Chair Welcome John C. Clohisy, MD	Trinity Ballroom
7:00 a.m.–7:56 a.m.	Session Two: Primary Total Hip Arthroplasty Moderators: David F. Dalury, MD and Gregory G. Polkowski, MD, MSc	
7:00 a.m.	Paper #9 Alternative Payment Models Should Risk-Adjust for Conversion Total Hip Arthroplasty: A Propensity Score-Matched Study	Alexander S. McLawhorn, MD, MBA, New York, NY
7:06 a.m.	Paper #10 Clinical Outcomes and 90-day Costs Following Hemiarthroplasty or Total Hip Arthroplasty for Hip Fracture	Ryan M. Nunley, MD, St. Louis, MO
7:12 a.m.	Paper #11 Predictors of Discharge to Skilled Nursing Facility (after Primary Total Hip Arthroplasty)	David C. Ayers, MD, Worcester, MA
7:18 a.m.	Discussion	
7:28 a.m.	Paper #12 Tranexamic Acid was Safe in Total Hip and Knee Patients with a History of Venous Thromboembolic Events: A Matched Outcome Trial	Orlando D. Sabbag, MD, Rochester, MN
7:34 a.m.	Paper #13 Preoperative PROMIS Scores Help Identify Patients Who Will Fail to Improve From Total Hip Arthroplasty at 6 to 12-Month Follow-up	Benjamin M. Strong, MD, Rochester, NY
7:40 a.m.	Paper #14 The Impact of Delirium on Perioperative Complications in Primary Total Hip Arthroplasty	Keith T. Aziz, MD, Baltimore, MD
7:46 a.m.	Discussion	
7:56–8:54 a.m.	Symposium III Current Trends in Multimodal Pain Management for Total Hip and Knee Arthroplasty (presented with American Society of Regional Anesthesia and Pain Medicine)	Moderator: William A. Jiranek, MD, FACS
	Introduction	William A. Jiranek, MD, FACS
	Preoperative Oral Medications—Effective & What Dose?	Gregory J. Golladay, MD
	Regional Anesthesia in TJA—What is the evidence	Asokumar Buvanendran, MD
	Post-Op Total Joint Arthroplasty Pain and Top 5 Management Tools	Eugene Viscusi, MD
	Periarticular Injection: What and Where?	Jeremy A. Ross, MD
	Discussion	
8:54–9:50 a.m.	Session Three: Infection Moderators: Craig J. Della Valle, MD and Bryan D. Springer, MD	
8:54 a.m.	Paper #15 A Novel Simple Assay to Detect Bacterial Antigen in Synovial Fluid	Keith Kardos, PhD, Philadelphia, PA
9:00 a.m.	Paper #16 The Alpha-Defensin Test Provides Incremental Benefit to the Traditional Tests for Periprosthetic Joint Infection	Carl A. Deirmengian, MD, Philadelphia, PA

9:06 a.m.	Paper #17 Familial Clustering in Periprosthetic Joint Infection: A Population-Based Cohort Study	Jeremy M. Gililland, MD, Salt Lake City, UT
9:12 a.m.	Discussion	
9:22 a.m.	Paper #18 Cost Effectiveness of Staphylococcus Aureus Decolonization Strategies in High-Risk Arthroplasty Patients	Andy O. Miller, MD, New York, NY
9:28 a.m.	Paper #19 Treatment of Periprosthetic Joint Infection based on Species of Infecting Organism: A Decision Analysis	Thomas J. Parisi, MD, JD, Denver, CO
9:34 a.m.	Paper #20 Comorbidity-Specific Outcomes Differences in Hip Periprosthetic Joint Infection Treatment	Joseph Kavolus, MD, MSCR, Durham, NC
9:40 a.m.	Discussion	
9:50–10:18 a.m.	Break	Trinity Exhibit Hall/ Learning Center
10:18–11:14 a.m.	Session Four: Health Policy Moderators: Mark I. Froimson, MD, MBA and Adolph J. Yates, MD	
10:18 a.m.	Paper #21 Analysis of Post-Discharge Timing and Risk Factors for Complications in Home-Discharged Primary Total Knee Arthroplasty Patients	Dong-han Yao, BA, New York, NY
10:24 a.m.	Paper #22 Modifiable Risk Factors in Primary Joint Arthroplasty Increase 90-day Cost of Care	William C. Schroer, MD, St. Louis, MO
10:30 a.m.	Paper #23 Analysis of Outcomes Following Total Knee Arthroplasty: Do All Databases Produce Similar Findings?	John J. Callaghan, MD, Iowa City, IA
10:36 a.m.	Discussion	
10:46 a.m.	Paper #24 Can an Arthroplasty Risk Score Predict Bundled Care Events after Total Joint Arthroplasty?	Blair S. Ashley, MD, Philadelphia, PA
10:52 a.m.	Paper #25 Prolonged Conservative Management in Total Joint Arthroplasty: Harming the Patient?	Carlos J. Lavernia, MD, Miami, FL
10:58 a.m.	Paper #26 External Clinical Validation of the “OARA Score” for Outpatient Joint Arthroplasty Candidates	Michael P. Bolognesi, MD, Durham, NC
11:04 a.m.	Discussion	
11:14–11:59 a.m.	Keynote Address Terry Bradshaw, Pro Football Hall of Fame Quarterback and Broadcaster	
11:59 a.m.–12:59 p.m.	Lunch for All Attendees	Exhibit Hall/ Learning Center
11:59 a.m.–12:59 p.m.	Exhibit Hall/Learning Center Open	

Schedule



Saturday, November 12, 2016

12:59–1:55 p.m. Session Five: Revision Total Hip and Knee Arthroplasty

Moderators: William A. Jiranek, MD, FACS and James A. Keeney, MD

12:59 p.m.	Paper #27 Preoperative Activity Level Does Not Effect Postoperative Outcomes with a Contemporary Revision Total Knee System	Kirby D. Hitt, MD, Temple, TX
1:05 p.m.	Paper #28 Higher Tissue Concentrations of Vancomycin with Low-dose Intraosseous Regional vs. Intravenous Systemic Prophylaxis in Revision Total Knee Arthroplasty: A Randomized Trial	Mark J. Spangehl, MD, Phoenix, AZ
1:11 p.m.	Paper #29 Porous-Coated Metaphyseal Sleeves for Severe Femoral and Tibial Bone Loss in Revision Total Knee Arthroplasty	Tyler S. Watters, MD, Denver, CO
1:17 p.m.	Discussion	
1:27 p.m.	Paper #30 Revision Total Hip Arthroplasty—Reducing Hospital Cost through Fixed Implant Pricing	Kristopher D. Collins, MD, Lynchburg, VA
1:33 p.m.	Paper #31 The Double Cup Construct: A Novel Treatment Strategy for the Management of Paprosky IIIA and IIIB Acetabular Defects	Jonathan E. Webb, MD, Rochester, MN
1:39 p.m.	Paper #32 Outcomes of Modular Dual Mobility Acetabular Components in Revision Total Hip Arthroplasty	E. Grant Sutter, MD, MS, Durham, NC
1:45 p.m.	Discussion	
1:55 p.m.–2:00 p.m.	AAHKS Health Policy Fellow Report	P. Maxwell Courtney, MD
2:00–2:30 p.m.	Symposium IV Practice Norms in Primary Hip and Knee Arthroplasty: What is Everyone Else Doing?	Moderator: Daniel J. Berry, MD
2:30–2:35 p.m.	American Joint Replacement Registry Annual Report	Daniel J. Berry, MD
2:35–3:08 p.m.	AAHKS Award Papers	
2:35 p.m.	The James A. Rand Young Investigator’s Award Administrative Claims vs. Surgical Registry: Data Source and Outcome Disparities in Total Joint Arthroplasty	Joseph T. Patterson, MD, San Francisco, CA Presented by James A. Rand, MD
2:41 p.m.	Discussion	
2:46 p.m.	The Lawrence D. Dorr Surgical Techniques & Technologies Award Differences in Post-Operative Outcomes between Total Hip Arthroplasty for Fracture vs. Osteoarthritis	David W. Fitz, MD, Chicago, IL Presented by Lawrence D. Dorr, MD
2:52 p.m.	Discussion	
2:57 p.m.	The AAHKS Clinical Research Award What are the Costs of Knee Osteoarthritis in the Year Prior to Total Knee Arthroplasty?	Nicholas A. Bedard, MD, Iowa City, IA Presented by Jay R. Lieberman, MD
3:03 p.m.	Discussion	

3:08–3:36 p.m.	Break	Exhibit Hall/ Learning Center
3:08–3:36 p.m.	Exhibit Hall/Learning Center Open	Trinity Exhibit Hall
3:36–4:34 p.m.	Symposium V Understanding Hip Dysplasia: Evolving Disease Concepts and Treatment Innovations	Moderator: John C. Clohisy, MD
	Introduction	John C. Clohisy, MD
	A Contemporary Definition of DDH and Structural Instability	Paul Beaulé, MD
	Does Hip Arthroscopy Have a Role in the Treatment of Developmental Hip Dysplasia?	Asheesh Bedi, MD
	Innovations in Joint Preservation Procedures for the Dysplastic Hip	John C. Clohisy, MD
	Arthroplasty Challenges Covering the Spectrum of DDH	Christopher L. Peters, MD
	Discussion (including cases)	
4:34–5:30 p.m.	Session Six: Complications Moderators: Javad Parvizi, MD, FRCS and Matthew S. Austin, MD	
4:34 p.m.	Paper #33 Patient-Reported Allergies: Does the Number of Allergies Affect Outcomes Following Primary Total Hip and Knee Arthroplasty?	Jesse E. Otero, MD, PhD, Iowa City, IA
4:40 p.m.	Paper #34 Serum Metal Levels for the Diagnosis of Adverse Local Tissue Reaction Secondary to Corrosion in Metal-on-Polyethylene Bearing Total Hip Arthroplasty	Yale A. Fillingham, MD, Chicago, IL
4:46 p.m.	Paper #35 History of Beta-Lactam Allergy in Total Joint Patients: Are These Patients Really Allergic?	Nicolas O. Noiseux, MD, Iowa City, IA
4:52 p.m.	Discussion	
5:02 p.m.	Paper #36 First Time Dislocation following Total Hip Arthroplasty: What is the Risk of Subsequent Dislocation and Revision?	Jourdan M. Cancienne, MD, Charlottesville, VA
5:08 p.m.	Paper #37 Fewer Complications following Revision Hip and Knee Arthroplasty in Patients with Normal Vitamin D Levels	Sophia Traven, MD, Charleston, SC
5:14 p.m.	Paper #38 Predicting the Incremental Hospital Cost of Adverse Events among Medicare Beneficiaries in the Comprehensive Joint Replacement Program	David S. Jevsevar, MD, MBA, Lebanon, NH
5:20 p.m.	Discussion	

Schedule

Saturday, November 12, 2016

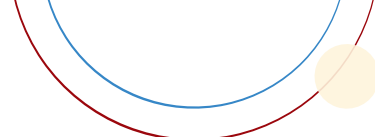
5:30–6:30 p.m.	Symposium VI Periprosthetic Joint Infection, Practical Guide to Management	Moderator: Javad Parvizi, MD, FRCS
	Introduction/Prevention of Periprosthetic Joint Infection: The CDC has Spoken	Javad Parvizi, MD, FRCS
	Diagnosis of Periprosthetic Joint Infection: An Algorithm Based Approach	Craig J. Della Valle, MD
	One-Stage Exchange Arthroplasty: An Underutilized Treatment Strategy	Fares S. Haddad, FRCS
	Management of Periprosthetic Joint Infection: The More You Learn the Less You Know	Matthew S. Austin, MD
Discussion		
6:30–8:30 p.m.	President’s Reception for All Attendees	Exhibit Hall/ Learning Center
8:30–11:00 p.m.	“Docs’ Night Out” Benefit Event for Operation Walk USA and FARE	Chantilly Ballroom West

Sunday, November 13, 2016

6:00–10:00 a.m.	Registration	Peacock Foyer
6:00–7:00 a.m.	Breakfast	Exhibit Hall/ Learning Center
6:00 a.m.–12:00 p.m.	Speaker Ready Room	Milan
7:00–7:56 a.m.	Session Seven: Primary Total Knee Moderators: C. Lowry Barnes, MD and Jonathan L. Schaffer, MD, MBA	
7:00 a.m.	Paper #39 Total Knee Arthroplasty in the 21st Century: Why Do They Fail? A Fifteen-Year Analysis of 11,135 Knees	Simon W. Young, FRACS, Auckland, New Zealand
7:06 a.m.	Paper #40 Modified Frailty Index is an Effective Risk Assessment Tool in Primary Total Knee Arthroplasty	Robert P. Runner, MD, Atlanta, GA
7:12 a.m.	Paper #41 Do Press Ganey Scores Correlate with Total Knee Arthroplasty- Specific Outcome Questionnaires in Post-Surgical Patients?	Nirav K. Patel, MD, FRCS, Baltimore, MD
7:18 a.m.	Discussion	
7:28 a.m.	Paper #42 Effectiveness of Liposomal Bupivacaine for Postoperative Pain Control in Total Knee Arthroplasty: A Prospective, Randomized, Double Blind, Controlled Trial	Jeffrey H. DeClaire, MD, Rochester Hills, MI
7:34 a.m.	Paper #43 Cryoneurolysis for Temporary Relief of Pain Associated with Knee Osteoarthritis: A Multi-center, Prospective, Double-Blind, Randomized, Controlled Trial	Vinod Dasa, MD, New Orleans, LA

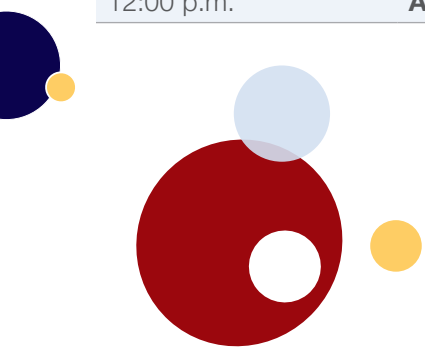


7:40 a.m.	Paper #44 Bariatric Surgery Improves Outcomes After Lower Extremity Arthroplasty in the Morbidly Obese: A Propensity Score-Matched Study	Ashley E. Levack, MD, MAS, New York, NY
7:46 a.m.	Discussion	
7:56–8:56 a.m.	Symposium VII Challenges in Revision Total Knee Arthroplasty: Exposure, Bone Defects Management and Fixation	Moderator: Adolph V. Lombardi, Jr., MD, FACS
	Introduction/Exposure from Basic to Extensile	Adolph V. Lombardi, Jr., MD, FACS
	Audience Response Questions, Discussion and Case Review	
	Safe and Effective Removal of Components	Steven MacDonald, MD
	Audience Response Questions, Discussion and Case Review	
	Bone Deficit Management: Screws, Cement, Graft, Cones and Sleeves	David G. Lewallen, MD
	Audience Response Questions, Discussion and Case Review	
	Fixation Options: Cementless, Hybrid, and Fully Cemented	Michael E. Berend, MD
	Audience Response Questions, Discussion and Case Review	
8:56–9:52 a.m.	Session Eight: Non-Arthroplasty Moderators: Christopher L. Peters, MD and Rafael J. Sierra, MD	
8:56 a.m.	Paper #45 Low Prevalence of Hip and Knee Arthritis in Marathon Runners	Danielle Y. Ponzio, MD, Philadelphia, PA
9:02 a.m.	Paper #46 Preoperative Symptoms in Femoroacetabular Impingement Patients are More Related to Mental Health Scores than the Condition of the Local Tissue	Cale A. Jacobs, PhD, Lexington, KY
9:08 a.m.	Paper #47 Long-Term Results following the Bernese Periacetabular Osteotomy	John C. Clohisy, MD, St. Louis, MO
9:14 a.m.	Discussion	
9:24 a.m.	Paper #48 Characterization of Femoral Morphology in the Borderline Dysplastic Hip: Patient-specific 3-D CT Modeling	Joel E. Wells, MD, MPH, St. Louis, MO
9:30 a.m.	Paper #49 Do Demographic or Arthropometric Factors Affect Tibial Tubercle Lateralization in a Diverse Population? An MRI Study	Isaac Livshetz, MD, Chicago, IL
9:36 a.m.	Paper #50 Large Variation in Native Femoral Anteversion in Patients Requiring Total Hip Arthroplasty	Ed Marel, MBBS, FRACS, FAOrthA, Australia
9:42 a.m.	Discussion	



Sunday, November 13, 2016

9:52–10:52 a.m.	Symposium VIII Too Loose, Too Tight, Just Right: Total Knee is a Soft Tissue Operation	Moderator: Thomas K. Fehring, MD
	Introduction	Thomas K. Fehring, MD
	Balancing the Total Knee; Getting it Right the First Time	Douglas A. Dennis, MD
	Can Kinematic Alignment or Sensor Technology Solve Instability Issues	Mark W. Pagnano, MD
	Prevention and Treatment of Flexion Instability	Matthew P. Abdel, MD
	Management of Arthrofibrosis and Flexion Contracture; Can we make it better?	Thomas P. Vail, MD
	Discussion	
10:52–11:48 a.m.	Session Nine: Primary Total Hip Arthroplasty Moderators: R. Michael Meneghini, MD; Frank R. Voss, MD	
10:52 a.m.	Paper #51 A Large Randomized Clinical Trial of Direct Anterior and Mini-Posterior THA: Which Provides Faster Functional Recovery?	Michael J. Taunton, MD, Rochester, MN
10:58 a.m.	Paper #52 Anterior Capsulectomy vs. Repair in Direct Anterior Total Hip Arthroplasty	Brian M. Curtin, MS, MD, Charlotte, NC
11:04 a.m.	Paper #53 The Impact of Total Hip Arthroplasty on Pelvic Motion and Functional Component Position is Highly Variable	Denis Nam, MD, MSc, Chicago, IL
11:10 a.m.	Discussion	
11:20 a.m.	Paper #54 Is There a Threshold Value of Hemoglobin A1c that Predicts Risk of Infection following Primary Total Hip Arthroplasty?	James A. Browne, MD, Charlottesville, VA
11:26 a.m.	Paper #55 Is Orthopaedic Department Teaching Status Associated with Adverse Outcomes of Primary Total Hip Arthroplasty?	Qais Naziri, MD, Brooklyn, NY
11:32 a.m.	Paper #56 Metal Artifact Reduction Sequence MRI Findings in Ceramic-on-Polyethylene Total Hip Arthroplasty	Jason M. Jennings, MD, DPT, Denver, CO
11:38 a.m.	Discussion	
11:48 a.m.	Concluding Remarks	William A. Jiranek, MD, FACS
12:00 p.m.	Adjourn	



AAHKS

26th ANNUAL MEETING

November 10–13, 2016 | Dallas, Texas

AAHKS Humanitarian Award

THE 2016 AAHKS HUMANITARIAN AWARD

AAHKS is proud to award Brian S. Parsley, MD with the 2016 AAHKS Humanitarian Award for his humanitarian efforts with the Faith In Practice medical mission organization. Dr. Parsley has served in the organization for 20 years—completing 50 trips to provide surgical care to the poor of Guatemala. Some of his work includes co-leading screening clinics and surgical missions and securing donations of implants, supplies and medication. His accomplishments include serving as chair of campaigns to build 5 operating rooms at Los Obras Hospital in Antigua and expanding Hilario Galinda Hospital in San Felipe. Dr. Parsley currently serves on the Faith In Practice Board of Directors.



Because of Dr. Parsley's commitment, compassion and talent, hundreds of Guatemalans are living productive lives, supporting their families and living joyfully. Because of Dr. Parsley, even the patients that he could not physically help, remember that he took his time, spoke to them, and treated them with compassion and respect. Each patient has a champion in Dr. Parsley. Through his example, I firmly believe, he is not only witnessing to the patients he cares for in Guatemala, but he is teaching those who serve beside him how to be better physicians.

– Rev. Linda L. McCarty, Faith In Practice President & CEO

Faith In Practice is committed to serving the poor of Guatemala through short-term medical mission trips that take an integrated approach to care—striving to reach those in the greatest need. More than 1,200 medical professionals and support personnel from across the United States work beside nearly 900 Guatemalan volunteers who see more than 25,000 patients annually.

Please join us in congratulating Dr. Parsley, and stop by the Humanitarian Booth D in the Exhibit Hall for more information about Faith In Practice.

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 2017 AAHKS Humanitarian Award are now being accepted through April 15, 2017 at www.AAHKS.org/Humanitarian.

Paper #2

Continued Inpatient Care after Primary Total Knee Arthroplasty Increases 30-Day Post-Discharge Complications: A Propensity Score-Adjusted Analysis

Alexander S. McLawhorn, MD, MBA, Michael C. Fu, MD, William W. Schairer, MD, Peter K. Sculco, MD, Catherine H. MacLean, MD, PhD, **Douglas E. Padgett, MD**

Introduction: Discharge destination, either home or inpatient facility, after TKA may represent significant variation in post-acute care outcomes. Differences in these outcomes are not well characterized. The purpose of this study was to characterize the 30-day post-discharge outcomes after primary TKA relative to discharge destination.

Methods: Primary TKAs performed for osteoarthritis from 2011–2014 were identified in the National Surgical Quality Improvement Program database, excluding bilateral surgeries. Propensity scores were used to adjust for selection bias in discharge destination. A propensity score was defined as the conditional probability of being discharged to continued inpatient care facilities based on demographics, obesity class, preoperative functional status, modified Charlson Comorbidity Index (CCI), American Society of Anesthesiologists (ASA) class, and the presence of pre-discharge complications. Propensity-adjusted multivariable logistic regressions were used to examine associations between discharge destination and post-discharge complications, with odds ratios (OR) and 95% confidence intervals (CI).

Results: Among 101,256 primary TKAs identified, 70,628 were discharged home and 30,628 to inpatient facilities. Patients discharged to inpatient care more frequently were female, older, higher BMI class, higher CCI and ASA classes, had pre-discharge complications, received general anesthesia, and classified as non-independent preoperatively. Propensity adjustment accounted for this selection bias (propensity-adjusted p -values >0.05). Propensity-adjusted multivariable logistic regression demonstrated that patients discharged to continued inpatient care after TKA had higher odds of any major complication (OR=1.25; 95% CI, 1.13-1.37) and readmission (OR=1.81; 95% CI, 1.50-2.18). Inpatient care increased odds for respiratory, septic, thromboembolic and urinary complications (all $p<0.05$). Associations between discharge destination and death, cardiac and wound complications were insignificant ($p>0.05$).

Conclusions: After controlling for pre-discharge patient characteristics, discharge to inpatient care versus home after primary TKA is associated with higher odds of numerous complications and unplanned readmission. These results support coordination of care pathways to facilitate home discharge after hospitalization for TKA patients whenever possible.

Notes

Paper #3

Relationship between Patient Expectations, Satisfaction, and Patient Reported Outcomes in Total Knee Arthroplasty: A Prospective Multi-Center Study

Deeptee Jain, MD, Long-Co Nguyen, BS, Ilya Bendich, MD, MBA, Courtland Lewis, MD, James Huddleston, MD, Paul J. Duwelius, MD, Brian Feeley, MD, Kevin J. Bozic, MD, MBA

Introduction: The interaction between patient expectations, patient reported outcome measures (PROMs), and patient satisfaction in patients undergoing total knee arthroplasty is not well understood.

Methods: We prospectively evaluated patients who underwent TKA across four institutions. Patient demographics including age, gender, education, race, BMI, race, and work status were collected. Preoperatively, patients completed the Hospital for Special Surgery Knee Replacement Expectations Survey (HSS-KRES), the SF-12, the UCLA activity score, and the Knee Disability and Osteoarthritis Score (KOOS). Postoperatively at 6 months, patients completed the Hospital for Special Surgery Knee Replacement Fulfillment of Expectations Survey (HSS-KRFES), a satisfaction survey, and the same PROMs. Multivariate regression models were created to predict expectations based on demographics and preoperative PROMs, and then to predict postoperative PROMs, change in PROMs, and satisfaction based on preoperative expectations.

Results: There were 83 patients enrolled (age: 69.7 +/- 9.0 years; 45% F, 45% M; education: 1.2% some high school, 12.8% high school degree, 24.4% some college, 23.1% college degree, 38.4% postgraduate degree; race: 89.2% Caucasian, 2.4% Asian, 1.2%, Hispanic, 1.2% Native American; BMI: 29.9 +/- 5.4 kg/m² ; 39% working, 61% not working). At 6 months postoperatively, the follow up rate was 84.3%. All PROMs significantly improved. No demographics or preoperative PROMs were predictive of HSS-KRES scores. Preoperative HSS-KRES did not predict postoperative satisfaction, fulfillment of expectations or final PROMs, but higher HSS-KRES did predict greater improvement in all PROMs, except SF-12 MCS (UCLA activity: B=0.031, p=0.013; SF-12 PCS: B=0.20, p = 0.004; KOOS B=0.43; p=0.011).

Conclusions: In patients undergoing TKA, demographics and preoperative function do not predict preoperative expectations of surgery. Higher expectations predict greater improvement overall physical function, activity and knee function postoperatively, but do not predict patient satisfaction or fulfillment of expectations. These findings have profound implications for counseling patients preoperatively.

Notes



Paper #4

Administrative Databases Can Yield False Conclusions—an Example of Obesity in Total Joint Arthroplasty

Jaiben George, MBBS, Jared M. Newman, MD, Alison K. Klika, MS, Carlos A. Higuera, MD, Wael K. Barsoum, MD

Introduction: Research using large administrative databases has substantially increased in the recent years. Obesity is highly prevalent among patients undergoing total joint arthroplasty (TJA), and obese TJA patients may be at higher risk for complications. Accuracy with which comorbidities are represented in these administrative databases has been questioned. The purpose of this study was to evaluate the extent and impact of errors in obesity coding in TJA research using a single healthcare system dataset.

Methods: A total of 18,030 primary total knee arthroplasties (TKA) and 10,475 total hip arthroplasties (THA) performed at a single healthcare system from 2004-2014 were included. Patients were classified as obese or non-obese by two methods: 1) BMI \geq 30 and 2) ICD-9 diagnosis codes used by National Inpatient Sample (278.0,278.00,278.01,278.03,649.10-14,793.91,V85.30-39,V85.41-45,V85.54). Complications within 90 days, transfusion requirements, length of stay and operative time were collected. The effect of obesity on various outcomes was separately analyzed for both BMI- and coding-based obesity.

Results: From 2004 to 2014, prevalence of BMI-based obesity increased from 54% to 63% and 40% to 45% in TKA and THA, respectively (Figure 1). Prevalence of coding-based obesity increased from 15% to 28% and 8% to 17% in TKA and THA, respectively. Coding overestimated the growth of obesity in TKA and THA by 8.4 and 5.6 times, respectively. When obesity was defined by coding, obesity was falsely shown to increase the risk of transfusion (TKA and THA), deep vein thrombosis (TKA), pulmonary embolism (THA) and longer hospital stay (TKA and THA) (Table 1).

Conclusions: Administrative databases might overestimate the growth of obesity due to improvements in coding over the years. Obesity defined by coding can overestimate the actual effect of obesity on complications after TJA. Therefore, studies using large databases should be interpreted with caution, especially when variables prone to coding errors are involved.

Notes

Paper #5

A Large 3-Arm RCT of Peripheral Nerve Blocks, Periarticular Ropivacaine or Liposomal Bupivacaine in Total Knee Arthroplasty[◊]

Matthew P. Abdel, MD, Adam W. Amundson, MD, Rebecca L. Johnson, MD, Michael E. Kralovec, MD, Michael J. Taunton, MD, James R. Hebl, MD, Jason K. Panchamia, DO, Carlos B. Mantilla, MD, PhD, Sandra L. Kopp, MD, Mark W. Pagnano, MD

Introduction: Two pain management strategies after TKA are peripheral nerve blocks (PNB) and peri-articular injections (PAI). Further debate surrounds PAI and the use of standard local anesthetics or a liposomal-bound bupivacaine. This investigator-initiated, independently-funded 3-arm RCT sought to determine the effectiveness of: 1) PNB with a continuous femoral catheter and single-shot sciatic block; versus 2) PAI with ropivacaine, ketorolac, epinephrine (PAI-Ropi); versus 3) PAI with liposomal bupivacaine (Exparel[®]), ketorolac, epinephrine (PAI-Lipo) after TKA.

Methods: 165 consecutive adults undergoing unilateral primary TKA at a single institution were randomized to the three intervention arms using dynamically-balanced computerized randomization. Sample size was calculated based on an MCID of 1.2 for VAS pain. All patients had a contemporary multimodal analgesia pathway using preop and postop oral. Differences in pain and opioid consumption were collected. Intention-to-treat analysis was employed.

Results: The PNB group had less pain on POD 0 (day of surgery) compared to the PAI-Ropi and PAI-Lipo groups (mean 0.6, 1.7, 2.4, respectively; $p < 0.001$). Maximum POD 1 morning pain scores were lower in the PNB group (3.0) compared to the PAI-Lipo group (4.5; $p = 0.011$) and similar to the PAI-Ropi group (4.0; $p = 0.112$). Opioid consumption was less on POD 0 in the PNB group compared to the PAI-Ropi ($p = 0.004$) and PAI-Lipo groups (10, 17.5, 25 moeq, respectively; $p < 0.001$). On POD 1, the PNB and PAI-Ropi had similar opioid consumption, while the PAI-Lipo group had more opioid consumption (22.5, 37.5, 45 moeq, respectively; $p = 0.16$ and $p = 0.006$)

Conclusions: In this large RCT, all 3 modalities provided good pain relief with mean pain scores less than 3.7 and mean maximum scores less than 6 in the first three days after TKA. On POD 0 and 1, the least pain and use of opioid medications was consistently found in the PNB group, while slightly higher pain and greater opioid use was found in the PAI-Lipo group. At no time interval did the PAI-Lipo group have less pain or opioid consumption than the PAI-Ropi group.

Notes

[◊] The FDA has not cleared the pharmaceuticals and/or medical devices listed here:
Exparel

Paper #6

Intraoperative Variability with Load Sensing Technology during Total Knee Arthroplasty

Scott R. Nodzo, MD, Vincenzo Franceschini, MD, **Alejandro Gonzalez Della Valle, MD**

Introduction: The validity and reliability of load sensing technology needs to be assessed in order to define intraoperative device expectations.

Methods: 54 patients underwent TKA using a load-sensing tibial insert to assist with ligament balance. All femoral components were implanted parallel to the transepicondylar axis (TEA). The posterior condylar angle (PCA) was measured. Load measurements were recorded at 10, 45, and 90 degrees of flexion with the trial (TRIAL) components and with definitive (FINAL) cemented implants. The surgeon was blinded to the load values. Adequate knee balance was defined as a load differential ≤ 15 pounds between compartments. Correlation and linear regression analysis were used to evaluate the compartment load differential between TRIAL and FINAL values. Additionally, we assessed correlation between the PCA and the load differential recorded at 45 and 90 degrees of flexion.

Results: Adequate balance with TRIAL and FINAL implants was observed in 89% of TKAs. Linear correlation between the TRIAL and FINAL loads in the medial compartment at 10 degrees ($R^2= 0.22$, $p=0.0003$), 45 degrees ($R^2= 0.22$, $p=0.005$), and 90 degrees ($R^2= 0.09$, $p=0.02$) of flexion were statistically significant. No significant correlation between the TRIAL and FINAL values were identified in the lateral compartment at any flexion pose. There was no relationship between the magnitude of the PCA and medial compartment loads at 45 ($R^2= 0.0006$; $p=0.86$) and 90 degrees ($R^2= 0.004$, $p=0.62$) of flexion. A similar finding was observed in the lateral compartment; suggesting that compartment loads were not significantly affected with femoral components implanted parallel to the TEA, regardless of the magnitude of the PCA.

Conclusions: Variability between the TRIAL and FINAL load measurements was higher in the lateral than medial compartment. An adequately balanced flexion gap is frequently achieved when the femoral component is implanted parallel to the TEA, and not the PCA.

Notes

Paper #7

Comparing the Incidence of Patellofemoral Complications in a New Total Knee Arthroplasty System vs. Currently Available Products in Two, World-Wide, Multi-Center Prospective Clinical Studies

Sean D. Toomey, MD, Juan Daccach, MD, Jinesh Shah, MS, Sam Himden, BA, CCRA, James Lesko, PhD, William G. Hamilton, MD

Introduction: Patellofemoral complications in TKA include crepitus and clunk (PCCs), which are associated more commonly with posterior stabilized (PS) components. The cumulative incidence rate (CIR) of PCCs and CIR of symptomatic patellofemoral crepitus excluding clunk (SC) at both 1-year and 2-year post-op using a new knee implant system (NEW-TKA) were compared to currently available products (CA-TKA).

Methods: From October 2011-March 2015, 22 investigators (from US, UK, Australia, New Zealand) prospectively enrolled 845 patients with CA-TKA. 422 (50%) received a PS-configuration. From November 2012-May 2015, 23 investigators (19 from CA-TKA study) enrolled 1,138 patients in the NEW-TKA study. 584 (51%) received a PS-configuration. PCCs were compared and a focused comparison of SC excluding clunk was analyzed. CIR was estimated with Kaplan-Meier time-to-event methodology. The time variable was time to first observation of the event, or last clinical follow-up or death if there was no event. The CIR was 100% minus Kaplan-Meier event-free survivorship.

Results: Demographics and length of follow-up were similar. In CA-TKA, 29-PCCs (27 Crepitus, 2 Clunk) were reported with a CIR of 5.14% at 1-year and 6.74% at 2-years. For NEW-TKA, there were 16-PCCs (14 Crepitus, 2 Clunk). CIR was 2.96% at 1-year and 4.78% at 2-years. In CA-TKA there were 13-SCs (11 PSRP, 2 PSFB), of which 11 occurred prior to 2-years post-op, with a CIR of 2.97%, whereas for NEW-TKA, there were 5-SCs (4 PSRP, 1 PSFB) of which all occurred prior to 2-years post op with a CIR of 1.69%. A log-rank test showed that differences in the point-wise estimates of PCC and SC among PS knees were not statistically significant through 2-years post-op with these interim data (p-value for PCC=0.262; p-value for SC=0.207).

Conclusions: At 1-year, incidence of SC in NEW-TKA was half of that for CA-TKA; while not statistically significant, this trend is promising. Longer follow-up is ongoing. The time to event methodology is useful for comparing adverse events with cohorts of varying follow-up times.

Notes



Paper #8

Intra-Articular Injection of an Extended-Release Formulation of Triamcinolone Acetonide Provided Significant Improvement in Pain, Stiffness and Function in Patients with Knee Osteoarthritis^o

Andrew I. Spitzer, MD, Jay Lieberman, MD, Deryk Jones, MD, David Jevsevar, MD, Joelle Lufkin, MPH, James R. Johnson, Ph.D., Mittie K. Doyle, MD, Neil C. Bodick, MD, PhD

Introduction: FX006, an extended-release formulation of triamcinolone acetonide (TCA), prolongs TCA joint residency and reduces systemic exposure following intra-articular injection in patients with knee osteoarthritis. This multinational phase 3 study (NCT02357459) evaluated effects on pain relief, physical function, stiffness, and quality of life (QoL). Clinical relevance of treatment effects were evaluated post-hoc with application of Minimum Clinically Important Improvement (MCII) criteria from the 2013 AAOS Treatment of Osteoarthritis of the Knee Evidence-Based Guideline.

Methods: Patients with Kellgren-Lawrence grade 2/3 knee osteoarthritis and baseline average daily pain (ADP) score ≥ 5 to ≤ 9 on an 11-point numeric rating scale were randomized to FX006 40 mg, placebo, or standard TCA 40 mg. Weekly mean ADP, Western Ontario and McMaster Universities Arthritis Index (WOMAC) A (pain), B (stiffness), and C (function), and Knee Injury and Osteoarthritis Outcome Score (KOOS) QoL were assessed at 4-week intervals over 24 weeks. Safety assessments included adverse event (AE) monitoring and clinical, laboratory, and radiographic evaluations.

Results: 484 patients were treated (FX006, $n=161$; placebo, $n=162$; TCA, $n=161$). Baseline characteristics were similar across groups. FX006 demonstrated statistically significant improvement over placebo in Week-12 mean ADP ($P < 0.0001$); improvement over placebo and TCA in WOMAC A, B, and C, at Weeks 4, 8, and 12 ($P < 0.05$); and improvement over placebo and TCA in KOOS QoL at Weeks 4, 8, and 12 ($P < 0.05$). Improvement produced by FX006 exceeded AAOS thresholds for MCII treatment effect for each WOMAC subscale. Further, FX006, but not TCA, achieved AAOS definition for clinically significant improvement. No serious drug-related AEs occurred. AEs were balanced across arms and generally mild.

Conclusions: In this phase 3 study of patients with knee osteoarthritis, intra-articular injection of FX006 demonstrated clinical significance according to AAOS MCII criteria for improvement in osteoarthritis-specific measures of pain, stiffness, and function with an AE profile similar to placebo.

^o The FDA has not cleared the pharmaceuticals and/or medical devices listed here: FX006 is an investigational pharmaceutical product

Notes

Symposium I

Common Hip Arthroplasty Problems: Useful Alternative Solutions from “Across the Pond”

Moderator: Fares S. Haddad, FRCS

Faculty: Andrew Manktelow, MD, Stephen A. Jones, MD, Fares Haddad, FRCS, John Skinner, FRCS

This symposium is designed to share experiences of useful current techniques from outside the United States that may help hip surgeons in their day to day practice. The remit is not to change philosophy, but to update on alternatives that are available and evidence based, and can help in some situations. The faculty are all experienced, high volume hip surgeons with a good knowledge of North American practice.

Objective: Review alternative strategies and help the delegates see where these might fit into their practice.

Outline:

- Introduction—Fares S. Haddad, FRCS
- Even Cementless Surgeons Use Cement—Andrew Manktelow, MD
- Impaction Grafting Made Easy—Steve Jones, MD
- Single State Revision for Infection—Fares S. Haddad, FRCS
- Registry Data—Valuable Lessons, but Beware the Confounders—John Skinner, FRCS
- Discussions (including cases)

Notes



Symposium II

It's a Brave New World: Alternative Payment Models and Value Creation in Total Joint Replacement

Moderator: Richard Iorio, MD

Speakers: Ryan Nunley, MD, C. Lowry Barnes, MD, Joseph A. Bosco, III, MD, Owen Roe O'Neill, MD

In April, 2016, the Centers for Medicare and Medicaid Services (CMS) initiated a mandatory Alternative Payment Model (APM) called Comprehensive Care for Joint Replacement (CJR) which mimics the voluntary Model 2 Bundled Payment for Care Improvement Initiative started in 2013. Well aligned, effective hospital systems have performed well in terms of financial reconciliation and quality metrics improvement in BPCI. Key components of that success include emphasis on alignment of stakeholders, gain sharing, preoperative patient optimization, care management delivery, evidence based care pathway protocols, and patient education aimed at aligning expectations and minimizing non-essential post-acute services. CJR will affect approximately 25% of the CMS TJA population and is projected to save Medicare \$354 million over its 5-year test period. It is likely that more APM's will be introduced as a result of value based purchasing. This symposium will emphasize the role of the physician champion as the leader of APM implementation. All of the symposium participants have extensive experience with APM implementation.

Objective: Review 5 viewpoints of the Value Based approach to TJR

Outline:

Introduction: The Five Pillars of Value for TJR – Richard Iorio, MD

Creating Value for TJR, Quality and Cost Effectiveness Programs – Joseph A. Bosco, MD

Private Bundles: The Nuances of Contracting and Managing TJR Episodes – Owen O'Neill, MD

Gainsharing Strategies, Physician Champions, Getting Physician Buy in – Ryan Nunley, MD

The Arkansas Experience in Bundling, Everybody's in the Pool – C. Lowry Barnes, MD

Discussion

Notes



Paper #9

Alternative Payment Models Should Risk-Adjust for Conversion Total Hip Arthroplasty: A Propensity Score-Matched Study

Alexander S. McLawhorn, MD, MBA, William W. Schairer, MD, Ran Schwarzkopf, MD, MSc, David A. Halsey, MD, Richard Iorio, MD, Douglas E. Padgett, MD

Introduction: For Medicare beneficiaries, hospital reimbursement for non-revision hip arthroplasty is currently anchored on either DRG code 469 or 470. Under alternative payment models, which often include post-acute care, procedures representing increased resource utilization across complete episodes of care should be identified for risk-adjustment. The purpose of this study was to compare the 30-day outcomes of primary total hip arthroplasty (THA) versus conversion THA from prior hip surgery.

Methods: The National Surgical Quality Improvement Program (NSQIP) database was used to identify all primary and conversion THAs from 2007 to 2014. Patients with femoral neck fracture, paralysis, and cancer were excluded. To reduce confounding, conversion patients were matched 1:1 to primary THA patients using propensity scores, based on preoperative covariates. Complications, transfusions, operative time, length of stay (LOS), and discharge destination were compared. Multivariable logistic regressions were used to evaluate associations between conversion THA and these outcomes. Odds ratios (OR) with 95% confidence intervals (CIs) were determined. $P < 0.05$ defined significance.

Results: 2,018 conversion THAs were matched to 2,018 primary THAs. There were no differences in preoperative covariates (all $p > 0.05$). Conversions had longer mean operative times (148 vs. 95 minutes, $p < 0.001$), more transfusions (37% vs. 17%, $p < 0.001$), and longer LOS (4.4 vs. 3.1 days, $p < 0.001$). Conversion THA versus primary THA was associated with postoperative complications (OR=1.75; 95% CI, 1.37-2.24), deep infection (OR=4.21; 95% CI, 1.72-10.28), discharge to inpatient care (OR=1.52; 95% CI, 1.34-1.72), and death (OR=2.39; 95% CI, 1.04-5.47). Odds for readmission were insignificant ($p=0.436$).

Conclusions: Compared to primary THA, conversion THA is associated with significantly more complications, longer LOS, and more likely discharge to continued inpatient care, implying greater resource utilization for these patients versus primary THA patients. As reimbursement models shift towards bundled payment paradigms, conversion THA appears to be a procedure for which risk-adjustment is appropriate.

Notes

Paper #11

Predictors of Discharge to Skilled Nursing Facility (after Primary Total Hip Arthroplasty)

David C. Ayers, MD, Celeste Lemay, RN, MPH, Wenyun Yang, MS,
Patricia D. Franklin, MD, MBA, MPH

Introduction: As inpatient stays for total hip replacement (THR) fall to a national average of 2 days, or shorter, the discharge disposition should be determined in advance of surgery. To guide efficient discharge planning in this era of bundled payment and to optimize safe return to home, we evaluated pre-operative THR patient factors associated with post-discharge Skilled Nursing Facility (SNF) use or direct return to home.

Methods: Pre-operative demographic, medical (modified Charlson), musculoskeletal, and emotional (SF; MCS) comorbidities, and pre-THR pain and function (HOOS) and global function (SF; PCS) and discharge status were identified for a subset of patients in a cohort 6800 primary THRs. Descriptive statistics and multivariable linear models were performed.

Results: Overall, 70% of patients were discharged directly to home post-THR. Patients discharged to SNF were older (71 vs. 61 years; $p < 0.000$), and more likely to have primary Medicare insurance (45% vs 16%; $p < 0.000$). Women (39%; $p < 0.0001$) and patients with 2 or more medical comorbidities (50%; $p < 0.003$) were twice as likely to be discharged to SNF compared to men or those with no comorbidities. SNF patients had poorer physical (PCS; 29 vs 32, $p < 0.013$) and emotional health (MCS; 46 vs. 51, $p < 0.001$). Patients living alone (44%) vs. those with another adult ($p < 0.046$) were more likely to use SNF. No differences in BMI, pre-THR pain of hip function, or musculoskeletal comorbidities were identified.

Conclusions: Living alone pre-THR and increasing numbers of medical comorbidities are associated with discharge to SNF while severity of hip and musculoskeletal disease was not associated with SNF use. After discharge, an in-home family member, friend, or employed assistant may decrease the need for SNF stays. Pre-operative identification of patients most likely to require SNF care post-THR will ease discharge transitions, and allow hospitals to arrange safe, in-home support for the majority of patients.

Notes

Paper #12

Tranexamic Acid was Safe in THA & TKA Patients with a History of VTE: A Matched Outcome Trial

Orlando D. Sabbag, MD, Matthew P. Abdel, MD, Adam W. Amundson, MD, Dirk R. Larson, MS, Mark W. Pagnano, MD

Introduction: In contemporary THAs and TKAs, tranexamic acid (TXA) has proved efficacious. Many surgeons are interested in expanding its use, including patients with a prior venous thromboembolic event (VTE). Most randomized trials of TXA have excluded patients with prior VTE, leaving meta-analyses and systematic reviews unable to comment on TXA safety in the setting of prior VTE. We determined a matched, retrospective outcome study to be the best available methodology to determine safety of TXA in patients with prior VTE. We specifically asked: in patients with prior VTE, was the rate of recurrent VTE greater in patients who received IV TXA during primary THA or TKA compared to those who did not receive IV TXA?

Methods: We retrospectively reviewed 1262 patients (1620 cases) with a history of VTE who underwent primary THA or TKA between 2000 and 2012. Intravenous TXA was given in 258 (16%) of the cases and not given in 1362 (84%). VTE rates were evaluated at 90 days postoperatively. Given the rarity of recurrent VTE, patients who experienced a recurrent VTE were 2:1 retrospectively matched against patients who did not experience a recurrent VTE using age (± 5 years), sex, body mass index (± 5 kg/m²), type of surgery, ASA score, and type of chemoprophylaxis.

Results: In patients with prior VTE, the rate of recurrent VTE was not significantly greater in patients who received IV TXA (2.3%; 6/258) compared to in those who did not receive IV TXA (1.8%; 25/1362; $p = 0.6$). Of the 31 patients who experienced a recurrent VTE, the 2:1 matched control identified 62 patients who did not have a recurrent VTE. That matched outcome analysis demonstrated that IV TXA did not increase the risk of recurrent VTE (OR 0.9; $p=0.9$).

Conclusions: Patients with a history of VTE had a low risk of recurrent VTE (2%) after contemporary THA and TKA, and that rate was not increased with the use of IV tranexamic acid.

Notes

Paper #13

Preoperative PROMIS Scores Help Identify Patients Who Will Fail to Improve from Total Hip Replacement at 6-12 Month Follow-Up

Benjamin Strong, MD, Richard Okafor, MD, Nathan Kaplan, MD, Bryant Ho, MD, Jeff Houck, PT, PhD, Judith Baumhauer, MD, MPH, Christopher Drinkwater, MD, John Ginnetti, MD

Introduction: The purpose of this analysis was to determine whether the use of preoperative PROMIS scores increases the probability of determining who will fail to improve at 6-12 month following THA.

Methods: Prospective PROMIS physical function (PF), pain interference(PI), and depression scores were collected for all orthopaedic patient clinic visits at a multi-surgeon tertiary total joint clinic from February 2015 to May 2016. Primary THA for osteoarthritis were identified by ICD-9 and CPT code. Of the 881 patients identified, 115 patients had complete data for a minimum of 6 months follow up. The minimal clinical important difference (MCID) was calculated using the distributive method. Receiver operating curves (ROC) were utilized to determine sensitivity/specificity for various cut points to estimate patients failing to achieve a MCID for each PROMIS domain (PF, PI, Depression). Cutoffs corresponding to 95% specificity for not achieving MCID were chosen. Pre- and post-test probabilities were then calculated using the selected cutoffs.

Results: Average follow-up was 279 days (181-447 days). Pre-test probability for patients who failed to improve physical function scores to the MCID was 48.7%. Patients with a preoperative PROMIS PF score of 48.3 or higher had a 78.3% probability of failing to reach the MCID. Pre-test probability for patients who failed to improve pain interference scores to the MCID was 46.1%. Patients with preoperative PROMIS PI of less than 52.4 had an 83.6% probability of failing to meet the MCID. Pre-test probability for patients who failed to improve depression scores to the MCID was 30.4%. Patients with PROMIS depression less than 45.7 had a 74.8% probability of failing to meet the MCID.

Conclusions: Preoperative PROMIS domain scores of physical function, pain interference, and depression can be utilized to identify patients who are unlikely to show improvement following THA at 6-12-month follow-up.

Notes



Paper #14

The Impact of Delirium on Perioperative Complications in Primary Total Hip Arthroplasty

Keith T. Aziz, MD, Matt Best, MD, Richard Skolasky, ScD, Karthik Ponnusamy, MD, Robert Sterling, MD, Harpal P. Khanuja, MD

Introduction: The number of elderly patients undergoing total hip arthroplasty (THA) is increasing. The relationship between delirium and peri-operative complications is not well described. We hypothesize that delirium would be associated with increased complication rates in patients undergoing primary elective THA.

Methods: Using the Nationwide Inpatient Sample (NIS), we reviewed 410,241 patients undergoing primary elective THA between 2000 and 2009. We used International Classification of Disease version 9 codes to identify patients with all subtypes of delirium. Patients with delirium (2,768 patients) were compared to a control group without delirium (407,473 patients). Major complications were defined as mortality, pulmonary embolism, myocardial infarction, stroke, pneumonia, and acute renal failure. Minor complications were defined as wound infection, seroma, deep vein thrombosis, dislocation, wound dehiscence, and hematoma. Descriptive statistics of age, sex, length of stay, and Elixhauser comorbidities were assessed for both groups. Multivariate logistic regression models were constructed to assess the association of delirium with major and minor surgical complications. Statistical significance was set at $p < 0.01$.

Results: Patients with delirium undergoing primary elective THA were older (mean 75.0 vs. 65.0, $p < 0.0001$), more likely to be male (56% vs. 52%, $p < 0.0001$), had longer length of stay (mean 5.7 vs. 3.8, $p < 0.0001$), and had higher Elixhauser comorbidity counts (mean 2.8 vs. 1.4, $p < 0.0001$). Chi squared analysis demonstrated that patients with delirium were more likely to have both major surgical complications (11% vs. 3%, $p < 0.0001$) and minor surgical complications (17% vs. 5%, $p < 0.0001$). In order to account for demographic variance in comparative groups, multivariate logistic regression was performed. Multivariate logistic regression models using Elixhauser comorbidities, age, and sex as covariates demonstrated that delirium was independently associated with major surgical complications (OR 2.0 95% CI: 1.7 to 2.3) and minor surgical complications (OR 2.0 95% CI 1.7 to 2.3) in patients undergoing primary elective THA.

Conclusions: Delirium is an independent risk factor for both major and minor surgical complications in primary elective THA.

Notes



Symposium III

Current Trends in Multimodal Pain Management for Total Hip and Knee Arthroplasty (co-branded with American Society of Regional Anesthesia and Pain Medicine)

Moderator: William A. Jiranek, MD

Faculty: Gregory J. Golladay, MD, Asokumar Buvanendran, MD, Eugene Viscusi, MD,
Jeremy A. Ross, MD

Rapid recovery from anesthesia and adequate pain control following hip and knee arthroplasty have become important topics to both surgeons and anesthesiologists, but there has been little standardization of protocols to guide physicians. This symposium will review basic science and clinical data supporting the concept of multimodal pain control for arthroplasty patients. In addition, the roles of neuraxial and regional anesthetics as alternatives to general anesthesia will be discussed. The efficacy of periarticular injections, as well as the ultra-structural location of pain receptors in the tissues around the hip and knee will be presented.

Objective: Review the basic science and clinical data on multimodal pain control, anesthetic applications other than general anesthesia, and the anatomic and pharmacologic bases for periarticular injections.

Outline:

Introduction—William A. Jiranek, MD, MD

Preoperative Oral Medications—Effective & What Dose?—Gregory J. Golladay, MD

Regional Anesthesia in TJA—What is the Evidence—Asokumar Buvanendran, MD

Postop TJA Pain and Top 5 Management Tools—Eugene Viscusi, MD

Periarticular Injection: What and Where?—Jeremy A. Ross, MD

Discussion

Notes

Paper #16

The Alpha-Defensin Test Provides Incremental Benefit to the Traditional Tests for Periprosthetic Joint Infection^o

Carl Deirmengian, MD, Gregory Kazarian, BA, Simmi Gulati, BA, Patrick Citrano, BA, Keith Kardos, PhD

Introduction: How should we interpret an alpha-defensin (AD) test in the context of other available traditional laboratory data? The purpose of this study is to determine how the AD test result changes the likelihood of a positive culture, when considered in the context of the fluid WBC count, neutrophil%, and CRP.

Methods: We retrospectively identified 8382 synovial fluid samples, aspirated from hip and knee arthroplasties, which had a complete set of synovial fluid laboratories. When a synovial fluid's WBC count, neutrophil%, and CRP were all negative for PJI, it was placed in the group "ALLNEG"(N=4872). When a synovial fluid's WBC count, neutrophil%, and CRP were all positive for PJI, it was placed in the group "ALLPOS"(N=1299). When a synovial fluid's WBC count, neutrophil%, and CRP yielded mixed results for PJI, it was placed in the group "MIXED"(N=2211). We then assessed how the AD result (positive or negative) altered the likelihood of a (+)culture in these different groups.

Results: The AD test, when interpreted in the context of the other laboratory results, had a significant effect on the likelihood of a (+)culture. Among the ALLNEG group, a (+)culture was 6.5-fold more likely when the AD test was positive rather than negative (5.1% vs. 0.8% culture positive; $p < 0.004$). Among the MIXED group, a (+)culture was 13.8-fold more likely when the AD test was positive (36.1% vs. 2.6% culture positive; $p < 0.0001$). Among the ALLPOS group, a (+)culture was 5.1-fold more likely when the AD test was positive (64.7% vs. 12.8% culture positive; $p < 0.0001$).

Conclusions: The AD test has a quite marked effect on the likelihood of a positive culture when considered in addition to the traditional test results. This improved predictive value for positive cultures is not only realized when the traditional tests are equivocal, but also when the traditional tests are all aligned toward one diagnosis. Consideration should be given to the utilization of the AD test whenever an arthroplasty is aspirated to diagnose PJI.

Notes

^oThe FDA has not cleared the pharmaceuticals and/or medical devices listed here: synovial fluid CRP

Paper #17

Familial Clustering in Periprosthetic Joint Infection: A Population-Based Cohort Study

Mike B. Anderson, MSc, Karen Curtin, PhD, Jathine Wong, BSc, Christopher E. Pelt, MD, Christopher L. Peters, MD, **Jeremy M. Gililland, MD**

Introduction: Recent reports suggest a genetic susceptibility towards PJI; however, there is limited data to support this. Thus, we performed a population-based, retrospective-cohort study to determine if familial clustering of PJI was observed.

Methods: The cohort was obtained by querying the UPDB for all patients who underwent TJA between January 1, 1996 to December 31, 2013. From this cohort, we identified patients who experienced subsequent PJI using an isolated ICD-9 code (996.66). The magnitude of familial risk was estimated by hazards ratios (HR) from Cox regression models to assess the relative risk of PJI in relatives and spouses. Using quantiles for age strata, we adjusted for sex, BMI ≥ 30 , a history of smoking, diabetes and/or end-stage renal disease (ESRD). Additionally, we identified families with an excess clustering of PJI above that expected in the population using the familial standardized incidence ratio (FSIR).

Results: We identified 66,985 patients that underwent TJA, of which 1,530 experienced a PJI (2.3%). The risk of PJI was elevated in first degree relatives (HR 2.16, 95% CI 1.29-3.59) and combined first and/or second degree relatives (HR 1.79, 95% CI 1.22-2.62) of PJI patients. There was no difference in PJI risk in spouses of PJI patients that also underwent TJA compared to their controls (HR 0.74, 95% CI 0.20–2.78). Further, 116 high-risk pedigrees with a FSIR >2 and p-value <0.05 were identified and nine were selected for future genotyping studies.

Conclusions: Familial clustering was confirmed in patients experiencing PJI. We found the adjusted HR of PJI in first degree relatives exceeds the individual hazard ratios of PJI for morbid obesity, diabetes, sex, age, smoking and approached that of end stage renal disease. This data supports the importance of genotyping studies and emphasizes the need to obtain a family history of PJI preoperatively in TJA candidates.

Notes

Paper #18

Cost Effectiveness of Staphylococcus Aureus Decolonization Strategies in High-Risk Arthroplasty Patients

Andy O. Miller, MD, Devin Williams, MPH, Michael W. Henry, MD, Geoffrey H. Westrich, MD, Hassan Ghomrawi, PhD, MPH

Introduction: The risk of prosthetic joint infection (PJI), a rare and costly complication of total joint arthroplasty (TJA), is increased with Staphylococcus aureus (Sa) colonization. The cost-effectiveness of different approaches to decrease the risk of PJI by decolonization is controversial. We sought to evaluate cost-effectiveness of preoperative protocols in high-risk patients.

Methods: A decision analytic model represented the PJI risk under 3 protocols: (1) nasal swab, (2) nasal & 1 other swab, and (3) 4 swabs (nares, axillae, groin, and pharynx). These protocols were also compared to no-testing-no-treatment and universal-decolonization strategies. Sensitivity and costs of the 3 Sa protocols were based on Sa screening results at one large orthopedic hospital between 2008-2015. Results of 4 swab sets were considered the gold standard. PJI risks were derived from literature. Cost effectiveness was evaluated from the hospital (hospital pays for screening and infection costs), patient (patient pays for mupirocin and chlorhexidine), and societal (combined hospital and patients) perspective and expressed in US\$ per PJI detected. Stability of the model was evaluated over a range of PJI rates and decolonization effectiveness values.

Results: 1,641 patients were evaluated. Assuming 1.5% PJI risk, base case results showed that universal-decolonization resulted in the largest reduction in number of PJIs, followed by 4 swab, 2 swab and 1 swab strategies (80 PJI vs. 82 PJIs vs. 83 PJIs vs. 83 PJIs/10,000 patients respectively). Nasal-swab-only and universal-decolonization approaches were more cost-effective than the other three strategies. From the patient and societal perspective, the nasal-swab strategy was maximally cost-effective (incremental cost of ~\$13,000 per prevented PJI). From the hospital perspective, universal-decolonization was the dominant treatment; however, the nasal swab remained cost-effective (incremental cost of ~\$9,000 per prevented PJI). The model results were stable over a range of plausible values.

Conclusions: In a bundled-payment system, selection of meaningful, cost-effective infection prevention strategies is critical. Sa decolonization strategies may benefit high-risk arthroplasty patients. Nasal-only Sa screening or universal-decolonization approaches appear most cost-effective. Additional swabs were cost-ineffective.

Notes

Paper #19

Treatment of Periprosthetic Joint Infection Based on Species of Infecting Organism: A Decision Analysis

Thomas J. Parisi, MD, JD, Hany Bedair, MD, Ho-Rim Choi, MD

Introduction: The success-rate of irrigation and debridement (I&D) for PJI varies widely with most studies reporting disappointing results. It is known that certain organisms and treatment timing influence success. It is unknown whether it is preferable to delay I&D; for identification of infecting organism(s) or urgently intervene without such data. The purpose of this study was to investigate the success-rate of PJI control with immediate versus delayed I&D; in different microbial species, and project through decision-analysis modeling the greatest strategy for success.

Methods: A retrospective review of patients meeting MSIS inclusion criteria for PJI who underwent I&D; at a single institution. Fifty-five patients, 14 hips (25%) and 41 knees (75%), with minimum two-year follow-up were analyzed. Causative microorganisms, symptom duration, and time from diagnosis of PJI to I&D; was recorded. At time of follow-up, treatment success was defined as no repeat surgical intervention or chronic antibiotic suppression. Decision analysis was used to model the different treatment states (Immediate I&D; or Delayed treatment) and describe which, if any, resulted in the greatest chance of success.

Results: 56.4% of patients were successfully treated with I&D.; Success-rate in the staphylococcal group (37%) was significantly lower than the non-staphylococcal group (75%, $p < 0.01$). When I&D; was performed within 48 hours, success-rate was 60.5% in the staphylococcal group, and 80% in non-staphylococcal group. Success of I&D; after 48 hours was 47.1% and 62.5% respectively. In the model, Immediate I&D; was the strategy that maximized quality-of-life outcomes. Sensitivity analysis revealed that Delayed I&D; resulted in greatest quality-of-life outcomes only if I&D; approached success-rates of greater than 85% in susceptible organisms or fell below 50% of all infections.

Conclusions: A decision analysis using estimates of infection control rate and quality-of-life outcomes after immediate I&D; or delay for culture showed possible outcomes for each treatment.

Notes

Comorbidity-Specific Outcomes Differences in Hip Periprosthetic Infection Treatment

Joseph Kavolus, MD, MS^{CR}, Daniel Cunningham, BS, Michael P. Bolognesi, MD, Samuel Wellman, MD, Thorsten Seyler, MD, PhD

Introduction: As the prevalence of patient comorbidity and the demand for hip arthroplasty both increase, it will be important to understand the impact of common comorbidities on peri-prosthetic infection treatment outcomes. While it is known that common medical comorbidities influence risk of developing peri-prosthetic infection, their impact on outcomes in infection treatment is less understood.

Methods: We reviewed the records of 158 patients from our tertiary care center that underwent treatment for peri-prosthetic hip infection between 2005 and 2015 and had at least 1 year of follow-up at our institution. We collected patient characteristics such as age, gender, and race as well as medical comorbidities. We determined the total number of surgeries and days in hospital for infection and final outcome. Patients were defined as being cured if they had appropriate arthroplasty components in place without need for further surgery or antibiotics. Finally, we constructed multivariable models of our outcomes using covariates that first met a univariate significance threshold of 0.1. Covariates that had p-value less than 0.05 in multivariable outcome models are reported below.

Results: Cure rates for patients with anemia (83% vs 94%, $p=0.040$) and coronary artery disease (71% vs 90%, $p=0.019$) were lower than for patients without those diseases. The following risk factors were associated with increased surgery for infection (additional surgeries, p-value): anemia (0.54, 0.0049), chronic pulmonary disease (0.61, 0.0057), and younger age (0.02/year, 0.046). Increased cumulative length of stay in hospital was associated with the following factors (additional days, p-value): diabetes (6.3, 0.00020), psychiatric disease (5.6, 0.0023), anemia (3.9, 0.0088), and chronic pulmonary disease (4.2, 0.015).

Conclusions: This is one of the first studies to demonstrate that common patient comorbidities are associated with poor outcomes in hip peri-prosthetic infection. This comorbidity-specific information could become a part of individualizing patient-physician conversations surrounding expected infection treatment.

Notes



Paper #21

Analysis of Post-Discharge Timing and Risk Factors for Complications in Home-Discharged Primary Total Knee Arthroplasty Patients

Dong-han Yao, BA, Aakash Keswani, BA, Benjamin Boodaie, BA, Chirag Shah, BS, Alex Sher, BS, Kevin Bozic, MD, MBA, Karl Koenig, MD, MS, Calin S. Moucha, MD

Introduction: Post-discharge services including transfer to a skilled nursing facility or inpatient rehabilitation facility have been identified as a primary driver of 90-day episode-of-care costs for total knee arthroplasty (TKA). Given that the proportion of TKA patients discharged home is rising, effective post-acute management will be critical for achieving better value. The purpose of this study was to assess risk factors and timing of complications in home-discharged TKA patients, and to propose a risk-stratification system based on this information to optimize post-acute care delivery for these patients.

Methods: Home-discharged primary TKA patients from 2011-2014 were identified in the American College of Surgeon’s National Surgical Quality Improvement Program database. Perioperative variables were used to perform bivariate and multivariate analyses.

Results: Of 71,293 home-discharged TKA patients included for analysis, 2,490 (3.5%) patients suffered a post-discharge severe complication or unplanned readmission. Bivariate analysis revealed that patients who suffered post-discharge complications were older, smokers, morbidly obese, functionally dependent, and more likely to have diabetes and congestive heart failure (Table 1, $p < 0.001$ for all). Severe adverse event (SAE) pre-discharge, age, male gender, smoking, pulmonary disease, hypertension, steroids for chronic conditions, bleeding-causing disorders, and ASA class 3-4 were identified as independent risk factors for post-discharge SAE or unplanned readmission ($OR \geq 1.31$, $p < 0.05$ for all). Across risk levels (i.e., 1, 2, 3, or ≥ 4 independent risk factors) TKA patients had 1.43-4.36 times odds of complications within 14 days post-discharge, and 1.75-3.61 times odds beyond 14 days compared to those with 0 risk factors (Table 2, $p \leq 0.01$ for all).

Conclusions: Orthopaedic surgeons and post-acute providers can use modifiable (smoking, hypertension) and non-modifiable risk factors (pre-discharge SAE, bleeding-causing disorders) to assess risk of post-discharge complication or unplanned readmission in home-discharged TKA patients. This information can be used to develop risk-stratification protocols to inform hospital and home-health provider care surveillance strategies.

Notes

Paper #22

Modifiable Risk Factors on Primary Joint Arthroplasty Increase 90-Day Cost of Care

William C. Schroer, MD, Paul J. Diesfeld, PA-C, Angela R. LeMarr, RN, ONC, Diane J. Morton, MS, Mary E. Reedy, RN, ONC

Introduction: Complications, hospital readmission, and need for further surgery are associated with risk factors in demographics and health status. A subset of these conditions has the opportunity to be positively altered before surgery and has been categorized as modifiable risk factors: anemia, malnutrition, obesity, diabetes, narcotic use, and tobacco use. Published reports to date focus on individual factors, and no report has evaluated their relative financial impact. This study determined the prevalence of these modifiable risk factors across a five-hospital network during a two-year period and compared relative impact on the primary arthroplasty 90-day cost of care.

Methods: An EMR query of 6968 lower extremity joint replacement procedures under DRG 469/470 performed in 2014-2015 was reviewed and total 90-day charges were calculated. The case mean was compared to charges for patients with modifiable risk factors: anemia (Hgb<10), malnutrition (albumin<3.4), obesity (BMI>45), uncontrolled diabetes (random glucose >180 or A1C>8), narcotic use (prescription filled), and tobacco use (documented within 30 days before surgery). Length of stay, emergency room visits, and hospital readmission were compared.

Results: Mean 90-day charges for DRG 469/470 were \$36,647. Risk factors were associated with a significant increase in 90-day charges: anemia (+\$ 15,869/126 patients), malnutrition (+\$9,270/592 patients), obesity (+\$2,048/445 patients), diabetes (+\$5,074/291 patients), narcotic use (+\$1,801/1943 patients), and tobacco use (+\$2,034/1882 patients). ICU admission rate, ED visits, and hospital readmission were significantly higher for patients with each risk factor. LOS was higher in patients with anemia, malnutrition, diabetes, and tobacco use. When separated by elective versus fracture admission, 90-day charges were significantly higher for each risk factor.

Conclusions: Every modifiable risk factor was associated with increased 90-day charges. Anemia and uncontrolled diabetes had large increased charges but were present in fewer patients. Narcotic and tobacco use had smaller increased charges but were present in a greater number of patients. Malnutrition had a large increase in charges for a relatively high percentage of patients. All modifiable risk factors had significantly higher hospital LOS (except obesity and narcotic use), ED visits, and readmissions. This analysis gives relative comparison and direction to our hospital network as we approach patient care under new payment models.

Notes

Paper #23

Analysis of Outcomes Following TKA: Do All Databases Produce Similar Findings?

Nicholas Bedard, MD, Andrew Pugely, MD, Michael McHugh, BS, Nathan Lux, BS, Jesse Otero, MD, PhD, Kevin Bozic, MD, MBA, Yubo Gao, PhD, **John Callaghan, MD**

Introduction: Use of large database for orthopaedic research has increased exponentially. Each database represents unique patient populations and vary in their methodology of data acquisition. The purpose of this study was to evaluate differences in reported demographics, comorbidities and complications following total knee arthroplasty (TKA) amongst four commonly used databases.

Methods: Patients who underwent primary TKA during 2010-2012 were identified within National Surgical Quality Improvement Programs (NSQIP), Nationwide Inpatient Sample (NIS), Medicare Standard Analytic Files (SAF) and Humana Claims Database (HCD). NSQIP definitions for comorbidities and surgical complications were matched to corresponding ICD-9 and CPT codes and these coding algorithms were used to query NIS, SAF and HCD. Age, sex, comorbidities, inpatient and 30-day postoperative complications were compared (NIS has inpatient data only) using standard statistical techniques.

Results: The number of primary TKA patients from each database was 48,248 in HCD, 783,546 in SAF, 393,050 in NIS and 43,220 in NSQIP. Databases were similar in their gender distribution (1.7-1.8:1 female to male). Age distribution was clinically similar between databases, but slightly older in HCD and SAF. There was variation in prevalence of comorbidities and rates of postoperative complications between databases. Prevalence of COPD and coagulopathy in HCD and SAF were more than twice those in NIS and NSQIP. NSQIP had more than twice the obesity than NIS. Rates of stroke 30-days after TKA had more than twofold difference between all databases. HCD had more than twice the rates of 30-day complications at all endpoints compared to NSQIP and more than twice the 30-day infections than SAF.

Conclusions: There is considerable variation in complication rates following TKA depending upon the database used for analysis. It will be important to consider these differences when critically evaluating database research. With the advent of bundled payments, these differences must be considered in risk adjustment models.

Notes

Paper #24

Can an Arthroplasty Risk Score Predict Bundled Care Events after Total Joint Arthroplasty?

Blair S. Ashley, MD, P. Maxwell Courtney, MD, Jenna A. Bernstein, MD, Daniel J. Gittings, MD, Gwo Chin Lee, MD, Eric L. Hume, MD, Atul F. Kamath, MD

Introduction: A validated Arthroplasty Risk Score (ARS), using preoperative and intraoperative variables, was shown to accurately predict the need for postoperative triage to an intensive care setting. Our group hypothesized that this ARS could be applied to predict hospital length of stay (LOS), discharge disposition, and total episode-of-care cost.

Methods: We retrospectively reviewed a consecutive series of 704 patients undergoing primary or revision total hip and knee arthroplasty from October 2013 to March 2015. An a priori power analysis was performed to ensure adequate power. The ARS score included history of cardiac, chronic obstructive pulmonary, and renal disease; BMI > 35 kg/m²; intraoperative vasopressors; and estimated blood loss > 1L. Patient demographics, medical comorbidities, 90-day episode-of-care cost data, LOS, and readmission rates were compared between groups before and after implementation of the ARS tool in September of 2014. Multivariate logistic regression analysis was performed to identify the independent effect of the ARS on patients in the upper quartile of episode-of-care costs at our institution (\$31,804).

Results: Implementation of the ARS was associated with a lower proportion of patients going to a skilled nursing facility (SNF) or rehabilitation center post-discharge (63% vs. 74%, p=0.002). However, there was no difference in LOS, episode-of-care costs, readmission rates, or complications before and after utilization of the ARS (all p>0.05). An ARS score >3 was predictive of a high episode-of-care cost outlier (OR 2.65, 95% CI 1.40-5.01, p=0.003). An increased ARS score correlated with increased episode-of-care costs (p=0.003) while the Charlson score had no statistically significant association (p=0.797).

Conclusions: The implementation of an institutional ARS was associated with increased disposition to home while maintaining equivalent LOS, complication, and readmission rates. The ARS was predictive of high episode-of-care cost outliers and should be considered when considering risk adjustment variables for reimbursement in alternative payment models.

Notes



Paper #25

Prolonged Conservative Management in Total Joint Arthroplasty: Harming the Patient?

Carlos J. Lavernia, MD, Anneliese D. Heiner, PhD, Michael Cronin, DO, Mark D. Rossi, PhD

Introduction: Indications for TJA have become a rationing tool for some insurance companies. Many modalities currently exist to delay the surgical procedure. We previously reported inferior postoperative outcomes at 3 years in patients that delayed their surgery. The purpose of this study was to assess outcomes in these patients in the mid to long term range.

Methods: Ninety-eight patients having a primary unilateral THA or TKA for osteoarthritis were assessed preoperatively and at a minimum of five years postoperatively using the WOMAC, SF-36, and Quality of Well-Being (QWB-7) scales. Patients were stratified into lower and higher preoperative functional level groups based on their preoperative WOMAC function score (≥ 51 and <51 points, respectively), and the lower and higher preoperative functional level groups statistically compared using Student’s t-test ($\alpha = 0.05$).

Results: At an average 11.3 year follow up (range 5–21 years), both groups continued have improved scores when compared to their preoperative scores. However, all postoperative outcome measures continued to be inferior in those patients that delayed the surgery. The differences between the lower and higher preoperative functional level groups at follow up were statistically significant for the SF-36 physical functioning (43.5 (SE 4.7) vs. 54.6 (SE 2.9), $p = 0.048$), bodily pain (56.9 (SE 4.6) vs. 72.4 (SE 2.9), $p = 0.006$), and social functioning (64.4 (SE 5.0) vs. 80.0 (SE 2.4), $p = 0.006$) scores.

Conclusions: Although all patients in this cohort benefited from arthroplasty, at an average of 11.3 years postoperatively, the patients with lower preoperative function continued to present with greater functional impairment compared to the patients with higher preoperative function. Patients who allowed their function to deteriorate significantly before getting an arthroplasty did not fully “catch up” to those patients who had TJA at an earlier disease stage.

Notes

Paper #26

External Clinical Validation of the “OARA Score” for Outpatient Joint Arthroplasty Candidates

Robert Andrew Henderson, MD MSc, Elshaday Belay, BA, Thorsten M. Seyler, MD, Cynthia L. Green, PhD, R. Michael Meneghini, MD, Peter Caccavallo, MD, **Michael P. Bolognesi, MD**

Introduction: Joint replacement surgery has historically been conducted in the inpatient setting. With recent advances in perioperative protocols, some surgeons have begun performing outpatient arthroplasty. Stratifying patients for whom outpatient arthroplasty is a safe alternative remains a challenge. Recently, Meneghini and colleagues developed a new risk stratification scoring system, the “OARA score,” which has yet to be externally validated. This study evaluated this using a large cohort of joint replacement patients.

Methods: A retrospective review of primary joint replacements (THA, TKA, UKA) was performed using a consecutive three-year sample of patients. Inputs recorded included baseline demographics, procedure performed, American Society of Anesthesiologists (ASA) score, and elements of the medical history necessary to calculate the OARA score for each patient. Output variables included length of stay, discharge disposition, 90-day readmission, one-year reoperation rate, and DVT/PE.

Results: 945 patients met inclusion criteria for the study, accounting for 1058 procedures. Mean OARA score for this cohort was 36.9 (range: 0-340). 778 (73.5%) cases met the suggested cutoff of <60, while 280 (26.5%) did not. In multivariate regression analysis, both the OARA score and ASA classification were significantly associated with length of stay, with the OARA carrying a stronger Pearson correlation coefficient (0.22) than the ASA score (0.19). The OARA score was also significantly associated with risk of reoperation ($p=.03$), surgical site infection ($p=.04$), and readmission ($p=.01$), as well as likelihood for home disposition ($p<.01$).

Conclusions: The OARA score is a valid predictor of length of stay and discharge disposition for accelerated-discharge arthroplasty. Its further use and adoption into clinical practice for patients being considered for outpatient arthroplasty should be considered.

Notes

Preoperative Activity Level Does Not Effect Postoperative Outcomes with a Contemporary Revision Total Knee System

Kirby D. Hitt, MD, Craig J. Della Valle, MD, Danielle Campbell, MS, Christine K. Brozyniak, MPH

Introduction: As the population requiring revision total knee arthroplasty (rTKA) continues to expand, varying preoperative conditions need to be considered when analyzing postoperative outcomes. Factoring in preoperative activity levels can help manage the expectations of patients. The purpose of this study was to analyze the outcomes of low and high activity patients receiving a contemporary rTKA.

Methods: One hundred and eighty rTKA patients enrolled in a prospective, multicenter study were evaluated through 2 years postoperative. Patients were divided into groups based on preoperative activity level using the Lower Extremity Activity Scale (LEAS). Patients scoring between 1-7 were classified as ‘Low Activity’ (LA, N=104) and patients scoring 8-18 were classified as ‘High Activity’ (HA, N=76). Clinical outcomes were evaluated, with an additional quality of life analysis completed utilizing SF-6D scores obtained through a method described by Brazier et al. and analyzed for effect size.

Results: There were no differences in age or BMI between groups, with 64% females in the LA group and 58% males in the HA group. Postoperative improvement in both groups were similar in the KSS, but the LA group showed larger increases in the KSS Functional assessment at 6 weeks (16.2) and 2 years (34.8). There was a statistically significant large effect (0.96, p=0.0006) seen in the LA group at 1 year, in conjunction with a higher SF-6D outcome.

Conclusions: The current study population displayed significant improvement in functional patient outcomes following rTKA regardless of preoperative activity level and function. Patients with lower preoperative activity levels demonstrated greater cumulative functional and quality of life improvements. This suggests that a lower preoperative activity level may be related to a poorly functioning knee and that rTKA has the potential to improve overall activity levels and function.

Notes

Paper #28

Higher Tissue Concentrations of Vancomycin with Low-Dose Intraosseous Regional vs. Intravenous Systemic Prophylaxis in Revision Total Knee Arthroplasty: A Randomized Trial

Simon W. Young, FRACS, Mei Zhang, MD, Grant A. Moore, PhD, Rocco P. Pitto, MD, PhD, Henry D. Clarke, MD, **Mark J. Spangehl, MD**

Introduction: Prophylaxis with low-dose vancomycin via intraosseous regional administration (IORA) achieves tissue concentrations 6-10 times higher than systemic administration in primary TKA, and has been shown to provide more effective prophylaxis in an animal model. This study compared tissue concentrations of vancomycin administered intravenously (IV) versus IORA in revision TKA. We also investigated if the presence of a tibial implant compromised IORA injection, and whether tourniquet deflation during surgery would lower tissue concentrations.

Methods: Twenty patients undergoing aseptic revision TKA were randomized to two groups. The IV group received 1g of systemic IV prophylactic vancomycin. The IORA Group received 500mg vancomycin as a bolus injection into a tibial intraosseous cannula, below an inflated thigh tourniquet before skin incision. During the procedure subcutaneous fat and bone samples were taken at regular intervals. Tissue vancomycin concentrations were measured using high performance liquid chromatography (HPLC).

Results: In all IORA patients, intraosseous tibial injection was unaffected by the tibial implant. Mean procedure length was 3.5 hours in both groups. Mean initial tourniquet inflation was 1.5 hours, with a second inflation for mean 35 minutes during cementation. Overall mean tissue concentration of vancomycin in fat samples was 4.1ug/L in the IV group versus 115ug/L in the IORA group ($p<0.001$); tissue concentrations in femoral bone were 7.2ug/L in the IV group vs 101ug/L in the IORA group. Vancomycin concentrations in the final subcutaneous fat sample taken before closure remained 5.3 times higher in the IORA versus IV Group ($p<0.001$). The intra-articular concentration of vancomycin on post-operative day 1 drain samples was similar between the two groups (mean 4.6ug/L IV group vs 6.6ug/L IORA, $p=0.08$)

Conclusions: IORA administration of vancomycin is effective in revision TKA, resulting in tissue concentrations of vancomycin 10-20 times higher than systemic IV administration despite the lower dose. High tissue concentrations were maintained throughout the procedure, despite a period of tourniquet deflation. IORA may be more clinically important in revision TKA, where the risk of infection is higher.

Notes



Paper #29

Porous-Coated Metaphyseal Sleeves for Severe Femoral and Tibial Bone Loss in Revision Total Knee Arthroplasty

Tyler S. Watters, MD, J. Ryan Martin, MD, Daniel L. Levy, BS, Charlie C. Yang, MD, Raymond H. Kim, MD, Douglas A. Dennis, MD

Introduction: Metaphyseal bone loss is commonly encountered in revision total knee arthroplasty (TKA). While Anderson Orthopaedic Research Institute (AORI) type 1 defects can typically be managed with standard revision components, with or without stems, type 2 and 3 defects generally require some form of metaphyseal fixation or augmentation. The purpose of this study was to evaluate the midterm results of stepped, porous-coated metaphyseal sleeves for revision TKA in the setting of severe bone loss.

Methods: All patients who had undergone revision TKA using metaphyseal sleeves from March 2006 to May 2014 at our institution were identified from a prospective research database. Only patients with minimum 2 year clinical and radiographic follow-up were included in the final analysis. Preoperative patient characteristics and operative data were reviewed, including AORI defect classification. Postoperative outcomes, included Knee Society Scores (KSS), were compared with preoperative values. Primary study outcomes included complications, reoperations, radiographic assessment of sleeve osteointegration, and survivorship.

Results: 116 knees (108 patients) underwent revision TKA with 152 metaphyseal sleeves (111 tibial, 41 femoral). AORI defect classification on the tibial side included 5 type 2A, 89 type 2B, and 17 type 3 defects. The femoral side included 3 type 2A, 34 type 2B, and 4 type 3 defects. There were 3 intraoperative fractures (1.9%) associated with sleeve preparation/insertion, all of which went on heal uneventfully. 6 knees (5 patients) were lost to follow-up before 2 years and 5 patients (6 knees) died before 2 years. Of the remaining 104 knees (98 patients, 134 sleeves), mean follow-up was 5.3 years. Nineteen knees (16.4%) required reoperation, most commonly for recurrent infection (6 knees). Only 1 sleeve demonstrated radiographic evidence of failed osteointegration with subsidence, however this did not require revision. Two sleeves (1.3%) required removal as part of resection for recurrent infection.

Conclusions: This large retrospective series illustrates the utility of porous metaphyseal sleeves in revision TKA with a low rate of intraoperative complications, excellent osteointegration and long-term fixation.

Notes



Paper #30

Revision Total Hip Arthroplasty –Reducing Hospital Cost through Fixed Implant Pricing

Kristopher D. Collins, MD, Kevin Chen, MA, Jacob Ziegler, MD, Ran Schwarzkopf, MD, Joseph Bosco, MD, Richard Iorio, MD

Introduction: Prevalence of Total Hip Arthroplasty (THA) is increasing and a subsequent dramatic increase in the number of revision THA is expected to follow. Institutions with large revision THA volume will be forced to decrease the cost of revision THA in order to remain economically viable. A large component of the cost of revision THA is the cost of the implants. The purpose of this study was to evaluate the pricing of revision THA implants, and compare implant price with the total hospital cost. Furthermore, to evaluate whether an improvement in implant cost is possible with direct to hospital or fixed implant pricing models.

Methods: From our institutional database all THA revisions done from 9/1/2013 to 8/31/2014 were identified. The cost of the implants was analyzed as a percentage of the total cost of the hospitalization. A direct to hospital pricing model with standardized revision component pricing and a fixed implant pricing model were then used to determine possible implant cost savings.

Results: Of 155 hip revisions analyzed the cost of implants amounted to 36% of the total hospital cost. The average implant cost for full component hip revision was \$13,329 which was 43% of the total hospital cost. The direct to hospital cost model would reduce the cost of an all component revision to \$4,395. This amounts to a cost savings of \$8,934 per case and \$276,954 for the year. The direct to hospital model would reduce the implant cost to 14% of the total direct hospital cost. Fixed implant pricing of \$5000 would save \$8,329 per case and \$258,199 per year. The fixed revision hip implant pricing model would reduce the implant cost to 16% of the total direct hospital cost.

Conclusions: Both fixed implant pricing and the direct to hospital pricing models allow for a dramatic decrease in implant costs. Exploring new implant pricing models is essential in our evolving national health care environment.

Notes

Paper #31

The Double Cup Construct: A Novel Treatment Strategy for the Management of Paprosky IIIA and IIIB Acetabular Defects

Jonathan E. Webb, MD, Robert J. McGill, MD, Brian T. Palumbo, MD, Daniel M. Estok, MD

Introduction: Treatment of massive acetabular bone loss in revision total hip arthroplasty is complex and various treatment strategies have been described for reconstruction of these difficult cases. We describe a novel technique of using a second Trabecular Metal™ revision shell as a “Double Cup” buttress augment instead of using custom triflanges or cup-cage constructs for Paprosky IIIA and IIIB acetabular defects.

Methods: We retrospectively reviewed a continuous case series of double cup constructs performed at our institution between 2005 and 2014. Preoperative co-morbidities and postoperative complications were assessed. Radiographic signs of loosening were evaluated by two observers and hip center of rotation was noted preoperatively and at most recent follow-up. Pre- and postoperative modified Harris Hip Scores (HHS) and Merle d’Aubigne-Postel pain and walking scores were evaluated.

Results: Twenty patients were included in our series at an average 2.3-year follow-up. There were no failures for acetabular loosening for a 100% survival for aseptic loosening. Hip center of rotation was restored to an average 22.5mm of the interteardrop line. We observed a 25% dislocation with rate within 1 year with most of these seen in single component revisions. Average HHS improved from 28.2 to 68.7 ($p < 0.001$) and Merle d’Aubigne-Postel pain and walking improved from 2.7 to 5.1 and 2.4 to 4 respectively ($p < 0.001$).

Conclusions: The double cup construct provides stable reconstruction of complex Paprosky type IIIA and IIIB acetabular defects without evidence of radiographic failure at average 2-year follow-up. Clinical outcome measures were improved postoperatively and remained improved at most recent follow-up.

Notes

Paper #32

Outcomes of Modular Dual Mobility Acetabular Components in Revision Total Hip Arthroplasty

Edward Grant Sutter, MD, MS, Taylor R. McClellan, MD, David E. Attarian, MD, Paul F. Lachiewicz, MD, Michael P. Bolognesi, MD, Samuel S. Wellman, MD

Introduction: Patients undergoing revision total hip arthroplasty (THA) are at increased risk for complications. Dual mobility implants provide an alternative to larger head sizes and constrained liners. Most modern dual mobility designs utilize a monoblock acetabular component that limits fixation options and cup control. Modular dual mobility (MDM) implants, with separate acetabular cup and metal liner, were created to account for this. We reviewed our institution's outcomes in high-risk patients undergoing revision to MDM implants for recurrent dislocation, infection, and metal-on-metal (MoM) reaction.

Methods: Seventy revisions were performed in 69 patients (22 males and 47 females) with average follow up of 2 years. Average age was 58.4 years and BMI was 29.6 kg/m². Revision was performed in 24 patients for instability, 19 for metallosis, 11 for infection, and 16 for aseptic loosening, malposition, or fracture.

Results: Overall survival of the MDM implants was 92.9%. There were complications in 12 revisions (17.1%), including 2 dislocations (2.9%) and 8 infections (11.4%) with 9 subsequent surgeries (12.8%). There were no intra-prosthetic dislocations (IPD). One patient developed recurrent metallosis after revision from MoM implant requiring revision. Complication rate was 3.8x greater in patients who underwent revision for infection versus not, with 80% of these complications being recurrent infection. Sex, age, BMI, history of diabetes or tobacco did not correlate with rate of complications.

Conclusions: We found good overall survival and dislocation rate in high-risk patients revised to MDM implants at 2-year average follow-up, comparable to previously reported rates of other dual mobility implants. IPD is a concern in dual mobility implants, though we had none in our series. Metallosis is also a concern in MDM implants and may have led to a complication in one patient. Rates of complication, specifically infection, were higher in patients revised for infection. Care should be taken when considering re-implantation in these patients.

Notes

Symposium IV



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

Moderator: Daniel J. Berry, MD

Dr. Berry will conduct a poll of the attendees using an audience response system with real time display of results and commentary. Questions will be about current practices in perioperative and intraoperative management in primary total hip arthroplasty and total knee arthroplasty.

Notes



The James A. Rand Young Investigator's Award

Administrative Claims vs. Surgical Registry: Data Source and Outcome Disparities in Total Joint Arthroplasty

Joseph T. Patterson, MD, David Sing, BS, Erik Hansen, MD, Bobby Tay, MD, Alan Zhang, MD

Introduction: Administrative claims are increasingly used for observational studies, reimbursement, and quality improvement in total joint arthroplasty. We sought to characterize differences in reported outcome measures between administrative claims and prospective registry data relevant to these endeavors in total joint arthroplasty.

Methods: A retrospective multiple cohort study of patients undergoing primary total hip and knee arthroplasty from 2007-2011 was performed using administrative claims from Medicare and United Healthcare, respectively the largest public and private sector insurance payers in the United States. Demographic characteristics, comorbidities, and inpatient and outpatient adverse events within 30 days were compared to age-matched cohorts in the National Surgical Quality Improvement Program (ACS-NSQIP) registry over the same time period.

Results: The total study population included 88,309 total hip and 169,283 total knee arthroplasty patients. There were large, clinically significant differences in the preoperative prevalence of cardiopulmonary comorbidities and diabetes between administrative claims and registry cohorts ($p < 0.001$ all comparisons). Smoking, alcohol abuse, and BMI were underreported by an order of magnitude in administrative claims ($p < 0.001$ all comparisons). Rates of surgical site infection, wound dehiscence, thromboembolic events, and neurologic deficits after primary TKA and THA were significantly greater in administrative claims cohorts ($p < 0.001$ all comparisons).

Conclusions: We report significant discordance in the prevalence of patient comorbidities and incidence of complications in primary total hip and total knee arthroplasty between ACS-NSQIP and the administrative claims of Medicare and United Healthcare. These disparities have implications for the design and interpretation of investigations of outcomes and assessments of quality in total joint arthroplasty that rely on insurance claims data.

Notes

The Lawrence D. Dorr Surgical Techniques & Technologies Award

Differences in Post-Operative Outcomes between Total Hip Arthroplasty for Fracture vs. Osteoarthritis

Charles Du Qin, BS, Mia Helfrich, BS, **David W. Fitz, MD**, Kevin D. Hardt, MD, Matthew D. Beal, MD, David W. Manning, MD

Introduction: Total hip arthroplasty (THA) is a repeatable and reliable intervention with measurable impact on quality of life for patients with degenerative hip conditions. Hip fracture is an increasingly common expanded indication for THA and warrants outcome analysis so as to best inform risk assessment models, public reporting of outcome and value based reimbursement schemes.

Methods: The National Surgical Quality Improvement Program (NSQIP) data file from 2011 to 2014 was used to identify all patients undergoing THA via current procedural terminology (CPT) code 27130. Propensity score matching in a 1:5 fashion was used to compare 2 cohorts: THA for osteoarthritis and THA for fracture. Primary outcomes included Center of Medicare and Medicaid Services (CMS) reportable complications, unplanned readmission, post-surgical length of stay, and discharge destination. χ^2 tests for categorical variables, and Student t test for continuous variables were used to compare the two cohorts and adjusted linear regression analysis used to determine the association between hip fracture and THA outcomes of interest.

Results: 58,302 patients underwent elective THA for osteoarthritis and 1,580 patients underwent THA for hip fracture. Successful propensity score matching eliminated differences between cohorts with the exception of functional status. Rates of CMS-reported complications (4.0% vs 10.7%; $P < .001$), non-home bound discharge (39.8% vs 64.7%; $P < .001$), readmission (4.7% vs 8.0%; $P < .001$), and mean days of post-surgical hospital stay (3.2 vs 4.4; $P < .001$) were greater in the hip fracture cohort. THA for hip fracture was significantly associated with increased risk for CMS-reportable complications (OR 2.67; 2.17-3.28), non-home bound discharge (OR 1.73; 1.39-2.15), and readmission (OR 2.78; 2.46-3.12).

Conclusions: Compared to elective THA for osteoarthritis, THA for hip fracture is associated with greater rates of post-operative morbidity. Our findings support recent advocacy for the exclusion of THA for fracture from THA bundled pricing methodology and public reporting of outcomes.

Notes

AAHKS Clinical Research Award

What are the Costs of Knee Osteoarthritis in the Year Prior to Total Knee Arthroplasty?

Nicholas Bedard, MD, S. Blake Dowdle, MD, Christopher Anthony, MD, David DeMik, PharmD, Michael McHugh, BS, Kevin Bozic, MD, MBA, John Callaghan, MD

Introduction: Despite AAOS Clinical Practice Guidelines on OA, non-recommended treatments remain in common use. We sought to determine cost associated with non-arthroplasty management of knee OA in the year prior to total knee arthroplasty (TKA) and stratify them by CPG recommendation status.

Methods: The Humana Inc. administrative claims dataset was reviewed from 2007 to 2015 for patients undergoing primary TKA. Cost of hyaluronic acid (HA) and corticosteroid (CS) injections, physical therapy (PT), braces, wedge insoles, opioids, non-steroidal anti-inflammatories (NSAID) and tramadol in the year prior to TKA were calculated. Costs were analyzed as total cost compared to the overall non-inpatient cost of knee OA, which was calculated by the database, and based upon CPG recommendations.

Results: 86,073 primary TKA patients were included in the analysis. In the year prior to TKA, total cost associated with knee OA was \$78,392,953 and non-inpatient cost associated with the diagnosis of knee OA was \$43,582,648. 56,690 patients (65.8%) underwent at least one treatment in the year prior to their TKA. In aggregate, the treatments analyzed made up 57.6% of the total non-inpatient cost of knee OA in the year prior to TKA. Only 3 of the 8 treatments studied are recommended by the AAOS in the CPG (PT, NSAIDS, tramadol) and cost for these intervention represent 11.1% of non-inpatient knee OA costs. In contrast, 46.5% of non-inpatient cost associated with the diagnosis of knee OA in the year prior to TKA are not recommend by the AAOS knee OA CPG.

Conclusions: In the years prior to TKA, over half of the non-inpatient costs associated with knee OA are from injections, therapy, prosthetics and prescriptions. Approximately 30% of this cost is due to hyaluronic acid injections alone, for which the CPGs cite strong evidence against their use in the management of knee OA. If only interventions recommend by the CPG are utilized, then cost associated with outpatient management of knee OA could be decreased by 90%.

Notes

Symposium V

Understanding Hip Dysplasia: Evolving Disease Concepts and Treatment Innovations

Moderator: John C. Clohisy, MD

Faculty: Paul Beaulé, MD, Asheesh Bedi, MD, Christopher L. Peters, MD

Dysplasia of the hip is a common disorder that impacts patients in childhood, adolescence, young adulthood and later adulthood. Improved understanding of hip pathomorphology and dynamic instability have led to major improvements in diagnosis and surgical treatments. This symposium highlights recent advancements and innovations in the understanding and treatment of the very diverse disease spectrum. Presentations will emphasize surgical techniques via educational videos.

Objectives: Review the contemporary definition of hip dysplasia/structural instability and the pathophysiology of disease.

Define the contemporary role of hip arthroscopy in the treatment of hip dysplasia (video techniques).

Discuss open joint preservation procedures and joint replacement procedures for the spectrum of hip dysplasia pathomorphologies (video techniques).

Outline:

Introduction—John C. Clohisy, MD

A contemporary definition of DDH and structural instability—Paul Beaulé, MD

Does Hip Arthroscopy have a role in the treatment of developmental hip dysplasia?—Asheesh Bedi, MD

Innovations in joint preservation procedures for the dysplastic hip—John C. Clohisy, MD

Arthroplasty challenges covering the spectrum of DDH—Christopher L. Peters, MD

Discussion (including cases)

Notes

Paper #33

Patient-Reported Allergies: Does the Number of Allergies Affect Outcomes following Primary Total Hip and Knee Arthroplasty

Jesse Otero, MD, PhD, Christopher Graves, MD, Tyler Olson, BS, Chris Dickinson, BS, Rhonda Chalus, RN, David Vittetoe, MD, Devon Goetz, MD, John Callaghan, MD

Introduction: The authors have hypothesized that patients with multiple reported allergies report higher rates of dissatisfaction following TKR and THR based on a retrospective review. The purpose of this study was to prospectively compare patient reported outcomes in patients with and without multiple reported allergies.

Methods: The authors prospectively evaluated 500 patients undergoing total hip or total knee arthroplasty at a single institution in 2013 who completed the Short Form-36 (SF-36) and a questionnaire pertaining to their demographics, allergies and comorbidities. The Charlson Comorbidity Index as well as SF-36 Physical Component Score (PCS) and Mental Component Score (MCS) were calculated pre-op and at two year follow up. Differences in outcomes between the patients with and without reported allergies were compared.

Results: At minimum two year follow up, age had a significant negative correlation with post op SF-36 PCS ($r=-0.41$, $p<0.0001$). Comorbidity index had a significant negative correlation with post op SF-36 PCS ($r=-0.3$, $p=0.001$) and post op SF-36 MCS ($r=-0.3$, $p=0.005$). Number of patient reported allergies had a significant negative correlation with all outcomes measured ($p<0.03$). Multivariate regression analysis showed that number of patient reported allergies had a significant negative association with pre-op SF-36 PCS, as well as post-op SF-36 PCS, MCS, and WOMAC independent of age and comorbidity index ($p<0.05$).

Conclusions: Patients with multiple reported allergies who undergo TJR report less improvement in SF36 physical components scores and WOMAC functional scores following the procedure. It occurred independent of age and patient-reported comorbidities. The patient subgroup with multiple allergies should be counseled as to the potential for less satisfactory outcomes than the patients without multiple allergies. This represents an important process in outcomes studies where authors study a problem retrospectively and then implement a prospective study to corroborate the findings of the retrospective study.

Notes

Paper #34

Serum Metal Levels for the Diagnosis of Adverse Local Tissue Reaction Secondary to Corrosion in Metal-on-Polyethylene Bearing Total Hip Arthroplasty

Yale A. Fillingham, MD, Craig J. Della Valle, MD, Daniel D. Bohl, MD, MPH, Mick P. Kelly, MD, Deborah J. Hall, BS, Robin Pourzal, PhD, Joshua J. Jacobs, MD

Introduction: Recently, corrosion at the head-neck junction in metal-on-polyethylene bearing total hip arthroplasty (THA) has been recognized as a cause of adverse local tissue reactions (ALTR). Serum metal levels have been advocated as a tool for the diagnosis of ALTR, however no prior studies have specifically examined their utility. The purpose of this study was to determine the optimal cutoff values for serum cobalt and chromium in diagnosing ALTR after metal-on-polyethylene bearing THA.

Methods: We reviewed 447 consecutive patients with serum metal levels tested at our institution and identified 62 with a metal-on-polyethylene bearing who had axial imaging or underwent reoperation to confirm the presence or absence of ALTR. Receiver operating characteristic curves were produced to identify cutoff thresholds to optimize sensitivity and diagnostic test performance was characterized.

Results: 42 of the 62 patients (66%) were positive for an ALTR. The best test for the diagnosis of ALTR was the serum cobalt level (area under the curve [AUC]=99%). A threshold cutoff of ≥ 1.0 ng/ml had a sensitivity of 100%, specificity of 90%, positive predictive value (PPV) of 96%, and negative predictive value (NPV) of 100%. Serum chromium levels were also diagnostic (AUC=87%). A threshold cutoff of ≥ 0.15 ng/ml had a sensitivity of 100%, specificity of 50%, PPV of 81%, and NPV of 100%. Finally, serum cobalt to chromium ratio was also helpful for diagnosis (AUC=90%). A threshold cutoff of 1.4 for the cobalt to chromium ratio offered a sensitivity of 93%, specificity of 70%, PPV of 87%, and NPV of 82%.

Conclusions: Measurement of serum cobalt with a threshold value of 1.0 ng/ml in our experience is the best test for identifying the presence of ALTR in patients with a metal-on-polyethylene THA. Measurement of chromium and the ratio of cobalt to chromium are also of value.

Notes

Paper #35

History of Beta-Lactam Allergy in Total Joint Patients: Are These Patients Really Allergic?

Nicolas Noiseux, MD, Deanna McDanel, PharmD, Ambar Haleem, MD, Amy Dowden, MD, Melissa Willenborg, MD, Charles Clark, MD, John Callaghan, MD

Introduction: The reliability of a reported drug allergy by patients or by documentation in their medical record has been disputed in numerous studies. In 2013 with the development of a drug allergy clinic at our institution, patients undergoing joint replacement with a reported history of beta-lactam allergy (HOBA) were referred to the clinic to determine whether there was a true presence of an IgE-mediated hypersensitivity. The purpose of this study was to determine the effectiveness of this program in enabling the surgical team to optimize antimicrobial prophylaxis and promote antimicrobial prophylaxis stewardship.

Methods: Between February 2013 and April 2015, 179 patients with a HOBA were referred to the Allergy Clinic for evaluation. Patients were evaluated by undergoing penicillin skin testing (PST) and/or a drug challenge to a beta-lactam medication. No further intervention was done if an inaccurate history was identified.

Results: PST was performed on 150 (84%) patients. A negative skin test occurred in 149 (99%) patients, indicating they were not allergic to penicillin. Cefazolin was deemed safe to use in 165 of 170 (97%) patients. Cefazolin in any surgical prophylaxis regimen was given in 156 of the 170 (92%) surgeries and there were no intra-operative reactions. This included 94% of patients with a negative PST and 80% of patients who did not undergo PST after initial screening. The overall use of cefazolin in orthopedic surgeries in patients with HOBA was 13% prior to the program in 2012 and 96% in 2015.

Conclusions: 99% of patients who had a HOBA were evaluated with PST and or drug challenge to a beta-lactam medication were not truly allergic and the use of a standard surgical prophylaxis with cefazolin was deemed safe in 97% of patients evaluated. Joint replacement and spine surgeons should consider implementing allergy screening programs to optimize antimicrobial prophylaxis.

Notes

Paper #36

First Time Dislocation following Total Hip Arthroplasty: What is the Risk of Subsequent Dislocation and Revision?

Jourdan M. Cancienne, MD, Brian C. Werner, MD, James A. Browne, MD

Introduction: The natural history of a first time dislocation following primary THA and the risk for subsequent dislocation and revision is ill-defined. The purpose of the present study is to evaluate the natural history of the first time dislocation following initial reduction in the Emergency Department (ED).

Methods: A national patient record database was queried for patients who underwent closed reduction following primary THA in the ED using CPT codes. Subsequent reductions were then assessed for the ipsilateral limb. These patients were separated into three groups based on the number of closed reductions in the ED. The revision rate within 2 years of reduction was calculated for each group and compared.

Results: 1,072 patients were included in the study. 643 patients underwent 1 closed reduction, and 240 (37.3%) of these patients required revision THA within 2 years; 233 patients underwent 2 closed reductions, with 126 (54.1%) requiring revision THA within 2 years; finally, 196 patients underwent 3 or more closed reductions, with 64.8% of these patients requiring revision THA within 2 years of reduction. Compared to 1 episode of instability, patients who experienced 2 closed reductions were significantly more likely to require revision THA (O.R. 2.0, 95% CI 1.5-2.7, $p < 0.0001$). Patients who underwent 3 or more closed reductions required revision THA at a significantly higher rate than both the 2 closed reduction (O.R. 1.6, 95% CI 1.1-2.3, $p = 0.032$) and 1 closed reduction (O.R. 2.7, 95% CI 1.9-3.7, $p < 0.0001$) groups.

Conclusions: More than a third of all patients who are closed reduced for a prosthetic dislocation in the ED will go on to require revision surgery within 2 years, while more than two thirds of patients who experience 3 or more instability episodes will undergo revision THA within 2 years.

Notes

Paper #37

Fewer Complications following Revision Hip and Knee Arthroplasty in Patients with Normal Vitamin D Levels

Sophia Traven, MD, Alexander Chiamonti, MD, William Barfield, PhD, Patricia Kirkland, BS, Harry Demos, MD, Jacob Drew, MD

Introduction: Surgeons and hospitals increasingly face penalty for postoperative complications and readmission following total joint arthroplasty (TJA), therefore preoperative optimization of modifiable risk factors is paramount. Recent literature associates low vitamin D with risk of periprosthetic joint infection (PJI). Normal preoperative vitamin D is hypothesized to be associated with lower rates of 30-day readmission, infection, and 90-day complications following revision TJA.

Methods: An IRB-approved retrospective review of 126 revision TJA patients between 2010-14 was performed. Independent variables included age, Charlson comorbidity index (CCI), BMI, smoking status, and vitamin D level. Primary outcomes were 30-day readmission and 90-day complications. Analysis was via ordinal regression; $p \leq 0.05$.

Results: Patients with normal vitamin D (>30 ng/mL, $n=57$) were similar to the deficient group ($n=69$) with respect to age, gender, CCI, BMI, and smoking status ($p > 0.05$). Patients undergoing surgery for PJI were more likely to have low preoperative vitamin D versus those undergoing revision surgery for aseptic indications ($p=0.016$). When controlling for PJI, patients with low vitamin D were more likely to have a complication ($p < 0.01$) or unplanned reoperation within 90 days ($p < 0.01$), and were more likely to have multiple postoperative complications ($p < 0.01$) than those with normal vitamin D. Independent of infection as a preoperative condition, the rate of infectious complications was significantly greater among those with low vitamin D ($p < 0.01$), as was the rate of surgical site infection ($p < 0.01$). Normal vitamin D was not associated with decreased likelihood of 30-day readmission ($p=0.58$).

Conclusions: Revision TJA patients with normal vitamin D experienced a significantly lower rate of 90-day postoperative complications and infection, though the rate of 30-day readmission was similar to those with low vitamin D. Preoperative vitamin D level should be considered as a modifiable risk factor for complications following revision arthroplasty.

Notes

Paper #38

Predicting the Incremental Hospital Cost of Adverse Events among Medicare Beneficiaries in the Comprehensive Joint Replacement Program

David S. Jevsevar, MD, MBA, Kevin J. McGuire, MD, MS, Kenneth M. Little, MD, FAANS, Kevin G. Shea, MD, Michael J. Schlosser, MD, MBA, FAANS, April W. Simon, RN, MSN, Steven D. Culler, PhD

Introduction: The purpose of this study is to estimate the effect of adverse events on the incremental cost of Medicare Beneficiaries (MBs) undergoing lower extremity joint replacement (LEJR) during their index hospitalization in FY-2014 to understand how these complications will impact episode costs in the comprehensive care for joint replacement (CJR) program.

Methods: This retrospective study consists of all MBs undergoing LEJR. There were 674,777 hospitalizations in 2014. Eight adverse events (death, acute myocardial infarction, pneumonia, sepsis or shock, surgical site bleeding, pulmonary embolism, mechanical complications, and perioperative joint infection) were identified. Hospital costs were estimated using the hospital's overall cost-to-charge ratio. Separate multi-variable regression equations were modeled to estimate the incremental cost associated with each adverse event relative to all MBs who did not experience any of the study complications. Demographic characteristics (age groups, gender, and race) and 61 comorbid variables were used as controls in all cost equations.

Results: A total of 8,906 (1.32%) MBs who underwent LEJR experienced an adverse event during the index hospitalization. The unadjusted average hospital cost of patients who experienced at least one of the adverse events was \$26,518 compared to an average of \$14,511 among MBs who did not experience any adverse events. The estimated cost ranged from a high of \$29,063 (patients experiencing hip fracture and joint infection) to a low of \$6,308 (MBs without hip fracture that experienced pulmonary embolism).

Conclusions: All but three adverse events increased hospital costs associated with LEJR by more than \$10,000. In addition, three adverse events (pneumonia, sepsis or shock, or perioperative joint infection) were associated with greater cost to treat compared to the average hospital cost of MBs undergoing LEJR who did not experience an adverse event. Avoidance of adverse events will play an important role in economic sustainability in the CJR program.

Notes

Symposium VI

Periprosthetic Joint Infection: Practical Guide to Management

Moderator: Javad Parvizi, MD

Faculty: Craig J. Della Valle, MD, Fares S. Haddad, FRCS, Matthew S. Austin, MD

Description: This symposium brings experts in the field to discuss all current issues related to prevention, diagnosis and treatment of PJI.

Objectives:

- Familiarize the audience with the recently released guidelines by the Center of Disease Control for prevention of surgical site infections
- Discuss recent developments in the diagnosis of peri prosthetic joint infection
- Provide rationale and indications for the use of one-stage exchange arthroplasty for the management of PJI

Outline:

Prevention of PJI: The CDC has spoken, Javad Parvizi, MD

Diagnosis of PJI: An algorithm Based Approach, Craig J. Della Valle, MD

One-Stage Exchange Arthroplasty: An underutilized treatment strategy, Fares S. Haddad, FRCS

Management of PJI: The more you learn the less you know, Matthew S. Austin, MD

Discussion

Notes



Paper #39

Total Knee Arthroplasty in the 21st Century: Why Do They Fail? A Fifteen-Year Analysis of 11,135 Knees

Simon W. Young, FRACS, Chuan Kong Koh, MBChB, Saiprasad Ravi, MBChB, Mark Zhu, MBChB, Irene Zeng, PhD, Kelly G. Vince, MD

Introduction: Efforts to improve TKA outcomes require understanding of the current mechanisms of failure in modern TKA. Revision TKAs reported to national registries lack clinical and radiological data to enable accurate identification of failure mechanisms. Similarly, reports on revision TKA from tertiary referral centres lack data on the overall denominator of primary TKA, therefore the relative importance of each failure mechanism leading to revision TKA remains unclear. The aim of this study was to identify reasons for failure following primary TKA, and assess their relative frequencies over long-term follow-up.

Methods: We identified 11,134 primary TKA performed between 2000–2015 at three tertiary referral hospitals. ‘Failure’ was defined as subsequent revision surgery involving change of one or more components or reoperation due to deep periprosthetic joint infection (PJI). Patients undergoing subsequent revision surgery were identified using individual search of patient records, supplemented with National Joint Registry data to identify revision TKA performed at outside hospitals. Relevant clinical records, radiographs, and lab results were reviewed to identify the primary reason for failure, according to a standardized protocol.

Results: A total of 357 failures over the 15-year period were identified. Clinical and radiographic data was obtained for all patients, including those undergoing revision at outside hospitals. The cumulative probability of failure at 15 years was 6.1% (standard error (SE) 0.4). At 10 years, the most common cause for failure was PJI (2.0% +/- SE0.2), 2.5 times more common than aseptic loosening. The majority of PJI occurred within the first 4 years (1.4% +/- SE0.1), with subsequent annual incidence of PJI of 0.1% per year. After 10 years, the reason with the highest annual incidence was aseptic loosening (0.3%).

Conclusions: In this large cohort of patients with comprehensive follow up, PJI was the dominant reason for failure in the first 15 years following primary TKA. Aseptic loosening became more important with longer follow up duration. Efforts to improve outcome following primary TKA should focus on these areas, particularly prevention of PJI.

Notes

Paper #40

Modified Frailty Index is an Effective Risk Assessment Tool in Primary Total Knee Arthroplasty

Robert P. Runner, MD, Jaime Bellamy, DO, CatPhuong Le. Vu, BA, Greg A. Erens, MD, Mara L. Schenker, MD, George N. Guild III, MD

Introduction: “Frailty” is a marker of physiologic decline of multiple organ systems and the frailty index identifies patients who are more susceptible to post-operative complications. The purpose of this study is to validate the modified frailty index as a predictor of postoperative complications, reoperations, and readmissions in patients who underwent primary total knee arthroplasty (TKA).

Methods: The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database from 2005-2014 was queried by the Current Procedural Terminology (CPT) code for primary TKA (27447). A previously described modified frailty index (MFI) was utilized to summate 11 variables in five organ systems. Bivariate analysis was performed for post-operative complications (all occurrence of adverse events, infection, cardiac, pulmonary, renal, hematologic, adverse discharge disposition, hospital length of stay, reoperation, and readmission). A multiple logistic regression model was used to determine the relationship between MFI, American Society of Anesthesiologists (ASA) score and 30-day reoperation, controlling for age, gender, and BMI.

Results: 90,566 patients underwent primary TKA during the study period. As MFI score increased, 30-day mortality significantly increased ($p < 0.001$). Additionally, significantly higher rates of all post-operative complications (all $p < 0.001$) were observed with increasing MFI including: infection, wound, cardiac, pulmonary, renal, hematologic, any occurrence. More frail patients also had increasing odds of adverse hospital discharge disposition, reoperation, and readmission (all $p < 0.001$). Length of hospital stay increased from 3.10 days to 5.16 days ($p < 0.001$) while length of ICU stay increased from 3.47 days to 5.07 days ($p < 0.001$) between MFI score 0 and 0.36+. MFI predicts 30-day reoperation with an adjusted odds ratio of 3.32 (95% CI: 1.36-8.11, $p < 0.001$). Comparatively, MFI was a stronger predictor of reoperation compared to ASA score and age with adjustment for gender and BMI.

Conclusions: Utilization of the modified frailty index is a valid method in predicting postoperative complications, reoperations, and readmissions in patients undergoing primary TKA and can provide an effective and robust risk assessment tool to appropriately counsel patients and aid in preoperative optimization.

Notes



Paper #41

Do Press Ganey Scores Correlate with Total Knee Arthroplasty-Specific Outcome Questionnaires in Post-Surgical Patients?

Morad Chughtai, MD, **Nirav K. Patel, MD, FRCS**, Chukwuweike Gwam, MD, Anton Khlopas, MD, Peter Bonutti, MD, Ronald Delanois, MD, Michael A. Mont, MD

Introduction: The Center for Medicaid and Medicare services (CMS) has adopted patient satisfaction surveys as a determinant for reimbursement. However, these surveys do not necessarily contain common arthroplasty-related outcome parameters that are present in validated long-term arthroplasty assessment tools. Therefore, the purpose of this study was to assess whether in-patient satisfaction survey results correlate with outcomes of total knee arthroplasty (TKA). Specifically, we assessed the correlation between Press Ganey overall hospital rating scores, and the following TKA-specific outcome questionnaires: 1) SF-12 and 36 Health Surveys; 2) Knee Society Scores (KSS); 3) Knee Western Ontario and McMaster Universities Arthritis Indices (WOMAC); 4) UCLA Activity Scores; 6) Visual Analogue Scales (VAS).

Methods: A total of 743 patients (mean age 65 years; range, 25-92 years) who had undergone TKA and received a Press Ganey survey from November 2009 to January 2015 were asked to answer the SF-12, SF-36, KSS, WOMAC, UCLA, and VAS questionnaires. The mean follow-up of patients was 3 years. A Pearson correlation analysis was then conducted between the Press Ganey survey overall hospital rating scores and the individual long-term outcome assessment tools.

Results: Pearson correlation analysis revealed no correlation between Press Ganey survey overall hospital rating score and the various outcome assessment tools: Knee WOMAC ($r=.169$, $p=.208$); Knee Society Score ($r=.156$, $p=.248$); and SF-12 physical ($r=.115$, $p=.197$). The remaining assessment tools and their correlation with PG overall hospital rating score are listed in (Table 1).

Conclusions: There were no statistically significant relationships between established arthroplasty assessment tools and the PG overall hospital ratings. Based on the results of this study, the Press Ganey surveys may not be an appropriate tool to determine reimbursement for orthopaedists who perform TKA. These results are of paramount importance, indicating a necessary reevaluation of Press Ganey Surveys as a major determinant for reimbursements rendered.

Notes



Paper #42

Effectiveness of Liposomal Bupivacaine for Postoperative Pain Control in Total Knee Arthroplasty: A Prospective, Randomized, Double Blind, Controlled Study

Jeffrey H. DeClaire, MD, Paige M. Aiello, MS, D. Carl Freeman, PhD

Introduction: Pain control following total knee arthroplasty (TKA) heavily influences timing of mobilization and length of hospital stay postoperatively. We studied the effectiveness of periarticular liposomal bupivacaine in TKA postoperative pain control, including impact on early mobilization and length of hospital stay, compared to another local analgesic (ropivacaine) when both are used as part of a multimodal pain management approach.

Methods: We performed a double blind, randomized, controlled, prospective, IRB-approved study on opioid naïve patients with a primary diagnosis of osteoarthritis undergoing a unilateral TKA between May 2014 and March 2015 (n=96). Patients with prior knee replacement, inflammatory arthritis, bilateral TKA, or opioid tolerance were excluded. Study participants were randomized into a control group, given the standard intra-articular injection (ropivacaine, ketorolac, morphine, and epinephrine in saline; 100cc), and experimental group, given a similar intra-articular injection (bupivacaine, ketorolac, morphine, and epinephrine in saline; 80cc) plus 1.3% liposomal bupivacaine (20cc; total injection 100cc). Postoperative pain management and physical therapy were standardized. The frequency and total use of oral and intravenous narcotic use was recorded during hospital stay. We also recorded Visual Analog Pain scores, hours to ambulate 100 feet, and length of hospital stay (hours).

Results: There was no significant difference between the groups in mean narcotic use per hour (differed by 0.1mg), total narcotic (hydrocodone) use during hospital stay (experimental: 97.7mg±42.84; control: 89.6mg±58.57), mean length of stay (experimental: 59.0±13.7hours; control: 60.3±23.7hours), time to ambulate 100 feet (experimental: 27.3±17.4hours; control: 26.4±19.4hours), or Visual Analog Score for pain on day 1 or day 2 post-operatively. The experimental design had a power of 0.074.

Conclusions: When comparing liposomal bupivacaine to ropivacaine as part of a multimodal pain management approach in TKA, there is no difference in postoperative opioid consumption, Visual Analog Scores for pain, amount of time to ambulate or length of hospital stay.

Notes



Paper #43

Cryoneurolysis for Temporary Relief of Pain Associated with Knee Osteoarthritis: A Multi-Center, Prospective, Double-Blind, Randomized, Controlled Trial

Vinod Dasa, MD, Atul T. Patel, MD, Kevin B. Shrock, MD, David Forrest Scott, MD, Richard Radnovich, DO, Julian F. Naranjo, MD, Richard R. Olson, MD, Ronald Z. Surowitz, DO, James Choo, MD, Nathan Wei, MD

Introduction: The purpose of this study was to evaluate the effect of cryoneurolysis on knee pain associated with osteoarthritis.

Methods: In this 2:1 prospective, double-blind, randomized, sham-controlled trial 180 patients with OA received percutaneous cryoneurolysis or sham treatment of the Infrapatellar Saphenous Nerve (ISN). WOMAC Pain and Total scores were recorded at baseline and 30 and 60 days post-treatment. VAS Pain scores were collected at baseline and at 1, 7, 30, 60, 90 days post-treatment. Adverse events were also recorded.

Results: At 30 and 60 days post-treatment the WOMAC Total Score, a measure of knee pain, stiffness and function, was significantly improved (lower) for the cryo groups versus the sham (65.21 vs. 105.11, $p < 0.0001$; 69.94 vs. 94.93, $p = 0.0093$, respectively). The change from baseline for the WOMAC Total Scores was also significantly improved (lower) for the cryo groups versus the sham (-81.43 vs. -42.83, $p = 0.0001$; -76.57 vs. -53.34, $p = 0.0145$, respectively). At these same time points the WOMAC Pain Scores (13.45 vs. 22.21, $p < 0.0001$; 13.97 vs. 19.30, $p = 0.0093$, respectively) and VAS Pain Scores (26.29 vs. 42.77, $p = 0.0006$ and 27.72 vs. 37.44, $p = 0.0426$, respectively) were significantly lower for the cryo group versus the sham. The percent of VAS Pain Responders, defined as a patient who experiences at least a 30% reduction in VAS Pain Score compared to baseline, was higher for the cryo group at every time point in comparison to the sham group (1: 84.7 vs. 70.9; 7: 76.4 vs. 70.4; 30: 71.4 vs. 48.2; 60: 69.6 vs. 58.9; 90: 77.2 vs. 65.4). There were no serious device-related adverse events.

Conclusions: Results from this prospective, double-blind, randomized, sham-controlled trial demonstrate that cryoneurolysis of the ISN results in reduced pain and stiffness and improved functionality for patients with knee pain associated with osteoarthritis.

Notes

Paper #44

Bariatric Surgery Improves Outcomes after Lower Extremity Arthroplasty in the Morbidly Obese: A Propensity Score-Matched Study

Alexander S. McLawhorn, MD, MBA, **Ashley E. Levack, MD, MAS**, Yuo-yu Lee, MS, Molly Ge, MSc, Huong Do, MS, Stephen Lyman, PhD, Emily R. Dodwell, MD, MPH

Introduction: The purpose of this study was to compare risks for revision and short-term complications after total joint arthroplasty (TJA) in matched cohorts of morbidly obese patients, receiving and not receiving prior bariatric surgery.

Methods: Patients undergoing elective TJA between 1997 and 2011 were identified in a New York Statewide database. Total knee arthroplasty (TKA) and total hip arthroplasty (THA) were analyzed separately. To reduce confounding, propensity scores were used to match morbidly obese patients having received bariatric surgery prior to TJA to morbidly obese patients never receiving bariatric surgery. A propensity score was defined as the conditional probability of receiving bariatric surgery, based on age, year in which TJA was performed, laterality, sex, payer, region, and Elixhauser comorbidities. Cox proportional hazard modeling assessed revision risk. Logistic regression evaluated odds for short-term complications. Significance was set at $p < 0.05$.

Results: For TKA, 2,636 patients who received prior bariatric surgery were matched to 2,636 morbidly obese patients who did not; 792 THA patients who received prior bariatric surgery were matched to 792 morbidly obese patients who did not. Matching balanced all covariates. Bariatric surgery lowered the comorbidity burden prior to TJA (TKA $p < 0.0001$; THA $p < 0.005$). Risks for in-hospital complications were lower for THA and TKA patients receiving bariatric surgery prior to TJA (odds ratio [OR]=0.25, $p < 0.001$; and OR=0.69, $p = 0.021$, respectively). Risks for 90-day complications were lower for TKA (OR =0.61, $p = 0.002$). Revision risks were not different for either THA ($p = 0.634$) or TKA ($p = 0.431$), nor was THA dislocation risk ($p = 1.000$).

Conclusions: After matching that accounted for selection biases related to bariatric surgery, bariatric surgery prior to TJA in morbidly obese patients was associated with reduced comorbidity burden at the time of TJA and with reduced post-TJA complications. However, bariatric surgery did not reduce the risk for revision surgery for either TKA or THA.

Notes

Symposium VII

Challenges in Revision Total Knee Arthroplasty: Exposure, Bone Defects Management and Fixation

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

Faculty: Michael E. Berend, MD; Steven MacDonald, MD; David G. Lewallen, MD

The task of revision total knee arthroplasty has multiple challenges. There is no doubt that surgical technique is at the forefront of success of the revision procedure. The purpose of this video symposium is to present and review surgical techniques relative to various aspects of revision total knee arthroplasty including exposure, careful removal of the components, bone deficit management, and fixation.

Objectives: Review exposure techniques which will facilitate the performance of revision total knee arthroplasty.

- Discuss what if any modifications to the postoperative physical therapy plan must be incorporated as a consequence of various surgical exposures.
- Review the current state of the art of bone deficit management.
- Review results of various techniques of bone deficit management.
- Discuss the various modalities of fixation in revision total knee arthroplasty.
- Review the success and long term clinical results of various types of fixation in revision total knee arthroplasty.

Outline:

Introduction/Exposure from Basic to Extensile–
Adolph V. Lombardi, Jr., MD, FACS

Audience Response Questions, Discussion and
Case Review

Safe and Effective Removal of Components–
Steven MacDonald, MD

Audience Response Questions, Discussion and
Case Review

Bone Deficit Management: Screws, Cement, Graft, Cones
and Sleeves–David G. Lewallen, MD

Audience Response Questions, Discussion and
Case Review

Fixation Options: Cementless, Hybrid, and Fully
Cemented–Michael E. Berend, MD

Audience Response Questions, Discussion and
Case Review

Notes

Paper #45

Low Prevalence of Hip and Knee Arthritis in Marathon Runners

Danielle Y. Ponzio, MD, Usman M. Syed, BS, Kelly Purcell, BS, Alexis M. Cooper, BS, Mitchell Maltenfort, PhD, Julie Shaner, MD, Antonia F. Chen, MD, MBA

Introduction: The association between distance running and arthritis is unclear. Our study is the first to describe hip and knee health in marathon runners, including the prevalence of pain, arthritis, arthroplasty, and associated risk factors.

Methods: A hip and knee joint health survey was completed by 953 marathoners, 52.8% male, from 37 countries with a median age of 45 years (18-79). Marathoners ran a median of 30 miles per week (0-150) over 12 years (1-60) and completed 19 marathons (1-1016). Questions assessed pain, diagnosis of arthritis, family history, history of hip or knee surgery, personal record time, and current running status. The prevalence of arthritis in marathoners was compared to the prevalence in the United States adult population based on 2010–2012 National Health Interview Survey data. Multivariate analyses identified risk factors for hip or knee pain and arthritis in marathoners.

Results: Hip or knee pain was reported by 53.3% of marathoners. The prevalence of hip and knee arthritis was 8.8% in marathoners, which is significantly lower than the overall prevalence in the U.S. population (22.7%) and subgroups stratified by age, gender, and BMI, and physical activity level. Nine marathoners (0.9%) reported undergoing hip or knee arthroplasty, and seven continued to run. Multivariate analysis indicated that increasing number of marathons was associated with decreased rates of joint pain (OR 0.5, 0.4-0.7, $p < 0.0001$). Female gender (OR 1.8, 1.0-3.1, $p = 0.045$), family history (OR 2.2, 1.3-3.7, $p = 0.002$), surgical history (OR 5.4, 3.1-9.3, $p < 0.0001$), age (OR 1.1, 1.0-1.1, $p < 0.0001$), and BMI (OR 1.1, 1.0-1.1, $p < 0.0001$) are independent risk factors for arthritis in marathoners while there was no significant affect from running volume or intensity.

Conclusions: Female gender, family history, surgical history, age, and BMI are independent risk factors for arthritis in marathoners while there is no significant correlation between running history and arthritis.

Notes

Paper #48

Characterization of Femoral Morphology in the Borderline Dysplastic Hip: Patient-Specific 3-D CT Modeling

Joel E. Wells, MD, MPH, Jeffrey Nepple, MD, Karla Crook, BS, John Clohisy, MD

Introduction: Overlap between hip dysplasia and femoroacetabular impingement (FAI) due to underlying femoral deformities is increasingly recognized but poorly defined, especially in borderline dysplastic hips. Little is known about the head-neck geometry and version of the femora. Our goal was to define the three-dimensional femoral anatomy in borderline dysplastic hips using low dose CT scans and patient specific three-dimensional models.

Methods: We analyzed 36 hips with symptomatic borderline acetabular dysplasia (LCEA 20-25) that underwent low dose pelvic computed tomography scan (Low-dose CT scans (0.75-1.25 mSv, equivalent to 3-5 AP pelvis radiographs). CT scans were assessed in a CT-based computer modeling software program to generate patient-specific, 3-dimensional models. Inclusion criteria were LCEA angle 20-25° and Tönnis grade 0 or 1 on plain AP radiographs. Hips were characterized with regards to version, neck shaft angle, femoral head diameter, head neck offset, femoral neck length, femoral offset, head center height, trochanteric height and alpha angle using CT 3-D patient specific reformats.

Results: Average age was 26 years (range, 13-60 years) with 33 females (92%). Mean LCEA and Tönnis angle was $22^{\circ} \pm 2^{\circ}$ and $11^{\circ} \pm 4^{\circ}$. Mean femora was $18^{\circ} \pm 11^{\circ}$ of anteversion. Eleven hips (31%) had excessive femoral anteversion ($>20^{\circ}$) and three (8%) had relative femoral retroversion ($\leq 5^{\circ}$). One hip had $> 35^{\circ}$ of femoral anteversion. Thirteen hips (36%) had alpha angles $\geq 55^{\circ}$ and were classified as cam morphology. Mean max alpha location was 1:45 (± 45 minutes) and mean max alpha angle was 52° ($\pm 9^{\circ}$). 81% of hips had anterior head-neck offset ratio of ≤ 0.17 .

Conclusions: Treatment of borderline dysplasia must not solely focus on the acetabular side but must also take into account proximal femoral morphology and possible coexisting FAI. Cam-type deformities and decreased head-neck offset are common and should be closely assessed relative to diagnosis and treatment.

Notes

Paper #49

Do Demographic or Anthropometric Factors Affect Tibial Tubercle Lateralization in a Diverse Population? A MRI Study

Isaac Livshetz, MD, Mitchell Meghpara, MD, Joseph A. Karam, MD, Brian E. Schwartz, MD, Omar Hassan, BA, Benjamin A. Goldberg, MD

Introduction: The tibial tubercle–trochlear groove (TT-TG) distance, a measure of the lateral offset of the TT relative to the TG, is commonly used to evaluate and guide treatment for patellar instability. Limited data exists regarding variability of the TT-TG distance based on patient demographic and anthropometric factors. The aim of this study was to evaluate whether TT-TG distance varies based on patient race, gender, and body size.

Methods: Magnetic resonance imaging (MRI) studies of the knee were retrospectively reviewed for 384 consecutive adult patients. TT-TG was measured using a method well described in the literature. Demographic information (age, gender, ethnicity, height, and body mass index {BMI}) was gathered from the electronic medical record. ANOVA, Tukey’s, Student t-test and Pearson’s r was used for comparison and analysis.

Results: The study included 253 females, 131 males. Mean age 44.2 years, mean height and weight 169.3cm and 87.2kg, respectively. Mean BMI 30.5kg/m². 206 patients were African-American, 76 Caucasian, 49 Hispanic, 53 were listed as ‘other’. Mean TT-TG interval was 12.7 mm. It was significantly correlated with height ($p=0.010$) and weight ($p=0.012$). There was no significant correlation between TT-TG and sex ($p=0.854$), BMI ($p=0.187$) or age ($p=0.100$). Race did significantly effect TTTG ($p<0.001$). TT-TG in African Americans was statistically different than in Hispanics ($p=0.001$) or ‘other’ (0.006). A backward linear regression model showed that height and African American race were independent predictors of TT-TG ($p=0.008$ and $p<0.001$, respectively).

Conclusions: TT-TG distance was significantly greater in African American patients and in taller patients, though not significantly associated with age, sex, or BMI. Previous clinical studies have demonstrated African American and Caucasian race to be significant risk factors for patellar dislocation. The morphological findings in our study may help explain these differences and can establish ‘norms’ for patients of various ethnic and anthropometric variability.

Notes

Symposium VIII

Too Loose, Too Tight, Just Right: Total Knee is a Soft Tissue Operation

Moderator: Thomas K. Fehring, MD

Faculty: Douglas A. Dennis, MD, Mark W. Pagnano, MD, Matthew P. Abdel, MD, Thomas P. Vail, MD

Prosthetic knee instability is one of the leading causes of reoperation and patient dissatisfaction in total knee arthroplasty. A successful stable knee arthroplasty requires proper mechanical alignment, a complete concave release of the coronal deformity and equalization of the flexion and extension gaps.

Objective: This Symposium will focus on the prevention, diagnosis and treatment of prosthetic knee instability. A classification of prosthetic knee instability will help guide the revision situation.

Outline:

Introduction–Thomas K. Fehring, MD

Diagnosis and Classification of Prosthetic Knee Instability–Thomas K. Fehring, MD

Balancing the Total Knee; Getting it Right the First Time–Douglas A. Dennis, MD

Can Kinematic Alignment or Sensor Technology Solve Instability Issues–Mark W. Pagnano, MD

Prevention and Treatment of Flexion Instability–Matthew P. Abdel, MD

Management of Arthrofibrosis and Flexion Contracture: Can we make it better?–Thomas P. Vail, MD

Discussion

Notes

Paper #51

A Large Randomized Clinical Trial of Direct Anterior and Mini-Posterior THA: Which Provides Faster Functional Recovery?

Michael J. Taunton, MD, Robert T. Trousdale, MD, Rafael J. Sierra, MD, Kenton R. Kaufman, PhD, Mark W. Pagnano, MD

Introduction: This randomized clinical trial was designed to determine if patients recovered faster after DAA than MPA as measured by: (1) attainment of early functional milestones, (2) advanced activity-monitors employed in the at-home setting, and (3) in-hospital outcomes.

Methods: One hundred patients were randomized. A novel methodology was used to eliminate the learning-curve effect: one high-volume surgeon performed all of the DAA and three high-volume surgeons performed the MPA THAs, regardless of who the patients' initial consulting surgeon was. Groups did not differ in mean age (65.4 years), sex (52% female), or mean body mass index (mean 29.2 kg/m²) (all $p > 0.40$). In-hospital data and functional results from a milestone diary were recorded. Each patient's activity was monitored in the home environment over three-day periods pre-op, at 2 weeks, 8 weeks, and one year with 5 wearable activity-monitoring sensors with tri-axial MEMS accelerometers & custom analysis algorithms.

Results: Early functional recovery was faster after DAA compared to MPA as measured by time to: discontinue walker (10 vs. 14.5 days, $p=0.01$), discontinue all gait aids (18 vs 23 days, $p=0.04$), discontinue opioids (9 vs. 14 days, $p=0.05$), ascend stairs with gait aid (5 vs. 10 days, $p<0.01$), and to walk 6 blocks (20.5 vs. 26.0 days, $p=0.05$). Early functional recovery was faster after DAA compared to MPA as measured by advanced activity-monitoring at two weeks postoperatively: DAA patients walked more steps (3897 +/- 2258 steps vs. 2235 +/- 1688; $p=0.01$) and spent a greater portion of each day active than did MPA patients (10.5% +/- 4.6 vs. 6.9% +/- 3.7; $p=0.01$).

Conclusions: Both the direct anterior approach and mini-posterior approach provided excellent early postoperative recovery. The DAA patients had objectively faster recovery with slightly shorter times to achieve milestones of function and as measured by advanced, quantitative activity monitoring at 2 weeks postoperatively.

Notes

Paper #52

Anterior Capsulectomy vs. Repair in Direct Anterior Total Hip Arthroplasty

Brian M. Curtin, MS, MD, Paul K. Edwards, MD, Susan Odum, PhD, John L. Masonis, MD

Introduction: Utilization of the direct anterior approach for total hip arthroplasty (DAA THA) has increased over the last ten years. The preservation and repair of the anterior hip capsule has been recommended while anterior capsulectomy has been described by others. In contrast, the higher risk of posterior dislocation using the posterior approach improved significantly after capsular repair. No studies to date have investigated outcome scores based on capsular repair versus capsulectomy for the DAA.

Methods: Patients randomized to anterior capsulectomy or anterior capsule repair. Patients were blinded to their randomization. Maximum hip flexion was measured both radiographically and clinically with a goniometer. Using a one-sided t-test assuming equal variance with an effect size, Cohen's *d*, of 0.6 and an alpha of 0.05, 36 patients in each group (total 72 patients) needed for a minimum 80% power.

Results: Median goniometer measurements for the two groups preoperatively were 95° for Repair (IQR 85-100) and 91° for Capsulectomy (IQR 82-97.5) ($p=0.53$). Four months and 1-year goniometer measurements also had no significant difference, 110° (IQR 102-115) and 110° (IQR 105-120) for Repair, and 105° (IQR 96-116) and 109.5° (IQR 102-120) for Capsulectomy ($p=0.44$ and $p=0.51$). Median change in flexion as measured by goniometer at 4 months and 1 year was 13° and 15° for Repair and 10° and 14.5° for Capsulectomy ($p=0.61$ and $p=0.85$). X-ray analysis also showed no differences in pre-op, 4-month, and 1-year flexion with median 1-year flexion of 105.5° (IQR 96-109.5) for Repair and 100° (IQR 93.5-112) for Capsulectomy ($p=0.35$). VAS scores were the same for both groups at all three time points. HOOS Functions of Daily Living Scores also did not vary between groups at any time point. No differences in surgeon randomization, age, or gender.

Conclusions: Both capsular repair and capsulectomy used in direct anterior approach THA result in equal maximum clinical as well as radiographic hip flexion with no change in postoperative pain or HOOS scores.

Notes

Paper #54

Is There a Threshold Value of Hemoglobin A1c that Predicts Risk of Infection following Primary Total Hip Arthroplasty?

Jourdan M. Cancienne, MD, Brian C. Werner, MD, **James A. Browne, MD**

Introduction: Despite substantial research on the use of glycemic markers to predict infection in patients with diabetes mellitus (DM), there remains little evidence to support a perioperative HbA1c level that could serve as a threshold for a significantly increased risk of deep postoperative infection following THA.

Methods: A national administrative database was queried for patients who underwent primary THA. Patients with DM who had an HbA1c level within 3 months of surgery were identified, and were then stratified based on their HbA1c level in 0.5 mg/dL increments. Patients were grouped into thirteen mutually exclusive groups based on their HbA1c by increments of 0.5 mg/dL, starting with patients with a level between 0.00 and 5.49 mg/dL up to those patients with a level of 11.5 mg/dL or greater. The incidence of deep infection requiring operative intervention within 1 year for each HbA1c group was then identified. A receiver operating characteristic (ROC) analysis was performed to determine a threshold value of the HbA1c.

Results: 7,736 patients who underwent THA with diabetes and a perioperative HbA1c recorded in the database were included in the study. The rate of infection ranged from a low of 0.7% up to 5.9% ($P < 0.0001$). The inflection point of the ROC curve corresponded to an HbA1c level between 7.0 and 7.5 mg/dL ($p = 0.001$, specificity = 69%, sensitivity = 47%).

Conclusions: The risk of deep postoperative infection requiring surgical intervention following THA in patients with DM increases as the perioperative HbA1c increases. ROC analysis determined that a perioperative HbA1c above 7.5 mg/dL could serve as a threshold for a significantly increased risk of deep postoperative infection following THA.

Notes

Paper #55

Is Orthopaedic Department Teaching Status Associated with Adverse Outcomes of Primary Total Hip Arthroplasty?

Dean C. Perfetti, BA, Matthew R. Boylan, MD, MPH, **Qais Naziri, MD**, Aditya V. Maheshwari, MD, Carl B. Paulino, MD, Michael A. Mont, MD

Introduction: Although resident education is necessary to maintain our healthcare system, it is believed to create potential inefficiencies in the delivery of care. Under the regional pricing component of the Comprehensive Care for Joint Replacement (CJR) model, teaching hospitals will be forced to compete on cost, outcomes and efficiency with non-teaching hospitals. In this study, we compared the following outcomes according to hospital type: (1) inpatient complications; (2) costs; (3) unplanned 90-day readmission.

Methods: A total of 60,894 patients underwent primary total hip arthroplasty (THA) between January 1, 2009 and September 30, 2012 in the New York Statewide Planning and Research Cooperative System. Perioperative medical and surgical complication categories were created using ICD-9-CM diagnosis codes. Costs were calculated using cost-to-charge ratios. Mixed-effects regression models accounted for hospital clustering and year of surgery and were controlled for demographics and Deyo comorbidity score.

Results: Perioperative medical complications were less common at teaching compared to non-teaching hospitals (3.7% vs. 4.7%; $p < 0.001$) but this was not significant in regression modeling (OR=0.88, $p = 0.122$). Perioperative surgical complications were similar at teaching compared to non-teaching hospitals (0.8% vs. 0.9%, $p = 0.130$), remaining insignificant after regression modeling (OR=0.99, $p = 0.948$). Mean costs were higher at teaching compared to non-teaching hospitals (21,568 vs. 19,579 USD; $p < 0.001$) and this difference remained highly significant in adjusted regression modeling (beta: 15.3%, $p < 0.001$). The rate of unplanned 90-day readmission was less common with patients receiving their procedure from teaching compared to non-teaching hospitals (6.1% vs. 7.2%, $p < 0.001$), but this was not significant after adjusted regression modeling (OR=0.95, $p = 0.249$).

Conclusions: Primary THA at teaching hospitals is associated with higher costs but not significantly differ from non-teaching hospitals in terms of inpatient complications or 90-day readmission. Therefore, orthopaedic teaching hospitals may be adversely affected by regional pricing. While indirect medical education payments help defray the costs of inefficiency in United States teaching hospitals, administrators and policy makers must ensure that financial incentives for efficiency are not impeding resident education.

Notes

Paper #56



Metal Artifact Reduction Sequence MRI Findings in Ceramic-on-Polyethylene Total Hip Arthroplasty

Jason M. Jennings, MD, DPT, J. Ryan Martin, MD, Raymond H. Kim, MD, Charlie C. Yang, MD, Todd M. Miner, MD, Douglas A. Dennis, MD

Introduction: MRI is a commonly utilized screening modality in patients with a metal-on-metal (MoM) total hip arthroplasty (THA). An overestimation of the incidence of clinically significant fluid collections may be present since these collections have been reported in asymptomatic patients with MoM and other bearing surface. The purpose of this study was to determine the frequency, size and types of MRI-documented adverse local tissue reactions (ALTR) in asymptomatic patients with a ceramic-on-polyethylene (CoP) total hip arthroplasty.

Methods: Fifty hips (44 patients) with a minimum 2-year follow-up after CoP THA and a Harris hip score > 90 were enrolled in this study. Inclusion criteria were patients without pain and appropriate follow-up radiographs. All patients underwent a metal artifact reduction sequence (MARS) MRI to determine the presence of fluid collections in asymptomatic patients with a CoP bearing surface.

Results: Fluid collections were observed in 9 of 50 (18 %) asymptomatic hips in this cohort. There were five hips with intracapsular synovitis. Two of these hips had a thickened synovium. Extraarticular fluid collections with direct intracapsular communication were identified in four additional hips. Two of these hips had a thickened synovium. No signs of osteolysis or evidence of ALTR were noted on most recent radiographic follow-up.

Conclusions: The following study revealed that fluid collections are not uncommon after CoP THA. Synovial thickening appears to be present and is more prevalent than previous reports with MoP bearing surfaces. The clinical significance and natural history of these findings remain unknown.

Notes

Disclosures

For the complete list of disclosures, visit www.AAHKS.org/Meeting

Abdel, Matthew P., MD:

American Association of Hip and Knee Surgeons: Board or committee member; European Journal of Orthopaedic Surgery and Traumatology: Editorial or governing board; Journal of Bone and Joint Surgery – British: Editorial or governing board; Journal of Orthopaedic Research: Editorial or governing board; Journal of Orthopaedics and Traumatology: Editorial or governing board; Minnesota Orthopaedic Society: Board or committee member

Abt, John, ATC, PhD: (n)

Ackerman, Jeffrey A., MD: (n)

Adelani, Muyibat A., MD: American Association of Hip and Knee Surgeons: Board or committee member

Agrawal, Kshitijkuma M., MD: (n)

Aiello, Paige M., MS: (n)

Amundson, Adam W., MD: (n)

Anderson, Mike B., MSc: Orthogrid Systems, Inc.: Paid consultant

Anthony, Christopher, MD: (n)

Ashley, Blair Surran., MD: (n)

Attarian, David E., MD: American Orthopaedic Association: Board or committee member; Data Trace Publishers: Publishing royalties, financial or material support

Austin, Matthew S., MD:

AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; JayPee: Publishing royalties, financial or material support; Journal of Arthroplasty: Editorial or governing board; Link Orthopaedics: Paid consultant; Zimmer: IP royalties, Paid consultant

Ayers, David C., MD:

AAOS: Board or committee member; American Orthopaedic Association: Board or committee member; Journal of Bone and Joint Surgery – American: Editorial or governing board

Aziz, Keith T., MD: (n)

Baca, Geneva, BS: (n)

Baré, Jonathan V., MBBS, FRACS, FAOrthA:

Australian Arthroplasty Society: Board or committee member; Biomet: Paid presenter or speaker, Research support; Corin U.S.A.: IP royalties, Paid presenter or speaker, Research support; Zimmer: Paid presenter or speaker

Barfield, William R., PhD: (n)

Barnes, C. Lowry, MD:

American Association of Hip and Knee Surgeons: Board or committee member; AR Orthopaedic Society: Board or committee member; Clinical Orthopaedics and Related Research: Editorial or governing board; ConforMIS:

Research support; DJO: IP royalties; HealthTrust: Paid consultant; HipKnee Arkansas Foundation: Board or committee member; AR Orthopaedic Society: Board or committee member; Clinical Orthopaedics and Related Research: Editorial or governing board; ConforMIS: Research support; DJO: IP royalties; HealthTrust: Paid consultant; HipKnee Arkansas Foundation: Board or committee member; Journal of Arthroplasty: Editorial or governing board; JSOA: Editorial or governing board; Livent: Stock or stock Options; Medtronic: IP royalties, Paid consultant; Mid-American Orthopaedic Association: Board or committee member; Responsive Orthopaedics: Stock or stock Options; Responsive Risk Solutions: Paid consultant, Stock or stock Options; Southern Orthopaedic Association: Board or committee member; Zimmer: IP royalties, Paid consultant; Board or committee member; Journal of Arthroplasty: Editorial or governing board; JSOA: Editorial or governing board; Livent: Stock or stock Options; Medtronic: IP royalties, Paid consultant; Mid-American Orthopaedic Association: Board or committee member; Responsive Orthopaedics:

Stock or stock Options; Responsive Risk Solutions: Paid consultant, Stock or stock Options; Southern Orthopaedic Association: Board or committee member; Zimmer: IP royalties, Paid consultant

Barrack, Robert L., MD:

Biomet: Research support; Hip Society: Board or committee member; Journal of Bone and Joint Surgery – American: Editorial or governing board; Journal of Bone and Joint Surgery – British: Editorial or governing board; Knee Society: Board or committee member; Medical Compression Systems: Research support; National Institutes of Health (NIAMS & NICHD): Research support; Smith & Nephew: Research support; Stryker: IP royalties, Other financial or material support, Paid consultant, Research support; The McGraw-Hill Companies Inc: Publishing royalties, financial or material support; Wolters Kluwer Health – Lippincott Williams & Wilkins: Publishing royalties, financial or material support; Wright Medical Technology, Inc.: Research support

Barrett, William P., MD: DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Paid presenter or speaker, Research support

Disclosures

Barsoum, Wael K., MD:

Active Implants: Research support; Cool Systems: Research support; Custom Orthopaedic Solutions: Stock or stock Options; DJO, Inc.: Research support; Exactech, Inc: IP royalties; IOTied: Other financial or material support; iVHR: Stock or stock Options; KEF Healthcare (Board Member): Other financial or material support; Orthosensor: Research support; Orthovita: Research support; Otismed: Stock or stock Options; Stryker: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Zimmer: IP royalties, Research support

Baumhauer, Judith F., MD, MPH:

American Board of Medical Specialties: Board or committee member; American Board of Orthopaedic Surgery, Inc.: Board or committee member; American Orthopaedic Association: Board or committee member; American Orthopaedic Foot and Ankle Society: Board or committee member; Cartiva: Paid consultant; Clinical Orthopaedics and Related Research: Editorial or governing board DJ Orthopaedics: Paid consultant; Ferring Pharmaceuticals: Paid consultant; Nextremity Solutions Inc.: Paid consultant; Stryker: Paid consultant; Techniques in Foot and Ankle Surgery: Editorial or governing board;

Wright Medical Technology, Inc.: Paid consultant

Beal, Matthew D., MD:

AAOS: Board or committee member; Medacta: IP royalties, Paid consultant, Research support; National Institutes of Health (NIAMS & NICHD), Zimmer, Stryker, Mako Surgical: Research support; Zimmer: Paid consultant

Beaule, Paul, MD:

Corin U.S.A.: IP royalties, Paid consultant, Research support; DePuy, A Johnson & Johnson Company: Paid consultant, Research support; Journal of Bone and Joint Surgery–American: Publishing royalties, financial or material support; MEDACTA: IP royalties, Paid consultant, Paid presenter or speaker; MicroPORT: Paid presenter or speaker, Research support; MicroPort Orthopedics: IP royalties; Smith & Nephew: Paid consultant; Smith-Nephew: Paid presenter or speaker; Wolters Kluwer Health–Lippincott Williams & Wilkins: Publishing royalties, financial or material support; Zimmer: Paid consultant

Bedair, Hany, MD: (n)**Bedard, Nicholas, MD:** (n)**Bedi, Asheesh, MD:**

American Orthopaedic Society for Sports Medicine: Board or committee member; Arthrex, Inc: Paid consultant; Journal of Shoulder and Elbow

Surgery: Editorial or governing board; SLACK Incorporated: Publishing royalties, financial or material support; Springer: Publishing royalties, financial or material support

Belay, Elshaday, BA: (n)**Bellamy, Jaime, DO:** (n)**Bendich, Ilya, MD, MBA:** (n)**Berend, Michael E., MD:**

Biomet: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Hip Society: Board or committee member; Johnson & Johnson. Into our 501c3 research foundation.: Research support; Journal of Arthroplasty: Editorial or governing board; Knee Society: Board or committee member Stryker: Research support; Zimmer: IP royalties, Paid consultant, Paid presenter or speaker, Research support

Bernstein, Jenna A., MD: (n)**Berry, Daniel J.,**

MD: American Joint Replacement Registry: Board or committee member; DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Research support; Elsevier: Publishing royalties, financial or material support; Hip Society: Board or committee member; International Hip Society: Board or committee member;

Journal of Bone and Joint Surgery–American: Editorial or governing board; Mayo Clinic Board of Governors: Board or committee member; Wolters Kluwer Health–Lippincott Williams & Wilkins: Publishing royalties, financial or material support

Best, Matt, MD: (n)**Bezwada, Hari, MD:**

CD Diagnostics: Stock or stock Options; Journal of Arthroplasty: Editorial or governing board; Ortho Development: Paid consultant; Zimmer: Paid consultant

Bini, Stefano A., MD:

AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Arthroplasty Today, Associate Editor: Editorial or governing board; Journal of Arthroplasty: Editorial or governing board; MEDACTA (Grant Research Support): Research support; Nokia Health Care Advisory Board: Paid consultant

Blankstein, Michael, MD: (n)

Bodick, Neil C., MD, PhD: Flexion Therapeutics: Employee, Stock or stock Options

Bohl, Daniel D., MD, MPH: (n)

Bolognesi, Michael P., MD: Amedica: Stock or stock Options, Unpaid consultant; American Association of Hip and Knee Surgeons: Board or committee member; AOA Omega: Other financial or material support; Arthroplasty Today: Editorial or governing board; Biomet: Research support; DePuy, A Johnson & Johnson Company: Research support; Eastern Orthopaedic Association: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Surgical Orthopaedic Advances: Editorial or governing board; TJO: IP royalties, Paid consultant, Stock or stock Options; Zimmer: IP royalties, Paid presenter or speaker, Research support

Bonutti, Peter, MD: Joint Active Systems, Inc.: IP royalties, Stock or stock Options; Stryker: IP royalties, Paid consultant, Paid presenter or speaker

Boodaie, Benjamin: (n)

Bosco, Joseph, MD: Association of Professionals in Infection Control (APIC): Board or committee member; Bulletin of The Hospital for Joint Diseases: Editorial or governing Board; Genovel: IP royalties, Paid consultant, Stock or stock Options; Journal of Bone and Joint Surgery–American: Editorial or governing board; labrador healthcare: Paid consultant; Medtronic:

Paid consultant; Pacira: Paid presenter or speaker; surgical directions consulting: Paid consultant; the orthopedic learning center: Board or committee member

Boylan, Matthew R., MD MPH: (n)

Bozic, Kevin J., MD, MBA: AAOS: Board or committee member; American Joint Replacement Registry: Board or committee member; Centers for Medicare and Medicaid Services: Paid consultant; Harvard Business School: Paid consultant; Orthopaedic Research and Education Foundation: Board or committee member; Yale-New Haven Center for Outcomes Research: Paid consultant

Braud, Jared, MD: (n)

Browne, James A., MD: American Journal of Orthopedics: Editorial or governing board; Biocomposites Ltd: Paid consultant; DJ Orthopaedics: IP royalties, Paid consultant; Journal of Arthroplasty: Editorial or governing board; Radlink: Stock or stock Options; Radlink/DePuy: Paid consultant; Saunders/Mosby-Elsevier: Publishing royalties, financial or material support; Southern Orthopaedic Association: Board or committee member

Brozyniak, Christine K., MPH: Stryker: Employee

Burnham, Jeremy M., MD: (n)

Buvanendran, Asokumar, MD: American Society of Regional Anesthesia and Pain Medicine: Board or committee member; Anesthesia & Analgesia Regional Anesthesia and Pain Medicine: Editorial or governing board, consultant; About Multimodal Analgesia: Paid consultant; Pfizer: Research support; Vital 5: Stock or stock Options

Caccavallo, Peter, MD: Stryker: Paid consultant

Callaghan, John, MD: DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant; International Hip Society: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Arthroplasty (Deputy Editor): Publishing royalties, financial or material support; Knee Society: Board or committee member; Orthopaedic Research and Education Foundation: Board or committee member; Wolters Kluwer Health–Lippincott Williams & Wilkins: Publishing royalties, financial or material support

Campbell, Danielle, MS: Stryker: Employee; Stock or stock Options

Cancienne, Jourdan M., MD: (n)

Chalus, Rhonda, RN: (n)

Chen, Antonia F., MD, MBA: 3M: Research support; AAOS: Board or committee member; ACI: Paid consultant; DJ Orthopaedics: IP royalties; European Knee Association: Board or committee member; Joint Purification System: Unpaid consultant; Musculoskeletal Infection Society: Board or committee member; Myoscience: Research support; SLACK Incorporated: Publishing royalties, financial or material support; Smith & Nephew: Research support; Stryker: IP royalties

Chen, Kevin, MA: (n)

Chiaromonti, Alexander, MD: (n)

Choi, Horim, MD: (n)

Choo, James, MD: Metro Drug Coalition: Board or committee member; Myoscience: Research support; Pfizer: Paid presenter or speaker, Research support; Shinogi: Research support; Tennessee Medical Association: Board or committee member; Tennessee Pain Society: Board or committee member; TEVA: Research support

Disclosures

Chughtai, Morad, MD: (n)

Chung, Eun Kyung, AB: CD Diagnostics, Inc: Employee

Citrano, Patrick, BA: CD Diagnostics: Employee, Stock or stock Options

Clark, Charles, MD: American Orthopaedic Association: Board or committee member; DePuy, A Johnson & Johnson Company: Paid consultant, Paid presenter or speaker, Research support; Journal of Bone and Joint Surgery—American: Editorial or governing board, Publishing royalties, financial or material support; Merck: Other financial or material support; Zimmer: Other financial or material support

Clarke, Henry D., MD: AAOS: Board or committee member; Association of Bone and Joint Surgeons: Board or committee member; ConforMIS: IP royalties, Paid consultant, Unpaid consultant; ICJR: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Knee Surgery: Editorial or governing board; Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board, Publishing royalties, financial or material support; Knee: Editorial or governing board; Smith & Nephew: Paid consultant, Paid presenter or speaker; Stryker: Research support; VIDACARE: Research support

Clohisy, John C., MD: Microport Orthopedics, Inc.: Paid consultant; Pivot Medical: Research support; Smith & Nephew: Research support; Wolters Kluwer Health—Lippincott Williams & Wilkins: Publishing royalties, financial or material support; Zimmer: Research support

Collins, Kristopher D., MD: (n)

Cooper, Alexis M., BS: (n)

Cooper, H. John, MD: AAOS: Board or committee member; Corin U.S.A.: IP royalties, Paid consultant; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery – American: Editorial or governing board; KCI: Paid presenter or speaker, Research support; KCI Medical Canada, Inc: Paid consultant; KCI USA, Inc: Paid consultant; Medacta USA: Paid consultant; Zimmer-Biomet: Paid consultant

Courtney, P. Maxwell, MD: (n)

Creed, Sharon M.: (n)

Cronin, Michael, DO: (n)

Crook, Karla, BS: (n)

Cross, Michael B., MD: Acelity: Paid consultant; Acelity Surgical Advisory Board: Paid consultant; Bone and Joint Journal 360: Editorial or governing board; Exactech, Inc: Paid consultant; Intellijoint: Paid consultant, Stock or

stock Options; Journal of Orthopaedics and Traumatology: Editorial or governing board; Link Orthopaedics: Paid consultant; Smith & Nephew: Paid consultant, Research support; Techniques in Orthopaedics: Editorial or governing board; Theravance Biopharma: Paid consultant; Zimmer: Paid consultant

Culler, Steven D., PhD: HealthTrust Purchasing Group, LLP: Paid consultant

Cunningham, Daniel, BS: (n)

Curtin, Brian M., MS, MD: American Association of Hip and Knee Surgeons: Board or committee member; American Joint Replacement Registry Review Commission: Board or committee member; CareStream: Paid consultant; Clinical Orthopaedics and Related Research: Editorial or governing board; DePuy, A Johnson & Johnson Company: Paid presenter or speaker; European Journal of Orthopaedic Surgery and Traumatology: Editorial or governing board; International Congress for Joint Reconstruction: Board or committee member; Iroko Pharmaceuticals: Paid consultant; Johnson & Johnson: Paid consultant; Journal of Arthroplasty: Editorial or governing board; Orthopedics: Editorial or governing board; Springer:

Publishing royalties, financial or material support

Curtin, Karen, PhD: (n)

Daccach, Juan, MD: DePuy, A Johnson & Johnson Company: Employee; Johnson & Johnson: Stock or stock Options

Dalury, David F., MD: DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Johnson & Johnson: Stock or stock Options; Journal of Arthroplasty: Editorial or governing board

Dangles, Chris J., MD: American Association of Hip and Knee Surgeons: Board or committee member

Dasa, Vinod, MD: Bioventus: Paid consultant, Paid presenter or speaker; Cropper Medical: Research support; Myoscience: Paid consultant, Stock or stock Options; Seikagaku: Paid consultant; Vector Medical: Stock or stock Options

Davenport, Stephen R., MD: Orthopaedic Society of Oklahoma (president): Board or committee member

Davis III, Charles M., MD, PhD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Journal of Arthroplasty: Editorial or governing board

DeClaire, Jeffrey H., MD:
Biomet: Paid consultant,
Paid presenter or speaker;
Zimmer: IP royalties

Deirmengian, Carl, MD:
Biomet: Paid consultant;
Biostar Venture Fund
partner, CD Diagnostics,
Trice, Domain: Stock or
stock Options; Journal
of Bone and Joint
Surgery–American:
Publishing royalties,
financial or material support;
Synthes: Paid consultant;
Zimmer: Paid consultant,
Paid presenter or speaker;
Zimmer, CD Diagnostics:
Research support

Delanois, Ronald, MD:
Cayenne Medical: Paid
consultant, Paid presenter
or speaker; Corin U.S.A.:
Paid consultant; Maryland
Orthopedic association:
Board or committee
member

Del Gaizo, Daniel, MD:
Biom'up: Research support;
Cadence Pharmaceuticals:
Paid presenter or speaker;
Journal of Arthroplasty:
Editorial or governing board;
OrthAlign: Paid consultant;
Pacira: Research support;
SPR Therapeutics: Paid
consultant; Stryker:
Research support; Zimmer:
Research support

Della Valle, Craig J., MD:
American Association of Hip
and Knee Surgeons: Board
or committee member;
Arthritis Foundation: Board
or committee member;
Biomet: IP royalties, Paid
consultant, Research
support; CD Diagnostics:

Stock or stock Options;
DePuy, A Johnson &
Johnson Company: Paid
consultant; Hip Society:
Board or committee
member; Knee Society:
Board or committee
member; Mid America
Orthopaedic Association:
Board or committee
member; Orthopedics
Today: Editorial or
governing board; SLACK
Incorporated: Editorial or
governing board, Publishing
royalties, financial or
material support; Smith &
Nephew: Paid consultant,
Research support; Stryker:
Research support; Wolters
Kluwer Health–Lippincott
Williams & Wilkins:
Publishing royalties, financial
or material support

DeMik, David, PharmD:
(n)

Demos, Harry, MD:
AAOS: Board or committee
member; Think, Surgical,
Inc.: Paid consultant

Dennis, Douglas A., MD:
Clinical Orthopaedics and
Related Research: Editorial
or governing board; DePuy,
A Johnson & Johnson
Company: IP royalties, Paid
consultant, Paid presenter
or speaker; DePuy, A
Johnson & Johnson
Company, Porter Adventist
Hospital: Research support;
Innomed: IP royalties;
Joint Vue: Stock or stock
Options;
Journal of Arthroplasty:
Editorial or governing
board; Journal of Bone and
Joint Surgery–American:

Editorial or governing board;
Orthopedics Today: Editorial
or governing board; Wolters
Kluwer Health–Lippincott
Williams & Wilkins:
Publishing royalties, financial
or material support

**Dickinson, Christopher
C., BS:** (n)

Diesfeld, Paul J., PA-C:
(n)

Do, Huong, MS: (n)

**Dodwell, Emily R., MD,
MPH:** (n)

Dowden, Amy, MD: (n)

**Dowdle, Spencer Blake,
MD:** (n)

Doyle, Mittie K., MD:
Flexion Therapeutics:
Employee; Stock or stock
Options

Drew, Jacob, MD: DePuy,
A Johnson & Johnson
Company: Paid presenter or
speaker

**Drinkwater, Christopher,
MD:** Omni Life Science:
Paid consultant, Paid
presenter or speaker;
Smith & Nephew: Research
support

Duncan, Stephen T., MD:
American Association of Hip
and Knee Surgeons: Board
or committee member;
Journal of Arthroplasty:
Editorial or governing board;
Kentucky Orthopaedic
Society: Board or
committee member; Mitek:
Paid consultant; Morph:
Unpaid consultant; Smith &
Nephew: Paid consultant;
Stryker: Research support

**Duwelius, Paul J.,
MD:** AAOS: Board or
committee member;
Clinical Orthopaedics
and Related Research:
Editorial or governing
board; Journal of Bone and
Joint Surgery–American:
Publishing royalties,
financial or material support;
Operation Walk-Freedom
to Move CEO: Board
or committee member;
Providence Orthopedic
Foundation & Director of
Providence Orthopedic
Institute: Research support;
Signature Health Care:
Paid presenter or speaker;
UniteOR: Stock or stock
Options; Zimmer: IP
royalties; Paid consultant;
Research support

Edwards, Paul K., MD:
DJO: Paid consultant

Erens, Greg A., MD:
Johnson & Johnson: Stock
or stock Options; Stryker
(institutional and research
support): Other financial or
material support; UpToDate
(This is an evidence-based
clinical decision support
resource authored by
physicians. It is available
online and in other formats.
UpToDate is part of Wolters
Kluwer Health): Publishing
royalties, financial or
material support; Zimmer:
Other financial or material
support

Erez, Orry, MD: Premia
Spine: Stock or stock
Options

Estok, Daniel M., MD: (n)

Disclosures

Fabi, David W., MD:

Premia Spine: Stock or stock Options

Feeley, Brian, MD: AAOS:

Board or committee member; American Orthopaedic Society for Sports Medicine: Board or committee member; Knee: Editorial or governing board

Fehring, Thomas K., MD:

American Association of Hip and Knee Surgeons: Board or committee member; DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Knee Society: Board or committee member

Fillingham, Yale A., MD:

(n)

Fitz, David W., MD: (n)**Foran, Jared R. H., MD:**

AAOS OrthoInfo: Editorial or governing board; Cardinal Health: Paid consultant; Journal of Arthroplasty: Editorial or governing board; Zimmer: Paid consultant

Franceschini, Vincenzo, MD: (n)**Franklin, Patricia D., MD, MBA, MPH:**

Zimmer: Research support

Freeman, D. Carl, PhD: (n)**Froimson, Mark I., MD:**

American Association of Hip and Knee Surgeons: Board or committee member; American Journal of Orthopedics: Editorial or governing board; American Orthopaedic

Association: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery – American: Editorial or governing board; Medical Compression Systems: Paid consultant, Stock or stock Options; Mid American Orthopaedic Association: Board or committee member

Fu, Michael C., MD: (n)**Furlan, Jean:** (n)**Gao, Yubo, PhD:** (n)**Ge, Yile (Molly), MSc:** (n)**Geller, Jeffrey A., MD:**

American Association of Hip and Knee Surgeons, American Association of Orthopaedic Surgeons: Board or committee member; Clinical Orthopaedics and Related Research, Journal of Arthroplasty: Editorial or governing board; Orthopaedic Scientific Research Foundation: Research support; OrthoSensor: Paid consultant, Research support; Smith & Nephew: Paid consultant, Paid presenter or speaker, Research support

George, Jaiben, MBBS: (n)**Ghomrawi, Hassan, PhD, MPH:**

American Journal of Orthopedics: Editorial or governing board; Hamad General Hospital, Doha, Qatar: Paid consultant; Optum Health: Paid consultant

Gilliland, Jeremy M., MD:

Biomet: Research support; CoNextions: Stock or stock Options; Orthogrid: Paid consultant, Stock or stock Options, Unpaid consultant; Zimmer: Research support

Ginnetti, John, MD: (n)**Gittings, Daniel J., MD:** (n)**Goetz, Devon, MD:**

Clinical Orthopaedics and Related Research: Editorial or governing board; Journal of Bone and Joint Surgery – American: Editorial or governing board; Society for Arthritic Joint Surgery: Board or committee member

Goldberg, Benjamin A., MD:

AAOS Electronic Skills Pavilion: Board or committee member; AAOS Exhibits Committee: Board or committee member; Acumed, LLC: Paid consultant, Paid presenter or speaker; Allen Medical: Paid consultant, Paid presenter or speaker; Aston: Paid consultant, Paid presenter or speaker; Aston Medical: IP royalties; Biomimetic: Stock or stock Options; European Journal of Orthopaedic Surgery and Traumatology (EJOST): Editorial or governing board; Mako: Stock or stock Options; Midwest/Arthrex: Paid consultant, Paid presenter or speaker; Stryker: Paid consultant, Paid presenter or speaker

Golladay, Gregory, MD:

American Association of Hip and Knee Surgeons: Board or committee member; Cayenne Medical, Inc: Paid consultant; Editorial Board, Journal of Arthroplasty: Editorial or governing board; Medical Society of Virginia: Board or committee member; Orthosensor: Paid consultant, Research support; Orthosensor, Inc: IP royalties; Orthosensor, Inc.: Paid presenter or speaker, Stock or stock Options; Stryker: Paid consultant; Virginia Orthopaedic Society: Board or committee member

Gonzalez Della Valle, Alejandro, MD:

Link Orthopaedics: Paid consultant; Merz Pharmaceuticals: Paid consultant; Orthodevelopment: Paid consultant; Orthosensor: Paid consultant

Goyal, Nitin, MD:

Cayenne Medical: Paid consultant; Data Trace: Publishing royalties, financial or material support; Stryker: Paid consultant

Graves, Christopher, MD: (n)**Green, Cynthia L., PhD:** (n)**Guild III, George N., MD:**

United States Medical Innovations: Research support

Gulati, Simmi, BA:

CD Diagnostics: Employee; Stock or stock Options

Gwam, Chukwuweike, MD: (n)

Haddad, Fares, FRCS:
Annals of the Royal College of Surgeons England: Editorial or governing board; Bone and Joint Journal: Editorial or governing board; Corin: IP royalties; Journal of Arthroplasty: Editorial or governing board; Matortho: IP royalties; Orthopedics Today: Editorial or governing board; Smith & Nephew: IP royalties, Paid consultant, Research support; Stryker: IP royalties, Paid consultant

Haleem, Ambar, MD: (n)

Hall, Deborah J., BS:
Wright Medical Technology, Inc.: Paid consultant, Research support

Halsey, David A., MD:
AAOS: Board or committee member; Vermont Medical Society: Board or committee member; Vermont Orthopaedic Society: Board or committee member

Hamilton, David, MD: (n)

Hamilton, William G., MD: Biomet: Research support; DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Inova Health Care Services: Research support; Total Joint Orthopedics: IP royalties, Paid consultant

Hansen, Erik Nathan, MD: (n)

Hardt, Kevin D., MD:
Medacta: Research support

Hassan, Omar, BA: (n)

Hebl, James R., MD:
Minnesota Society of Anesthesiologists: Board or committee member; Oxford University Press: Publishing royalties, financial or material support; Regional Anesthesia and Pain Medicine: Editorial or governing board

Heiner, Anneliese D., PhD: Clinical Biomechanics: Editorial or governing board; DePuy, A Johnson & Johnson Company: Other financial or material support; Smith & Nephew: Research support

Helfrich, Mia, BS: (n)

Henderson, Robert Andrew, MD, MSc: (n)

Henry, Michael W., MD: (n)

Higuera, Carlos A., MD:
American Association of Hip and Knee Surgeons: Board or committee member; American Journal of Orthopedics: Editorial or governing board; CD Diagnostics: Research support; Cempra: Research support; Convatec: Paid presenter or speaker; KCI: Paid consultant, Research support; Myoscience: Research support; OREF: Research support; Pfizer: Paid consultant Stryker: Research support; The Academy of Medicine of Cleveland & Northern Ohio (AMCNO): Board

or committee member; Zimmer: Paid consultant

Himden, Sam, BA, CCRA:
DePuy Synthes, A Johnson & Johnson Company: Employee; Johnson & Johnson: Stock or stock Options

Hitt, Kirby D., MD: Stryker: IP royalties, Other financial or material support, Paid consultant, Research support; StrykerConvatec: Paid presenter or speaker

Ho, Bryant, MD: (n)

Huddleston, James, MD:
AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; American Knee Society: Research support; Biomet: Paid consultant, Research support; California Joint Replacement Registry: Board or committee member, Paid consultant; Exactech, Inc: IP royalties, Paid consultant, Paid presenter or speaker; Journal of Arthroplasty: Editorial or governing board; Knee Society: Board or committee member; Porosteon: Paid consultant, Stock or stock Options; Robert Wood Johnson Foundation: Research support; Zimmer: Paid consultant, Paid presenter or speaker

Hume, Eric L., MD:
Zimmer: Paid consultant

Hunt, Emily, MS: (n)

Huo, Michael H., MD:
American Academy of Orthopedic Surgeons (Committee on Evaluation: self-assessment examination): Board or committee member; Current Orthopedic Practice: Editorial or governing board; DePuy, A Johnson & Johnson Company: Paid consultant; Elsevier: Paid consultant; Stryker: Paid consultant

Iorio, Richard, MD:
American Association of Hip and Knee Surgeons: Board or committee member; Bioentis: Research support; Clinical Orthopaedics and Related Research: Editorial or governing board; DJ Orthopaedics: Paid consultant; Ferring Pharmaceuticals: Research support; Hip Society: Board or committee member; JBJS Reviews: Editorial or governing board; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery–American: Editorial or governing board; Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board; Knee Society: Board or committee member; MCS ActiveCare: Paid consultant, Stock or stock Options; Medtronic: Paid consultant; Orthofix, Inc.: Research support; Orthosensor: Research support; Pacira: Paid consultant, Research support; Vericel: Research support; Wellbe: Stock or stock Options

Disclosures

Jacobs, Cale A., PhD:

Biomet: Research support;
Stryker: Research support;
Zimmer: Research support

Jacobs, Joshua J.,

MD: American Board of Orthopaedic Surgery, Inc.: Board or committee member; Hip Society: Board or committee member; Implant Protection: Stock or stock Options; Medtronic Sofamor Danek: Paid consultant, Research support; Nuvasive: Research support; Orthopaedic Research and Education Foundation: Board or committee member; Zimmer: Research support

Jain, Deeptee, MD: (n)**Jennings, Jason M., MD, DPT:** (n)**Jevsevar, David S., MD, MBA:** (n)**Jiraneck, William, MD:**

American Association of Hip and Knee Surgeons: Board or committee member; Cayenne Medical: Paid consultant; DePuy, A Johnson & Johnson Company: IP royalties; Paid consultant; Research support; Johnson & Johnson: Stock or stock Options; Lifenet Health, Inc.: Board or committee member; OLC Orthopaedic Learning Center: Board or committee member; Stryker: Research support

Jochimsen, Kate N., MS: (n)**John, Thomas K., MD:** (n)**Johnson, James R., PhD:**

Flexion Therapeutics, Inc.: Employee; Stock or stock Options

Johnson, Rebecca L., MD: (n)**Jones, Deryk, MD:**

Genzyme: Paid consultant, Paid presenter or speaker; Mitek: Paid presenter or speaker; Musculoskeletal Transplant Foundation: Board or committee member, Paid consultant

Jones, Stephen A., MD:

Smith & Nephew: Paid consultant, Paid presenter or speaker; Zimmer: Paid consultant, Paid presenter or speaker

Kalore, Niraj V., MD:

Arthroscopy: Editorial or governing board

Kamath, Atul F.,

MD: AAOS: Board or committee member; BMC Musculoskeletal Disorders: Editorial or governing board; DePuy, A Johnson & Johnson Company: Paid consultant, Paid presenter or speaker; Innomed: IP royalties; Procter & Gamble: Stock or stock Options; Zimmer: Paid consultant, Paid presenter or speaker, Research support

Kaplan, Nathan, MD: (n)**Karam, Joseph A., MD:** (n)

Kardos, Keith, PhD: CD Diagnostics: Employee, Stock or stock Options

Kavolus, Joseph, MD,

MSCR: Pacira: Stock or stock Options

Kazarian, Gregory, BA: (n)**Kelly, Mick P., MD:** (n)**Kerr, Joshua:** (n)**Keter, Daniel, BA:** CD

Diagnostics: Employee

Khanuja, Harpal P., MD:

AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Journal of Arthroplasty: Editorial or governing board

Khlopas, Anton, MD: (n)**Kim, Raymond H., MD:**

Ceramtec: Paid presenter or speaker; Convatec: Paid presenter or speaker; DJ Orthopaedics: IP royalties, Paid consultant; ICJR: Board or committee member; Innomed: IP royalties

Kirkland, Patricia A., BS: (n)**Kissin, Yair David, MD:**

AAOS: Board or committee member; American Journal of Orthopedics: Editorial or governing board; Ethicon: Paid consultant, Paid presenter or speaker; Journal of Arthroplasty: Editorial or governing board; Knee: Editorial or governing board; Pacira: Paid presenter or speaker

Klatt, Brian A., MD:

AAOS AAHKS Abstract Review Committee: Board or committee member; American Association of Hip

and Knee Surgeons: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Saunders/Mosby-Elsevier Operative Techniques in Orthopaedics: Publishing royalties, financial or material support; SLACK Incorporated: Publishing royalties, financial or material support

Klika, Alison K., MS: (n)**Koenig, Karl, MD, MS:** (n)**Kolessar, David J., MD:** (n)**Kong Koh, Chuan, MBChB:** (n)**Kopp, Sandra L., MD:** (n)**Kralovec, Michael E., MD:** (n)

Lachiewicz, Paul F., MD: Gerson Lehrman Group: Paid consultant; Guidepoint Global Advisors: Paid consultant; Innomed: IP royalties; Journal of Arthroplasty: Editorial or governing board; Journal of Surgical Orthopaedic Advances: Editorial or governing board; Mallinckrodt (formerly Cadence): Paid presenter or speaker; Pacira: Paid consultant, Paid presenter or speaker; Zimmer: Research support

Lang, Jason E., MD:

Smith & Nephew: Paid consultant, Research support

Larson, Dirk R., MS: (n)

Lattermann, Christian, MD: Cartiheal: Paid consultant; Cartilage J Sports Physiology The Knee Orthopaedic Journal of Sports Medicine: Editorial or governing board; International Cartilage Repair Society German-speaking Arthroscopy Society (AGA): Board or committee member; Smith & Nephew: Research support; Vericel: Paid consultant

Lavernia, Carlos J., MD: Biomet: Paid consultant; Florida Orthopaedic Society: Board or committee member; Johnson & Johnson: Stock or stock Options; Journal of Arthroplasty: Editorial or governing board; MAKO SURGICAL/STRYKER: IP royalties; Stryker: Stock or stock Options; Symmetry Medical (Telcomet): Stock or stock Options; Wright Medical Technology, Inc.: Stock or stock Options; Zimmer: Paid consultant, Stock or stock Options

Lee, Gwo-Chin, MD: AAOS: Board or committee member; CD Diagnostics: Research support; Ceramtec: Paid presenter or speaker; Clinical Orthopaedics and Related Research: Editorial or governing board; DePuy, A Johnson & Johnson Company: Paid consultant, Paid presenter or speaker; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery:

Editorial or governing board; Orthopedics: Editorial or governing board; Pacira: Paid consultant; SLACK Incorporated: Editorial or governing board; Smith and Nephew: Research support; Stryker: Paid consultant; Zimmer: Research support

Lee, Yuo-yu, MS: (n)

LeMarr, Angela R., RN, ONC: (n)

Lemay, Celeste, RN, MPH: (n)

Lesko, James, PhD: DePuy Synthes, A Johnson & Johnson Company: Employee; Johnson & Johnson: Stock or stock Options

Levack, Ashley E., MD, MAS: (n)

Levine, Brett R., MD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Artelon: Research support; Biomet: Research support; CODR: Board or committee member; Human kinetics: Editorial or governing board; Link Orthopaedics: Paid consultant; McGraw-Hill: Paid consultant; OrthoView: Paid consultant; SLACK Incorporated: Editorial or governing board; Zimmer: Paid consultant; Research support

Levy, Daniel L., BS: (n)

Lewallen, David G., MD: Acuitive: Stock or stock Options; American Joint

Replacement Registry: Board or committee member; Ketai Medical Devices: Stock or stock Options, Unpaid consultant; Link Orthopaedics: Paid consultant; Mako/Stryker: IP royalties; Orthopaedic Research and Education Foundation: Board or committee member; Pipeline: IP royalties; Zimmer: IP royalties, Paid consultant

Lewis, Courtland, MD: Biomet: Research support

Lieberman, Jay, MD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Editorial or governing board; DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant; Hip Innovation Technology: Stock or stock Options; Journal of Arthroplasty: Editorial or governing board; Saunders/Mosby-Elsevier: Publishing royalties, financial or material support; Western Orthopaedic Association: Board or committee member

Little, Kenneth M., MD, FAANS: (n)

Livshetz, Isaac, MD: (n)

Lombardi, Jr., Adolph V., MD: Clinical Orthopaedics and Related Research: Editorial or governing board; Hip Society: Board or committee member; Innomed: IP royalties; Journal of Arthroplasty: Editorial or governing

board; Journal of Bone and Joint Surgery–American: Editorial or governing board; Journal of Orthopaedics and Traumatology: Editorial or governing board; Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board; Knee: Editorial or governing board; Knee Society: Board or committee member; Mount Carmel Education Center at New Albany: Board or committee member; Operation Walk USA: Board or committee member; Orthosensor: IP royalties, Paid consultant, Research support; Pacira Pharmaceuticals, Inc.: Paid consultant, Research support; SPR Therapeutics, LLC: Research support, Stock or stock Options; Surgical Technology International: Editorial or governing board; Zimmer Biomet: IP royalties, Paid consultant, Research support

Lufkin, Joelle, MPH: Flexion Therapeutics: Employee, Stock or stock Options

Lusk, Eileen M.: (n)

Lux, Nathan, BS: (n)

Disclosures

Lyman, Stephen, PhD:

HSS Journal: Editorial or governing board; International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine: Board or committee member; ISAKOS Journal (new journal): Editorial or governing board; Journal of Bone and Joint Surgery–American: Editorial or governing board

MacDonald, Steven J., MD:

DePuy, A Johnson & Johnson Company: IP royalties, Paid consultant, Research support; Hip Innovations Technology, JointVue: Stock or stock Options; Smith & Nephew: Research support; Stryker: Research support

MacLean, Catherine H., MD, PhD:

American College of Physicians: Board or committee member

Maheshwari, Aditya V., MD:

World Journal of Orthopedics: Editorial or governing board

Malempati, Chaitu S., MD:

(n)

Maltenfort, Mitchell, PhD:

(n)

Malvar-Ledda, Renalin J.:

(n)

Manktelow, Andrew, MD:

Biomet: Paid presenter or speaker; British Hip Society: Board or committee member; DePuy, A Johnson & Johnson Company: Paid presenter or speaker;

Zimmer: IP royalties, Paid consultant, Paid presenter or speaker

Manning, David W., MD:

AAOS: Program Committee-Subcommittee Adult Hip: Board or committee member; Biomet: IP royalties; Biomet, Medacta: Paid consultant; Iconacy: Stock or stock Options; Medacta: Paid presenter or speaker

Manson, Theodore T., MD:

AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Clinical Orthopaedics and Related Research: Editorial or governing board; DePuy, A Johnson & Johnson Company: Research support; Globus Medical: Paid consultant; Journal of Arthroplasty: Editorial or governing board; Smith & Nephew: Paid consultant; Stryker: Paid consultant; Synthes: Research support

Mantilla, Carlos B., MD, PhD:

Physiology, American Physiological Society: Editorial or governing board

Marel, Ed, MBBS, FRACS, FAOrthA:

Optimized Ortho: Paid consultant, Paid presenter or speaker, Stock or stock Options

Martin, John Ryan, MD:

Biomet: Paid consultant; Paid presenter or speaker

Mason, J. Bohannon, MD:

American Association of Hip and Knee Surgeons:

Board or committee member; DePuy, A Johnson & Johnson Company: IP royalties, Other financial or material support, Paid consultant; Journal of Arthroplasty: Publishing royalties, financial or material support

Masonis, John L., MD:

Corin U.S.A.: Paid consultant; DePuy, A Johnson & Johnson Company: Research support; Smith & Nephew: IP royalties, Paid consultant, Paid presenter or speaker, Research support; Zimmer: IP royalties, Paid consultant, Research support

Mayman, David J., MD:

Knee Society: Board or committee member; OrthAlign: Stock or stock Options; Smith & Nephew: Paid consultant, Paid presenter or speaker

McClellan, Taylor R., BS:

(n)

McDanel, Deanna, PharmD:

(n)

McGill, Robert J., MD:

(n)

McGuire, Kevin J., MD, MS:

Ortho Data Solutions: Paid consultant; Spine: Editorial or governing board

McHugh, Michael, BS:

(n)

McLawhorn, Alexander S., MD, MBA:

American Association of Hip and Knee Surgeons: Board or committee member; American Journal of Orthopedics: Editorial or governing board;

HSS Journal: Editorial or governing board

McMahon, Stephen, MBBS, FRACS, FAOrthA:

Corin U.S.A.: Paid consultant; Smith & Nephew: Paid consultant, Research support; Stryker: Paid consultant

Meftah, Morteza, MD:

Journal of Arthroplasty: Editorial or governing board; Orthopedics: Editorial or governing board; SwiftPath: Paid presenter or speaker

Meghpara, Mitchell, MD:

(n)

Meller, Menachem M., MD:

AAOS: Board or committee member; Clinical Orthopaedics and Related Research: Editorial or governing board; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery – American: Editorial or governing board; PLOS ONE: Editorial or governing board

Meneghini, R. Michael, MD:

DJ Orthopaedics: IP royalties, Paid consultant; Journal of Arthroplasty: Editorial or governing board; Knee Society: Board or committee member; Stryker: IP royalties; Paid consultant

Miller, Andy O., MD:

(n)

Miller, Michael J., BS, MS:

(n)

Miner, Todd M., MD:

DePuy: Research support; DePuy, A Johnson & Johnson Company: Unpaid consultant; Operation Walk Denver- I am Board Chairman: Board or committee member; Porter Adventist Hospital: Research support; Zimmer: Paid consultant, Paid presenter or speaker, Research support

Mittal, Yogesh, MD:

American Association of Hip and Knee Surgeons: Board or committee member; Stryker: Paid consultant

Molina, Domingo, IV, MD:
(n)**Molloy, Robert M., MD:**

Stryker: Paid consultant, Paid presenter or speaker, Research support; Zimmer: Research support

Mont, Michael A., MD:

AAOS: Board or committee member; American Journal of Orthopedics: Editorial or governing board; DJ Orthopaedics: Paid consultant, Research support; Johnson & Johnson: Paid consultant, Research support; Journal of Arthroplasty: Editorial or governing board; Journal of Knee Surgery: Editorial or governing board; Merz: Paid consultant; Microport: IP royalties; National Institutes of Health (NIAMS & NICHD): Research support; Ongoing Care Solutions: Research support; Orthopedics: Editorial or governing board; Orthosensor: Paid consultant, Research

support; Pacira: Paid consultant; Sage Products, Inc.: Paid consultant; Stryker: IP royalties; Paid consultant, Research support; Surgical Techniques International: Editorial or governing board; TissueGene: Paid consultant, Research support; U S Medical Innovations: Paid consultant

Moore, Grant A., PhD: (n)**Mortazavi, S. M. Javad, MD:** (n)**Morton, Diane J., MS:** (n)

Moskal, Joseph T., MD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Corin U.S.A.: Paid consultant; DePuy, A Johnson & Johnson Company: IP royalties; Invuity: Stock or stock Options; Medtronic: Paid consultant, Paid presenter or speaker; Stryker: Paid consultant, Paid presenter or speaker

Moucha, Calin S., MD: 3M: Paid presenter or speaker; Saunders/ Mosby-Elsevier: Publishing royalties, financial or material support

Nam, Denis, MD, MSc:

EOS Imaging: Research support; KCl: Paid consultant OrthAlign Inc.: Stock or stock Options

Naranjo, Julian F., MD: (n)**Navale, Suparna, MS, MPH:** (n)**Naziri, Qais, MD:** (n)**Nepple, Jeffrey, MD:**

Smith & Nephew: Paid consultant, Paid presenter or speaker; Zimmer: Research support

Newman, Jared M., MD:
(n)**Nguyen, Long-Co, BS:** (n)

Nichols, Christine I., MA, MBA: Medtronic: Employee, Stock or stock Options

Nodzo, Scott R., MD:

NanoAxis, LLC: Unpaid consultant

Noiseux, Nicolas,

MD: DePuy, A Johnson & Johnson Company: Research support; MicroPort: Paid consultant; Smith & Nephew: Paid consultant; Zimmer: Research support

Nunley, Ryan M., MD:

American Association of Hip and Knee Surgeons: Board or committee member; Biocomposites: Paid consultant; Biomet: Research support; Blue Belt Technology: Paid consultant; Cardinal Health: Paid consultant; DePuy, A Johnson & Johnson Company: Paid consultant, Research support; Halyard: Paid consultant; Medical Compression System Inc: Paid consultant; Medical Compression Systems, Inc.: Research support; Medtronic: Paid consultant; Microport: IP royalties, Paid

consultant; Mirus: Paid consultant; Missouri State Orthopaedic Association Board Member: Board or committee member; Smith & Nephew: Paid consultant, Research support; Southern Orthopaedic Association Board Member: Board or committee member; Stryker: Research support

Oakes, Daniel A., MD:

American Association of Hip and Knee Surgeons: Board or committee member; Journal of Knee Surgery: Editorial or governing board; Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board; Orthopedics: Editorial or governing board

Odum, Susan, PhD:

American Association of Hip and Knee Surgeons: Board or committee member; Ceramtec: Paid presenter or speaker; Journal of Arthroplasty: Editorial or governing board

Okafor, Richard, MD: (n)**Olson, Richard R., MD:** (n)**Olson, Tyler, BS:** (n)**O'Neil, Owen, MD:**

Medtronic: Paid consultant, Paid presenter or speaker; Responsive Orthopedics: IP royalties

Otero, Jesse, MD, PhD:
(n)

Disclosures

Padgett, Douglas E., MD: American Joint Replacement Registry: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Mako: Paid consultant; Medical Compression Systems: Paid consultant; Stryker: Paid consultant, Paid presenter or speaker; The Hip Society: Board or committee member

Pagnano, Mark W., MD: DePuy, A Johnson & Johnson Company: IP royalties; Hip Society: Board or committee member; Knee Society: Board or committee member; Pacira: Paid consultant; Stryker: IP royalties

Palumbo, Brian T., MD: DJ Orthopaedics: Paid consultant; Zimmer: Paid consultant

Panchamia, Jason K., DO: (n)

Parisi, Thomas J., MD, JD: (n)

Parsley, Brian S., MD: American Association of Hip and Knee Surgeons: Board or committee member; Conformis: Paid presenter or speaker, Research support; Conformis Inc.: IP royalties, Stock or stock Options; DePuy, A Johnson & Johnson Company: Research support; Nimbic Inc.: Unpaid consultant; Nimbic Systems: Paid presenter or speaker, Stock or stock Options

Parvataneni, Hari K., MD: AAOS: Board or committee member; American

Association of Hip and Knee Surgeons: Board or committee member; Florida Orthopaedic Society: Board or committee member

Parvizi, Javad, MD, FRCS: 3M: Research support; CD Diagnostics: Stock or stock Options; Cemptra: Research support; CeramTec: Research support; Data Trace: Publishing royalties, financial or material support; DePuy, A Johnson & Johnson Company: Research support; Eastern Orthopaedic Association: Board or committee member; Elsevier: Publishing royalties, financial or material support; Hip Innovation Technology: Stock or stock Options; Jaypee Publishing: Publishing royalties, financial or material support; Journal of Arthroplasty: Editorial or governing board; Journal of Bone and Joint Surgery–American: Editorial or governing board; Journal of Bone and Joint Surgery–British: Editorial or governing board; Muller Foundation: Board or committee member; National Institutes of Health (NIAMS & NICHD): Research support; OREF: Research support; PRN: Stock or stock Options; SLACK Incorporated: Publishing royalties, financial or material support; Smith & Nephew: Paid consultant, Research support; StelKast: Research support; Stryker: Research support; Wolters Kluwer Health–Lippincott Williams & Wilkins: Publishing royalties,

financial or material support; Zimmer: Paid consultant, Research support

Pashos, Gail, BS: GlaxoSmithKline: Stock or stock Options

Patel, Atul T., MD: Allergan: Paid presenter or speaker, Research support; American Academy of Physical Medicine & Rehabilitation: Board or committee member; American Association of Neuromuscular and Electrodiagnostic Medicine: Board or committee member; IPSEN: Research support; Merz: Research support; Revance: Research support

Patel, Nirav K., MD, FRCS: (n)

Patterson, Joseph T., MD: (n)

Paulino, Carl B., MD: DePuy, A Johnson & Johnson Company; Ethicon: Paid presenter or speaker

Pelt, Christopher E., MD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Biomet: Paid consultant, Paid presenter or speaker, Research support; Pacira: Research support, Unpaid consultant

Perfetti, Dean C., BA: (n)

Perricelli, Brett C., MD: AAHKS – Abstract Review Committee: Board or committee member; AAHKS – Patient

Educational Committee Member: Board or committee member; Data Trace Publishing Company: Research support; Journal of Arthroplasty: Editorial or governing board; Mallinckrodt Pharmaceuticals: Paid consultant; Pacira Pharmaceuticals Inc: Paid consultant, Paid presenter or speaker, Stock or stock Options; Zimmer Biomet: Paid presenter or speaker

Peters, Christopher L., MD: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Biomet: IP royalties, Paid consultant, Paid presenter or speaker, Research support; CoNextions Medical: Stock or stock Options; Hip Society: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Hip Preservation: Editorial or governing board; Knee Society: Board or committee member

Pierrepoint, Jim W., PhD, MEng: Corin Group: Employee, Stock or stock Options

Pitto, Rocco P., MD, PhD: Association of Bone and Joint Surgeons: Board or committee member; Ceramtec: Research support

Polkowski II, Gregory G., MD: American Association of Hip and Knee Surgeons: Board or committee member

Ponnusamy, Karthik, MD: (n)

Ponzio, Danielle Y., MD: (n)

Pourzal, Robin, PhD: (n)

Pugely, Andrew, MD:
AAOS: Board or committee member
Clinical Orthopaedics and Related Research: Editorial or governing board

Purcell, Kelly, BS: (n)

Qin, Charles Du, BS: (n)

Radnovich, Richard, DO: (n)

Ramanathan, Deepak, MBBS: (n)

Ravi, Saiprasad, MBChB: (n)

Reedy, Mary E., RN, ONC: (n)

Riegler, Venessa, BA: (n)

Robertson, Kate, PA-C: (n)

Rodd, Denise Smith: (n)

Rose, Patti: (n)

Ross, Jeremy A., MD: (n)

Rossi, Mark D., PhD: (n)

Runner, Robert P., MD: (n)

Sabbag, Orlando D., MD: (n)

Schaffer, Jonathan L., MD: AAOS: Board or committee member; AcelRx Pharmaceuticals, Inc.: Paid consultant; American Association of Hip and Knee Surgeons: Board or committee

member; Biorita, Inc.: Paid consultant; CardioMEMS: Paid consultant; Compliant Innovations, LLC: Paid consultant, Stock or stock Options; Elsevier: Publishing royalties, financial or material support; iBalance Medical, Inc.; Biorita, Inc.: Stock or stock Options; SnappSkin, Inc.: Paid consultant; Taylor and Francis: Publishing royalties, financial or material support; Zin Medical, Inc.: Paid consultant; Zin Medical, Inc., now Flex Life Healthcare: IP royalties

Schairer, William W., MD: (n)

Schenker, Mara L., MD:
Carmell Therapeutics: Paid consultant

Schlosser, Michael J., MD, MBA, FAANS: (n)

Schmaltz, Harry W., MD:
Biomet: Paid consultant, Paid presenter or speaker; PA Ortho Society: Board or committee member

Schoenecker, Perry, MD: Journal of Children's Orthopaedics: Editorial or governing board; Journal of Pediatric Orthopedics: Editorial or governing board; Pediatric Orthopaedic Society of North America: Board or committee member

Schroder, David T., MD:
Pacira: Stock or stock Options; Pfizer: Stock or stock Options

Schroer, William C., MD:
Biomet: Paid presenter or speaker, Research support

Schwartz, Brian E., MD:
Abbott: Employee

Schwarzkopf, Ran, MD, MSc: AAOS: Board or committee member; American Association of Hip and Knee Surgeons: Board or committee member; Arthroplasty Today: Editorial or governing board; Gauss surgical: Stock or stock Options; Intelijoint: Paid consultant; Journal of Arthroplasty: Editorial or governing board; Pristine: Stock or stock Options; Smith & Nephew: Paid consultant; Stryker: Paid consultant

Scott, David Forrest, MD: Medacta International: Paid consultant, Paid presenter or speaker, Research support; Microport Orthopedics: Paid consultant, Paid presenter or speaker; OMNI Life Science: Paid consultant, Paid presenter or speaker, Stock or stock Options; Stryker: Paid consultant, Paid presenter or speaker; Stryker, OMNI life science, Novartis, Proctor & Gamble: Research support

Sculco, Peter K., MD: (n)

Seyler, Thorsten, MD, PhD: Editorial Board Member, Bone & Joint Research: Editorial or governing board; Total Joint Orthopedics, Inc.: Paid consultant

Shah, Chirag K., BA: (n)

Shah, Jinesh, MS: DePuy, A Johnson & Johnson Company: Paid consultant; GBSN: Stock or stock Options

Shaner, Julie, MD: (n)

Shea, Kevin G., MD:
AAOS: Board or committee member; Allosource: Research support; Clinical Data Solutions, SourceTrust: Unpaid consultant; Pediatric Orthopaedic Society of North America: Board or committee member; PRISM–Pediatric Research in Sport Medicine: Board or committee member; ROCK- Research for Osteochondritis Dissecans of the Knee: Board or committee member

Sher, Alex, BS: Merck: Stock or stock Options

Shimmin, Andrew J., MBBS, FRACS, FAOrthA:
American Association of Hip and Knee Surgeons: Board or committee member; Corin UK: Research support; Corin Ukmatortho: IP royalties; Corin Ukmatortho uk: Paid consultant; Matortho UK: Research support; Optimized Orthopedics: Unpaid consultant; Smith & Nephew: Paid consultant

Disclosures

Shrock, Kevin B., MD:

AAOS: Board or committee member; Actavis: Stock or stock Options; Ampion: Research support; Apimed: Research support; Flexion: Research support; Florida Orthopaedic Society: Board or committee member; Galderma: Research support; Histogenics: Research support; Hyalofast: Research support; Janssen: Research support; Myoscience: Research support; Novum: Research support; Pfizer: Stock or stock Options; Viking: Research support

Sierra, Rafael Jose, MD:

American Association of Hip and Knee Surgeons: Board or committee member; Biomet: IP royalties, Paid consultant, Paid presenter or speaker; DePuy, A Johnson & Johnson Company: Research support; Journal of Arthroplasty: Editorial or governing board; Link Orthopaedics: Paid consultant; Stryker, Biomet: Research support; Zimmer: Research support

Simon, April W., RN, MSN: (n)**Sing, David, BS:** (n)**Skinner, John, FRCS:**

Codirector London Implant Retrieval Centre. The LIRC has received funding from Depuy, Stryker, Zimmer, Biomet, Matthys, Zimmer, Finsbury. All have funded retrieval analysis at LIRC in the last 10 years: Other financial or material

support; Journal of Bone and Joint Surgery–British: Editorial or governing board; MEDACTA: Paid consultant, Research support; President British Hip Society: Board or committee member

Skolasky, Richard, ScD:

AT&T Foundation: Research support; Cervical Spine Research Society: Board or committee member; DePuy, A Johnson & Johnson Company: Research support; DePuy Spine: Research support; North American Spine Society: Board or committee member; Quality of Life Research: Editorial or governing board

Solomon, Michael, MBChB, FRACS(Orth):
Medacta: Paid consultant**Spangehl, Mark J., MD:**

Arthroplasty Today: Editorial or governing board; DePuy, A Johnson & Johnson Company: Research support; Journal of Arthroplasty: Editorial or governing board; Stryker: Research support; Vidacare: Research support

Spitzer, Andrew I., MD:

DePuy, A Johnson & Johnson Company: Paid consultant; Research support; Flexion Therapeutics: Paid consultant; Sanofi-Aventis: Paid consultant, Paid presenter or speaker

Sporer, Scott M., MD:

American Joint Replacement Registry: Board or committee member; Central DuPage Hospital: Research support; DJ Orthopaedics: Paid consultant; Hip Society: Board or committee member; Pacira: Paid consultant; SLACK Incorporated: Publishing royalties, financial or material support; Smith & Nephew: Paid consultant; Stryker: Research support; Zimmer: Paid consultant, Research support

Springer, Brian D., MD:

AJRR: Board or committee member; Arthroplasty Today: Editorial or governing board; Convatec: Paid consultant; Joint Purification Systems: Other financial or material support; Journal of Arthroplasty: Editorial or governing board; Knee Society: Board or committee member; Stryker: IP royalties, Paid consultant

Stave, James, PhD:

CD Diagnostics: Employee, Stock or stock Options

Steele, Garen Daxton, MD:

OrthoCor: Paid consultant

Sterling, Robert, MD:

AAOS: Board or committee member; American Orthopaedic Association: Board or committee member; Journal of Arthroplasty: Editorial or governing board; Journal of Surgical Education: Editorial or governing board;

Maryland Orthopaedic Association: Board or committee member

Strong, Benjamin, MD: (n)**Suarez, Juan C., MD:**

Corin U.S.A.: IP royalties; DePuy, A Johnson & Johnson Company: Paid presenter or speaker; Ilovera: Research support; OrthoGrid: Research support; Pacira: Research support

Surowitz, Ronald Z., DO: (n)**Sutter, Edward Grant, MD, MS:** (n)**Syed, Usman M., BS:** (n)**Taunton, Michael J., MD:**

AAOS: Board or committee member; DJ Orthopaedics: IP royalties, Paid consultant; Journal of Arthroplasty: Editorial or governing board; Minnesota Orthopedic Society: Board or committee member; Stryker: Research support

Tay, Bobby, MD:

AOSpine North American: Research support; Biomet: Paid presenter or speaker; Globus Medical: Research support; Nuvasive: Research support; Stryker: Paid presenter or speaker; Synthes: Paid presenter or speaker

Thomason, Kayla, BS: (n)**Toomey, Sean D., MD:**

DePuy, A Johnson & Johnson Company: Paid consultant, Paid presenter or speaker, Research support, Other financial or

material support;
Johnson & Johnson: Stock
or stock Options, Other
financial or material support;
Stryker: Paid consultant,
Paid presenter or speaker

Traven, Sophia, MD: (n)

Tripuraneni, Krishna R., MD: Arthroplasty Today:
Editorial or governing
board; DJO Surgical:
Research support; Journal
of Arthroplasty: Editorial
or governing board;
Orthopaedic Implant
Company: Stock or stock
Options

Urish, Kenneth, MD, PhD:
AAOS: Board or committee
member; Smith & Nephew:
Paid consultant

Vail, Thomas Parker, MD: American Board
of Orthopaedic Surgery,
Inc.: Board or committee
member; DePuy, A Johnson
& Johnson Company: IP
royalties, Paid consultant;
Knee Society: Board or
committee member

Vince, Kelly G., MD: Knee:
Editorial or governing board;
Zimmer: IP royalties, Paid
consultant, Paid presenter
or speaker

Viscusi, Eugene R., MD:
AcelRx: Paid consultant,
Research support;
American Society of
Regional Anesthesia and
Pain Medicine: Board
or committee member;
Cara: Paid consultant;
Durect: Research support;
Malinckrodt: Paid presenter
or speaker; Mallinckrodt:
Paid consultant; Medicines

Company: Paid consultant,
Paid presenter or speaker;
Merck: Paid consultant,
Paid presenter or speaker;
Pacira: Paid consultant,
Research support; Salix:
Paid presenter or speaker;
Trevena: Paid consultant

Vittetoe, David, MD: (n)

Vose, Joshua G., MD:
Medtronic: Employee, Paid
presenter or speaker, Stock
or stock Options

Voss, Frank R., MD:
AAOS Coding, Coverage
and Reimbursement
Committee: Board or
committee member;
American Association of
Hip and Knee Surgeons:
Board or committee
member; American
Medical Association, CPT
committee member: Board
or committee member

Vu, CatPhuong Le, BA: (n)

Walter, Leonard R., MBBS, FRACS, FAOrthA:
Corin, UK: IP royalties;
Optimized Ortho: Paid
consultant

Watters, Tyler S., MD: (n)

Webb, Jonathan E., MD:
(n)

Wei, Nathan, MD: (n)

Wellman, Samuel S., MD: Biomet: Research
support; DePuy, A Johnson
& Johnson Company:
Research support; Journal
of Arthroplasty: Editorial or
governing board; Stryker:
Research support; Total
Joint Orthopaedics: Paid
consultant; Zimmer:

Research support

Wells, Joel E., MD, MPH:
(n)

Werner, Brian C., MD: (n)

Westrich, Geoffrey H., MD: DJ Orthopaedics:
Paid consultant, Paid
presenter or speaker,
Research support; Eastern
Orthopedic Association:
Board or committee
member; Exactech, Inc:
Paid consultant, Paid
presenter or speaker,
Research support
Knee Society:
Board or committee
member; Mallinckrodt
Pharmaceuticals: Paid
presenter or speaker;
Stryker: Paid consultant,
Paid presenter or speaker,
Research support

Willenborg, Melissa, MD:
Publications Committee:
Board or committee
member

Williams, Devin, MPH: (n)

Wolfe, Sigita: (n)

Wong, Jathine, BSc: (n)

Yang, Charlie C., MD:
DePuy, A Johnson &
Johnson Company: Paid
consultant, Paid presenter
or speaker

Yang, Wenyun, MS: (n)

Yao, Dong-han, BA: (n)

Yates Jr., Adolph J., MD:
American Association of Hip
and Knee Surgeons: Board
or committee member

Young, Simon W., FRACS: Arthrex, Inc: Paid
presenter or speaker;
Stryker: Paid presenter or
speaker, Research support;
Surgical Solutions: Stock
or stock Options; Vidacare:
Research support

Zarski, Michael J.:
American Association of Hip
and Knee Surgeons: Board
or committee member

Zeng, Irene Suilan, PhD: Pacific Edge: Paid
consultant; Vidacare/Mayo
clinic: Paid consultant

Zhang, Alan, MD: (n)

Zhang, Mei, MD: (n)

Zhu, Mark, MBChB: (n)

Ziegler, Jacob, MD: (n)

Operation Walk USA and FARE are pleased to announce

DOCS NIGHT OUT

Saturday, November 12, 2016

8:30–11:00 p.m.

Hilton Anatole Chantilly Ballroom West
Dallas, Texas, USA



A festive evening of fun and games!

- Open bar plus fine wine and craft beer tastings
- Golf simulator of famous courses with pro instructor
- Gourmet appetizers and desserts
- Texas Hold 'em tournament
- Operation game challenge and other skill games
- Pool table
- AAHKS hip and knee bag toss
- Fabulous raffle prizes every 30 minutes



The mission of Operation Walk USA is to encourage and enable joint replacement surgeons to restore mobility and improve quality of life for uninsured and under insured patients in the United States who suffer from disabling arthritis of the hip or knee.



The Foundation for Arthroplasty Research and Education (FARE) supports the AAHKS mission by funding research and education in total joint replacement.

All-Inclusive Ticket Prices

- \$250** per attendee
(\$125 is tax-deductible)
- \$500** per attendee with Texas Hold 'em
(\$300 is tax-deductible)
- \$50** Resident Ticket

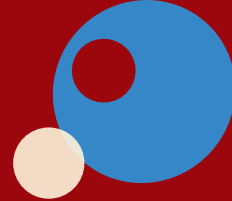
Sign up for **Docs' Night Out** when you register for the Annual Meeting online at **www.AAHKS.org**.

Operation Walk USA and FARE are 501(c)(3) organizations.

AAHKS

26th ANNUAL MEETING

November 10–13, 2016 | Dallas, Texas



Future AAHKS Meetings

2017

AAHKS
Spring Meeting

MAY 5–6
SAN FRANCISCO

2017

AAHKS
Annual Meeting

NOVEMBER 2–5
DALLAS

2018

AAHKS
Annual Meeting

NOVEMBER 1–4
DALLAS

Future AAHKS / The Hip Society /
The Knee Society Specialty Days

March 18, 2017

SAN DIEGO

March 10, 2018

NEW ORLEANS



9400 W. Higgins Rd., Suite 230
Rosemont, IL 60018-4237
847-430-5072
www.AAHKS.org

