The Hip Society | The Knee Society

CCJR®

CURRENT CONCEPTS IN JOINT REPLACEMENT

December 13-16, 2023 • Orlando, FL

SYLLABUS

2023

DAILY SCHEDULE

The Hip Society | The Knee Society

CCJR®

CURRENT CONCEPTS IN JOINT REPLACEMENT

Hyatt Grand Cypress | Orlando, FL

2023

TIMES ARE LISTED IN US EASTERN STANDARD TIME (EST)

WEDNESDAY, DECEMBER 13

12:00PM – 7:00PM	**CHECK-IN | BADGE PICK-UP | ON-SITE REGISTRATION**	
1:00PM – 6:00PM	**FREE PRE-COURSE: LET'S TALK HIPS AND KNEES IN SPANISH** *Presented in Spanish to Spanish-Speaking Attendees; Registration Required*	Location: Palm
3:00PM – 6:00PM	**FREE PRE-COURSE: HOW AND WHEN TO CHOOSE YOUR FIRST JOB: EVALUATING PRACTICE OPPORTUNITIES** *Designed for Senior Residents and Fellows; Registration Required*	Location: Regency Hall
6:00PM – 7:30PM	**RESIDENTS/FELLOWS RECEPTION WITH CCJR® FACULTY** **This Reception is only for Residents, Fellows, and CCJR® Faculty, and Industry Partners**	Exhibit Hall

THURSDAY, DECEMBER 14

6:30AM – 7:25AM	**BREAKFAST IN THE EXHIBIT HALL | VISIT EXHIBITS**	
GENERAL SESSION ROOM:		Windsong
7:30AM – 7:35AM	Welcome and Opening Remarks	Daniel J. Berry, MD
SESSION I **7:35AM – 9:30AM**	**INFECTION: OUR SINGLE BIGGEST UNSOLVED PROBLEM** ***Moderator 1:*** Bryan D. Springer, MD ***Moderator 2:*** Carlos A. Higuera-Rueda, MD	
7:35AM	Infection: Our Unsolved Problem	Daniel J. Berry, MD
7:41AM	Diagnosis of Infection — The Latest Algorithms: When to Use Molecular Tests	Craig J. Della Valle, MD
7:48AM	**DEBATE: DAIR VS. DOUBLE DAIR FOR ACUTE INFECTION: BATTLE OF THE BRITISH ACCENTS** ***Moderator:*** Bryan D. Springer, MD	
	DAIR: One Operation is Enough	Fares S. Haddad, MD
	Double DAIR: Two is Twice as Good!	Henry D. Clarke, MD
8:03AM	How to Do a Good DAIR Procedure	William A. Jiranek, MD
8:10AM	**DEBATE: THE 1.5 STAGE PROCEDURE: REASONABLE MIDDLE GROUND OR THE MOST MISGUIDED IDEA EVER?** ***Moderator:*** Bryan D. Springer, MD	
	1.5 Stage: In Favor	Michael P. Bolognesi, MD
	Good One-Stage or Two-Stage, But Not Half-Way	Matthew P. Abdel, MD
8:25AM	**SURGICAL CASE 1: INCISION, DRAINAGE, DEBRIDEMENT WITH SPECIALIZED TOOLS, BIOFILM SOLUBILIZING IRRIGATION, AND IMPLEMENTATION OF ARTICULATING SPACER.** ***Moderator:*** Craig J. Della Valle, MD | ***Surgeon:*** David Crawford, MD	
8:45AM	How I Do a Good One-Stage: Technical Tips/Video	Thorsten Gehrke, MD
8:51AM	How I Do a Good Two-Stage: Technical Tips With Emphasis On Spacers	Mathias P.G. Bostrom, MD
8:57AM	Infection Prevention: Which Steps are Actually Worth Taking?	Javad Parvizi, MD
9:03AM	**What Would You Do in This Case? 3 Rapid Fire Infection Cases Presented to Panel by Moderator** ***Moderator:*** Thomas K. Fehring, MD ***Panel:*** Antonia F. Chen, MD • Henry D. Clarke, MD • Craig J. Della Valle, MD • Thorsten Gehrke, MD • William A. Jiranek, MD Javad Parvizi, MD	

THURSDAY, DECEMBER 14 (CONTINUED)

9:18AM Panel Discussion and Audience Questions
Moderator: Bryan D. Springer, MD
Panel: Matthew P. Abdel, MD • Daniel J. Berry, MD • Michael P. Bolognesi, MD • Mathias P.G. Bostrom, MD • Henry D. Clarke, MD
David Crawford, MD • Craig J. Della Valle, MD • Thorsten Gehrke, MD • Fares S. Haddad, MD • William A. Jiranek, MD • Javad Parvizi, MD

9:30AM – 10:00AM **BREAK IN THE EXHIBIT HALL | MEET FACULTY IN THE HUB**

SESSION II **PRIMARY TKA—THE BIG QUESTIONS: ALIGNMENT, INDICATIONS, FIXATION, BEARING SURFACE CONFIGURATION**
10:00AM – 12:00PM
Moderator 1: Robert L. Barrack, MD
Moderator 2: Antonia F. Chen, MD

10:00AM **KEYNOTE:** The Main Options for Knee Alignment Targets in 2023: Pros And Cons of Each — Mark W. Pagnano, MD

10:08AM **DEBATE: DO WE HAVE ENOUGH INFORMATION TO CONFIDENTLY USE UNCEMENTED TKA IN ROUTINE PRACTICE?**
Moderator: Robert L. Barack, MD
The Default Should Be Uncemented in Most Patients — R. Michael Meneghini, MD
The Default Should Be Cemented Implants in the Great Majority of Patients — Steven B. Haas, MD

10:23AM **SURGICAL CASE 2: CEMENTLESS TKA IS POISED TO BECOME THE GOLD STANDARD FOR FIXATION**
Moderator: Christopher L. Peters, MD | ***Surgeon:*** Adolph V. Lombardi, Jr., MD

10:43AM The Bearing Surface Configuration: Structured Questions to Advocates of Each with Audience Participation
Moderator: Robert L. Barrack, MD — ***Panel:***
Posterior Substituting Advocate — Giles R. Scuderi, MD
Posterior Cruciate Retaining Advocate — William A. Jiranek, MD
Medial Stabilized Advocate — Robert T. Trousdale, MD
Ultra Congruent Advocate — Michael P. Bolognesi, MD

10:58AM **DEBATE: ALMOST ALL PATELLAE SHOULD BE RESURFACED**
Moderator: Robert L. Barrack, MD
Affirm — Steven J. MacDonald, MD
Oppose — Michael A. Mont, MD

11:13AM **SURGICAL CASE 3: A NOVEL FEMORAL COMPONENT DESIGNED FOR UNRESTRICTED KINEMATIC ALIGNMENT**
Moderator: Keith R. Berend, MD | ***Surgeon:*** Stephen M. Howell, MD

11:33AM **DEBATE: BILATERAL SIMULTANEOUS TKA IS SAFE, COST-EFFECTIVE, AND SHOULD BE USED IN SELECTED PATIENTS**
Moderator: Robert L. Barrack, MD
Affirm — Thomas P. Vail, MD
Oppose — Jay R. Lieberman, MD

11:48AM Panel Discussion and Audience Questions
Moderator: Robert L. Barrack, MD
Panel: Michael P. Bolognesi, MD • Steven B. Haas, MD • Stephen M. Howell, MD • William A. Jiranek, MD • Jay R. Lieberman, MD
Adolph V. Lombardi, Jr., MD • Steven J. MacDonald, MD • Michael A. Mont, MD • R. Michael Meneghini, MD • Mark W. Pagnano, MD
Giles R. Scuderi, MD • Robert T. Trousdale, MD • Thomas P. Vail, MD

12:00PM – 2:00PM **LUNCH IN THE EXHIBIT HALL | NON-CME INDUSTRY-SPONSORED-SESSIONS** — Exhibit Hall

12:10PM - 12:30PM **LUNCH & LEARN 1**
Wound Complication Risks in Hip and Knee Closure and How to Reduce Them – Review With Procedure Video
Presented by: **Ethicon**

12:40PM - 1:00PM **LUNCH & LEARN 2**
How to Get More Options for Your Knees With Cementless - Introducing The Osseoti® Cementless Tibia For The Persona® Total Knee System
Presented by: **Zimmer Biomet**

1:05PM - 1:55PM **INDUSTRY SPOTLIGHT**
Proper Use of Legal Entities for Lawsuit Protection and Tax Reduction
Presented by: **Legally Mine**

THURSDAY, DECEMBER 14 (CONTINUED)

SESSION III — **COMPLEX PRIMARY TKA; MANAGING COMPLICATIONS OF TKA**
2:00PM – 3:30PM
Moderator 1: Giles R. Scuderi, MD
Moderator 2: Carlos J. Lavernia, MD

2:00PM **KEYNOTE:** Activity After THA and TKA: What Should We Tell Our Patients in 2023 With Modern Fixation and Bearings? — Carlos A. Higuera-Rueda, MD

2:07PM Oh No! What Now? Managing Common Intraoperative Complications in TKA
I "Disrupted" the MCL • I "Disrupted" the Patellar Tendon • I Have a Medial Condyle Fracture
Moderator: Giles R. Scuderi, MD
Panel: Francesco Benazzo, MD • Keith R. Berend, MD • Ronald E. Delanois, MD • Douglas A. Dennis, MD • Steven B. Haas, MD

2:22PM SURGICAL CASE 4: IMPROVING YOUR ACCURACY AND ENHANCING STABILITY OF YOUR THA WITH IMPROVED NAVIGATION
Moderator: Don S. Garbuz, MD | ***Surgeon:*** George Haidukewych, MD

2:42PM **Case Discussion Session with Audience Participation: Complex TKA**
Moderator: Douglas A. Dennis, MD
Panel: Ronald E. Delanois, MD • C. Anderson Engh, Jr., MD • Steven B. Haas, MD • Carlos J. Lavernia, MD • Rafael J. Sierra, MD

2:42PM **Case:** Prior ACL Surgery — Douglas A. Dennis, MD

2:48PM My Top Tips and Tricks for TKA After ACL Surgery — Steven B. Haas, MD

2:52PM **Case:** Extraarticular Bone Deformity — Douglas A. Dennis, MD

2:58PM My Top Tips and Tricks for TKA In Extra Articular Deformity — C. Anderson Engh, Jr., MD

3:02PM SURGICAL CASE 5: BALANCING AND ALIGNING YOUR THA WITH A COMBINED VERSION APPROACH
Moderator: Mark W. Pagnano, MD | ***Surgeon:*** Rafael J. Sierra, MD

3:22PM Panel Discussion and Audience Questions
Moderator: Giles R. Scuderi, MD
Panel: Francesco Benazzo, MD • Keith R. Berend, MD • Ronald E. Delanois, MD • Douglas A. Dennis, MD • C. Anderson Engh, Jr., MD
Steven B. Haas, MD • George J. Haidukewych, MD • Carlos A. Higuera-Rueda, MD • Carlos J. Lavernia, MD • Rafael J. Sierra, MD

3:30PM – 4:00PM BREAK IN THE EXHIBIT HALL | MEET FACULTY IN THE HUB

SESSION IV — **NEW TECHNOLOGY IN TOTAL KNEE ARTHROPLASTY**
4:00PM – 5:30PM
Moderator 1: James A. Browne, MD
Moderator 2: Ronald E. Delanois, MD

4:00PM SURGICAL CASE 6: ROBOTIC TKA COMBINED WITH A REAL-TIME TENSOR TO EFFECTIVELY BALANCE THE RECONSTRUCTION
Moderator: Douglas A. Dennis, MD | ***Surgeon:*** Steven B. Haas, MD

4:20PM DEBATE: ROBOTICS ALLOWS YOU TO DO A BETTER TKA, HAS LIMITED DOWNSIDES, AND SHOULD BE USED ROUTINELY IN PRIMARY TKA
Moderator: James A. Browne, MD
Affirm — Fares S. Haddad, MD
Oppose — Javad Parvizi, MD

4:35PM SURGICAL CASE 7: ROBOTIC TKA CAN BE PERFORMED EFFICIENTLY
Moderator: Matthew P. Abdel, MD | ***Surgeon:*** Robert T. Trousdale, MD

4:55PM DEBATE: TECHNOLOGY WILL MOSTLY ELIMINATE THE 15%-20% OF UNSATISFIED PATIENTS IN TKA
Moderator: James A. Browne, MD
Affirm — Antonia F. Chen, MD
Oppose — Robert L. Barrack, MD

5:10PM Panel Discussion and Audience Questions
Moderator: James A. Browne, MD
Panel: Matthew P. Abdel, MD • Robert L. Barrack, MD • Antonia F. Chen, MD • Steven B. Haas, MD • Fares S. Haddad, MD
Stephen B. Murphy, MD • Javad Parvizi, MD • Robert T. Trousdale, MD

5:25PM **Best Question of The Day / Announcements** — Robert L. Barrack, MD • Adolph V. Lombardi, Jr., MD

5:30PM - 6:00PM POSTER SESSION

6:00PM - 7:30PM HAPPY HOUR IN THE EXHIBIT HALL

FRIDAY, DECEMBER 15

6:30AM – 7:25AM **BREAKFAST IN THE EXHIBIT HALL | VISIT EXHIBITS**

7:30AM – 7:32AM Welcome and Daily Announcements — Daniel J. Berry, MD

SESSION V
7:32AM – 9:30AM
OUTPATIENT SURGERY AND UNICOMPARTMENTAL ARTHROPLASTY
Moderator 1: Mark W. Pagnano, MD
Moderator 2: David J. Mayman, MD

7:32AM **KEYNOTE:** How to Think About Data in Total Joint Arthroplasty: Interpretation and Skepticism Are Key: Common Pitfalls — James A. Browne, MD

7:39AM Patient Selection and Optimization for Outpatient Surgery — Keith R. Berend, MD

7:46AM Unique Operative Concerns in The ASC Environment: Safety and Efficiency — Adolph V. Lombardi, Jr., *MD*

7:53AM Management of The Outpatient Surgery Patient After Discharge — Matthew S. Austin, MD

8:00AM Is Outpatient Arthroplasty Safe? What Do The Data Say? — Scott M. Sporer, MD

8:07AM **DEBATE: UNIS ARE GREAT AND IF ANYTHING WE SHOULD BE DOING MORE**
Moderator: Mark W. Pagnano, MD
Affirm — Anders Troelsen, MD
Oppose — Thomas K. Fehring, MD

8:22AM **SURGICAL CASE 8: CEMENTLESS MEDIAL UKA: TIPS AND TRICKS BASED ON 10 YEARS OF EXPERIENCE**
Moderator: Anders Troelsen, MD | ***Surgeon:*** Christopher A. F. Dodd, MD

8:42AM **DEBATE: ALL UNICOMPARTMENTAL KNEE ARTHROPLASTIES SHOULD BE DONE WITH A ROBOT**
Moderator: Mark W. Pagnano, MD
Affirm — Robert L. Barrack, MD
Oppose — Craig J. Della Valle, MD

8:57AM Panel on Controversies in UKA with Illustrative Cases
Best Uni Fixation? • Uni in ACL-Deficient Knee? • Lateral Unis? • Mobile versus Fixed Bearing? • How Important is Patellofemoral Joint Status?
Moderator: William G. Hamilton, MD
Panel: Keith R. Berend, MD • C. Anderson Engh, Jr., MD • David J. Mayman, MD • Mark W. Pagnano, MD • Anders Troelsen, MD

9:12AM What is the Role of Patellofemoral Arthroplasty in 2023? — Sebastien Parratte, MD, PhD

9:19AM Panel Discussion and Audience Questions
Moderator: Mark W. Pagnano, MD
Panel: Matthew S. Austin, MD • Robert L. Barrack, MD • Keith R. Berend, MD • James A. Browne, MD • Craig J. Della Valle, MD
Christopher A. F. Dodd, MD • Thomas K. Fehring, MD • Adolph V. Lombardi, Jr., MD • David J. Mayman, MD
Sebastien Parratte, MD, PhD • Scott M. Sporer, MD • Anders Troelsen, MD

9:30AM – 10:00AM **BREAK IN THE EXHIBIT HALL | MEET FACULTY IN THE HUB**

SESSION VI
10:00AM - 12:00PM
PERIOPERATIVE MANAGEMENT OF THA AND TKA PATIENTS AND CLINICAL CHALLENGES
Moderator 1: Adolph V. Lombardi, Jr., MD
Moderator 2: Jeremy M. Gililland, MD

10:00AM **KEYNOTE:** Dental Prophylaxis after THA and TKA: Rethinking the Paradigm — Bryan D. Springer, MD

10:07AM Outpatient Wearable Sensors in THA and TKA: Is This the Future? How Can They Help My Clinical Practice Now? — Christopher L. Peters, MD

10:13AM **CONFIRM OR DENY: CONTROVERSIES IN PERIOPERATIVE MANAGEMENT AND DECISION MAKING IN PRIMARY THA AND TKA**
Moderator: Daniel J. Berry, MD
Panel: Michael P. Bolognesi, MD • James A. Browne, MD • Fares S. Haddad, MD • Robert T. Trousdale, MD

10:31AM **SURGICAL CASE 9: DA THA IN PATIENT WITH A LONG SPINE FUSION EXECUTED WITH THE ASSISTANCE OF AN AI-BASED FLUOROSCOPIC NAVIGATION SYSTEM**
Moderator: David J. Mayman, MD | ***Surgeon:*** Jeremy M. Gililland, MD

10:51AM How to Manage the High Risk Venous Thromboembolism Patient after THA/TKA in 2023 — Jay R. Lieberman, MD

FRIDAY, DECEMBER 15 (CONTINUED)

10:57AM **The One Question That Keeps Me Up at Night Is...**
Moderator: Adolph V. Lombardi, Jr., MD
Panel: Matthew P. Abdel, MD • David G. Lewallen, MD • Michael A. Mont, MD • Douglas E. Padgett, MD

11:15AM THA In The Very Young Patient — Christopher L. Peters, MD

11:21AM **DEBATE: DIRECT ANTERIOR VS. POSTERIOR APPROACH FOR PRIMARY THA: NOW THAT THE DUST HAS SETTLED, WHERE ARE WE?**
Moderator: Adolph V. Lombardi, Jr., MD
Direct Anterior Is Best — William G. Hamilton, MD
Posterior Is Best — Don S. Garbuz, MD

11:36AM Technical Tips for Direct Anterior Approach to Avoid Complications — Jeremy M. Gililland, MD

11:42AM Technical Tips for Posterior Approach to Avoid Complications — David J. Mayman, MD

11:48AM Panel Discussion and Audience Questions
Moderator: Adolph V. Lombardi, Jr., MD
Panel: Don S. Garbuz, MD • Jeremy M. Gililland, MD • William G. Hamilton, MD • Jay R. Lieberman, MD • Christopher L. Peters, MD
Bryan D. Springer, MD • Edwin P. Su, MD

12:00PM – 2:00PM **LUNCH IN THE EXHIBIT HALL | NON-CME INDUSTRY-SPONSORED SESSION**

1:10-1:50PM **INDUSTRY SPOTLIGHT**
Striving for the Forgotten Knee through Advanced Technologies and Patient-Specific Techniques
Presented by: **DePuy Synthes**

SESSION VII **PRIMARY THA: OPERATIVE DECISIONS AND NEW TECHNOLOGY**
2:00PM - 3:30PM
Moderator 1: Steven J. MacDonald, MD
Moderator 2: Edwin P. Su, MD

2:00PM **DEBATE: CEMENTED VS. UNCEMENTED THA IN THE OLDER PATIENTS**
Moderator: Steven J. MacDonald, MD
Use Cemented Femoral Fixation: It Has Lowest Complication Rate — Matthew S. Austin, MD
Use Uncemented Femoral Fixation: It Works Well and You Know How to Do It — Craig J. Della Valle, MD

2:15PM **DEBATE: COLLARED VS. COLLARLESS TRIPLE TAPERED STEMS IN PRIMARY THA**
Moderator: Steven J. MacDonald, MD
Use Collarless: The Best Long Term Track Record — Mystery debater to be revealed
Use Collared: Avoid Early Complications — Mystery debater to be revealed

2:30PM **SURGICAL CASE 10: A STRAIGHTFORWARD ANTERIOR APPROACH WITH AN IMPLANT SYSTEM THAT ALLOWS FOR SEAMLESS TRANSITION FROM CEMENTLESS TO CEMENTED THA.**
Moderator: William G. Hamilton, MD | ***Surgeon:*** Christopher L. Peters, MD

2:50PM **DEBATE: IS IT ALREADY TIME TO CONSIDER ROBOTIC THA? (HSS VS. HSS!)**
Moderator: Steven J. MacDonald, MD
Affirm — David J. Mayman, MD
Oppose — Douglas E. Padgett, MD

3:05PM **DEBATE: DUAL MOBILITY: OVERUSED IN PRIMARY THA OR NOT USED ENOUGH?**
Moderator: Steven J. MacDonald, MD
Overused — Javad Parvizi, MD
Not Used Enough — Ryan M. Nunley, MD

3:20PM Panel Discussion and Audience Questions
Moderator: Steven J. MacDonald, MD
Panel: Matthew S. Austin, MD • Daniel J. Berry, MD • Craig J. Della Valle, MD • David J. Mayman, MD • Ryan M. Nunley, MD
Douglas E. Padgett, MD • Javad Parvizi, MD • Christopher L. Peters, MD

3:30PM - 4:00PM **BREAK IN THE EXHIBIT HALL | MEET FACULTY IN THE HUB | NON-CME INDUSTRY-SPONSORED SESSION**

3:40PM - 3:50PM **FOCUSED PRESENTATION**
Eras 2.0 - The Next Generation of Perioperative Care
Presented by: **MEND**

FRIDAY, DECEMBER 15 (CONTINUED)

SESSION VIII — **COMPLEX PRIMARY THA AND MANAGEMENT OF COMPLICATIONS OF THA**
4:00PM - 5:30PM
Moderator 1: David G. Lewallen, MD
Moderator 2: Elizabeth B. Gausden, MD

4:00PM **Oh No! Now What? Managing Common Intra Operative Complications in THA**
I Reamed Through the Medial Wall • The Hip Is Unstable After I Put in the Implants • Best Live Question From the Audience
Moderator: David G. Lewallen, MD
Panel: Stephen B. Murphy, MD • Wayne G. Paprosky, MD • Edwin P. Su, MD • Anders Troelsen, MD

4:15PM **THE PRESIDENTIAL TOWN HALL: The Big Questions in THA and TKA with Audience Participation and Talking Heads**
Moderator: William G. Hamilton, MD
Presidential Candidates: 1st Vice President of The Knee Society: Henry D. Clarke, MD
1st Vice President of The Hip Society: Don S. Garbuz, MD
2nd Vice President of AAHKS: R. Michael Meneghini, MD
Talking Heads Assessment of Debate: Robert L. Barrack, MD • Adolph V. Lombardi, Jr.,MD

4:30PM **SURGICAL CASE 11: A MONOBLOCK TAPERED SPLINE STEM CAN MAKE COMPLEX PRIMARY THA SIMPLE**
Moderator: Robert T. Trousdale, MD | ***Surgeon:*** J. Bohannon Mason, MD

4:50PM **Case Discussion Session with Audience Participation: Complex THA**
Moderator: Robert T. Trousdale, MD
Panel: Elizabeth B. Gausden, MD • Michael A. Mont, MD • Stephen B. Murphy, MD • Rafael J. Sierra, MD

4:50PM	**Case:** Complex Primary THA: Development Hip Dysplasia	Robert T. Trousdale, MD
4:56PM	My Tips and Tricks for THA in DDH	Rafael J. Sierra, MD
5:00PM	**Case:** Complex Primary THA: Conversion THA for Failed Intertrochanteric Fracture	Robert T. Trousdale, MD
5:06PM	My Tips and Tricks for Conversion THA for Failed IT Fracture.	Elizabeth B. Gausden, MD

5:10PM Panel Discussion and Audience Questions
Moderator: David G. Lewallen, MD
Panel: Henry D. Clarke, MD • Don S. Garbuz, MD • Elizabeth B. Gausden, MD • J. Bohannon Mason, MD • R. Michael Meneghini, MD
Michael A. Mont, MD • Stephen B. Murphy, MD • Wayne G. Paprosky, MD • Edwin P. Su, MD • Rafael J. Sierra, MD

5:20PM	**Best Question of The Day / Best Poster Awards**	Robert L. Barack, MD • Adolph V. Lombardi, Jr., MD
5:25PM	**Announcement of the Engh Awards**	C. Anderson Engh, Jr., MD

5:40PM **FIRESIDES CHATS:** Small Group Detailed Case-Based Discussions with Faculty
Please join the group you pre-selected during your registration. Check your badge for the Breakout Session number.

6:30PM-8:00PM **DePuy Synthes Customer Reception** **Location: Windsong Fountain Lawn**

SATURDAY, DECEMBER 16

6:45AM - 7:25AM **BREAKFAST OUTSIDE** (weather permitting)
Family members are welcome to attend; registration is required.

7:30AM - 7:32AM Welcome and Daily Announcements — Daniel J. Berry, MD

SESSION IX — **REVISION THA AND OPERATIVE MANAGEMENT OF COMPLICATIONS OF THA**
7:32AM - 9:30AM
Moderator 1: Christopher L. Peters, MD
Moderator 2: Charles L. Nelson, MD

7:32AM **KEYNOTE:** A Look to The Future: How Our Field is Evolving and What It Means for Future Practice — Thomas P. Vail, MD

7:39AM **Case Discussions Session with Audience Participation: Revision THA**
Moderator: C. Anderson Engh, Jr., MD
Panel: Mathias P.G. Bostrom, MD • Gijs van Hellemondt, MD • William A. Jiranek, MD • Stephen Jones, MD
David G. Lewallen, MD • Wayne G. Paprosky, MD

7:39AM	**Case:** Challenging Femoral Component Removal	C. Anderson Engh, Jr., MD
7:45AM	My Video Tips and Tricks for Well Fixed Femoral Component Removal	William A. Jiranek, MD
7:49AM	My Video Tips and Tricks for ETO	Wayne G. Paprosky, MD
7:53AM	**Case:** Acetabular Bone Loss	C. Anderson Engh, Jr., MD
7:59AM	My Video Tips and Tricks for Jumbo Cups	Mathias P.G. Bostrom, MD
8:03AM	My Video Tips and Tricks for Augments	David G. Lewallen, MD
8:07AM	My Video Tips and Tricks for Custom Triflange Cup	Gijs van Hellemondt, MD
8:11AM	**Case:** Femoral Bone Loss	C. Anderson Engh, Jr., MD
8:17AM	My Video Tips and Tricks for Modular Fluted Tapered Stem	Stephen Jones, MD

SATURDAY, DECEMBER 16 (CONTINUED)

8:21AM **SURGICAL CASE 12: REVISION THA WITH A MID-LENGTH TAPERED SPLINE STEM**
Moderator: Robert L. Barrack, MD | ***Surgeon:*** David J. Mayman, MD

8:41AM **DEBATE: MODULAR VS. NON-MODULAR TAPERED FLUTED FEMORAL COMPONENTS FOR ROUTINE REVISION SURGERY**
Moderator: Christopher L. Peters, MD

	Non-Modular	Steven J. MacDonald, MD
	Modular	David G. Lewallen, MD

8:56AM **Case Discussion Session with Audience Participation: Instability and Periprosthetic Fractures**
Moderator: Scott M. Sporer, MD
Panel: Thomas K. Fehring, MD • Jeremy M.Gililland, MD • George J. Haidukewych, MD • Stephen Jones, MD

8:56AM	**Case:** Chronic Instability After THA	Scott M. Sporer, MD
9:02AM	My Tips and Tricks for Instability	Stephen Jones, MD
9:06AM	**Case:** Vancouver B1 Periprosthetic Fracture	Scott M. Sporer, MD
9:12AM	My Tips and Tricks for Vancouver B1 Fractures	George J. Haidukewych, MD
9:16AM	**Case:** Vancouver B2/B3 Periprosthetic Fracture	Scott M. Sporer, MD
9:22AM	My Tips and Tricks for Revising B2/B3 Cases	Jeremy M. Gililland, MD

9:26AM Panel Discussion and Audience Questions
Panel: Mathias P.G. Bostrom, MD • Thomas K. Fehring, MD • Jeremy M. Gililland, MD • Gijs van Hellemondt, MD
George J. Haidukewych, MD • William A. Jiranek, MD • Stephen Jones, MD • David G. Lewallen, MD • Steven J. MacDonald, MD
Wayne G. Paprosky, MD • Christopher L. Peters, MD • Thomas P. Vail, MD

9:30AM - 10:00AM **BREAK**

SESSION X **REVISION TKA AND OPERATIVE MANAGEMENT OF COMPLICATIONS OF TKA**
10:00AM-11:50AM ***Moderator 1:*** Michael P. Bolognesi, MD | ***Moderator 2:*** **Douglas A. Dennis**, MD

10:00AM **SURGICAL CASE 13: REVERSE THA WILL BE COMING YOUR WAY**
Moderator: Steven J. MacDonald, MD | ***Surgeon:*** Adolph V. Lombardi, Jr., MD

10:20AM **Case Discussion Session with Audience Participation: Revision TKA**
Moderator: Carlos J. Lavernia, MD
Panel: David G. Lewallen, MD • Charles L. Nelson, MD • Ryan M. Nunley, MD • Rafael J. Sierra, MD

10:20AM	**Case:** Challenging Implant Removal	Carlos J. Lavernia, MD
10:26AM	My Tips and Tricks for Well Fixed Cone Removal	Charles L. Nelson, MD
10:30AM	**Case:** Tibial Bone Loss	Carlos J. Lavernia, MD
10:36AM	My Tips and Tricks for Cones	David G. Lewallen, MD
10:40AM	My Tips and Tricks for Sleeves	Ryan M. Nunley, MD
10:44AM	**Case:** Femoral Bone Loss	Carlos J. Lavernia, MD
10:50AM	My Tips and Tricks to Manage Bone Loss with Cones and Diaphyseal Impaction Grafting	Rafael J. Sierra, MD

10:54AM **SURGICAL CASE 14: SOLVING THE LIGAMENTOUSLY CHALLENGED REVISION TKA WITH A HINGE**
Moderator: Elizabeth B. Gausden, MD | ***Surgeon:*** Bryan D. Springer, MD

11:14AM **Case Discussion Session with Audience Participation: Stiffness and Periprosthetic Fractures**
Moderator: Henry D. Clarke, MD
Panel: Elizabeth B. Gausden, MD • George J. Haidukewych, MD • R. Michael Meneghini, MD • Charles L. Nelson, MD

11:14AM	**Case:** Chronic Stiffness After TKA	Henry D. Clarke, MD
11:20AM	My Tips and Tricks for Operative Management of The Stiff TKA	Charles L. Nelson, MD
11:24AM	**Case:** Distal Femoral Periprosthetic Fracture	Henry D. Clarke, MD
11:30AM	My Tips and Tricks for Distal Femoral Replacement for Distal Femur Periprosthetic Fracture	Elizabeth B. Gausden, MD
11:34AM	My Tips and Tricks for Internal Fixation for Distal Femur Periprosthetic Fracture	George J. Haidukewych, MD

11:38AM Panel Discussion and Audience Questions
Moderator: Michael P. Bolognesi, MD
Panel: Elizabeth B. Gausden, MD • George J. Haidukewych, MD • David G. Lewallen, MD • Adolph V. Lombardi, Jr., MD
R. Michael Meneghini, MD • Charles L. Nelson, MD • Ryan M. Nunley, MD • Rafael J. Sierra, MD • Bryan D. Springer, MD

11:50AM	**Best Question of the Week**	Robert L. Barrack, MD • Adolph V. Lombardi, Jr., MD
11:55AM	**Farewell**	Daniel J. Berry, MD
12:00PM	**ADJOURN**	

Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: Infection: Our Unsolved Problem
Faculty: Daniel J. Berry, MD

TAKE HOME KEY POINTS:

- Infection is our single biggest unsolved problem in THA and TKA.

- Prevalence
  - Infection is one of the most common complications/reasons for THA/TKA revision in all joint registries.

- We have made little or no progress in preventing infection over the last 30 years.
  - Data show infection rates have not gone down (and may be going up!).
  - This is despite: Staph screening; antimicrobial irrigants; antibiotic protocols, patient BMI and nutrition optimization; smoking cessation; etc., etc.

- Infection treatment has either marginal results (DAIR) or is very destructive/archaic requiring removal of otherwise well-functioning implants (one or two-stage revision).

- Treatment of THA/TKA infection is incredibly expensive.

- Treatment of THA/TKA infection has high morbidity and high mortality.

- There is much about infection we still don't understand:
  - Males have 2X infection rate as females. Why?
  - What causes culture negative infections?
  - Why does mechanical bone/implant instability foster infection?

- We need game-changing prevention and treatment advances; not small changes that improve results marginally or not at all.

- Improving infection prevention and treatment are our big challenges for the next decade.

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: Diagnosis of Infection – The Latest Algorithms: When to Use Molecular Tests
Faculty: Craig J. Della Valle, MD

TAKE HOME KEY POINTS:

- In most cases ruling in or out PJI is relatively straightforward
    - Perform a good history and physical examination.
    - Get an ESR and C-Reactive Protein.
    - If the ESR and/or CRP are elevated or if you have a high clinical suspicion for PJI, aspirate the joint.
    - Send the synovial fluid for a synovial fluid WBC count, differential, and culture (aerobic and anaerobic).
    - Usually this will rule in or out PJ.

- If there is a discordant result (typically an elevated synovial fluid WBC count and/or differential with negative cultures).
    - Repeat the aspiration.
    - Double check the synovial fluid WBC count and differential.
    - Ensure the patient has not recently taken antibiotics.
    - Send the fluid for not only aerobic and anaerobic cultures (usually at this point we send them in blood culture bottles), but also for AFB and fungal cultures.
    - Call the microbiology lab, get an Infectious Disease consultant involved and ask them to hold the cultures for an extended period of time.
    - Get an alpha defensin (we don't get this routinely but find it helpful in these complex cases where the diagnosis is unclear).
    - Send the fluid for molecular diagnostics in an attempt to identify bacterial, fungal or AFB DNA.

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: DAIR: One Operation Is Enough
Faculty: Fares S. Haddad, MD

TAKE HOME KEY POINTS:

- Periprosthetic Joint Infection (PJI) is among the leading causes of revision in total hip (THA) and knee arthroplasties (TKA), with an incidence of approximately 1% following primary procedures. The Single-stage Debridement, Antibiotics, and Implant Retention (DAIR) protocol is increasingly acknowledged as a viable treatment, offering several benefits over exchange arthroplasty, including reduced morbidity, shorter hospital stay, preservation of bone stock and decreased economic impact on patients and healthcare systems.

- Success rates for single-stage DAIR fluctuate between 55.5% to 90% in early post-operative and acute hematogenous PJI cases1, contingent upon critical factors such as patient selection, host immunity, timing of surgery, the involved pathogen and surgical technique. A two-stage DAIR regimen has been championed for acute PJI, involving an initial debridement, irrigation, reintroduction of cleaned modular components and insertion of antibiotic loaded cement beads. This is followed by a secondary procedure approximately one week later to exchange the modular components and remove the beads.

- Contrary to some case series suggesting high success rates for two-stage DAIR 2,3, the more discerning comparative studies report that single-stage DAIR achieves infection control rates comparable with two-stage protocols 4,5. Furthermore, two-stage DAIR, necessitates multiple operative interventions within a short timeframe with potential adverse impacts on patient physiology. The systemic inflammatory response, the strain of repeated surgeries and the adverse effects of multiple exposures to anaesthesia6, especially in the elderly, raise appreciable concerns. Additionally, the prolonged operative and recovery times could contribute to the physiological7 and psychological burden on patients and impose economic demands on healthcare systems.

- Emphasizing the strategic utility of Double DAIR for appropriately selected patient cohorts could enhance treatment outcomes and mitigate risks. High-risk patients can be identified through predictive tools such as the KLIC score8 and JS BACH9, aiding in the stratification of those who may require a two-stage approach. In conclusion, although double DAIR may serve as an effective strategy for selecting high-risk groups, the lack of high-quality evidence and variable outcomes negate the need for a shift in routine clinical practice. We should dare to DAIR but only once!

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: Double DAIR: Two Is Twice as Good!
Faculty: Henry D. Clarke, MD

TAKE HOME KEY POINTS:

- Published results for one stage open DAIR with modular poly exchange demonstrate a 20 – 50% chance or eradicating acute PJI after hip or knee replacement.

- Due to these poor results, in the early 2000's, we developed a new protocol to manage acute PJI.
    - 2-stage DAIR with abx beads & modular component exchange, aka the "DOUBLE DAIR".

- TECHNIQUE
    - Proceed to surgery urgently
    - Aggressive, thorough debridement to remove infected and necrotic tissue
    - Modular parts are removed & cleaned with anti-bacterial solutions
    - Implants are scrubbed to reduce biofilm
    - The joint is soaked with antibacterial solutions for 5 minutes
    - Irrigation with pulse lavage and sterile saline
    - The cleaned, modular parts are reinserted
    - High Dose Antibiotic beads are made and added to the joint
        - 1 batch cement with 3.6 g tobramycin, 3 g vancomycin and 2 g cefazolin
    - Wound is closed & leg is placed in immobilizer with WBAT
    - IV abx are initiated and adjusted based on culture results
    - Return to O.R. 3 – 7 days later for planned second stage
        - Bead removal, repeat debridement and irrigation
        - Removal of old modular parts & insertion of new modular parts
    - IV Antibiotics are continued for 6 weeks after second stage followed by extended oral antibiotics for 3-6 months

- DOUBLE DAIR clinical study
    - Study period 2002-2016
    - 83 primary and revision TKA/THA with acute post-op or hematogenous PJI that met the following criteria:
        - Symptoms < 4 weeks in duration
        - Met MMSI criteria for PJI infection
    - Results at mean F/U 44 months (range, 12-171)
        - Overall 72 of 83 (87%) – 'success'

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        - 94% primary/77% revision TKA/THA
    - No further surgery for infection and no clinical or lab evidence of infection

- Why does Double DAIR seem to increase the chance of eradicating acute PJI after TKA/THA ?
    - Multi-modal attack on organisms in biofilm
        - Important elements:
            - Extensive mechanical debridement to remove biofilm
            - Soak with topical disinfectants that can penetrate biofilm
            - Beads achieve very high intra-articular abx levels that have been shown to be able to kill bacteria in biofilm

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: How To Do a Good DAIR Procedure
Faculty: William A. Jiranek, MD

TAKE HOME KEY POINTS:

- DAIR for the right reason
    - Within 4 weeks of the index arthroplasty surgery
    - Late hematogenous within 1 week of symptoms

- Send synovial fluid after incision – cell count and diff, urine dipstick, cultures in blood culture bottles.
- Initial irrigation of the wound with pulsatile saline or antiseptic agent.
- Some antiseptic solutions are better for certain bacteria.
- Debridement of all devitalized tissue.
- Removal of modular equipment – poly liners/inserts/heads.
- Consider instillation of 1% methylene blue.
- Repeat debridement.
- Instillation of biofilm buster solution – may have to tailor to the infecting organism.
- Wait recommended time -? 1minute, followed by pulsatile irrigation.
- Close with running suture.
- Surgical team removes gown and gloves, rescrubs, and dons new gown and gloves.
- 1st table is moved away, scrub assistant moves to 2nd table.
- Repeat irrigation.
- New modular equipment is installed.
- Closure in layers.
- Organism appropriate IV antibiotics continue for 6 weeks, need PIC line.

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: DEBATE: The 1.5 Stage Procedure: Reasonable Middle Ground or the Most Misguided Idea Ever? In Favor
Faculty: Michael P. Bolognesi, MD

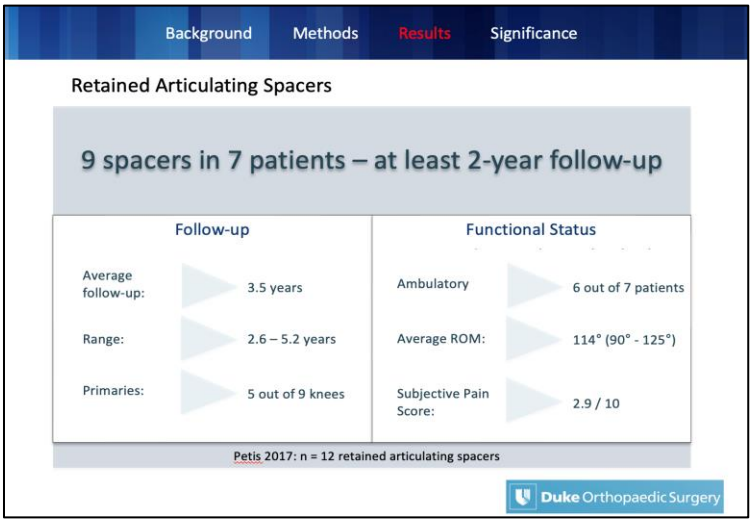
TAKE HOME KEY POINTS:

- The goal of revision surgery in the setting of infection is complete eradication of infection with preservation of knee function.
- 1.5 Stage is: Evolution of the 1 stage, Metal femoral and all-poly tibial component, Antibiotic impregnated cement.
- **Not a New Concept**:

Table 4. Current literature on outcomes of articulating spacers with sterilized femoral components. '--' denotes variable not reported

Authors	Year	Cohort Size	Reported Reinfection	Same Organism	Spacer ROM	Latest ROM	Follow-up (mo)	1st --> 2nd Stage (wks)	Min 2-yr f/u	Retained Spacer	Notes
Chen et al	2016	11	2	--	81	95	32	19	Yes	1	
Lee et al	2015	20	1	--	72	113	29	25	Yes	0	
Classen et al	2014	23	3	0	68	105	47	26	No	0	3 arthrodeses (no reimplantation)
Kim et al	2013	20	2	--	98	103	22	14	No	0	
Choi et al	2012	14	4	--	82	100	43	26	No	0	Not stratified by new (6) vs sterilized (8)
Kalore et al	2012	15	2	--	79	94	73	21	Yes	0	3 remained on chronic antibiotics
Anderson et al	2009	25	1	1	107	112	54	11	Yes	0	
Jämsen et al	2006	24	2	--	89	104	25	24	No	2	6 needed redebridement before 2nd stage
Pietsch et al	2006	33	3	1	83	100	47	--	Yes	0	
Huang et al	2006	21	1	--	85	98	52	21	Yes	0	
Cuckler et al	2005	44	1	1	110	112	65	--	Yes	0	
Hoffman et al	2005	50	6	3	85	100	74	12	Yes	0	4 on chronic antibiotics, 1 fusion for ROM
Emerson et al	2002	22	2	0	--	108	46	--	Yes	0	Excluded McPherson Type C
Hofmann et al	1995	26	0	--	72	101	30	15	No	0	

- **Our Early Experience:**



- **Other Publications:**

One and a Half-Stage Revision With Prosthetic Articulating Spacer for Definitive Management of Knee Periprosthetic Joint Infection

Ahmed Siddiqi, DO, MBA,[a,b,c] Yusuf Mahmoud, MD,[b] Salvador A. Forte, DO,[d] Thomas A. Novack, MD,[e] and James Nace, DO, FAOAO, MPT[e,*]

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Survival and Outcomes of 1.5-Stage vs 2-Stage Exchange Total Knee Arthroplasty Following Prosthetic Joint Infection

Austin Nabet, DO, Oliver C. Sax, DO, MS, Roni Shanoada, BS, Janet D. Conway, MD, Michael A. Mont, MD, Ronald E. Delanois, MD, James Nace, DO *

Table 2
Outcomes and Complications of Knee Exchanges.

Variables	1.5-Stage N = 114 (%)	2-Stage N = 48 (%)	*P*-Value
Infection-free spacers	97 (85.1)	36 (75.0)	.127
Conversion to TKA	23 (20.2)	48 (100.0)	<.001
Time to conversion TKA (y)	1.0 ± 1.9	0.39 ± 0.35	.029
30-d ED visits	11 (9.6)	1 (2.1)	.096
30-d Readmissions	4 (3.5)	3 (6.3)	.425
1-y Complications, total	13 (8.8)	15 (31.3)	<.001
Cellulites	1 (0.9)	1 (2.1)	
Wound dehiscences	0 (0.0)	1 (2.1)	
Acute kidney injuries	2 (1.8)	0 (0.0)	
Aseptic loosenings	3 (2.6)	0 (0.0)	
Amputations	0 (0.0)	2 (4.2)	
Knee dislocations	1 (0.9)	0 (0.0)	
Lyses of adhesions	2 (1.8)	5 (10.4)	
Manipulations under anesthesia	2 (1.8)	5 (10.4)	
Periprosthetic fractures	2 (1.8)	1 (2.1)	
Osteolysis	0 (0.0)	0 (0.0)	
Subsidence (°)			
AP femoral	0.75 ± 5.17	0.17 ± 5.58	.525
AP tibial	0.44 ± 2.81	0.21 ± 4.15	.682
Lateral tibial slope	0.56 ± 3.61	1.25 ± 5.35	.341

TKA, total knee arthroplasty; AP, anteroposterior; ED, emergency department.

Knee Injury and Osteoarthritis Outcome Joint Replacement Scores.

	1.5-Stage	2-Stage	*P*-Value
Baseline	41.93 ± 8.81	38.03 ± 8.47	.011
Follow-up	67.14 ± 11.35	54.69 ± 11.30	<.001
Difference	24.46 ± 11.66	16.59 ± 8.40	<.001

1.5-Stage Exchange Arthroplasty for Total Knee Arthroplasty Periprosthetic Joint Infections

Nicholas M. Hernandez, MD [a, *], Michael W. Buchanan, BS [b], Thorsten M. Seyler, MD, PhD [c], Samuel S. Wellman, MD [c], Jessica Seidelman, MD, MPH [d], William A. Jiranek, MD [c]

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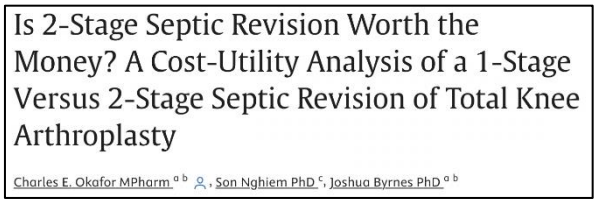
- Mean follow-up of 2.7 years, 25 initial spacers were in situ (81%).
    - Five knees retained their spacer(s) for some time (mean 1.5 years) and then underwent a second stage reimplantation; one of the five had progressive radiolucent lines but no evidence of component migration.
    - Three knees (10%) had PJI reoccurrence.
    - Four had progressive radiolucent lines, but there was no evidence of component migration in any knees.
- Cost **Concerns**

The economic impact of periprosthetic infection in total knee arthroplasty

Mina W. Morcos, Paul Kooner, Jackie Marsh, James Howard, Brent Lanting and Edward Vasarhelyi

Can J Surg April 01, 2021 64 (2) E144-E148; DOI: https://doi.org/10.1503/cjs.012519



Is 2-Stage Septic Revision Worth the Money? A Cost-Utility Analysis of a 1-Stage Versus 2-Stage Septic Revision of Total Knee Arthroplasty

Charles E. Okafor MPharm [a b], Son Nghiem PhD [c], Joshua Byrnes PhD [a b]

- Need to look at outcomes for all three approaches critically.
- This must include cost and morbidity to the patient.
- 1.5 Stage should be considered as an option for the patientTEXT
- It is the least studied option of the current treatment options.
- Important to consider the challenge of late recurrence when complex constructs are in place.

Session I: Infection: Our Single Biggest Unsolved Problem
Talk Title: DEBATE: The 1.5 Stage Procedure: Reasonable Middle Ground or the Most Misguided Idea Ever?
Good One-Stage or Two-Stage, But Not Half-Way
Faculty: Matthew P. Abdel, MD

TAKE HOME KEY POINTS:

- The incidence of periprosthetic joint infection (PJI) following THA or TKA ranges from 1-3%.

- Insall et al. described the contemporary two-stage exchange protocol for managing PJI where the implants are removed, soft tissue is thoroughly debrided, antibiotic-laden. cement spacers are inserted, parenteral antibiotics are administered, and re-implantation. occurs. The successful eradication of THA or TKA PJIs using this protocol ranges from 70-95% at mid-term follow-up.

- Our series from Mayo Clinic indicates the cumulative incidence of recurrence of hip infection is 10% at 1 year, 14% at 5 years, and 15% at 10 and 15 years following two stage exchange arthroplasty.

- Similarly, our series from Mayo Clinic indicates the cumulative incidence of knee reinfection is 4% at 1 year, 14% at 5 years, 16% at 10 years, and 17% at 15 years after two-stage exchange arthroplasty.

- One-stage exchange arthroplasty has garnered enthusiasm in North America for the following patient populations: A host, no draining sinus tract and appropriate soft-tissue envelope for closure, minimal bone loss, susceptible and suppressible organisms, and no atypical organisms.

- Recently, some have discussed a “1.5 Stage Procedure”, which in reality is a “0.5 Stage Procedure.”
    - In this procedure, a resection arthroplasty is completed, and a spacer is placed as a “destination spacer.”
    - However, both goals are sacrificed:
        - Inadequate infection treatment
        - Inadequate long-term fixation
    - As such, this is not in between a one-stage exchange arthroplasty and a two-stage exchange arthroplasty. Rather, it is a 0.5 exchange arthroplasty, not a 1.5 stage procedure.

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- In our Mayo Clinic series on destination spacers, the following catastrophic results were reported:
    - 2-year cumulative incidence of re-infection = 10%
    - 4-year cumulative incidence of any spacer revision = 25%
    - 4-year cumulative incidence of radiographic signs of mechanical failure = 80%

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: Surgical Case 1: Incision, Drainage, Debridement with Specialized Tools, Biofilm Solubilizing Irrigation, and Implementation of Articulating Spacer
Surgeon: David A. Crawford, MD

TAKE HOME KEY POINTS:

Infection Diagnostics

- The Synovasure Alpha Defensin Lateral Flow Test is specifically designed as an aid for the diagnosis of periprosthetic joint infection (PJI).
- The test is a standalone, rapid device for detecting alpha defensin in synovial fluid.
- The test received FDA authorization in 2019 as a CLIA moderately complex test.
- The test delivers the same day results with speed and accuracy with 10 minutes of performing the test.
- Demonstrates a high sensitivity (94.3%) and specificity (94.5%). In addition, results proven in clinical studies to be unaffected by:
    - Prior antibiotic administration
    - Comorbidities related to inflammation.
    - Type and/or virulence of the organism

Disposable Spacer Molds

- Indications
    - Disposable spacer molds are indicated for use to mold a temporary total knee arthroplasty (TKA) for skeletally mature patients undergoing a two-stage revision procedure due to a septic process.
    - The temporary prosthesis is molded using acrylic bone cement and inserted into the joint space following removal of the existing TKA implants and debridement.
    - The device is intended for use in conjunction with systemic antimicrobial antibiotic therapy (standard treatment approach to an infection).
    - The knee prosthesis made from the StageOne™ Knee Cement Spacer Molds is not intended for use more than 180 days, at which time it must be explanted, and permanent devices implanted, or another appropriate treatment performed (e.g. resection arthroplasty, fusion, etc.).
    - Due to the inherent mechanical limitations of the knee prosthesis material (Refobacin Bone Cement), the temporary knee prosthesis is only indicated for patients who will consistently use traditional mobility devices (e.g., crutches, walkers) throughout the implant period.
- Technique
    - Bottles of antibiotic powders are introduced to the sterile operating field and the antibiotics are sifted together with the cement powder multiple times through a strainer to pulverize the powder and ensure a thorough mix.

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        - The use of high-dose antibiotics mixed with bone cement is not FDA approved and represents physician-directed off-label use.
    - At the beginning of the case, materials for the molds are set up on a separate table at the rear of the sterile field.
    - Two disposable injection nozzles are used to mold intramedullary dowels, which will enhance delivery of antibiotics into the femoral and tibial canals.
    - Basing the mold depth on the thickness of the metal and polyethylene that was removed and striving for minimal thickness, the tibial component is fabricated. The construct is somewhat lax to allow motion for ambulation.
    - Next, the femoral mold is fabricated. During fabrication, the mold is massaged to eliminate air spaces and to keep the anterior flange thin to avoid overstuffing the patellofemoral articulation.
    - After the cement cures, the molds are removed.
    - Removal of the intramedullary rods from the injection nozzles is facilitated by cutting the plastic longitudinally with an oscillating saw and pushing the rod out with a blunt instrument.
    - The femoral mold opens along the midline. Separation may be facilitated by cutting along the split with a scalpel.
    - The femoral and tibial spacers are each marked centrally on the underside.
    - The spacers are implanted with intentionally poor cement technique, and a small amount of doughy cement is applied after tourniquet release to reduce adherence and allow for easier removal at reimplantation.

Bone Harvester

- A suction powered bone & marrow harvester can be useful to debride and capture infected, necrotic, or diseased cancellous bone e.g., osteomyelitis and cancellous bone tumors.
- The device can harvest 5-50cc of cancellous bone graft and additional liquid marrow in minutes through a minimally invasive incision.

Solutions for Advanced Biofilm Removal

- The vast majority of bacteria naturally form biofilms which shields them within a protective extracellular polymeric substances matrix that provides both a chemical and mechanical resistant barrier.
- A pulsed jet wound lavage system has been developed for removal of planktonic and biofilm bacteria from the articular joint space.
- The solution is a mixture of surfactants, chelating agents, and salts to disrupt and dissolve contaminants and clean debris from the wound.
- Ingredients include benzalkonium chloride (surfactant) and purified water.
- Supplied in a 1000mL single-dose flexible plastic container/bag with a sterile fluid path and packaged with a dust cover.

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- The pulsed wound lavage system deconstructs the extracellular polymeric substances matrix, exposing the bacteria to antibiotics, removal via lavage, and the body's natural defense systems.

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: How I Do a Good Two-Stage: Technical Tips with Emphasis on Spacers
Faculty: Mathias P.G. Bostrom, MD

TAKE HOME KEY POINTS:

- Two-Stage Revision
- Three phases of 2 stage reconstruction
    - Removal of the prosthesis and all cement and debridement of the soft tissues and bone
    - Prolonged parenteral antibiotic therapy and local antibiotics delivery with cement spacer or beads
    - Implantation of a new prosthesis

- Protocol – 3 months
    - Implant/foreign body removal
    - Through debridement
    - Tissue culture, aerobic/anaerobic (14d), fungal
    - Irrigation solutions
    - Antibiotic spacer placement
    - Postoperative protocol and IV antibiotic
    - Antibiotic holiday 2-4 weeks and synovial fluid
    - TJA reimplantation

- Implant/foreign body removal
    - Explant instruments

- Debridement
    - Very thorough debridement of all non-viable bone/tissue required.
        - Healthy bleeding tissue
        - Extensor/adductor spared
        - Methylene blue?

- Cultures
    - 5 tissue cultures (not swabs) with a different rongeur
        - All for aerobic and anaerobic
        - HOLD for 14 days
        - 2 for fungal and MB
        - Re-aspiration into blood culture bottle if prior culture negative

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- Irrigation
    - Betadine/peroxide – 1 L, sir for 5-10 mins
    - 3L normal saline
    - Betadine scrub brushes
    - 3 minutes (non-dilute)
    - 6 L normal saline
- Articulating Spacer
    - As often as possible:
        - Function
        - Ease of reimplantation
- TKA
    - All poly tibia
    - New femoral component
    - +/-Dowels
    - +/-Stems/augments
        - Articulating Spacer
- THA
    - Antibiotic coated femoral component
    - All poly constrained cup/DM
    - Screws if needed
- Static Spacer
    - TKA
        - Extremely poor soft tissue envelope, sinus (flap)
        - No extensor mechanism
        - Extremely severe bone loss (DFR)
    - THA
        - Rare
        - Severe acetabular bone loss

High Dose Antibiotics

Low viscosity cement with 4-6 grams of antibiotic per batch

2 gram vancomycin

2.4 gram tobramycin

+voriconazole 400mg selectively

Caution: high viscosity cement

2-3g/batch

Monitor renal function

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Renal Failure

- Post-operative Protocol
  - Staples/nylon closure, wound vac
  - Organism-specific IV antibiotics for 6 weeks
  - Infectious disease consult, PICC line, weekly labs
  - PWB 50%, no ROM x 3 weeks (TKAs), gentle ROM +/-brace in needed
  - FU exam – 3 weeks, 6 weeks, 10 weeks

- Antibiotics Holiday and Re-testing
  - 2–4-week antibiotic holiday – monitor symptoms, incision
  - ESR/CRP, re-aspiration
    - <3000 WBCs, <80% PMNs
  - Low threshold for re-debridement and spacer exchange

- Re-implantation
  - Implant removal, thorough debridement, cultures
  - Irrigation solutions
  - Reimplantation of revision components – durable fixation
    - Constraint in TKA
    - Dual mobility in THA
    - Patella- none
  - Antibiotics (Duricef or doxycycline) x 3 months

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Session # I: Infection: Our Single Biggest Unsolved Problem
Talk Title: Infection Prevention: Which Steps Are Actually Worth Taking?
Faculty: Javad Parvizi, MD

TAKE HOME KEY POINTS:

- Infection prevention is a multistep approach and needs to consider that bioburden and immune status of the host are the two competing events at each end of this equation.

- Thus, our efforts should be to reduce bioburden and enhance the immune status of the host and reduce bioburden.

- Numerous strategies for prevention of Surgical site infection (SSI) and periprosthetic joint infection (PJI) have been proposed.

- Review of the current guidelines, particularly the most recent guideline issued by SHEA/IDSA/CDC/APIC provides a great starting point for us as orthopedic surgeons to reduce infection.

- Strategies aimed at reducing bioburden includes the use of preoperative antiseptic wipes/soaps, administration of perioperative antibiotic, skin and nose decolonization, and use of intraoperative irrigation solution.

- Efforts to enhance the immune status of the host includes optimization of underlying comorbidities such as diabetes, anemia, smoking, vitamin D deficiency, and metabolic syndrome.

- It is important to note that the source of microbes causing SSI are three: 1) Contamination of the wound with instruments, gloves 2) Organisms in the room air (which fall into/onto the surgical site) and 3) Patient's own flora. Thus, our efforts should concentrate on these three sources of microbes.

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Session # II: Primary TKA--The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration
Talk Title: The Main Options for Knee Alignment Targets in 2023: Pros & Cons of Each
Faculty: Mark W. Pagnano, MD

TAKE HOME KEY POINTS:

- The traditional dichotomous description of acceptable TKA alignment as aligned versus maligned has limited utility in predicting durability or outcomes after contemporary knee arthroplasty.

- Traditional descriptions of coronal plane alignment relative to the mechanical axis of the limb, within parameters of 0 +/- 3 degrees, is still of value but is incomplete.

- Modern TKA designs and fixation methods appear durable with expanded boundaries and targets for coronal plane alignment of the tibia, the femur, and the overall limb alignment.

- Strictly following Mechanical Alignment targets may achieve sound alignment but at the cost of an altered soft tissue envelope.

- Strictly following Kinematic Alignment respects the soft tissue envelope but may result in more extreme mechanical consequences.

- Hybrid approaches that impose limits, such as Adjusted Mechanical Alignment or Restricted Kinematic Alignment, seek to systematically find a balance between the mechanical and the soft tissue considerations.

- Functional Alignment is proposed as a hybrid technique that harnesses 3-dimensional imaging analysis to identify and achieve mechanically-sound, soft-tissue friendly alignment targets.

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Session #II: Primary TKA – The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration

Talk Title: DEBATE: Do We Have Enough Information To Confidently Use Uncemented TKA In Routine Practice? The Default Should Be Uncemented In Most Patients

Faculty: R. Michael Meneghini, MD

TAKE HOME KEY POINTS:

Cement is Not a Durable Interface

- Decrease in cement-trabecular bone interlock.
- Resorption of trabeculae.

Twenty-year Survivorship of Cementless TKA (Ritter & Meneghini, JOA 2010)

- 1983 - 1986
- 73 Cementless AGC TKR
- **Mean Age: 59 years (range,18-79)**
- All minimum 10-Year Follow-up
- Minimum 20 Year Follow-up: 24 patients
- Two tibial aseptic failures
    - 1 and 2 years postop
- **97% Survivorship at 20 years**
- **Equal Survivorship as Cemented AGC**
- **Younger patients in uncemented TKA by mean 11 years.**
- Pristine radiographic interfaces

Modern Testing Methods Developed (Bhimji & Meneghini, JOA 2012-2014)

- Subsidence and liftoff influenced by design characteristics of keels and pegs.
- Stair descent with greatest implant-bone interface stress
- The porous tantalum baseplate with dual-hex peg fixation experienced greater rocking motions and liftoff compared to the baseplate with a keel and adjuvant pegs.

Three Tibial Implant Design Essentials

1. **Robust** central keel or post
- **Not porous or rough**
- Interference fit instrument prep

2. Peripheral pegs
- Cruciform geometry ideal
- **Not porous or rough**
- Interference fit instrument prep

3. Highly Porous Ingrowth Material
- **Only baseplate undersurface**

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Cementless TKA Experience Over the Past Decade (Helvie & Meneghini, 2023)

- 627 consecutive contemporary cementless TKAs (11-year time period)
- Two modern designs with robust central keel and peripheral cruciform pegs
- Mean age 57 years; Mean BMI 36 kg/m^2
- **Aseptic loosening 0.5% (n=3) at mean 9.6 months**
- Results: Aseptic Loosening KM Survivorship
    - **99% at 10.4 years (95% CI, 98 to 100)**

Modern Cementless TKA Designs are Successful

- Mohammad et al (registry data)
    - Propensity matched analysis of 44,954 cemented and cementless TKAs
    - Registry data from England, Wales, Northern Ireland, and the Isle of Man
    - **>95% 10-year survivorship in matched cemented and cementless TKAs**

- Fricka et al (prospective RCT)
    - 100 TKA patients randomized to cemented or cementless fixation.
    - Two-year follow-up was obtained for 93 patients.
    - **Cementless TKA showed equivalent survivorship (revision for any reason as the endpoint) compared to cemented TKA at this early follow-up.**

- Nam et al (prospective RCT)
    - RCT 147 patients to cemented or cementless TKA (same design)
    - Mean 2 years postoperatively.
    - No difference in the change in the hemoglobin level from the preoperative measurement to postoperative day 1 (P=0.5)
    - ~ 12 minutes shorter operative time for cementless group (P=0.001)
    - **No difference in any clinical outcome measures out to 2-years.**

- Meding et al (retrospective surgeon series)
    - 232 press-fit conforming bearing TKAs
    - Minimum of 2 years (range, 24-42 months)
    - **Three knees (1.3%) were revised (one each for flexion instability, tibial plateau fracture, and suspected femoral component loosening). No other cases of femoral or tibial loosening were identified.**

- **AJRR 2023 Report**
    - **All males, regardless of age, have lower cumulative revision rate of TKA with cementless fixation versus cemented.**
    - **Females greater than 65 years of age have greater cumulative revision rates with cementless fixation in TKA compared to cemented.**

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Session II: Primary TKA – The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration

Talk Title: DEBATE: Do We Have Enough Information To Confidently Use Uncemented TKA in Routing Practice? The Default Should be Cemented Implants in the Great Majority of Patients

Faculty: Steven B. Haas, MD

TAKE HOME KEY POINTS:

Cemented Total Knee Arthroplasty (TKA) has been the Gold Standard for TKA fixation. Recent interest in cementless TKA is based on the assumption that cement fixation will deteriorate over time leading to late loosening. The data does not support this assumption. Registry data from numerous countries along with many long-term clinical studies show that cement fixation is durable, predictable, and reproducible. Registries and other studies have generally shown that cemented results are equal to or better than cementless TKA. Improvements in cementless materials and techniques may improve the outcomes but results to date are short term and equivocal. Patient selection, implant type, implant design and optimal technique remain controversial topics with cementless fixation. The outstanding long-term results of cemented fixation justify its Gold Standard status.

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Session # II: Primary TKA: The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration

Talk Title: Surgical Case 2: Cementless TKA is Poised to Become the Gold Standard for Fixation

Surgeon: Adolph V. Lombardi, Jr., MD

TAKE HOME KEY POINTS:

Why cementless total knee arthroplasty (TKA) in 2024?

- Conventional thinking is that cemented TKA is a non-issue, achieving long-term fixation in most patients.

- However, the Australian Orthopaedic Association National Joint Replacement Registry in 2022 reported a 20-year cumulative revision rate of 6-10.5% depending on implant design, with infection prevalent in the first decade and loosening in the second.

- Our patients have changed and are more physically active than twenty years ago. Most patients ask how soon they can return to all types of sporting activities.

- Heavy patients are a concern with weights increasing globally, which apply significant forces across implants that may compromise fixation earlier.

- Cemented fixation is implant, cement, and technique dependent, and best the day implanted, only weakening over time.

- Several studies show added time and material costs for cemented fixation neutralize added cost of cementless implants.

- More surgeons worldwide are performing cementless primary TKA.

- The American Joint Replacement Registry reported 2.7% of TKA in 2013 were cementless, increasing to 18.8% in 2021 and rising. Registry data shows men younger than 65 have lower revision risk with cementless than cemented TKA.
    - In older men and women of all ages there is no significant difference between cemented and cementless.

- Many randomized controlled trials, systematic reviews, and meta-analyses document improved survivorship and outcomes with contemporary cementless TKA compared with earlier designs, showing results similar to cemented designs.

- Manufacturers have developed new cementless TKA systems in response to demand.

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- Zimmer Biomet has designed the Persona Cementless TKA System, which features a porous plasma spray-coated chrome-cobalt femur and 3D-printed titanium tibial implant.
    - This OsseoTi keeled cementless tibia is stable, versatile, and anatomic.
    - Based on the heritage of the Vanguard and Natural Knee Systems, it incorporates many attractive features of the Persona System.
    - The tibial tray has a 0° keel design allowing for a straight down broaching technique perpendicular to the proximal tibial cut.
    - There is progressive press-fit built into the keel, and a very bone-friendly interface – the OsseoTi porous material facilitates early cell migration, biologic fixation, and vascularization.
    - Adopting surgeons have found the technology extremely straightforward and applicable to their patients.
    - If you wish to cement the tibia, preparation is the same and a cemented keeled component available.
    - With this new, stable, versatile, and anatomic design, patients are achieving excellent clinical and radiographic results.

- Cementless fixation is predicted to increase, and by year's end may reach 30-35% in the United States.

Session # II: Primary TKA – The Big Questions: Alignment, Indications, Fixations, Bearing Surface Configuration
Talk Title: DEBATE: Almost All Patella Should be Resurfaced - Affirm
Faculty: Steven J. MacDonald, MD

TAKE HOME KEY POINTS:

- Introduction
    - Routine resurfacing of the patella at the time of primary total knee arthroplasty (TKA) has been the standard of care in North America for decades, however, there has always been significant global variability. Surgeons have tended to be in one of three camps: always resurface, never resurface, or selectively resurface. With newer patellar friendly designs on the market, and with an increased use of cementless TKA's, the number of unresurfaced patella's is increasing.

- Advantages to Routine Patellar Resurfacing
    - There can be little doubt that routine patellar resurfacing will lead to a lower cumulative revision burden. Late patellar erosion following an unresurfaced patella necessitating revision TKA is the 6th leading cause of revision TKA in the Australian Joint registry (AJR). These revisions are for late erosion, not undiagnosed pain.
    - In the AJR, the cumulative present revision at 17 years is as follows:
        a. 11.1% for Unresurfaced PS designs
        b. 8.8% for Unresurfaced CR designs
        c. 7.9% for Resurfaced PS designs
        d. 7.1% for Resurfaced CR designs
    - Anterior knee pain can occur in the face of both resurfaced and unresurfaced patella. However, with the patella already resurfaced this is reassuring for both patient and surgeon that "all has been done'.
    - While patellar complications can occur with resurfacing, these are exceedingly rare with modern generation TKAs. Certainly, a much lower risk than the risk of late patellar erosion if the patella is not resurfaced.
    - The unresurfaced patella undergoes a well-documented loss of cartilage very quickly – 50% cartilage loss within 5 years postop.
    - Routine resurfacing is cost-effective (estimated saving of >$100USD/case) and has an absolute risk reduction for revision of 4%

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Session # II: Primary TKA – The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration
Talk Title: DEBATE: Almost All Patellae Should Be Resurfaced - Oppose
Faculty: Michael A. Mont, MD

TAKE HOME KEY POINTS:

I do not resurface 80% or more of my patellae. But, I use 3 special techniques:

- Small lateral facet release (esp. with osteophytes)
- Circumferential denervation ("ring-of-fire" technique)
- Rasp down rough surfaces

Why? Minimal outcome differences

- Minimize errors
- Decreases **Major Complications**
- Not Necessary
- Less Costly
- Data supports it

Resurfacing can lead to complications (many of these not tabulated in registries; extensor mechanism ruptures, fractures)

- In United States, resurfacing most common, **but most of the world does not resurface patellae.**

- Why avoid resurfacing?
  - Faster
  - Less likely to get **major complications**
  - Less expensive

- Use ancillary techniques when not resurfacing:
  - Circumferential denervation
  - Small Partial lateral facet release
  - Rasp/clear osteophytes/rough surfaces

- Studies show:
  - No difference in Pain scores between groups
  - No differences in Revision rates
  - No differences in Satisfaction Scores (maybe tend better scores in unresurfaced)
  - No differences in Anterior Knee Pain
  - No difference in Radiographic outcomes

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(Lygre et al 2010, Burnett et al 2004, van Jonbergen et al 2014, Pulavarti et al 2014, and others)

- Patients cannot tell if patella resurfaced or not (Burnett et al 2007).

- No functional differences by gait study (Smith et al 2006).

- Meta-analyses of studies no symptom differences (Chen et al 2013, 2021)

- What about higher rates of reoperation in non-resurfaced groups?
  - No differences in reoperation rates if patella-friendly designs (need to know implant type rather than pooled data)
  - Under-reporting of complications of resurfacing: Registries do not count some cases in resurfaced group as reoperations (extensor mechanism ruptures, patella fractures, etc.)
  - May be due to rotational problems of femoral/tibial components

- Why not resurface? Could have problems:
  - Fracture (if over-resect)
  - Avascular necrosis from disruption of blood supply
  - Maltracking—oblique cut
  - Decreased range of motion if under-resect
  - Anterior Knee Pain if under-resect
  - Patella component loosening

- When do I resurface?
  - Inflammatory arthritis
  - Patella deformity/erosion
  - Patella maltracking (subluxation/dislocation)
  - Primary patello-femoral symptoms/disease

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Session # II: Primary TKA – The Big Questions: Alignment, Indications, Fixation, Bearing Surface Configuration

Talk Title: DEBATE: Bilateral Simultaneous TKA Is Safe, Cost-Effective, And Should Be Used In Selected Patients – Affirm

Faculty: Thomas P. Vail, MD

TAKE HOME KEY POINTS:

- For patients needing bilateral TKA, there is conflicting opinion on whether to do both at once or one at a time. However, doing both knees at once has been the right choice for about 10% of the patients in my practice.

- Comparative studies are flawed because the sickest patients or patients with a complication after the first total knee may fall out of the staged cohort. Therefore, consensus statements have fallen short of definitive recommendations.

- Data suggests that the risk of a complication after the first knee remains higher when the second knee is done in a sequential process at separate sittings.

- While the absolute risk of any complication is low for both the staged and simultaneous cohorts, the relative risk varies depending upon the type of complication. Data suggest that the risk of DVT may be higher in the single stage group and infection may be higher in the staged cohort. There is no mortality difference.

- Life includes risk. Surgery includes risk. Total knee replacement has become a much easier proposition for patients and surgeons if one considers LOS and migration to the ambulatory sites as evidence. Many orthopaedic procedures that are commonly performed, indeed many surgical procedures of all types, have a higher risk of complications than bilateral TKA either simultaneous or staged.

- Cost. Two hospitalizations cost more than one. The majority of the cost of a hospitalization is born in the first 48 hours, negating the LOS effect in the inpatient setting. Outpatient surgery costs less, but outpatient migration for TKA has evolved unevenly across the nation with an unstable reimbursement model and low patient acceptance.

- Patients' opinions and needs matter too! Most people don't want to go to the hospital twice.

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Session # II: Primary TKA – The Big Question: Alignment, Indications, Fixation, Bearing Surface Configuration

Talk Title: DEBATE: Bilateral Simultaneous TKA is Safe, Cost-Effective, And Should Be Used in Selected Patients - Oppose

Faculty: Jay R. Lieberman, MD

TAKE HOME KEY POINTS:

- Knee OA is a common disease.
- High prevalence of bilateral knee OA but only 6% of TKAs performed simultaneously.
- Most bilateral OA patients do not have an equal disability.
- Advantages of bilateral TKA – single rehabilitation period, reduction in anesthesia time, potential cost reduction.
- Disadvantages – inpatient hospital admission, increased cardiac events, increased thromboembolic complications, increased mortality, and decreased surgeon reimbursement.
- In an era of outpatient and same day TKA, simultaneous bilateral TKA should be avoided in most instances.
- Definitive contraindications for bilateral TKA include: age, anemia, cardiac valvular disease, CHF, renal failure, lung disease (COPD, pulmonary hypotension) and obesity
- Recent study using a large database demonstrated increased complications with simultaneous bilateral TKA including: PE (OR -2.13); stroke (OR -2.21); anemia (OR -2.06); transfusion (OR -7.84); 90 day re-admissions (OR -1.35) – Richardson et al, JBJS 2023
- Orthopedic surgeons are unable to identify ideal candidates for simultaneous bilateral TKA
- Large database study patients were divided into quartiles based on morbidity probability and it was noted that was a 3x risk of any complications and 2x risk of major complications in the healthiest patients (Warren et al, JBJS, 2020)
- Simultaneous bilateral TKA should be a rare event in 2023.
- Consider a shoe lift in a patient with bilateral flexion contractures.

Session # III: Complex Primary TKA: Managing Complications of TKA
Talk Title: KEYNOTE: Activity After THA and TKA: What Should We Tell Our Patients In 2023 With Modern Fixation and Bearings?
Faculty: Carlos A. Higuera-Rueda, MD

TAKE HOME KEY POINTS:

- Kneeling after TKA is ok, as tolerable (may be trained).
- Driving after TJA: 2 weeks.
- Sex is okay after 2-3 weeks with boundaries.
- Most patients can return to preoperative levels of low- (e.g., walking) and moderate-impact (e.g., hiking) sports.
- Patients planning a return to high-impact (e.g., singles tennis) sports should be counseled. 70-80% of patients can return to sport as long as they practice the sport at least 1 year prior to the arthroplasty procedure.
- Previous experience in a particular sport is key for returning to such practices.

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Session # III: Complex Primary TKA: Managing Complications of TKA Talk
Title: Oh No! What Now? Managing Common Intraoperative Complications in TKA
Faculty: Giles R. Scuderi, MD

TAKE HOME KEY POINTS:

- Medial Collateral Ligament injury
    - Assess the integrity of the medial knee soft tissues consistently throughout surgery to allow timely identification of any potential injury.
    - Address the injury with either repair, augmentation, or alteration in component constraint, or a combination of these options.
    - Assess the integrity and balance of the repair prior to completion of the TKA.
    - Decide on the necessity of changing postoperative protocols and immobilize or protect with bracing when necessary.
    - Management of intraoperative medial instability with varus/valgus constrained implants may be necessary.

- Patella Tendon Injury
    - Care during exposure to protect the patella tendon is important.
    - When encountering a difficult exposure consider a more extensile approach such as the quadriceps snip or tibial tubercle osteotomy.
    - Primary repair with and without augmentation is appropriate in acute injuries when adequate tissue and bone are available.
    - Numerous reconstructive procedures have been described using autograft, allograft, and synthetic materials.
    - Changes in the postoperative rehabilitation may be necessary with an extended period of immobilization.

- Intraoperative Fractures
    - Intraoperative fractures can occur in the femur, tibia, or patella.
    - Risk factors include osteoporosis, anterior femoral cortical notching, advanced age, female sex, neurologic disorders, and surgical technique.
    - Fractures can potentially occur at any stage of the TKA including exposure, bone preparation, placement of trial components, cementation, insertion of the final components, and seating of the tibial polyethylene insert.
    - Management guidelines for these fractures include observation, internal fixation, the use of stems and augments, increasing constraint of the prosthesis, implant revision, and modifying the postoperative rehabilitation.

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Session # III: Complex Primary TKA: Managing Complications of TKA
Talk Title: Surgical Case 4: Improving Your Accuracy and Enhancing Stability of Your THA With Improved Navigation
Faculty: George J. Haidukewych, MD

TAKE HOME KEY POINTS:

- Dislocation remains a problematic complication of primary THA.
- The most common reason is malposition of the acetabular component.
- There is no universal safe zone for cup placement.
- Understanding pelvic tilt, spinal mobility and the hip-spine relationship is important for accurate cup placement for a particular patient.
- Big data supports lower dislocation rates with the use of navigation compared to manual THA.
- Preoperative impingement modeling can help determine the cup “target”.
- Intraoperative navigation can assist with hitting the desired target.
- The video will demonstrate pre op simulation, room set up, pin placement and registration, navigated cup placement, and intraop artificial intelligence assisted fluoroscopic evaluation of component placement, focusing on tips and tricks.

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Session # III: Complex Primary TKA: Managing Complications of TKA
Talk Title: My Top Tips And Tricks For TKA After ACL Surgery
Faculty: Steven B. Haas, MD

TAKE HOME KEY POINTS:

- **The Issues**
  - Incisions
  - Hardware
  - Bone Defects
  - Ligament Balance – Increased Instability
  - Infection – Increase Infection Rate
  - Stiffness – Increase Manipulations

- **Hardware – Be Prepared**
  - Set with Multiple screw drivers
  - High speed Bur (Midas)
  - Staple Remover if needed

- **Ligament Balance**
  - Good Preop Eval
  - Meticulous Soft Tissue Balance
  - Low Threshold For Midlevel Constraint Especially In Hypermobile Patient

- **Infection**
  - Check History
  - Routine Measures
  - Antibiotic Cement
  - Betadine Wash

- **Stiffness**
  - Close Observation
  - Good Pain Management
  - Manip If Needed

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Session # III: Complex Primary TKS: Managing Complications of TKA
Talk Title: My Top Tips and Tricks for TKA in Extra Articular Deformity
Faculty: C. Anderson Engh, Jr., MD

TAKE HOME KEY POINTS:

- The Rule: Neither distal femoral or proximal tibia resections can violate collateral ligaments.

- Extraarticular deformity options include intraarticular correction, TKA with simultaneous osteotomy, and staged osteotomy then TKA.

- Intraarticular correction acceptable for
    - Coronal femoral deformities <20° and tibial <30°
    - Rotational deformities <20°
    - Sagittal deformity <15-20°

- Templating: Long leg alignment AP and Lateral
    - If a line perpendicular (distal femoral cut) to a line from femoral head to femoral notch does not involve the collateral ligaments, then intraarticular correction is possible.
    - If a line from talus following the distal tibia (tibia distal to a tibial deformity) intersects the tibial plateau an intraarticular correction is possible.

- Internal rotation deformities are much more difficult to manage than external rotational deformities.

- Tibial deformities are easier to address than femoral deformities.
    - Tibial deformities affect stability throughout ROM.
    - Femoral deformities only affect extension balance creating flexion extension imbalance.

- Osteotomy with TKA
    - Staged: longer recovery
    - Simultaneous: nonunion and stiffness risk

- Use image free navigation
    - More accurate than extramedullary alignment and facilitates real time adjustments.

- Prepare for extensive releases and/or collateral ligament reconstruction.

- Prepare to add additional implant constraint.

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Session # IV: New Technology in Total Knee Arthroplasty
Talk Title: DEBATE: Robotics Allows You To Do A Better TKA, Has Limited Downsides, And Should Be Used Routinely In Primary TKA - Affirm
Faculty: Fares S. Haddad, MD

TAKE HOME KEY POINTS:

- Introduction
    - Robotic-arm assisted total knee arthroplasty (RO TKA) and robotic-arm assisted unicompartmental knee arthroplasty (RO UKA) use preoperative computerized tomography scans to create patient-specific models for optimal component positioning, intraoperative optical motion capture technology to assess knee biomechanics, and a robotic device to execute the planned component positioning.1 The increasing use of this technology globally has led to a surge in publications related to RO TKA and RO UKA over the previous decade.2 The objective of this study was to explore the medical evidence to date on RO TKA and RO UKA and understand the scientific rationale for the growing uptake of these procedures worldwide.

- Methods
    - A search of existing clinical trials reporting on outcomes in RO TKA and RO UKA was conducted using Pubmed, Ortho search, MEDLINE, Cochrane library and google scholar databases from their inception to date. All studies reporting on preoperative surgical planning, intraoperative surgical data, and postoperative outcomes were recorded. The search identified 958 studies on RO TKA and 612 studies on RO UKA to date. Studies were assessed for bias and the process was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

- Results
    - RO TKA is associated with improved accuracy in templating component sizes,3 increased accuracy of component positioning,4 reduced opiate analgesia consumption,5 faster postoperative rehabilitation,6 shorter time to hospital discharge,5 less iatrogenic soft tissue injury, 7 reduced systemic inflammatory response8 and improved Forgotten Joint scores at five years follow-up compared with conventional manual TKA9. Similarly, RO UKA is associated with improved accuracy of component positioning10 and shorter time to hospital discharge,11 with registry data showing improved long-term component survival compared with conventional manual UKA.12 In both RO TKA and RO UKA, there are no learning curves for accuracy of component positioning and no additional risk of complications during the learning phases.4,13 Robotic planning software and

intraoperative technology have been used to develop the coronal plane alignment of the knee (CPAK)14 and macroscopic soft tissue injury (MASTI) classifications7, establish the role of individualized “functional alignment” in TKA,15 and assess the effects of controlled ligament releases and fixed flexion deformity on knee biomechanics. 16,17

- Conclusion:
    - This study found that RO TKA and RO UKA are associated with improved accuracy of component positioning, faster inpatient rehabilitation, and reduced awareness of the operated joint at mid-term follow-up. Emerging registry data has shown this RO UKA is associated with improved long-term component survival compared with CO UKA. Robotic technology has also developed an important role as an investigative tool for assessing native knee anatomy and biomechanics. This may help in our transition away from the “one sits fits all” to delivering more individualized, patient specific TKAs and UKAs.

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Session IV: New Technology in Total Knee Arthroplasty
Talk Title: DEBATE: Technology Will Mostly Eliminate the 15-20% of Unsatisfied Patients in TKA - Affirm
Faculty: Antonia F. Chen, MD

TAKE HOME KEY POINTS:

- Total knee arthroplasty (TKA) patients and satisfaction
    - Historically, 15-20% of patients are unsatisfied after TKA
    - Multitude of reasons:
        - Patient factors
            1. Mental health
            2. Expectations
            3. Low back pain
            4. Comorbidities
            5. Less severe pre-operative radiological degenerative changes
        - Surgical factors
            1. Lack of patella resurfacing
            2. Type of insert used
            3. Alignment
        - Postoperative factors
            1. Complications
            2. Postoperative pain
            3. Postoperative physical function
            4. Postoperative range of motion

- How can technology reduce dissatisfaction after TKA?
    - Role of technology
        - Can help achieve desired alignment
        - May improve postoperative range of motion
        - May decrease postoperative pain
    - Technology options
        - Navigation
        - Robotics
        - Augmented Reality

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Session # IV: New Technology in Total Knee Arthroplasty
Talk Title: DEBATE: Technology Will Mostly Eliminate the 15%-20% of Unsatisfied Patients in TKA - Oppose
Faculty: Robert L. Barrack, MD

TAKE HOME KEY POINTS:

- A number of major factors that contribute to patient dissatisfaction do not relate to implant design or surgical technique.

- Early intervention of (TKA for early OA or mild/moderate symptoms) associated with four times more likelihood of dissatisfaction and /or failure to improve after TKA. (1,2)

- TKA was judged to be inappropriate by objective criteria (mild/moderate symptoms and or x-ray changes) in over 30% of cases. (2)

- Unmet expectations associated with 10x risk dissatisfaction (6)

- Patients expect to be pain free and relatively asymptomatic, yet most are not.

- Socio-economic factors such as household income correlate with dissatisfaction and complication rates. (5)

- Psychological factors (especially depression, anxiety, and central sensitization) also correlate with dissatisfaction and are modifiable to a limited degree. (4)

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Session V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: Patient Selection and Optimization for Outpatient Surgery
Faculty: Keith R. Berend, MD

TAKE HOME KEY POINTS:

- We follow a simple algorithm at JIS Orthopedics: 1) Does the patient have an ongoing medical issue that cannot be optimized? If yes, postpone surgery until medically optimized. If no, 2) Does the patient have an organ failure? If yes, the patient is not a candidate for outpatient surgery, and if medically stable, surgery should be performed at a hospital and the patient observed for 23 hours. If no, 3) Does the patient have adequate support upon discharge? If no, consider surgery at hospital. If yes, surgery can be performed safely as an outpatient.

- Develop a System that Helps You Determine Who Is a Candidate for Outpatient TJA

- Verify the patient's insurance benefits to identify those with and without benefits to cover surgery in your Ambulatory Surgery Center

- The 10 Elements of Success

- Orthopedic Assessment

- Medical Optimization versus "Clearance"

- Location of Surgery: Ambulatory Surgery Center vs. Orthopedic Specialty Hospital vs. Full-Service Hospital

- Review of JIS Orthopedics Outpatient Arthroplasty Experience to Date

- What Have I Learned?

- The Joint Reconstruction Team Must Understand that You Are Operating on a Healthy Patient

- Outpatient TJA Pros: Huge proportion of patients are eligible, complications and readmissions are low, we have 98% good/excellent patient satisfaction, outpatient TJA is scalable and applicable, and beneficial for all stakeholders.

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Session V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: Unique Operative Concerns in The ASC Environment: Safety and Efficiency
Faculty: Adolph V. Lombardi, Jr., MD

TAKE HOME KEY POINTS:

Ambulatory Surgery Centers - One Development Company's Experience

- Typical Model:
    - 2 operating rooms + 1 procedure room
    - 6,600-7,500 = typical square footage
        - Dependent on shape, access points, configuration of available space

Requirements for Central Sterile Processing - Physical Plant Design & Installations

- Separate Decontamination and Sterile Rooms (Soiled Room and Clean Room)
- Air Quality
    - Negative (flow inward) air pressure in Soiled Room
    - Positive (flow outward) air pressure in Clean room
    - Self-closing door hardware

Sterilization Equipment Selection

- Determine your procedures.

- Determine the number of items to be sterilized.
    - Total joint replacement: 10 (trays, power tools, etc.

- Washer Sterilizer
    - Large 3-rack
    - 2 of them; seals break down.

- Autoclaves
    - Large 48" or 60" (most ASCs have Flash Size)
    - 2 of them

- Sterile storage – minimums are not appropriate for TJR and spines cases; more space required.

- Cross train staff from OR who can assist in SPD to cover for absences, PTO, etc.

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Other Infrastructure Considerations

- Pre-op and Recovery Bays
    - If Pre-op and Recovery are in the same area, the minimum requirement is 1 bay per OR
    - The number of bays should be determined by the facility based on types of cases.
    - Recommend 3 – 4 bays per operating room as standard practice.

- Technology: Robots, monitors, etc.

Footprint - Preop / PACU

- Bays must be convertible.
    - All bays preop in AM
    - PACU later in day

- Same equipment

- Cross train staff

- Blocks are performed in this area.

Footprint - 4 Walled Rooms

- Longer PACU Phase 2 or overnight

- Discuss discharge plan with family.

- Review medications

- Physical therapy evaluation

- Patients ambulated to bathroom.

- Stair training

- Ambulated 50 feet.

Miscellaneous Considerations

- Medication Room
    - Convenient for both OR & Preop/PACU

- Supply Room
    - Large enough to accommodate volume and case type.

- Facility Front Entrance
    - Patient/family arrival only.
- Facility Exit
    - Patients exit through a private discharge area.
    - Consider covered portico.

- Facility Front Entrance
    - Patient/family arrival only.

- Facility Exit
    - Patients exit through a private discharge area.
    - Consider covered portico.

Imaging

- Centers are outfitted with C-arms.

- NO other imaging services.

Robotics Are Available

The OR Culture of Efficiency

- Surgeon perspective

- Preoperative planning / templating

- Effective utilization of preoperative holding

- Develop preference cards.

- Streamline instrument sets.

- OR set-up protocols

- OR team concept

- Consistent operative workflow

- Standardize closure / dressings

Effective Utilization of Preop Holding Area

- The OR is for the operation
- Eliminate unnecessary traffic while opening instruments.

Surgeon

- Team Leader
- Primary Caregiver

Preoperative Planning

- Templating
- Preoperative radiographs – if you are doing a matchup, you should know the sizes.
- Communicate special needs well in advance, e.g.:
    - Patella Baja
    - Post-acetabular fracture
    - Hardware present
    - Severe deformity / bone deficit

Efficient Performance of an Operative Procedure

- Skillfulness in avoiding wasted time and effort.

Planning for the OR - Must Recognize Some Key Limitations to the ASC

- Not EVERY implant option is available.
- Blood transfusions are not readily available.
- DME options are not robust.
- Physical therapists are not always there.
- Transfers to advanced levels of care are not always easy.
- Plan for these limitations.

Develop an Efficient Implant and Instrument Delivery System

- No Flash Sterilization
    - “Mini Bar” is the answer to gravity.

Complications

In spite of adhering to all best practices, know that complications may occur and have a procedural plan for handling medical emergencies. Required policy is to maintain a written transfer agreement with a Medicare-certified local hospital or if there is no transfer agreement with a local hospital, all physicians on the medical staff will have admitting privileges at a Medicare-certified hospital. Procedure in the event of an emergency is as follows:

- Alert the patient's family.
- Initiate arrangements for the transfer of the patient.
- Prepare the patient for transfer.
- Instruct emergency team which entrance to use.
- Call report to hospital.
- Copy medical record for transport with patient.
- Send patient's belongings with the patient or family.
- Document all events associated with the transfer in the patient's medical records.
- Detailed protocols, well-trained staff, a superb anesthesia team, and readily available general medical consultants ensure a rapid response and best possible outcomes for patients when unexpected complications occur.

Take Home Message

- Classic ASC footprints may not be appropriate for joint replacement.

- Do not overbuild.
  - Cross functional space and staff
  - 2 ORs and 1 procedure room
    - 8-10 TJR and 15 pain procedures / day
    - 2,040 – 2,530 TJR and 3,825 pain procedures / year
  - Increase capacity by increasing OR block time 8-10 hours before building additional OR
    - 5 cases / OR / week ↑

- Due Diligence
  - Visit high performing TJR ASCs
  - Partner with experienced management company

- Embrace Efficiency
  - You are the captain of the ship!

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: Management of the Outpatient Surgery Patient After Discharge
Faculty: Matthew S. Austin, MD

TAKE HOME KEY POINTS:

- The real key is to treat all patients very similarly regardless of their time to discharge.
- There needs to be alignment of the entire patient care team on perioperative care goals, processes, and expectations. Empower the team to "buy-in". Seek and value their input.
- There needs to be patient alignment on perioperative care goals, processes, and expectations. Seek and value their input.
- The entire team needs to convey appropriate messaging to the patient and their support system.
- Success of outpatient joint arthroplasty is dependent on optimizing all phases of patient care:
    - Preoperative
    - Intraoperative
    - Postoperative
- For those beginning the outpatient journey, it is important to do so in a stepwise fashion.
- A protocol driven process with care-pathway standardization is paramount.
- Patient selection is of ultimate importance in avoiding "failure to launch".
    - Use selection criteria that make sense for your institution and patient population.
    - Stick to your criteria (especially when beginning to perform outpatient surgery)!
- Avoiding "failure to launch"
    - Minimize PONV
    - Eliminate drains
    - Keep patients hydrated
    - Eliminate urinary catheters
    - Use a low-dose spinal or "light" general
    - Use TXA
    - Mobilization quickly after surgery
    - Use multimodal pain management

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- Patients DO NOT need:
    - Lab tests
    - Homecare
    - Formal physical therapy
    - Overly complicated, voluminous, or conflicting discharge instructions

- Patients DO need:
    - To be able to reach you or someone from your team with questions or concerns, especially with emergent/urgent issues
    - Someone from your team to contact them shortly after the surgery

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: Is Outpatient Arthroplasty Safe? What Does The Data Say?
Faculty: Scott M. Sporer, MD

TAKE HOME KEY POINTS:

- Outpatient total hip and knee arthroplasty has become increasingly common. Outpatient surgery, defined as patients discharged to home the same day as the surgical procedure, can be performed at an in-patient hospital with a same day discharge, at a hospital outpatient surgical (HOPD) center or at a free standing ambulatory surgical center (ASC). It is expected that within the next 5 years, over half of all elective primary total knee arthroplasty (TKA) and total hip arthroplasty (THA) will be performed as an outpatient procedure. This accelerated discharge is a departure from the historical 2–4-day in-patient hospitalization. Patient safety remains the highest priority with the migration of these procedures to the outpatient setting.

- Numerous factors must be considered when asking the question "Is Outpatient Arthroplasty Safe". While many published peer reviewed studies have demonstrated equal or improve patient outcomes and patient satisfaction, these studies must be taken in the appropriate context. (1) At baseline, a successful outpatient arthroplasty program requires a commitment and comprehensive program from multiple entities including a motivated patient, appropriate medical selection and optimization, efficient HOPD/ASC, consistent anesthesia technique, a surgeon with consistent skillset/outcomes and adequate/knowledgeable clinical staff.

- Programs that contain these key elements have demonstrated readmission rates similar to those observed in inpatient procedures. (2) A recent study utilizing NSQIP database evaluated the 30 day adverse events and readmission via propensity score matching. Outpatient joint arthroplasty was associated with a lower rate of adverse events (3.18% vs 7.45%). In this study, outpatient joint arthroplasty was an independent factor for lower adverse events with no increase in the risk of readmission. (3) Another study using the NSQIP database compared to a cohort of 1236 patients demonstrated no difference in overall 30-day complications.(4)

- The prevalence of Outpatient joint replacement will continue to increase. These procedures can be performed safely with a robust surgical program that follows evidence-based protocols.

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: DEBATE: Unis Are Great And If Anything We Should Be Doing More - Affirm
Faculty: Anders Troelsen, MD

TAKE HOME KEY POINTS:

- UKAs hold several benefits over TKA:
    - You will see better patient reported outcomes for pain, function, and knee awareness; Less severe medical complications & Less readmissions for UKA's.
    - UKA's show faster recovery; Reduced length of stay with higher success rates for same-day surgery.
    - Revisions for PJI are occurring twice as much after TKA compared with UKA.
    - Historically, Joint arthroplasty registries have shown higher revision rates for UKA's compared with TKA, but in contemporary UKA practices you can get similar revision rates comparing the two procedures. A sound practice pattern for UKA is crucial.

- Evidence have made us understand the following points relating to UKA practice:
    - Around 50 % of cases that are present for knee arthroplasty are candidates for a medial UKA.
    - To arrive at predictable outcomes and low revision rates your usage of UKA's should be minimum 20 % of your primary knee replacements.
    - In actual numbers you should do more than 10 cases per year.
    - You should follow a simply set of validated and commonly accepted indications and (few) contraindications. Antero-medial-OA is the primary indication. Identifying patients is simple and is done based on basic AP and Lateral x-rays.
    - Let's do enough, and let's do more!

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: DEBATE: Uni's Are Great And If Anything We Should Be Doing More - Oppose
Faculty: Thomas K. Fehring, MD

TAKE HOME KEY POINTS:

- What are the 4 important questions you need to make an evidence-based decision on unicondylar arthroplasty?
  - What are the long-term results of unicondylar arthroplasty?
  - Are the results of revised uni's comparable to a primary TKA?
  - How many uni's do you have to do to match registry results?
  - Will robots improve results?

- Long Term Results
  - Unicompartmental knee arthroplasty survivorship is lower than TKA survivorship: A 27-year Finnish registry study

    Clinical Orthopaedics and Related Research® **472**, 1496–1501 (2014)

Survival	5-Year	10-Year	15-Year
4,713 UNIs	89.4%	80.67%	69.6%
83,511 TKAs	93.3%	93.3%	88.7%

- Unicompartmental knee arthroplasty has higher revisions than total knee arthroplasty at long term follow-up: A registry study on 6,453 prostheses.
  Knee Surg Sports Traumatol Arthrosc **29**, 3323–3329 (2021)

	15-Year Revision Rate
6,453 UNIs	18.2%
54,012 TKA's	6.2%

- Revision Results
  - Revision Risk for Total Knee Arthroplasty Converted from Medial Unicompartmental Knee Arthroplasty: Comparison with Primary and Revision Arthroplasties, Based on Mid-Term Results from the Danish Knee Arthroplasty Registry. The Journal of Bone and Joint Surgery 101(22):p 1999-2006, November 20, 2019.

    1,012 uni revisions
    Revised uni's had 3x's the risk of re-revision compared to primary TKA

  - Inferior outcome of revision of unicompartmental knee arthroplasty to total knee arthroplasty compared with primary total knee arthroplasty: Systematic review and meta-analysis. KSSTA: First published: 27 March 2018
    https://doi.org/10.1007/s00167-018-4909-3

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Revised uni's have a higher re-revision rate and worse clinical outcomes compared to primary TKA.

- A meta-analysis of unicompartmental knee arthroplasty versus primary total knee arthroplasty. *J Orthop Surg Res* **13**, 158 (2018)

Uni revisions have significantly worse clinical outcomes compared to primary TKA.

- Survival and functional outcome after revision of a unicompartmental to a total knee replacement. *J Bone Joint Surg Br*. 2010;92-B(4):508-512

The poor outcome of a revised uni compared to a primary TKA should contraindicate the use of uni's as a more conservative procedure in younger patients.

- Effect of Case Load
  - The Interaction of Caseload and Usage in Determining Outcomes of Unicompartmental Knee Arthroplasty: A Meta-Analysis. The Journal of Arthroplasty Volume 32, Issue 10, October 2017, Pages 3228-3237.e2

To achieve optimal uni results, it is recommended that ideally >30% of a surgeon's knee practice should be uni's.

- Low percentage of surgeons meet the minimum recommended unicompartmental knee arthroplasty usage thresholds: Analysis of 3,037 Surgeons from Three National Joint Registries. >50% of surgeons in the UK, Australia and New Zealand registries do not meet the UK required thresholds. KSSTA: First published: 17 February 2021

  Only 5% of their operated knees were uni's.

- Will Robots Help?
  The three- year survivorship of robotically assisted versus non-robotically assisted unicompartmental knee arthroplasty. *Bone Joint J*. 2020;102-B(3):319-328.

  MAKO robotic compared to ZUK non-robotic uni's
  Similar revision rates
  Revision for infection significantly higher for the robotic technique

Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: DEBATE: All Unicompartmental Knee Arthroplasties Should Be Done With a Robot - Affirm
Faculty: Robert L. Barrack, MD

TAKE HOME KEY POINTS:

- The major issue leading to suboptimal results in total joint arthroplasty is inconsistency in component placement.
- There is a substantial learning curve, results are better with high volume surgeons, yet most procedures are performed by low volume surgeons.
- UKA is a prototype of this problem with 5–10-year results showing revision rates of 15-20% even in the hands of experienced surgeons.
- This data is consistent throughout numerous national registries outside of the US as well as the Medicare database and private insurance databases.
- Robotics solves the problem with inconsistency of component placement.
- This has resulted in much lower revision rates at major centers as well as in national datasets such as Pearl Diver and the Australian Registry.
- There is evidence that hitting multiple targets results in higher quality results in terms of patient reported outcomes as well as in lower revision rates.
- Robotic UKA is highly more accurate than manual and eliminates almost all outliers. This has been documented in multiple high-quality publications.
- Manual instruments are crude and inaccurate resulting in inconsistency in component placement in the hands of most surgeons. This is largely avoidable with the current generation robotics, and it is therefore past time to consider adoption of robotic technology for total joint replacement.

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: DEBATE: All Unicompartmental Knee Arthroplasties Should Be Done With a Robot - Oppose
Faculty: Craig J. Della Valle, MD

TAKE HOME KEY POINTS:

- If you consider the failure modes of UKA (arthritis progression/tibial loosening/unexplained pain), I am not sure the robot helps you avoid those complications.
    - It isn't going to help you pick your patients.
    - It isn't going to help you cement the implants into place.

- The surgical technique for a fixed bearing unicompartmental knee arthroplasty is simple; certainly not harder than a total knee arthroplasty particularly if a spacer block technique is used.
    - Most surgeons who perform total knee arthroplasty regularly should find it simple to cut the tibia perpendicular to its mechanical axis (or in slight varus if that is your preference
    - With a spacer block technique, once the tibia is cut the balance of the operation is quite simple.

- Robotics are necessarily more expensive.

- Based on these factors I do not think that a robot is necessary for unicompartmental knee arthroplasty

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Session # V: Outpatient Surgery and Unicompartmental Arthroplasty
Talk Title: What is the Role of Patellofemoral Arthroplasty in 2023?
Faculty: Sebastien Parratte, MD, PhD

TAKE HOME KEY POINTS:

- The use of patellofemoral arthroplasty (PFA) represents a small percentage of unicompartmental arthroplasty and has been less than 1% of knee arthroplasties in most of the joint registries.

- PFA using modern generation of implants represents however a safe and reliable solution for isolated patella-femoral osteo-arthritis.

- Ideal indication are “young” patients with bone-on-bone, post-dysplasia, or post-traumatic OA.

- Bad indications are inflammatory disease or patients with patella Baja.

- PFA can be performed with conventional instrumentation but a regain of interest has been observed toward PFA with robotic surgery.

- PFA can be performed isolated or in combination with a UKA. This is the concept of bicompartmental arthroplasty.

- In meta-analysis comparing TKA with PFA, PFA showed significant improvement in functional scores at 5-years, faster recovery, and better cost-effectiveness and no difference in terms of complications.

- Survivorship with modern PFA implants (onlay-style) are comprised between 80% and 90% at 15 years.

- When a revision is needed, the results of revision of PFA are comparable to the results of a primary TKA.

- In conclusion, in 2023, PFA can be considered as a less invasive, bone and kinematic preserving procedure which has a place for the isolated patella-femoral OA of the young and active patients.

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: KEYNOTE: Dental Prophylaxis After THA and TKA: Rethinking the Paradigm
Faculty: Bryan D. Springer, MD

TAKE HOME KEY POINTS:

- Antibiotic Prophylaxis for Dental Prophylaxis following THA/TKA is a long-held belief for orthopedic surgery and one of the most controversial.
    - Approximately 90% of Orthopedic Surgeons prescribe antibiotics for dental procedures.
    - This is at a cost of >60 million dollars annually and does not consider adverse events related to antibiotics.

- Antibiotic prophylaxis to prevent infective endocarditis was established in the1950's and served as the paradigm for antibiotic prophylaxis for patients with hip and knee arthroplasty despite data demonstrating that these are not comparative models.

- The historical data used to establish the dental guidelines were significantly underpowered and retrospective.

- Newer studies with better methodology and appropriately powered showed no association between dental procedures and development of late acute hematogenous infection after THA/TKA calling into question the role of prophylactic antibiotics.

- Many studies demonstrate that bacteremia is as likely, if not more likely, to occur with normal gingival manipulation that occurs with everyday activities including brushing, flossing, chewing etc.

- Several studies also demonstrate that even if significant bacteremia does occur, antibiotic prophylaxis fails to protect against bacteremia.

- The routine use of antibiotic prophylaxis is not in line with evidence-based medicine or antibiotic stewardship, promoting resistance and increasing risk of adverse events.

- The United States remains one of the only modern developed countries to routinely recommend antibiotic prophylaxis.

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: Outpatient Wearable Sensors in THA and TKA: Is This the Future? How Can They Help My Clinical Practice Now?
Faculty: Christopher L. Peters, MD

TAKE HOME KEY POINTS:

- Patient Engagement Platforms
    - Patient Portals
        - Examples are the following:
            - MyChart (Epic Systems Corporation), Madison, WI
            - aethnaCommunicator (athenahealth, Inc.), Watertown, MA

- Mobile Health Applications
    - Examples are the following:
        - GetWellLoop (GetWellNetwork, Inc.), Bethesda, MD
        - SeamlessMD (SeamlessMD), Toronto, ON, CA
        - MyMobility (Zimmer Biomet), Warsaw, IN
        - Force (Force Therapeautics), New York City, NY
        - Twistle (Twistle Inc.), Seattle, WA
        - Pattern Health (Pattern Health), Durham, NC
        - Mobomo (Mobomo), Vienna, VA
        - WellBe (WellBe Inc.), Maddison, WI
        - Conversa, tap cloud (TapCloud LLC), Chicago, IL

- Chatbots
    - Examples are as follows:
        - STREAMD (StreaMD Corp.), Chicago, IL
        - Conversa (ConversaHealth), Portland, OR
        - Memora Health (Memora Health), San Francisco, CA

- Remote Monitoring/Wearables
    - Watches
    - Braces
    - ROM
    - Glucose
    - TKA Implants

- Wearables: Positive Features
    - Quantitative activity assessment
    - Real time
    - Most are unobtrusive.
    - Tech friendly

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    - Can guide clinician/therapist advice.

- Wearables: Negative Features
    - Requires some technology savvy
    - Compliance
    - Unclear if a suitable replacement for PROs
    - May require more office manpower.

- Advantages of a chatbot platform at UofU
    - Simple
    - Patient's Love it
    - Right information at right time
    - Directs patients to call when they need help, but otherwise can reply to simple queries.
    - Available in 19 languages and growing, which is important as we improve healthcare delivery inequities and social determinants of health-related barriers.
    - Prior studies demonstrate benefits.
        - Reduced phone calls, ED visits and days taking narcotics, with increased self-directed/home-based PT.
            - Campbell KJ, Louie PK, Bohl DD, Edmiston T, Mikhail C, Li J, Khorsand DA, Levine BR, Gerlinger TL. A Novel, Automated Text-Messaging System Is Effective in Patients Undergoing Total Joint Arthroplasty. J Bone Joint Surg Am. 2019 Jan 16;101(2):145-151. doi: 10.2106/JBJS.17.01505. PMID: 30653044.
    - Utah experience:
        - Started in 2020, now with 5 surgeons participating.
            - 1,700 enrolled patients
            - 200,000 texts sent.
            - Responded to 17,000 patient queries automatically.
                - Average 30 responses per patient
                - Goal is the most common question asked by patients.
                - 46% of messages responded to during business hours.
            - Improved patient scoring on Google reviews for all 5 surgeons.
            - High patient satisfaction
- Summary:
    - Proactive preparation of the patient can protect the engaged team.
        - In office PTs, Joint Academy, Education
    - Chatbot/Text is an efficient way to communicate, is ubiquitous and easy to use, offers multiple language support.
    - Will continue to use technologies going forward.

Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: How To Manage the High-Risk Venous Thromboembolism Patient After THA/TKA In 2023
Faculty: Jay R. Lieberman, MD

TAKE HOME KEY POINTS:

- TJA – great operations but there is a risk of death.
- Selection of a prophylaxis agent is a balance between efficacy and safety.
- DVT prophylaxis – multiple agents are approved including ASA, Direct Oral Anticoagulants and Warfarin.
- The true efficacy of ASA prophylaxis is unknown because there is a selection bias in retrospective studies.
- Highest risk patients – Prior PE or DVT, hypercoagulable states, cancer, immobilization, and obesity.
- High risk patients - Shift balance from safety to efficacy because of concerns for PE and DVT.
- ASA prophylaxis for high-risk patients is controversial, retrospective studies with limited patient populations.
- Alter Prophylaxis Regimen – prior PE or DVT; patients already receiving oral anticoagulants, cancer patients and possibly obesity and limited mobilization.
- High Risk Patients – use Direct Oral Anticoagulants (i.e., Apixaban or Rivaroxaban) and start prophylaxis 18 to 24 hours after the procedure; early mobilization.
- VTE prophylaxis for patients on chronic anticoagulation – stop DOAC (3 days prior to surgery) and warfarin (5 days prior to surgery).
- VTE prophylaxis in high-risk patients involves shared decision making with patients.
- Consider DOACs in the high-risk patient particularly those on chronic anticoagulants, prior VTE and hypercoagulable states.

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: THA in the Very Young Patient
Faculty: Christopher L. Peters, MD

TAKE HOME KEY POINTS:

- THA under 30
- Not your normal primary
- Indications have shifted from inflammatory arthritis to sequelae of structural hip disease.
- Unique challenges are:
    - Morphology alteration
    - Previous surgery
    - Stiffness
    - High functional expectations
    - Mental health awareness
    - Durability concerns
- Limited Hip Preservation Options
- Alternative surgical procedures less acceptable (Arthrodesis)
- Modern cementless femoral components have high survivorship, low complication rates
- Same for modern cementless acetabular components
- Modern ceramic on highly cross-linked polyethylene game changing for young THA.
- We retrospectively reviewed all patients who underwent primary THA between January 2000 and May 2015 from our institutional database. A total of 145 very young and 1,359 elderly patients were reviewed. The mean follow-up was 5.3 years (1 to 18). Logistic generalized estimating equations were used to compare characteristics and the revision rate. Survival was evaluated using Kaplan–Meier curves and hazard rates were created using Cox regression.
- Results
    - The overall revision rate was 11% (16/145) in the very young and 3.83% (52/1359) in the elderly groups (odds ratio (OR) 2.58, 95% confidence interval (CI) 1.43 to 4.63). After adjusting for the American Society of Anesthesiologists (ASA) score, gender, and a history of previous surgery in a time-to-event model, the risk of revision remained greater in the very young (adjusted hazard ratio (HR) 2.48, 95%

CI 1.34 to 4.58). Survival at ten years was 82% (95% CI, 71 to 89) in the very young and 96% (95% CI, 94 to 97) in the elderly group
    - ($p < 0.001$). The very young had a higher rate of revision for complications related to metal- on-metal (MoM) bearing surfaces ($p < 0.001$). At last follow-up, the very young group had higher levels of physical function ($p = 0.002$), lower levels of mental health ($p = 0.001$), and similar levels of pain ($p = 0.670$) compared with their elderly counterparts.

- Conclusion
    - The overall revision rate was greater in very young THA patients. This was largely explained using MoM bearings. Young patients with non-MoM bearings had high survivorship with similar complication profiles to patients aged ≥ 60 years.

Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: DEBATE: Direct Anterior vs. Posterior Approach For Primary THA: Now That The Dust Has Settled, Where Are We? Direct Anterior is Best
Faculty: William G. Hamilton, MD

TAKE HOME KEY POINTS:

- The direct anterior approach (DAA) to Total Hip Arthroplasty (THA) is growing in popularity, with some data suggesting it is the most commonly used approach in the US. This growth is fueled by interest from surgeons and patients alike, both of whom are in search of improved outcomes in THA.

- The DAA has been shown to have less pain and faster functional recovery compared to the posterior approach, but the differences may be less pronounced than some marketing claims made. Still, if the DAA can contribute to an accelerated recovery, a shorter length of stay, then this can lead to a more cost-effective result. Any differences between approaches are equivalent by 2- or 3-months post-op.

- The supine patient positioning of DAA allows for easy implementation of intraoperative fluoroscopy, which has been shown to reduce outliers in component positioning. Improved component positioning has the potential to reduce dislocation rates, lower bearing wear, and improve longevity.

- While image guided implant positioning can be used with any approach or patient position, it is efficient, affordable, and available to implement with the anterior approach. Using intraoperative imaging requires learning how to use and interpret the image, because incorrect utilization of fluoroscopy can be as harmful as it can be helpful. Several technologies are available to help surgeons improve the accuracy of implant positioning as well as get the leg lengths correct.

- Surgeons contemplating adapting the approach in practice must be aware of the potential pitfalls and learning curve, as studies have demonstrated increased operative time, blood loss, and perioperative complications in the early cases. However, with appropriate training, patient selection, and implementation, the approach can be safely used in all THA patients.

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: DEBATE: Direct Anterior vs. Posterior Approach For Primary THA: Now That The Dust Has Settled, Where Are We? Posterior Approach is Best
Faculty: Don S. Garbuz, MD

TAKE HOME KEY POINTS:

- Posterior approach is an extensile approach and gives excellent visualization of femur and socket.
- Posterior approach can be done on all patients.
- There is no need for a special table or 2 assistants with the Posterior approach.
- There is a decreased rate of infection, periprosthetic fracture, and early femoral loosening with the posterior approach as compared to the anterior approach.
- Minimal, if any learning curve.
- The posterior approach is easily taught and easily learned.
- No need for special implants or instruments with the posterior approach.

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: Technical Tips For Direct Anterior Approach To Avoid Complications
Faculty: Jeremy M. Gililland, MD

TAKE HOME KEY POINTS:

- **Choose easier patients when first starting out!**
    - Avoid high BMIs, large muscular men, and wide iliac wings.

- **Tricks for Avoiding Wound Complications**
    - Stay distal to groin crease.
    - Use a soft tissue protector.
    - In higher BMI patients:
        - Tape the pannus out of the way.
        - Make incision more lateral and slightly more distal.

- **Tricks for Avoiding Cup Malposition (Avoiding Psoas Irritation and Instability)**
    - Keep the cup small.
        - Ream with a single reamer that is 1-3mm larger than native femoral head.
        - Reaming with single reamer helps prevent eccentric anterior/posterior reaming.
- Position cup just tucked behind the anterior rim of acetabulum.
- Try to avoid posterior cup overhang if possible (best accomplished with smaller cups!)
- If using fluoroscopy:
        - Be aware of parallax and distortion.
        - Try to recreate standing pelvis position with fluoro image.
    - Be aware of pre-op spine-pelvis mechanics & adjust cup target as needed.

- **Tricks for Avoiding Femoral Fracture**
    - Cement femoral component when appropriate (female sex, older age, increased ASA)
    - Perform adequate releases to allow femoral exposure.
        - Proper capsule management or resection
        - Release conjoined tendon to prevent greater trochanteric avulsion when elevating.
- Remember butt lift technique if using Hana table (avoid lifting entire femur with lift hook)
- Broach start point is more posterior than you think.
- Use a rasp to sound femoral canal and create a starting path for the first broach.
- Always inspect entire proximal femoral bone after broaching and after final stem insertion
        - Be diligent about looking for fractures.
        - Cerclage wire if any doubt – LEARN HOW TO DO IT!

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Session # VI: Perioperative Management of THA and TKA Patients and Clinical Challenges
Talk Title: Technical Tips for Posterior Approach to Avoid Complications
Faculty: David J. Mayman, MD

TAKE HOME KEY POINTS:

- Recent study with 2888 consecutive primary total hip replacements done through a posterior approach with technology assistance.
    - Dislocation rate 0.35%
    - 0.1% without history of spine fusion
    - Infection rate of 0.2%
    - Periprosthetic fracture rate of 0.52%
        - This has been lowered to 0.07% in the subsequent 1,400 hip replacements with 1 fracture.
- How do we minimize the risk of complications?
    - Pre-op planning
        - Evaluation of hip-spine relationship
    - Positioning and Exposure
        - Stable pelvic control
    - Acetabular Exposure and Preparation
        - Modified posterior approach maintaining the piriformis and minimus
    - Femoral exposure and preparation
        - Not an issue
    - Stability testing
        - Always should be tested prior to leaving the OR
    - Soft tissue repair
        - Anatomic soft tissue repair
    - Post op protocols
        - No hip precautions
        - WBAT with a cane

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Session # VII: Primary THA: Operative Decisions And New Technology
Talk Title: DEBATE: Cemented vs. Uncemented THA in The Older Patients
Use Cemented Femoral Fixation: It Has Lowest Complication Rate
Faculty: Matthew S. Austin, MD

TAKE HOME KEY POINTS:

- Use of cement for the femur in THA is slowly increasing in the US for elderly patients.
- The US lags far behind Europe and Australia in the use of cemented femoral components for THA.
- The primary reason to use cemented femoral components is to reduce the risk of periprosthetic fracture both intraoperatively and postoperatively, especially in the elderly patient.
- Postoperative periprosthetic fractures are not benign events and prevention is the best strategy for the patient.
- Factors leading to periprosthetic fracture include:
    - Age >65
    - Female gender
    - Surgical approach
    - Cementless implants
- Fixation of the implant is one modifiable risk factor that is under complete control of the surgeon.
- Registry data has demonstrated that cemented femoral components are durable and reliable.
- Cementing is easily learned with a short learning curve, can used with every popular surgical approach and there are several techniques to improve the curing time of the cement.

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Session # VII: Primary THA: Operative Decisions and New Technology
Talk Title: DEBATE: Cemented vs. Uncemented THA in The Older Patients
Use Uncemented Femoral Fixation: It Works Well and You Know How To Do It
Faculty: Craig J. Della Valle, MD

TAKE HOME KEY POINTS:

- Cementless stems are my choice for the vast majority of THA.
    - Simpler, more reproducible technique that is efficient.
    - Pick one stem/philosophy/technique and get good at it.

- It is important to take care in femoral broaching and implant insertion.
    - Adequate expsoure is critical to avoid fractures.

- Cemented stems are appropriate for some patients, but I believe that they are rare
    - Not all cemented stems are created equal.
    - If you are going to use a cemented stem, choose a design that is forgiving and has a simple technique and a proven track record.

- Remember…we moved away from cemented stems for a reason!
    - Cemented stems in the US were associated with a higher revision rate.
    - Revision of a cementless stem once osseointegrated is essentially unheard of with current femoral stem designs and contemporary bearing surfaces.

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Session # VII: Primary THA: Operative Decisions and New Technology
Talk Title: DEBATE: Collared vs Collarless Triple Tapered Stems in Primary THA
Use Collarless: The Best Long Term Track Record
Faculty: Mystery Debater #1

TAKE HOME KEY POINTS:

- Biomechanical Logic of Collarless Tapered Stems:
  - A tapered stem with no collar allows the surgeon to impact the wedge-shaped stem until it stops and is rock stable.
    - This may be a little above or below the planned resection level.
    - The key point is that the implant stops and seats at the point of maximum stability.
  - With a collar, if stem seats proud then the collar does nothing.
  - With a collar, if the collar prevents full seating of the stem, then the taper does not fully engage—possibly leading to loosening.
  - Does a collar really add to rotational stability? Some data say yes but one must wonder how that works (flat surface on flat surface!).

- Long-Term Results
  - The results of the best collarless triple tapered stems provide the best **long-term** results of any implant class in multiple joint registries. Most modern collared tapered stems do not have long-term results.

- Early Periprosthetic Fracture Risk: Is an Acknowledged Problem
  - Can be mitigated with triple tapered stems compared to blade-shaped stems.
  - And…with prophylactic cerclage in selected patients, the risk of early fracture can be extremely low.

- Collars Are Not “Free” and Have Some Drawbacks
  - Harder to remove if necessary (infection, etc.) because collar impedes cutting implant free of medial bone ingrowth (where it typically is best).

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Session # VII: Primary THA: Operative Decisions and New Technology
Talk Title: DEBATE: Collared vs Collarless Triple Tapered Stems in Primary THA
Use Collared: Avoid Early Complications
Faculty: Mystery Debater #2

TAKE HOME KEY POINTS:

- Biomechanical Logic of Collared Tapered Stems:
  - Collar can help prevent subsidence.
  - Collar can improve rotational stability.

- Short to Mid-term Results
  - Several collared triple tapered uncemented stems have excellent short to mid-term results in registries…in fact… among the very best early results.
  - The main advantage is fewer early periprosthetic fractures.
  - The collar does not seem to be associated with elevated rate of implant loosening—apparently there is enough press fit for rotational stability even if collar engages slightly before taper fully engaged.
  - In head-to-head comparisons of a few implants that come in otherwise identical collared and collarless versions, the collared version <u>in most but not all</u> cases has outperformed collarless versions.

- The Collar May Provide:
  - Protection from early periprosthetic fracture due to falls/stumble—one of most common reasons for early revision, especially after direct anterior THA.
  - Protection from “over impacting” stems and creating intraop fracture.
  - Bottom line: All cause revision rate in modern practice (mainly direct anterior and posterior approaches) seems lowest with modern triple tapered uncemented collared stems.

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Session # VII: Primary THA: Operative Decisions And New Technology
Talk Title: DEBATE: Is It Already Time To Consider Robotic THA? (HSS vs HSS!) - Oppose
Faculty: Douglas E. Padgett, MD

TAKE HOME KEY POINTS:

- Rationale for the development of enabling technology assistance in THA:
    - Polymeric wear of conventional polyethylene used predominantly prior to 2000 was influenced by:
        - Socket parameters
            - Suboptimal abduction / version parameters[1]
            - Prosthetic impingement[2]
    - Suboptimal acetabular component placement associated with higher rates of instability.
            - The lewinneck “safe zone”[3]

- Validation of the precision and accuracy of acetabular component placement
    - Preclinical validation[4]
    - Initial Clinical validation[5]

- Evolution since 2000
    - Uniform adoption of highly cross-linked polyethylene
    - Near uniform adoption of “larger” femoral heads to improve stability without the concern of polyethylene wear

- Clinical Observations
    - Wear of modern-day cross-linked polyethylene’s not influenced by socket position[6.]
    - The “so-called safe zone” AIN’T SO SAFE !![7,8]
    - But with the advent of larger heads, greater impingement free ROM resulting in instability rates approaching 0!

- THR Summary in 2023
    - Wear is almost negligible.
    - Instability rates are extremely low.
    - NEITHER OF THESE ARE A RESULT OF THE USE OF A ROBOT!

- CONCLUSION: There is little rationale for use of robotic technology in routine THR

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Teeter et al Highly crosslinked polyethylene wear rates and acetabular component orientation. BJJ 2018

Esposito et al Cup position alone does not predict risk of dislocation after total hip arthroplasty J Arthroplasty 2015

Abdel et al What Safe Zone? The Vast majority of dislocated THA's are within the ...Safe Zone… CORR 2016

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Session # VII: Primary THA: Operative Decisions and New Technology
Talk Title: DEBATE: Dual Mobility: Overused in Primary THA or Not Used Enough? Overused
Faculty: Javad Parvizi, MD

TAKE HOME KEY POINTS:

- Instability after THA remains a main concern.
- The best strategy to prevent instability is to do the operation right in the first instance.
- Dual mobility has been introduced into the US market as the panacea for prevention of instability.
- Although some data on the use of dual mobility bearing surface in Europe (mostly France) exists, that data cannot be extrapolated to the US as the modular system in the US and the use of highly cross-linked bearing surface makes the comparison meaningless.
- Dual mobility has brought with itself a whole host of new problems that includes increased wear (multi-directional), osteolysis, femoral neck impingement, malseating of the acetabular component, ALTR and also intraprosthetic dislocations.
- In addition, it is important to note that the incidence of instability with dual mobility devices is not zero.
- So, the use of dual mobility should be limited to patients who are at extreme risk of instability such as those with hyperlaxity syndrome, revision arthroplasty in patients without abductor mechanism, extreme obesity and so on.
- We need to wait for data before embracing this unknown bearing surface.

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Session # VIII: Complex Primary THA and Management Of Complications of THA
Talk Title: My Tips and Tricks for THA in DDH
Faculty: Rafael J. Sierra, MD

TAKE HOME KEY POINTS:

- Anticipate altered anatomy: high hip center, increased acetabular and femoral anteversion, poor coverage of acetabular component.
- Low Dislocations (Crowe 2-3) may require acetabular augmentation.
- High Dislocations may require femoral osteotomy, small acetabular component in native anatomy.
- Plan your implants accordingly.
- Anticipate leg lengths and instability challenges.
- Native hip location is preferred: small acetabular component in native hip center, augmentation may be required if acetabular component under coverage greater than 30%. Femoral head autograft preferred.
- Femoral sided deformity may require stems that allow you to adjust version: modular S-ROM type stem, Fluted monoblock, or cemented stem.
- Femoral deformity may require osteotomy (especially if previous osteotomy), especially if varus deformity where trochanter overhangs canal.
- Balancing the hip: functional range of motion through the arc and restoration of leg lengths and offset will reduce risk of instability.

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Session # VIII: Complex Primary THA and Management of Complications of THA
Talk Title: My Tips and Tricks for Conversion THA for Failed IT Fracture
Faculty: Elizabeth B. Gausden, MD

TAKE HOME KEY POINTS:

- Conversion THA following failed IT fracture is associated with worse outcomes compared to primary THA (higher blood loss, instability, periprosthetic joint infection, and revision surgery).

- Preoperative planning should include the following:
    - Consideration for infection work-up (ESR/CRP/CBC/aspiration)
    - Identification of the hardware in place
    - Planning of positioning & approach, need for fluoroscopy, navigation.

- Principles with any conversion THA
    - Dislocate prior to ROH
    - Remove only what is necessary (unless infected)
    - Have multiple options available for ROH (Midas, trephines, osteotomes, broken hardware removal set)

- Removal of cephalomedullary nails
    - Identify the nail proximally (may require removal of bone/fluoroscopy)
    - Loosen set screw
    - Remove lag screw/blade
    - Cannulate the nail
    - Remove the distal screw(s)
    - Remove the nail

- Troubleshooting a “stuck nail”
    - Drill through unused interlocking hole options
    - Downward taps
    - Trephine over the nail (fluoro)
    - Episiotomy/ETO

- Challenges on THA
    - Expect osteoporotic bone, proximal femoral deformities, leg length discrepancy, instability, and plan for bypassing cortical defects on femoral side.

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: KEYNOTE: A Look to The Future: How Our Field is Evolving and What It Means for Future Practice
Faculty: Thomas P. Vail, MD

TAKE HOME KEY POINTS:

- Technology will fundamentally change how we live and do our work.

- "The coming wave is defined by two core technologies: artificial intelligence and synthetic biology… containing this wave – that is, controlling, curbing, or even stopping it – is not possible." Suleyman, The Coming Wave

- The wave is creating pressure for all of us to evolve more quickly or potentially be victimized by change around us.

- Adopting great ideas from other fields (adjacent possible) creates possibilities for innovation.

- Artificial intelligence in the form of machine learning will become a critical part of day-to-day operations in orthopedic practice. This technology has potential to influence efficient operations, patient optimization, risk assessment, outcome prediction, and technology such as robotics, sensors, 3-D printing, information gathering resources, and analytic platforms.

- Ethical concerns and downside risk are amplified given the pervasiveness of this technology. Risk extends from trivial things such as wasted time and lack of demonstrable value to serious concerns related to privacy, inaccurate information, fabrication of data (hallucinations and deepfakes), and malicious manipulation of systems. The ultimate concern by theorists is the state of "singularity" where generative AI achieves capacities that exceed human capacity.

- The coming wave is sure to put more powerful tools into the hands of many. Physicians will bear responsibility to achieve a balance between the technology and the patient's interests.

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GLOSSERY OF TERMS: (ref Suleyman, and GPT4 from OpenAI)

- Artificial intelligence (AI) – the science of teaching machines to learn humanlike capabilities (machine learning, natural language processing, computer vision)

- Artificial General Intelligence (AGI) – the point at which an AI can perform all human cognitive skills better than the human brain.

- Digital transformation – the process of adopting digital technologies and integrating them into various aspects of business operations, strategies, and models.

- Information technology – the infrastructure and tools used in digital transformation – hardware, networks, cloud computing, cybersecurity for storage, processing, and transmission of digital data.

- Synthetic biology – the ability to design and engineer new organisms or redesign existing biologic systems.

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: My Video Tips and Tricks For Well Fixed Femoral Component Removal
Faculty: William A. Jiranek, MD

TAKE HOME KEY POINTS:

- There are 3 augmented removal systems currently on the market (likely more in development).
- The goal is to remove prosthesis without the need for extended trochanteric osteotomy and without penetrating the femoral cortex.
- These systems use sharper, thinner osteotomes with design features to help prevent violation of the cortex. Some systems are intended as single use, and some can be reused.
- If unfamiliar with the system, meet with the rep and try to obtain an implant that is the same type as you are removing, and practice on the desktop the position of the osteotomes that you will need.
- At surgery use high speed burr to establish plane around the entire top of stem
- First, establish the lateral plane.
- Second, establish anterior and posterior planes.
- Last, establish medial plane – if prosthesis has a collar be prepared with a metal cutting burr.
- As always when you are working from the top, you must be cognizant of the angle of direction of the osteotomes.
- Plan the length you need and use the osteotomes to get to the end of the prosthesis.
- Use the stem extractor you have.
- Be prepared to ream the femur, and to repair the femur should you violate the cortex or have a fracture.

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: My Video Tips and Tricks for ETO
Faculty: Wayne G. Paprosky, MD

TAKE HOME KEY POINTS:

- Timing: prior to dislocation, before stem removal, after stem removal
- Most commonly done through posterior approach
- Indications
- Cement Removal
- Removal of well-fixed distally coated cementless stems
- Varus remodeled femurs
- Extensive stem subsidance with trochanteric overgrowth
- Extensive osteolysis of the greater trochanter
- Severe protrusio acetabuli
- Severe heterotopic ossification
- The transverse limb should be created first, keeping two-thirds of the femur diameter intact. The edges should be rounded to prevent stress risers when the proximal limb is created. Next, the proximal portion of the osteotomy should be created using a micro sagittal or standard oscillating saw. Several broad, flat osteotomes are then placed from posterior to anterior along the length of the posterior limb of the osteotomy and it should be “greensticked” open. This allows the vasculature to remain mainly undisturbed since it enters anteriorly. Prior to reaming or broaching, a prophylactic cable is placed circumferentially around the femoral shaft approximately 1 cm distal to the extent of the osteotomy preventing propagation of the osteotomy. At the conclusion of the case, the anterior pseudocapsule is released and the osteotomy is fixed with cerclage cables.

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: My Video Tips and Tricks for Jumbo Cups
Faculty: Mathias P.G. Bostrom, MD

TAKE HOME KEY POINTS:

Technical Protocol

- Assess bone stock pre-operatively
    - Imaging:
    - Radiographs/Judet Views
    - CT scan
    - ? MRIS
- Wide exposure
- Explant
    - Explant Instruments if needed
- Soft Tissue Debridement
- Gentle reaming
    - Be aware of A-P dimensions
    - Can easily run out of anterior or posterior bone.
- Trial
- Bone graft/Bone graft substitutes as needed
- Rigid stability without screws
- Screw fixation
    - Multiple Iliac screws
    - Ischial Screw
    - ? Pubic Screw
- Insert Liner
    - Modular
    - Cement in Liner
    - Liners:
        - Large Head
        - DM
        - Constrained Liner (only if abductors are deficient)

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Session # IX: Revision THA And Operative Management Of Complications Of THA
Talk Title: My Video Tips and Tricks for Augments
Faculty: David G. Lewallen, MD

TAKE HOME KEY POINTS:

Major bone loss involving the acetabulum can be seen during revision THA due to component loosening, migration, or osteolysis and can also occur as a sequela of infected THA. Uncemented porous ingrowth components can be used for reconstruction of the vast majority of revision cases, where smaller segmental or cavitary bone defects are typically present. But when stable structural support on host bone is lacking, highly porous metal acetabular augments have been described as a prosthetic alternative to large structural allograft, avoiding the potential for later graft resorption and the resulting loss of mechanical support that can follow. The fundamental concept behind the use of acetabular augments is the provision of critical additional initial fixation, structural support, and increased contact area against host bone over the weeks following surgery while the desired ingrowth into porous implant surfaces is occurring.

Tip 1: Following initial acetabular bone preparation, the size and location of **acetabular bone defects dictate whether augments are needed** for critical initial mechanical support of the cup.

Tip 2: Prioritize efforts to **maximize porous surface contact against intact host bone**.

Tip 3: Look for the bone defect patterns commonly associated with the **three patterns of augment placement**:

> **Type 1** - augment screwed to the superolateral acetabular rim in a **"Flying Buttress"** configuration for **segmental Paprosky 3A defects.**
>
> **Type 2** – augment placed superiorly within the residual dome to help create an **Elliptical Construct** for **cavitary Paprosky 3A defects.**
>
> **Type 3** – one (or usually two) augments are placed medially as a **"Footing"** to fill **Paprosky 3B defects** and allow more lateral cup placement and peripheral contact and osseointegration to the still intact residual acetabular walls and rim.

Tip 4: **Always cement the interface between augment and cup** to unitize the construct and increase mechanical stability.

Tip 5: Try to **Place Cup first and Augment second** for **Type 1** Flying buttress and **Type 2** Elliptical constructs to prioritize cup contact on host bone.

Tip 6: Must place **Augments first and cup second** for all **Type 3** Medial Footing Augments.

Tip 7: If **Pelvic Discontinuity** is present add an Antiprotrusio cage over the top for a **Cup-Cage** or add **Acetabular Distraction** or do both.

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Session # IX: Revision THA And Operative Management Of Complications Of THA
Talk Title: My Video Tips And Tricks For Custom Triflange Cup
Faculty: Gijs van Hellemondt, MD

TAKE HOME KEY POINTS:

- Custom triflange cups are a valid option in case of large bone loss / PD
- Preplanning with surgeon's feedback includes bone defect analysis/measuring bone quality / implant geometry / Anatomical reconstruction of COR / screw trajectory.
- Implant is 3D printed trabecular titanium augment / triflange cage.
- Anatomical flange should be as short as possible to facilitate positioning / medially bone graft could be considered between host bone and printed titanium scaffold.
- Surgery is probably most easily performed through a PL approach.
- Important is adequate exposure of Ilium / Ischium / Pubis after removal of retrieved implant.
- Printed hemi-pelvis / trial components / drill guides are very useful to check intraoperative anatomy / adequate positioning of implant.
- Intraoperative Implant Positioning: start inferior with flanges on ischium / pubis, then tilt from medial to superior, this seems to be the easiest technique positioning a large triflange implant.
- Screws (6.5 cancellous screws, non-locking) are placed after drilled using printed guides and checked on length and position according preop planning.
- We suggest starting with screw fixation in the inferior flanges first at the ischium / pubis, this seem to be most important in keeping the implant stable especially in case of PD. After inferior fixation screws can be placed based on personal preference.
- Double mobility is used in all our cases / Constrained liner in cases of Abd insufficiency.
- Postoperative we allow patient to full WB with two crutches.

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Session # IX: Revision THA and Operative Management Of Complications Of THA
Talk Title: My Video Tips and Tricks for Modular Fluted Tapered Stem
Faculty: Stephen A. Jones, MD

TAKE HOME KEY POINTS:

- Importance of pre-op planning
    - Determines the zone of conical fixation.
    - Thus, determines necessary stem length.
    - Will reveal varus remodeling.

- Template to determine body height.
    - Having pre-op identified landmark facilitates accurate conical preparation.

- Inspect your reamers.
    - Helps confirm zone & location of conical fixation.
    - Ensures uniform preparation.

- Proximal preparation
    - Difficulties attaching body are usually on medio-lateral plane not AP so ensure adequate lateral preparation (remember it's a straight stem that's being inserted)

- Distal stem insertion
    - Any stem that goes in too far (i.e. you are selecting a longer proximal body than anticipated then assume that either you have under-sized stem or there has been misadventure & you have caused a fracture – either way check with x-rays)

- Common errors
    - Under-sizing stem = risk of subsidence
    - Three-point fixation rather than conical fixation = risk of thigh pain & subsidence
    - Selection of stem that's too long = influence of anterior bow may undersize stem & in the event of re-revision the challenge of stem removal & limited further options
      *(** remember long & thin goes too far in **)*

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: DEBATE: Modular vs. Non-Modular Tapered Fluted Femoral Components For Routine Revision Surgery
Non-Modular
Faculty: Steven J. MacDonald, MD

TAKE HOME KEY POINTS:

- Introduction
  - Titanium fluted tapered stems developed outside of North America with the classic Wagner revision femoral component. This was a monoblock design. As this stem type grew in popularity, and when introduced into the North American market, modularity between the proximal and distal segments was introduced. More recently manufacturers have reintroduced the monoblock design. The vast majority of femoral revisions can be addressed very well with this monoblock implant.

- Advantages to a Monoblock vs a Modular Tapered Fluted Stem
  - While the modular junctions in current designs are excellent, all modularity brings with it the risk of complications such as failure and trunnionosis. These concerns are completely avoided with the use of a monoblock design.
  - Intraoperatively connecting the modular junction comes with an additional fiddle factor and time that is completely avoided when using a monoblock stem.
  - Intraoperatively the surgical technique of a monoblock fluted stem closely resembles that of primary total hip arthroplasty (THA). There is ease of use and familiarity of technique. This is in contradistinction to a modular stem that adds additional complexity and surgical steps.
  - The modular implants are universally more expensive than the monoblock design. In the author's institution there is a 30% premium with modularity with one company and a 50% premium with another, when compared to their respective monoblock designs.
  - The principle proposed advantage of modular fluted stems in revision THA is the ease with which a surgeon can fine tune leg length, offset and component length. However, these can all be very easily achieved with a monoblock stem at the time of trialing. It is simply unnecessary to have modularity to reconstruct the biomechanics of the hip at the time of revision. Current generation monoblock stems have very reliable seating depths allowing surgeons to reproduce what they achieved with their trialing with the final stem.

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Session # IX: Revision THA and Operative Management of Complications of THA
Talk Title: DEBATE: Modular vs. Non-Modular Tapered Fluted Femoral Components for Routine Revision Surgery
Modular
Faculty: David G. Lewallen, MD

TAKE HOME KEY POINTS:

Areas of Broad Consensus:

- Cementless Femoral Components Preferred for the Majority of Revision THA cases requiring Femoral Side Revision in North America.

- Excellent Results with **Modular** Tapered Fluted Stems Prompted the Widespread Migration to Use of **Tapered Fluted Roughened Titanium Designs.**

- **Modular** Tapered Fluted Femoral Components Combined with ETO methods have **Revolutionized the Speed, Relative Technical Challenge, and Effectiveness of Complex Revision THA**, Management of Major Femoral Bone Loss, Deformity Correction and Treatment of Periprosthetic Fractures.

- **The Switch to Non-Modular Implants** was due to an **Implant Breakage Problem** with Select Designs (since corrected) of **Historical Interest.**

- **Large Volume Revision Institutions** most afflicted by Implant Breakage gradually expanded use for Femoral Revisions for **COST reasons.**

- **Both Modular and Non-Modular Tapered Fluted Designs have been used by their respective proponents nearly exclusively for (nearly) all Femoral Revisions with high rates of success.**

- Most experienced Revision Hip Surgeons currently **Use Both Techniques Selectively** some of the time (though most have Biases and Preferences).

- Selective Use of Both seems rational to leverage the design differences, and advantages vs. disadvantages of the two Design Types.

So What is Real Question?

Where to Draw the Line Between the Two Design Choices

The Answer? Depends on Multiple Factors: The Patient, The Bone, The Surgeon, The Hospital System.

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The answer for an individual surgeon should be decided on all the above but highly leveraged by their own experience and femoral revision volume.

More experienced surgeons with higher volume practices and institutional resources can more reliably switch between Modular and Non-Modular devices and between different implant systems as needed.

In the US where 2023 AJRR Annual Report data shows that the **median number of Revision THA cases of all types is 3 per year**, infrequent femoral revision experience argues for use of a single system and design type by most surgeons to avoid the problems inherent to switching back and forth. Hence **a majority of surgeons using Tapered Fluted Stems should choose a single modular design with a good track record** that they can use in both Complex and “Routine” cases and they should try to learn the technical nuances of that system well!

Session # IX: Revision THA And Operative Management Of Complications Of THA
Talk Title: My Tips and Tricks for Instability
Faculty: Stephen A. Jones, MD

TAKE HOME KEY POINTS:

- Instability is multi-factorial – (5)
    - Patient factors
    - Surgeon factors
    - Component position
    - Implant design
    - Soft tissue factors
- Clearly, prevention is better than cure so key in primary THA to identify the at-risk patient.
- Clinical history & mechanism of dislocation episode aids understanding of instability.
- Implant position needs CT to assess BOTH socket & femur orientation.
    - You want to know pre-op if you must remove a well-fixed stem.
- For the established instability case standing / sitting spino-pelvic x-rays add value

  especially when implant position “appears” satisfactory.
- For surgical solutions, remember.
    - Isolated modular exchange has limited success.
    - The treatment for component malposition is to put the components in the right place.
    - Impingement is a common enemy driving dislocation, so increased offset is your friend.
    - Dual mobility is a proven solution, and you’re most likely to go to bearing choice in cases of recurrent instability.
    - Constrained liners are a salvage option, challenge is defining the salvage case.
    - If using constrained liners component position and limiting impingement is even more crucial

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Session # IX: Revision THA and Operative Management Of Complications Of THA
Talk Title: My Tips and Tricks for Vancouver B1 Fractures
Faculty: George Haidukewych, MD

TAKE HOME KEY POINTS:

- Make sure the stem is well fixed, CT scan pre op can help.
- Lateral position, C arm, cell saver
- Get anatomic reduction, these are open procedures in my hands. Get primary compression at the fracture whenever possible.
- Carefully dissect vastus but do not strip the periosteum.
- Judicious use of cables
- No struts are necessary when locking lateral plates are used.
- Span the entire femur.
- Combine cerclage with locking screw fixation and balance the fixation.
- Additional fixation of the trochanter can be obtained with modern modular plates.
- For fractures with distal extension, fix “bottom up”, for more proximal fractures fix ‘top down”.

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Session # IX: Revision THA And Operative Management Of Complications Of THA
Talk Title: My Tips And Tricks For Revising B2/B3 Cases
Faculty: Jeremy M. Gililland, MD

TAKE HOME KEY POINTS:

- Vancouver Classification:
  - A – Trochanteric
  - **B – Fx around stem** (1: stable implant, 2: unstable implant, 3: unstable implant, bad bone)
  - C – Fx distal to stem (1: stable implant, 2: unstable implant, 3: unstable implant, bad bone)
- ***Tip #1: B1 Fractures are RARE!***
  - Consider all femoral components to be loose until proven otherwise in Vancouver B fxs.
  - All femoral stems in acute post-operative periprosthetic fractures are loose!
- ***Tip #2: Work through the fracture for exposure.***
  - Vancouver B fractures are like a free ETO already done for you.
  - Open the fracture, pull out loose stem, then focus on the intact distal diaphysis.
- ***Tip #3: Place a prophylactic wire/cable distal to the fracture extent.***
  - This will help prevent fracture propagation or creating a new fracture when reaming for diaphyseal engaging stem or when trialing or implanting the actual stem.
  - Can also use this wire as a femoral elevation device to lift femur up out of wound while reaming.
- ***Tip #4: Obtain Diaphyseal Fixation First!***
  - Get good diaphyseal fixation with revision stem prior to rebuilding the proximal fragments around the new stem!
    - Can first approximate the proximal fragments if not too comminuted with cerclage wires that are left loose so that the reamer/stem is not engaging in the fractured fragments, but rather in the distal intact diaphysis.
  - After the stem is in place with good distal fixation, then can cerclage the proximal fragments around the proximal stem. (may need to burr out endosteal portion of bone to make it fit)
- ***Tip #5: Don't Ignore the Greater Trochanter.***
  - If the greater trochanter is fractured and mobile, consider some sort of stabilization.
    - Trochanteric extensions of periprosthetic fracture plates
    - Cerclage wires
    - Trochanteric plates
    - Proximal body fixation devices

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Session X: Revision TKA and Operative Management of Complications of TKA
Talk Title: Surgical Case 13: Reverse THA Will Be Coming Your Way
Surgeon: Adolph V. Lombardi, Jr., MD

TAKE HOME KEY POINTS:

The device is not approved for marketing in the U.S.

- The Hip Innovation Technology Reverse Hip Replacement System (HIT Reverse HRS, Hip Innovation Technology, LLC; Woodstock, Georgia) for primary total hip arthroplasty (THA) is an investigational device currently in a pivotal study randomized, controlled, multi-center clinical trial to evaluate its safety and effectiveness at up to 20 investigational sites.

- The device has undergone extensive and successful pre-clinical testing. Clinical experience with the device is available from an ongoing study in Canada.

Inclusion Criteria

- Patient requires primary THA due to non-inflammatory degenerative joint disease or any of its composite diagnoses such as osteoarthritis, avascular necrosis, posttraumatic arthritis, slipped capital epiphysis, fracture of the pelvis, and diastrophic variant requiring unilateral primary THA.

- Patient is between 50 (inclusive) and 75 (inclusive) years of age at the time of enrollment.

- Patient has preoperative medical clearance and is free from or treated for medical conditions that would pose excessive operative risk.

- Patient has a signed and dated Informed Consent Form.

- Patient is willing and able to participate in required follow-up visits at the investigational site and to complete study procedures and questionnaires.

Reverse HRS Design Rationale

- By alternating the placement of the ball onto the acetabular cup instead of the femoral stem, the ball maintains constant contact with both the acetabular component and the femoral component.

- As a result of this constant contact, the Reverse HRS can maintain stability of the hip at extended ranges of motion and thus minimize the risk of dislocation.

- This design change also reduces high contact stresses across the hip joint, thereby distributing wear evenly across the contact surface of the polyethylene liner and at the same time, minimizing edge loading.

- In addition, because the polyethylene liner is composed of highly cross-linked polyethylene (HXLPE), the risk of osteolysis and aseptic loosening due to wear debris generation is further reduced.

System Description

- The HIT Reverse Hip Replacement System (Reverse HRS) is a Metal-on-Polyethylene (MoP) reverse geometry hip prosthesis designed to improve stability at extended ranges of motion and reduce the risk of dislocation. Like most conventional systems, the Reverse HRS consists of a femoral stem, an acetabular cup, and a cobalt-chrome (CoCrMo) ball that articulates within a polyethylene liner.

- Unlike other systems, the ball seats on the acetabular cup instead of the femoral stem, and the polyethylene liner is attached to the femoral cup, which attaches to the femoral stem, instead of the polyethylene liner being attached to the acetabular cup.

- Despite this technological difference, the center of rotation of the Reverse HRS is similar to a normal physiological hip or a well-positioned Total Hip Arthroplasty (THA)

- The HIT Reverse HRS contains compatible femoral and acetabular components which create a semi-constrained MoP articulating surface. The acetabular cup incorporates a titanium plasma-spray coating for bony integration, a Morse taper that attaches to a CoCr ball, and a clustered screw hole design. The screws that mate with the acetabular shell have locking threads to ensure acetabular cup stability. An XLPE lined femoral cup attached to a femoral titanium stem articulates around the fixed ball.

- Components of the HIT Reverse HRS system are:
    - Femoral Stem: is cementless, comes in sizes 9–21 mm, and is intended to be used with other components of the HIT Reverse HRS.
    - Femoral Cup: mates to the femoral stem via a single Morse taper with offsets of 0, +3, +6, and +9 mm and is intended to be used in conjunction with other components of the HIT Reverse HRS.
    - Acetabular Ball: is 26 mm in diameter and attaches to the acetabular cup via a single Morse taper and mates with the XLPE-lined femoral cup.
    - Acetabular Cup: is provided in sizes 52–58 mm (nominal outer diameter) and contain a Morse taper which mates to the HIT acetabular ball.
    - Screws: are used to ensure a solid acetabular cup fixation. The sizes are 15–40 mm in length, in 5 mm increments.

Prior Clinical Experience

- The HIT Reverse HRS device is under clinical investigation under authorization by Health Canada as per the Clinical Investigational Plan (CIP) titled “A Multicenter Prospective Study of the Hip Innovation Technology (HIT) Hip Replacement System in Primary Total Hip Arthroplasty.” This ongoing study is a single-arm, single-center study. A pre-planned interim report of safety, effectiveness, and radiostereometric (RSA) radiologic outcomes

in 22 enrolled patients was published in February of 2020 (Hip Innovation Technology, 2020). Of the 22 subjects, 5 had completed 2-year follow-up, 11 had completed 1-year follow-up, and the remaining 7 had completed 6-month follow-up. There were a total of 76 AEs occurring in 19 (86.4%) patients. Of these, 9 were Serious Adverse Events (SAEs) occurring in 7 (31.8%) patients and 67 were AEs. 5 AEs were related to study procedures and 33 AEs were related to hip arthroplasty surgery.

- Seven SAEs were not device-related and 2 were anticipated device-related. One device-related SAE was a dislocation that was successfully treated by repositioning. The dislocation occurred 4 days postoperatively when the patient caught his surgical leg on the hospital bed resulting in a pivot motion and forced adduction of his surgical leg into a cross-leg position with the hip in extension, resulting in a dislocation event. The patient underwent a closed reduction with no further issues. The second device-related SAE was a calcar bone crack that occurred while preparing the femur during implantation of the device. A Dall-Miles cable and sleeve were used intraoperatively. No changes were made to the patient's postoperative plan, the protocol, or weight-bearing status. There were no unanticipated device-related SAEs. There was one revision due to deep infection. The same patient also had a re-revision. All HIT Reverse HRS components were removed during the revision. There were no deaths.

- The majority of AEs were of mild severity (42/76, 55.3%). Two SAEs were of mild severity (2.6%), 2 were moderate (2.6%), and 5 were severe (6.6%).

- Subjects' functional outcomes, hip-specific effectiveness outcomes, and health-related QoL questionnaires are summarized below. Subjects have improved in all measured clinical and patient-reported outcomes (HHS and OHS).

- At 12-month follow-up, 13/16 patients were very satisfied with the joint, 2 patients were somewhat dissatisfied, and one was very dissatisfied.

- RSA examinations were performed at 6 weeks postoperative (baseline), and 6- and 12-months postoperative. The early RSA data of the femoral stem shows migration well below the published 12- to 24-month threshold for maximum acceptable subsidence, suggesting high probability of good long-term implant fixation. Migration was detected in 3 dimensions (Maximum Total Point Motion) but is believed to be partly a result of compounding error from Ry which demonstrates the highest error through double examinations. Early RSA data of the acetabular cup also showed migration well below the published 12- to 24-month threshold for maximum acceptable subsidence, suggesting high probability of good long-term implant fixation.

- Health Canada performed a pre-planned staged review of the 12-month outcomes and approved the unrestricted continuation of the study.

Session # X: Revision TKA And Operative Management of Complications Of TKA
Talk Title: My Tips And Tricks For Well Fixed Cone Removal
Faculty: Charles L. Nelson, MD

TAKE HOME KEY POINTS:

Porous metal cones have provided excellent outcomes in the intermediate term in the setting of bone loss during revision total knee arthroplasty (1-3). These cones facilitate biologic fixation of the cone and allow establishment of a solid foundation to provide metaphyseal and epiphyseal support for a knee prosthesis in the setting of bone loss. Combined with a shorter cemented or longer press-fit stem, porous metal cones have been associated with low rates of re-revision surgery (1-3).

However, while porous metal cones facilitate outstanding fixation and support, re-revision surgery becomes more challenging when removal of well-fixed porous metal cones is required during re-revision surgery. Below are steps to facilitate removal of well-fixed porous metal cones.

1) Always attempt removal of the femoral and/or tibial component first to allow access to the porous metal cone. A well fixed femoral and/or tibial implant is best extracted first by disrupting the bone cement or bone prosthesis interface using of a thin saw blade, osteotome or pensil tip burr. An axial extraction device facilitates removal after disruption of the interface. If there is the ability to dissociate the stem from the femoral or tibial implant by removal of a screw, etc., removal facilitates removal of the implant surface and access to the stem, cement, and porous metal cone.
2) Once the implant has been removed, a high-speed burr, cement removal tools and specialized device to extract any remaining stem and cement can be performed in standard fashion. If removal of the femoral and/or tibial implant is not possible, go to step 4.
3) Removal of loose cones is not difficult. Always remember, in the absence of infection, a well-fixed porous metal cone which does not block placement of the planned re-revision knee prosthesis does not need to be removed. However, when removal of a well-fixed porous metal cone is necessary, removal is possible with use of a pensil tip burr circumferentially around the cone provided there is sufficient surrounding bone to facilitate containment of the re-revision prosthesis. However, by sectioning the porous metal cone using a metal cutting burr or osteotome into two, three or more sections, this allows the segments to be impacted away from the surrounding bone preserving the surrounding bone for the re-revision procedure.
4) If the distal aspect of the femoral implant and/or the proximal aspect of the tibial implant cannot be removed to allow access to the augment using extractors and disrupting the interface (for example, an off-set stem with well-fixed cement between the surface implant and off-set stem), use of a tibial tubercle osteotomy for the tibia, or femoral episiotomy or window can allow access to the cement and/or cone facilitating removal.

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Session # X: Revision TKA Operative Management of Complications of TKA
Talk Title: My Tips and Tricks for Cones
Faculty: David G. Lewallen, MD

TAKE HOME KEY POINTS:

Biologic fixation using highly porous metal cones has proven to provide durable mechanical support for revision knee components on both the femoral and tibia sides of the joint (Kamath, et al, JBJS 97 (3):216-223, 2015 and Potter, et al, JBJS 98-A (15):1286-1291, 2016). The adjunctive fixation provided by cones can help prevent loosening and provide important mechanical support to resist axial or bending stresses and rotational loads, especially when large condylar defects are present in the distal femur. Larger cones have recently been supplemented in several systems with smaller central cones designed primarily to add fixation even when axial mechanical support is adequate. The combination of both cement and cementless fixation of an individual component can be synergistic: initial cementing of the under surfaces of the implant and up to the diaphyseal area of the stem reliably controls initial implant interface motion and allows bone to grow into the porous portion. Once bone ingrowth occurs longer term loads on the cement bone interface is decreased providing potential protection against late loosening.
Technical Tips and Tricks include:

- Attempt to **Maximize support of the final trial femoral or tibial construct on host bone.**
- **Minimize host bone removal** while still trying to optimize fit and support.
- **Careful bone removal** using a **burr for thin fragile boney shell** vs **Reamers vs Rasp instrumentation if bone intact and thicker.**
- Fill smaller residual bone defects with bone graft, standard block augments, or in some cases **small central cones for improved fixation.**
- Consider **larger cones for poor bone quantity** to reestablish metaphyseal mechanical support due to segmental or condylar defects.
- Consider **smaller central cones for improved long-term fixation** and durability, especially in the presence of **impaired bone quality**.
- **Cement stems at least up to the metaphyseal-diaphyseal junction** even if long press fit diaphyseal engaging stems are used or alternatively **Cement the entire stem if intermediate length or shorter**.
- Consider a **Cone plus Impaction Grafting of the Diaphysis** below the cone for severe endosteal bone damage from **prior failed long stems** to further enhance fixation (Bedard, et al, BJJ 102 No. 6 supplement A:116-122, 2020)

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Session # X: Revision TKA Operative Management Of Complications Of TKA
Talk Title: My Tips and Tricks to Manage Bone Loss with Cones and Diaphyseal Impaction Grafting
Faculty: Rafael J. Sierra, MD

TAKE HOME KEY POINTS:

- Obtaining stable metaphyseal fixation is key during tibial and femoral revisions.

- Previously instrumented canals may limit cement interdigitation into diaphyseal cancellous bone limiting long term cement fixation.

- Indications for Diaphyseal impaction grafting + cone
    - Cemented fixation is indicated.
    - Previously instrumented canal.

- Surgical technique
    - Remove implants.
    - Assess bony defects.
    - Fibrous membranes debrided from metaphyseal bone.
    - Sclerotic canals debrided and irrigated.
    - Prepare metaphysis for appropriately sized cone using canal as reference for final cone position.
    - Plug canal approximately 2 cm distal to desired stem length.
    - Use cancellous chips of 6 to 8 mm in size to fill canal.
    - Use power smooth reamers to densely pack chips and sequentially increase the diameter of the canal to desired stem diameter + 2 mm for cement mantle.
    - Fill distally ONLY allowing space for placement of final metaphyseal cone.
    - Once packing is completed, impact metaphyseal cone achieves axial and rotational stability.
    - Fill canal with cement retrograde with thin (shoulder) cement gun and runny cement.
    - Finger pressurize.
    - Seal metaphyseal/ endosteal surface of cone prior to implant insertion.
    - Insertion of implant and cement curing.

- Pitfalls
    - Not packing bone densely.
    - Cement not runny when inserting.
    - Not using a thin nozzle.
    - Allowing cement to enter the metaphyseal cone/ endosteal tibial or femoral junction.

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Session # X: Revision TKA And Operative Management of Complications Of TKA
Talk Title: My Tips And Tricks For Operative Management Of The Stiff TKA
Faculty: Charles L. Nelson, MD

TAKE HOME KEY POINTS:

Evaluation of the stiff TKA begins with identification of the etiology of stiffness. It is important to rule of prosthetic joint infection and referred symptoms secondary to spine or hip pathology. If the stiffness is intrinsic to the knee, the etiology needs to be understood in order to achieve reproducible success.

Stiffness early on can be addressed with improved pain management, physiotherapy, dynamic bracing, and manipulation under anesthesia. Revision total knee arthroplasty is the workhorse for stiffness not responsive to early management interventions. However, in rare instances, lysis of adhesions or arthroscopic PCL release may be appropriate to improve ROM with less morbidity than revision TKA provided there is no infection, the implants are well fixed and optimally positioned. When revision is indicated for stiffness, the principles below are important.

Exposure of the Stiff Knee During Revision TKA

Good and safe exposure is a key initial step during revision TKA for stiffness. Patients with stiffness are at higher risk for extensor mechanism injury during exposure, particularly with very limited flexion and patella infera.

A wide extensile exposure is recommended when approaching the stiff knee. The surgical exposure steps include:

Step 1 – Medial parapatellar arthrotomy
Step 2 – Synovectomy
- Develop medial and lateral gutters deep to arthrotomy and release any scarring between the quadriceps and the femur and re-establish tissue planes.

Step 3 – Externally rotate tibia and develop medial subperiosteal sleeve around proximal tibia.
Step 4 – Remove retropatellar scar lateral to arthrotomy being careful to protect patellar tendon.
- Patella subluxation is preferred over eversion due to risk of patellar tendon injury.

Step 5 – Remove modular polyethylene insert if possible.
Step 6 – Assess exposure
- Consider lateral retinacular release in the setting of tension on patellar tendon insertion or excessive lateral tightness.

Step 7 – Perform quadriceps snip if needed at the proximal extent of the quadricep tendon obliquely, extending laterally and proximally. It is very rare to require a tibial tubercle osteotomy.

The soft tissues should become more compliant with time and exposure should improve with time. Good exposure facilitates bone preservation and preservation of key structures during implant removal.

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The revision procedure should address all potential technical issues identified and optimize component size, alignment, position, rotation, thickness and soft tissue balance. Accessing post revision range of motion with the patella reduced and extensor mechanism repaired allows assessment of potential post-revision ROM incorporating both intrinsic factors directly related to the technical aspects of the revision TKA prosthesis as well as extrinsic factors such as quadriceps tightness, while assessing ROM with the patella allows determination of ROM independent of a tight quadriceps.

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Session # X: Revision TKA Operative Management of Complications of TKA
Talk Title: My Tips and Tricks for Distal Femur Replacement for Distal Femur Periprosthetic Fracture
Faculty: Elizabeth B. Gausden, MD

TAKE HOME KEY POINTS:

- Indications: extreme comminution, extreme osteoporosis in setting of periprosthetic distal femur fracture.

- Advantages (over ORIF): allows immediate weightbearing, avoids risk of nonunion.

- Disadvantage: risk of periprosthetic joint infection.

- Technique Tips
    - Approach: medial parapatellar, rarely lateral subvastus
    - Rotation: external rotation for optimizing patellar tracking; posterior cortex more proximally*
    - Joint line: examine tibial bone loss first, then assess patellar height.
    - Length: estimate based on soft tissue tension
    - Implant selection: uncemented versus cemented stems; extension stop.
    - Metaphyseal cones/sleeves
    - Impaction bone grafting

- Postoperative protocol
    - Early mobilization
    - Extension/bracing for soft tissue rest
    - Prophylactic antibiotics

- Outcomes
    - Higher reoperation/revision rates highlight that this is a salvage operation.
    - slightly improved outcomes when DFR used in setting of fracture, compared to PJI, aseptic loosening.

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Wyles CC, Tibbo ME, Yuan BJ, Trousdale RT, Berry DJ, Abdel MP. Long-Term Results of Total Knee Arthroplasty with Contemporary Distal Femoral Replacement. J Bone Joint Surg Am. 2020 Jan 2;102(1):45-51. doi: 10.2106/JBJS.19.00489. PMID: 31596808.

Session # X: Revision TKA And Operative Management Of Complications Of TKA
Talk Title: My Tips and Tricks for Internal Fixation Of Distal Femur Periprosthetic Fractures
Faculty: George J. Haidukewych, MD

TAKE HOME POINTS:

- ORIF indicated for fractures above well-fixed implants.
- Nails generally have outperformed plates in most studies.
- Always xray entire femur to look for THA or other hardware above.
- Supine, Jackson table
- For simple fractures with long distal segments, standard retrograde nails work well.
- For very distal or comminuted fractures, consider nail-plate combinations.
- Avoid hyperextension with frequent lateral images, consider nails with 10-degree bends if starting points impeded by trochlear geometry.
- For inter-prosthetic fractures or in cases with impeded notch access (very stiff TKA, closed box designs, fractures above revision components) laterally based locking plates are preferred.

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All Relevant Financial Relationships Have Been Mitigated.

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