Musculoskeletal Infection Society

34th Annual Open Scientific Meeting

MUSCULOSKELETAL INFECTION SOCIETY

August 2-3, 2024

DURHAM, NC

IN PERSON AND VIRTUAL MEETING

Please join us!

35TH Annual Open Scientific Meeting

of the

Musculoskeletal Infection Society

MUSCULOSKELETAL INFECTION SOCIETY

August 1-2, 2025

Visit

www.msis–na.org

for updates

Objectives

At the conclusion of this educational activity, participants will:

- Understand the open questions in the management of musculoskeletal infections, including optimal surgical approaches and systemic antibiotic therapy.

- Discuss challenging clinical cases of musculoskeletal infection, including diagnostics and management strategies.

- Evaluate the utility of various irrigation solutions and local antibiotic therapy.

Intended Audience

This course is designed for member and nonmember clinicians, including orthopaedic surgeons, infectious disease specialists, PAs, NPs, podiatrists and other health care providers who manage the care of patients with musculoskeletal infections.

Continuing Education Credit

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Academy of Orthopaedic Surgeons and the Musculoskeletal Infection Society. The American Academy of Orthopaedic Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

The American Academy of Orthopaedic Surgeons designates this live activity, MSIS 34TH Annual Open Scientific Meeting, for a maximum of ***11.25 AMA PRA Category 1 Credits™***. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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The MSIS appreciates our **Exhibitors**

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In Memoriam

Paul Stoodley

October 4, 1960 – April 8, 2024

Paul Stoodley passed away peacefully at the age of 63 on 8 April 2024 after an extraordinary fight against cancer. He was surrounded by his girls, Luanne, Victoria, Emily, and Pixie the cat. Despite being diagnosed with Stage IV lung cancer in spring 2022, Paul continued to live his life as he always did: with joy, adventure, curiosity, and an infectious love for life.

Paul was born to Edna and Graham Stoodley in Taunton in the beautiful west country of England on 4 October 1960. Paul's appreciation and love of the simple things in life, shared by his sister Carol, was learnt from Edna and Graham.

Paul was a Professor in Microbial Infection and Immunity and in Orthopaedics in the College of Medicine at The Ohio State University, Columbus, Ohio, and a Professor in Microbial Tribology in the National Centre for Advanced Tribology (nCATS) in Engineering Sciences at the University of Southampton, United Kingdom. Paul received his Bachelor of Science degree from the University of Lancaster in Environmental Sciences with an emphasis in Geophysics. After graduating, Paul was the site geophysicist on an archeological dig looking for an 8th Century monastery in Dacre in the English Lake District near Ullswater. There, he met and fell in love with Luanne who was working on the dig after studying at Cambridge University. He visited Luanne in Montana, and they were married shortly after in 1983 at Dacre Church in England. Paul and Luanne then moved to Montana where Paul began working at the Institute for Process Analysis which became the Center for Biofilm Engineering (CBE) at Montana State University in Bozeman, Montana. Paul received his PhD at the University of Exeter and returned to the CBE as a postdoctoral fellow before moving on to faculty positions at the Allegheny-Singer Research Institute and Drexel University College of Medicine in Pennsylvania, the University of Southampton in the UK, and The Ohio State University. Paul was a pioneering researcher in microbial biofilms with widespread impact in surgical site infection, orthopedic implants, wound infection, dental as well as in industrial biofilms. Paul was an elected Fellow of the American Association of Microbiology and, among many other honors, director of the OSU imaging core. He was a dedicated mentor and a role model for mentorship at all levels. Paul is remembered for his kindness, humility, and genuine concern for his colleagues, staff and students and his love of science.

Alongside Paul's incredible impact in the science community, he was a family man at heart. Paul had an adventurous spirit and will be remembered by his family for many Stoodley Family adventures and travels. He

made an adventure out of every trip with Luanne and the girls, whether it was camping in Yellowstone National Park or bushwacking in the Picos de Europa mountain range in Spain. He encouraged Luanne, Victoria and Emily to be adventurous, excited for life and carefree in their spirits.

Paul's love for running started in the mountains of Bozeman, Montana where he fell in love with trail running and soon started signing up for races (and winning said races in baggy shorts and a Flintstone T shirt, much to the dismay of the pro-athletes in high-tech gear toeing the line beside him). Later, he joined the Winchester & District Athletics Club (WADAC) in Winchester, UK with Victoria and Emily, where they raced in competitions for the club. After moving to Columbus, Ohio, he joined two running clubs, Marathoners in Training (MIT) and Rogue Racers, with whom he competed in road races and marathons. He ran over 10 marathons during his time in Ohio including Boston and New York. He said his favorites was the Columbus Nationwide Children's Marathon where he loved giving high 5's to the children at each mile marker. Paul made an impact on the running communities in Winchester and Columbus that will be cherished by all that ran with him and knew his laugh and big smile that made running seem all too easy. A distinct memory for Paul's family and running buddy, Mary Dilhoff, was when he ran the Boston Marathon and had just crested Heartbreak Hill at which point everyone nearby was grimacing in pain but not Paul, who had the biggest smile on his face and a bounce in his step as if he had just started.

Paul was a loving son, husband, father, brother, uncle. The values and happiness Paul provided to his wife Luanne, their beloved daughters Victoria and Emily, his sister Carol, nieces Lisa and Lauren, and nephew Steven is immeasurable and will live on with them forever.

MUSCULOSKELETAL INFECTION SOCIETY

34th Annual Open Scientific Meeting
August 2-3, 2024
Durham, NC

Agenda

Friday, August 2, 2024
Duke Ballroom

7:00am *Ballroom foyer*	Registration Opens
7:00-8:30am *MarketPlace*	**Breakfast** **Visit Exhibitors and e-Posters**
7:45am	Welcome, Disclosures Thorsten Seyler, MD PhD, MSIS President
Session I	**BASIC SCIENCE** **Moderators**: Jessica Seidelman, MD, and Alberto Carli, MD
8:00am	Evaluating Soaking Duration: Ex Vivo vs In Vitro Methods for Determining the Efficacy of Dilute Povidone-Iodine Irrigation Solution (#1356) *Alisina Shahi, Kenneth Mathis, Robert Frangie, Adam Freedhand,* ***David Rodriguez-Quintana***
8:06am	Prolonged Antimicrobial Effect of Titanium Dioxide Nanotubes Loaded with Silver Nanoparticles and Calcium Phosphate (#1270) ***Sabrina Huang****, David Detwiler*
8:12am	Preventing Infections in Extensor Mechanism Reconstruction: Best Practices with Synthetic Meshes (#1352) *Alisina Shahi, Kenneth B Mathis, Robert Frangie, Adam Freedhand,* ***David Rodriguez-Quintana***
8:18am	A Novel Isotropic Optical Fiber: Antimicrobial Effect of Blue Light on Drug Resistant Organisms (#1253) *Megan Goh, Robert Rabiner, Santiago Lozano-Calderon,* ***Antonia Chen***
8:24am	Discussion

8:30am	Improved MSC Function on Nanotube Surfaces While Reducing Bacterial Adhesion and Biofilm Formation (#1262) ***David Detwiler***
8:36am	Halicin Combinations with Conventional Antibiotics are More Effective Than Monotherapy Against Both Planktonic and Biofilm-Residing Staphylococcus Aureus (#1239) ***Akira Morita,*** *Roman Natoli, Edward Greenfield*
8:42am	Complete Eradication of Biofilm Using Low Frequency Electromagnetic Force (EMF) and Antibiotics at MIC (#1232) ***Gerhard Maale***
8:48am	Pulsatile Lavage is Not Enough to Remove Implant Biofilm: The In-Vitro Case For Sonication Brushing (#1350) *Christina Chao, Tyler Khilnani, Mathias Bostrom,* ***Alberto Carli***
8:54am	Exploring and Quantifying the Pathogenic Mechanisms Contributing to Osteolysis in the Context of Prosthetic Joint Infections (PJI) (#1285) ***Beethi Sinha,*** *Elizabeth Stewart, Matthew Dietz*
9:00am	Discussion
SYMPOSIUM #1	**Staphylococcus Pathogenesis** **Moderator**: Brian Conlon, PhD
9:10am	Microbial Pathogenesis During Staphylococcus Aureus Osteomyelitis Infections James Cassat, MD, PhD, Infectious Disease Vanderbilt University Medical Center, Nashville, TN Ultrasound-Mediated Drug Delivery to Improve Antibiotic Efficacy Against Biofilms Sarah Rowe-Conlon, PhD UNC School of Medicine, Chapel Hill, NC Staphylococcus Aureus Bacteremia Vance Fowler Jr., MD, Infectious Disease Duke University School of Medicine, Durham, NC
10:10am	**Break** **Visit Exhibitors and e-Posters**
Session II	**CLINICAL STUDIES** **Moderators**: Laura Certain, MD, PhD, and Matthew Dietz, MD
10:40am	International Delphi Consensus on Wound Closure and Dressing Management in Total Knee and Total Hip Arthroplasty (#1241) ***Antonia Chen****, Ryan Nunley, Timothy Board, Michael Mont*
10:46am	Suppressive Antibiotic Therapy in Patients With Prosthetic Joint Infection and Retained Hardware: How Much is Enough (#1255) *Anne Spichler Moffarah, Jane O'Bryan, Lee Rubin,* ***Marjorie Golden***

10:52am Timing of Acute Peri-Prosthetic Joint Infections of Total Knee Arthroplasties does not Affect Failure Rates of Debridement, Antibiotics, and Implant Retention (DAIR) Procedure (#1260)
Andrew Frear, Shaan Sadhwani, Anthony Kamson, Christian Cisneros, Richard Chao, Muhammad Feroze, Clair Smith, Neel Shah, ***Kenneth Urish***

10:58am Timing from Admission to Debridement, Antibiotic and Implant Retention (DAIR) Affects Treatment Success in Total Knee Arthroplasty Prosthetic Joint Infection (#1359)
Samuel Morgan, Hesham Abdelbary, George Grammatopoulos, ***Simon Garceau***

11:04am Discussion

11:10am Rifampin Therapy in Prosthetic Joint Infections - A Retrospective Study of Barriers to Therapy Initiation and Completion in Guideline Indicated Patients (#1267)
David Kugelman, Justin Leal, Sharrieff Shah, Amy Mackowiak, Rebekah Wrenn, Thorsten Seyler, ***Jessica Seidelman***

11:16am Initial Success of Seven-Day Intra-Articular Antibiotic Irrigation for the Treatment of Chronic Periprosthetic Joint Infection: Results from Two Prospective Randomized Comparative Studies (#1341)
Bryan Springer, Carlos Higuera Rueda, Brian De Beaubien, Kevin Warner, Andrew Glassman, Hari Parvataneni, Kenneth Urish, Edward Stolarski, ***Nicolas Piuzzi***

11:22am Unsupervised Machine Learning Can Group Synovial Fluid Samples into Disease-Relevant Clusters: AI Diagnosis is Near (#1295)
Van Thai-Paquette, Krista Toler, Pearl Paranjape, ***Carl Deirmengian***

11:28am Discussion

SYMPOSIUM #2 **Technology, Innovation, and Regulatory Burden in Musculoskeletal Infections**
Moderator: Ken Urish, MD, PhD

11:35am Partnering With Start-Ups And The Journey To FDA Approval
Patrick Treacy, Co-Founder and CEO
Onkos Surgical, Paterson, NJ

Current Challenges And Why The Future Is Brighter – The Business And Investor Perspective
Nicholas Pachuda, DPM, COO
Peptilogics, Pittsburgh, PA

Focusing on a Solution - From Idea to Product
Jude Paganelli, Founder and CTO
Osteal Therapeutics, Dallas TX

12:35-1:20pm **Lunch**
Ballroom Foyer **Visit Exhibitors and e-Posters**

Session III **CLINICAL STUDIES**
Moderators: Andy Miller, MD, and Carlos Higuera, MD

1:20pm Defining Native Vertebral Osteomyelitis: The Quest for a Unified Diagnostic Framework Using a Meta-Epidemiological Approach (#1265)
***Francesco Petri**, Omar Mahmoud, Seyed Mohammad Amin Alavi, Said El Zein, Jared Verdoorn, Ahmad Nassr, Brett Freedman, Mohammad Murad, Elie Berbari*

1:26pm A Decade of Culture-Negative Native Vertebral Osteomyelitis: Insights from the Mayo Clinic (#1282)
***Rita Igwilo-Alaneme**, Said El Zein, Ryan Khodadadi, Francesco Petri, Omar Mahmoud, Elie Berbari*

1:32pm The Diagnostic Accuracy of Molecular Diagnostic Techniques in The Diagnosis of Native Vertebral Osteomyelitis: A Systematic Review and Meta-Analysis (#1275)
*Omar Mahmoud, Francesco Petri, Said El Zein, Jared Verdoorn, Audrey Schuetz, Mohammad Murad, Ahmad Nassr, **Elie Berbari***

1:38pm Assessment of Periprosthetic Joint Infection in Revision Shoulder Arthroplasty (#1308)
***Mark Cullen**, Tom Doyle, Mikhail Bethell, Samuel Lorentz, Bryan Crook, Eoghan Hurley, Thorsten Seyler, Oke Anakwenze, Christopher Klifto*

1:44pm Discussion

1:50pm A Comparative Analysis of 1.5-Stage and 2-Stage Revision for Periprosthetic Joint Infection after Total Hip Arthroplasty: Is 1.5-Stage Really Equivalent? (#1247)
*Shayan Hosseinzadeh, Katherine Rajschmir, Jesus Villa, Jorge Manrique, Aldo Riesgo, **Carlos Higuera***

1:56pm Lower Reported Success Rate of 2-Stage Revision for Total Hip Arthroplasty at a Prosthetic Joint Infection Specialty Referral Center: Treating "The Worst of the Worst" (#1355)
*Nicholas Tubin, **Hesham Abdelbary**, George Grammatopoulos, Paul Beaule, Simon Garceau*

2:02pm Utilization of Dalbavancin for Periprosthetic Joint Infections: A Single Institution Experience in North America (#1256)
*Peter Hsiue, Mia Fowler, Shay Warren, Michael Henry, Andy Miller, **Alberto Carli***

2:08pm Discussion

SYMPOSIUM #3 **Challenging Musculoskeletal Infection Cases – An interactive Discussion**
Panelists: Cezarina Mindru, MD, Jenny Aronson, MD, Carlos Higuera, MD, Derek Amanatullah, MD

2:15pm Case Presentations
Poorani Sekar, MD, Infectious Disease
University of Iowa, Iowa City, IA

3:15pm	**Break** **Visit Exhibitors and e-Posters**
Session IV	**BASIC SCIENCE** **Moderators:** Poorani Sekar, MD, and Johannes Plate, MD
3:45pm	Enhancing Predictive Precision: Onodera™s Prognostic Nutritional Index Outperforms Serum Albumin in Predicting Infection Risk After TKA (#1343) *Alisina Shahi, **Kenneth Mathis**, David Rodriguez-Quintana, Ali Oliashirazi, Adam Freedhand, Robert Frangie*
3:51pm	Efficacy and Limitations of a Web-Based Septic Arthritis Calculator in Urban Trauma Care (#1276) ***Ryan Serbin**, Joseph Burger, Sarah Welch, Ashley Duncan, Susan Odum, Meghan Wally, William Lack, Madhav Karunakar, Rachel Seymour*
3:57pm	Bacteriophage Dosing and its Effect on Bacterial Suppression in a Staphylococcus Epidermidis Model: An In Vitro Study (#1245) ***Jason Young**, Mohamad Shariati, Ahmad Razavi, Ara Nazarian, Edward Rodriguez*
4:03pm	Mononuclear Phagocyte Gene Expression Suppresses the Neutrophil Response and May Obscure the Accurate Diagnosis Of Infection (#1225) ***Derek Amanatullah**, Robert Manasherob, David Lowenberg, William Maloney, Stuart Goodman*
4:09pm	Assessment Of Implant-Associated Host Cell Response Reveals Distinct Immune Cell Populations (#1286) ***Bailey Fearing**, Sarah Romereim, Matthew Smykowski, Susan Odum, Rachel Seymour, Joseph Hsu*
4:15pm	Discussion
4:25pm	Optimal Duration of Antibiotic Holiday Prior to Reimplantation in Two-Stage Exchange Arthroplasty for Periprosthetic Joint Infection --MSIS Evidence Based Committee Project *Elie Ghanem, **Kyle Cichos**, Jakrapun Pupaibool, Jesus Villa, Alexandra Hohmann, Yale Fillingham, Emily Leary, Craishun Hart, Carlos Higuera*
4:35pm	Live Survey of the MSIS Brian Klatt, MD / Antonia Chen, MD
6:00pm	**President's Reception** Cocktails and Dinner Buffet Dress: Business Casual **Washington Duke Hotel**-*Ambassdor Ballroom*

Saturday, August 3, 2024
Duke Ballroom

6:30-8:30am *Marketplace*	**Breakfast** **Visit Exhibitors and e-Posters**
7:00-7:30am *Duke Ballroom*	MSIS Business Meeting (**MSIS Members only)**
7:30am	Podcast Update Jessica Seidelman, MD, and Johannes Plate, MD, PhD
7:40am	The Importance of Collaborative Research Jessica Seidelman, MD, and Sandy Nelson, MD
SYMPOSIUM #4	**Health Care Policy in MSK Infections** **Moderator**: Antonia Chen, MD
7:50am	Racial Disparities and Access to Care Challenges In MK Infections Christian Pean MD, MS, Orthopaedic Trauma Surgeon Duke University School of Medicine, Durham, NC
	Is it Time to Rethink – An Attempt to Change the Approach To PJI Tom Fehring, MD, Orthopaedic Surgeon OrthoCarolina, Charlotte, NC
	Together for Better Outcomes – Collaborative Efforts in PJI William Jiranek, MD, Orthopaedic Surgeon Duke University School of Medicine, Durham, NC
Session V	**CLINICAL STUDIES** **Moderators:** James Cassat, MD, and Jeremy Shaw, MD
8:50am	Applications and Outcomes of Physician-Directed Antibiotic-Loaded Cement and Calcium Sulfate in Orthopaedic Surgeries: A Retrospective Study (#1280) ***Bailey Fearing****, Sarah Romereim, Komi Afetse, Elaina Ball, Ziqing Yu, Benjamin Averkamp, Rodney Arthur, Rachel Seymour, Joseph Hsu*
8:56am	Evaluating the Safety and Efficacy of Low-dose Chlorhexidine Gluconate Irrigation for Open Fracture Management (#1324) *Kyle Auger, Ian Hong, Nicole Badalyan, Christian Zapf, Daniel Dziadosz, Frank Liporace, Richard Yoon,* ***Jaclyn Jankowski***
9:02am	Does Prophylactic Antibiotic Strategy Affect Outcomes of Type III Open Fractures? (#1235) *Joseph Cohen, Hobie Summers, Robert Hand,* ***Aaron Hoyt****, Andrew Marten, Carlo Eikani, Ashley Levack*

9:08am	Plasma Microbial Cell-free DNA Next-Generation Sequencing can be a Useful Diagnostic Tool in Patients with Osteoarticular Infections (#1271) ***Francesco Petri**, Omar Mahmoud, Said El Zein, Omar Abu Saleh, Elie Berbari*
9:14am	Discussion
9:20am	Infectious Diseases Pharmacists Review of Post-Discharge Musculoskeletal Infection Microbiology Results (#1283) ***Margaret Pertzborn**, Amy Van Abel, Kristin Cole, Trudi Lane, Douglas Osmon, Diana Schreier, Hilary Teaford, Courtney Willis, Anna Woods, Christina Rivera*
9:26am	Comparative Analysis of a Polymerase Chain Reaction Infection Panel Versus Conventional Culture Techniques in Patients with Presumptive Joint Infection (#1335) ***Anzar Sarfraz**, Guiqing Wang, Caitlin Otto, Ran Schwarzkopf, Vinh Pham, Vinay Aggarwal*
9:32am	Pediatric Clavicular Osteomyelitis: Radiographic Appearance Guides Evaluation (#1226) ***Jessica D Burns***
9:38am	Discussion
9:44am	**Break** **Visit Exhibitors and e-Posters**
Session VI	**CLINICAL SCIENC** **Moderators:** Aaron Tande, MD, and Thorsten Seyler, MD, PhD
10:00am	Longer Antibiotic Duration Is Protective Against Repeated Periprosthetic Joint Infections (#1229) ***Richard Chao**, Scott Rothenberger, Andrew Frear, Brian Hamlin, Brian Klatt, Neel Shah, Kenneth Urish*
10:06am	Outcome of Debridement and Implant Retention for Treatment of Late Acute Hematogenous Periprosthetic Joint Infections (#1240) *Thomas Fehring, Michael McHugh, Jeffrey Frandsen, **Jesse Otero***
10:12am	1 To 5 Years of Follow-Up May Capture Most Total Arthroplasty Acute Periprosthetic Joint Infections After Debridement Antibiotics and Implant Retention (#1228) ***Richard Chao**, Scott Rothenberger, Johanna Plates, Brian Klatt, Neel Shah, Kenneth Urish*
10:18am	Absolute Neutrophil Count in Synovial Fluid: A Promising Biomarker for Diagnosing Periprosthetic Joint Infections (#1346) *Alisina Shahi**, Kenneth Mathis,** David Rodriguez- Quintana, Adam Freedhand, Ali Oliashirazi*
10:24am	Discussion

10:30am Routine Psycho-Periprosthetic Joint Infection Assessment Highlights an Alarming Prevalence of Anxiety and Depression During PJI Treatment (#1354)
Alberto Telias, Sophie Henke Tarnow, George Grammatopoulos, Hesham Abdelbary, Paul Beaule, Amanda Pontefract, Patricia Poulin, ***Simon Garceau***

10:36am Periprosthetic Joint Infection Mortality Following Total Knee Arthroplasty Surpasses 5-Year Rates for Common Cancers: A Meta-Analysis (#1243)
Michael Ramos, Brian Benyamini, Varun Kompala, Shujaa Khan, ***Alison Klika****, Kyle Kunze, Anabelle Visperas, Nicolas Piuzzi*

10:42am Mortality Associated with Periprosthetic Joint Infection After Total Hip Arthroplasty: Comparable to 5-Year Rates of Common Cancers (#1244)
Michael Ramos, Brian Benyamini, Varun Kampala, Shujaa Khan, Alison Klika, Kyle Kunze, ***Anabelle Visperas****, Nicolas Piuzzi*

10:48am Discussion

SYMPOSIUM #5 **Osteomyelitis**
Moderators: Sandy Nelson, MD, and Malcolm DeBaun, MD

10:55am The Role of Imaging in the Diagnosis of Osteomyelitis
Charles Spritzer, MD, Radiologist
Duke University School of Medicine, Durham, NC

A Surgical Approach to the Treatment of Osteomyelitis in Orthopaedic Trauma
Malcolm DeBaun, MD, Orthopaedic Surgeon
Duke University School of Medicine, Durham, NC

Bone Appétit: Mechanisms of Bone Loss in Staphylococcus Aureus Osteomyelitis
James Cassat, MD, PhD, Infectious Disease
Vanderbilt University Medical Center, Nashville, TN

12:15pm **Introduction of Incoming President – Andy Miller, MD**
Thorsten Seyler, MD, PhD
Presentation of Awards
Brian Klatt, MD
Jon T. Mader Award – *Best Clinical Presentation*
Jeanette Wilkins Award- *Best Basic Science Presentation*
Poster Award- *Best Poster*
Closing Remarks -- Drawing for Ipad
Thorsten Seyler, MD, PhD

12:30pm Meeting Adjourn

Session I

1356 Evaluating Soaking Duration: Ex Vivo vs In Vitro Methods for Determining the Efficacy of Dilute Povidone-Iodine Irrigation Solution

Authors: Alisina Shahi, Kenneth B Mathis, Robert Frangie, Adam Freedhand, **David Rodriguez**

Background And Rationale: Antimicrobial irrigation solutions are essential for infection control in surgical procedures, with povidone-iodine (PVP-I) being a widely used antiseptic due to its broad-spectrum activity. This study compares ex vivo and in vitro methodologies to determine the optimal soaking duration of dilute povidone-iodine irrigation solution, specifically Surgiphor, against Gram-positive and Gram-negative bacteria.

Study Question: Does ex vivo testing, which mimics clinical conditions more closely, provide a more accurate assessment of PVP-I's efficacy compared to in vitro methods, and what is the optimal timing for PVP-I soak to effectively reduce bacterial load?

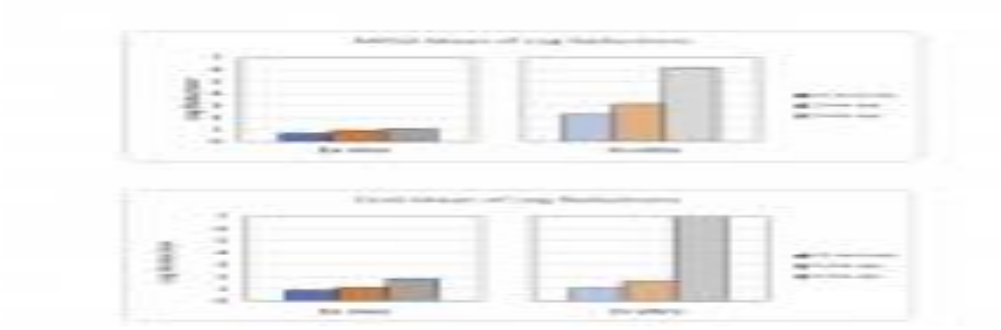
Methods: Human femoral heads collected during total hip replacement were used to harvest 12mm x 10mm trabecular bone cores. Forty-two cores were inoculated with 108 MRSA and another 42 with 108 E. Coli. After a 2-hour incubation in DMEM F-12 with 10% fetal bovine serum, groups of seven cores were exposed to PVP-I for 0.5, 2, and 3 minutes. Controls were exposed to saline. Cores were then neutralized in Dey-Engley broth, sonicated, and plated for CFU counting. In vitro, 108 MRSA and E. Coli were inoculated into wells of a 24-well plate and exposed to PVP-I under similar conditions. Iodine consumption was also tested using lipid-extracted bone cores titrated per ASTM D5768-02 test standard.

Results: For MRSA, the 3-minute in vitro group showed a log reduction of 6.2 ± 0.2, 2-minute 3.1 ± 0.2 ($p < 0.001$), and 0.5-minute 2.3 ± 0.5 ($p < 0.001$), with significant differences compared to ex vivo groups ($p < 0.001$ – $p = 0.003$). Ex vivo groups showed no significant differences among themselves ($p = 0.358$ – $p = 0.771$). For E. coli, the 3-minute in vitro group reduced by log 7.9 ± 0.6 ($p < 0.001$), while 0.5 and 2-minute groups showed lower reductions (log 1.1 ± 0.4 and log 1.6 ± 0.2; $p = 0.229$). Ex vivo comparisons were similar, with significant differences observed for the 3-minute in vitro group ($p < 0.001$) and no differences among shorter exposure times ($p = 0.106$ – $p = 0.912$). Iodine consumption indicated 0.28g of iodine per gram of bone extract.

Discussion: This study reveals that the lipid-rich environment in ex vivo conditions consumes iodine, impacting its antimicrobial activity.

Conclusion: Based on the results of this study, to effectively reduce bacterial load, the surgical site should be soaked in PVP-I for at least three minutes.

Attachments:



1270 Prolonged Antimicrobial Effect of Titanium Dioxide Nanotubes Loaded with Silver Nanoparticles and Calcium Phosphate

Authors: **Sabrina M Huang**, David A Detwiler

Background And Rationale: Nanovis, LLC. Has developed a surface based on nanoVIS Ti™ to provide prolonged antibacterial activity. The surface has been intentionally engineered with an average nanotube pore size diameter between 60 and 80 nanometers. These nanotube arrays are coated with silver nanoparticles and calcium phosphate (NT_AgCaP).

Study Question: Does the upgraded NT_AgCaP surface exhibit prolonged antibacterial activity without any noticeable cytotoxicity?

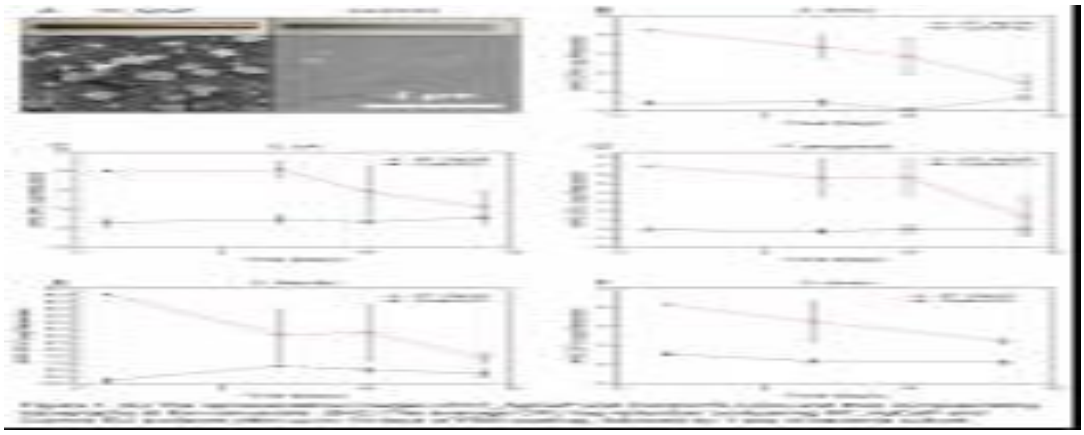
Methods: Two test groups were studied for in-vitro direct bacterial kill-off testing: nanoVIS Ti™ Surface with silver and calcium phosphate as the experimental group (NT_AgCaP) and machine-finished ELI as the control group (Control ELI). Before seeding, the specimens were incubated in PBS for 1, 7, 10, and 14 days to examine the prolonged antimicrobial effect. Five different bacteria strains (S. Aureus, E. Coli, P. Aeruginosa, E. Faecalis, and C. Acnes) were then seeded onto the specimens and quantified after 1 day of incubation. In-vitro cytotoxicity testing was performed in accordance with ISO 10993.

Results: Figure 1 shows the representative surface topography of NT_AgCaP and Control ELI coupon surfaces, as well as the CFU log reduction of individual bacteria strains over a period of 14 days. For all bacteria strains except E. faecalis, the NT_AgCaP surface showed at least a 4-log kill-off when incubated in PBS for 7 days, meeting the FDA's definition of antimicrobial. For cytotoxicity testing, all NT_AgCaP and Control ELI samples passed (data not shown).

Discussion: The NT_AgCaP surface showed significant bacteria kill-off compared to Control ELI. The bacteria log reduction steadily decreased as the PBS incubation time increased, indicating a controlled release of Ag over time. The NT_AgCaP surface passed cytotoxicity evaluation, indicating no signs of cell lysis or intracytoplasmic granules.

Conclusion: Nanovis conducted direct bacteria kill-off testing with 5 different species of bacteria on NT_AgCaP and Control ELI surfaces. The result showed that NT_AgCaP exhibited significant bacteria kill-off and reduced colonization effect for up to 14 days. Additionally, NT_AgCaP did not cause any discernable morphological cytotoxicity. The current findings have demonstrated the promising potential of NT_AgCaP as an orthopedic implant surface.

Attachments:



1352 Preventing Infections in Extensor Mechanism Reconstruction: Best Practices with Synthetic Meshes

Authors: Alisina Shahi, Kenneth B Mathis, Robert Frangie, Adam Freedhand, **David Rodriguez-Quintana**

Background And Rationale: Extensor mechanism deficiency is a significant challenge in total knee arthroplasty, with synthetic mesh providing a reasonable solution. However, these meshes can harbor biofilms, leading to postoperative infections that severely impact patient outcomes and increase healthcare costs.

Study Question: This study compares infection prevention strategies for polypropylene meshes(Marlex), including standard meshes, those with antibiotic-loaded CaSO4 beads, and those with direct antibiotic embedding.

Methods: The study tested three groups: (1) Marlex alone, (2) Marlex with antibiotic-loaded calcium sulfate beads, and (3) antibiotic-embedded polypropylene mesh (Ariste). Meshes were folded, stitched, and cut into five 25mm sections, housed in 6-well plates. CaSO4 beads (3mm, 0.05g) were made by mixing 20g CaSO4, 1g vancomycin, and 6ml saline, and six beads were placed in each mesh section (n=5). The antibiotic mesh (Ariste) was pre-embedded with minocycline and rifampin (n=5).
Each mesh set was inoculated with 4.8x10^7 Staphylococcus aureus and incubated for five days. After incubation, meshes were rinsed in PBS, sonicated, and vortexed in Dey-Engley neutralizing broth to detach bacteria. Suspensions were diluted and plated for colony counting. Five plain polypropylene mesh samples were treated with PVP-I solution for three minutes before sonication; the remaining five served as controls.

Results: The plain Marlex group had an average bacterial population of 2.5x108 (range: 6x107–7.9x108). SEM imaging showed attachment occurred on both the mesh and suture. After treating with PVP-I, there was a 96.8% reduction. The mesh loaded CaSO4 group had minimal bacteria attachment (261 average; range: 0 – 1.1x103) while the embedded mesh group had no bacteria attachment. When comparing the groups in terms of log reduction, the loaded CaSO4 and embedded mesh groups were both significantly different than the iodine washed group ($p < 0.001$, $p < 0.001$), but not when comparing each other ($p = 0.107$).

Discussion: This study shows that both antibiotic-loaded and -embedded Marlex significantly reduce bacterial colonization compared to standard meshes treated with PVP-I. Notably, meshes with embedded antibiotics exhibited the highest efficacy in preventing bacterial attachment.

Conclusion: This finding suggests that embedding antibiotics directly into the mesh may be the most effective strategy for infection prevention in extensor reconstruction.

Attachments:

1253 A Novel Isotropic Optical Fiber: Antimicrobial Effect of Blue Light on Drug Resistant Organisms

Authors: Megan H Goh, Robert A Rabiner , Santiago A Lozano-Calderon, **Antonia F Chen**

Background And Rationale: Drug-resistant organisms (DROs) present a need for the development of novel therapies. Antimicrobial blue light (ABL) is a potential option as the photoexcitation of bacterial components leads to reactive oxygen species creation and microbial death.

Study Question: Does the use of an ABL optical fiber under clinically relevant in-vitro conditions have a bactericidal effect on multidrug resistant gram-negative Pseudomonas aeruginosa (MRGN-Pa) and methicillin-resistant Staphylococcus aureus (MRSA)?

Methods: Time to kill assays were done in tubes with 10 mL 0.9% NaCl solution at a starting inocula of 1x10^5 CFU/mL for MRGN-Pa or MRSA; these assays were repeated a minimum of 3 times per strain. Experimental tubes had either 1 optical fiber (20.1 mW/mm; low power LP) or 2 optical fibers (40.3 mW/mm; high power HP), which delivered 5 wavelengths of ABL (405, 415, 435, 450 and 475 nm) over 60 min. Control tubes had no optical fiber. 50µL samples were taken from each tube at 0, 10, 20, 30 and 60 min and streaked onto agar plates that were incubated. CFU/mL was determined. One-way ANOVA were conducted.

Results: For MRGN-Pa, LP-ABL resulted in a log10CFU/mL±SD difference of -0.55±0.16, -1.06±0.08, -1.21±0.09, and -2.85±0.16 for 10, 20, 30 and 60 min, respectively (p=0.03). For HP-ABL, there was a log10CFU/mL±SD difference of -0.01±0.07, -1.56±0.21, -2.66±0.37, and -3.71±0.01 for the same respective time points (p=0.03). For MRSA, LP-ABL resulted in a log10CFU/mL±SD difference of -0.26±0.08, -1.22±0.19, -2.03±0.26, and -3.73±0.08 for 10, 20, 30 and 60 min, respectively (p=0.03). For HP-ABL, there was a log10CFU/mL±SD difference of -1.38±0.28, -3.07±0.28, -3.76±0.03, and-3.76±0.03 for the same respective time points (p=0.02).

Discussion: ABL provided bactericidal reduction of 99.9% (≥3 log10) for MRGN-Pa and MRSA in CFU/mL using LP and HP-ABL. Longer exposures in LP-ABL and HP-ABL increasingly reduced bacterial colony formation for both DROs. LP-ABL exhibited bactericidal effects at 60 min for MRSA but was unable to do so for MRGN-Pa. Consequently, HP-ABL exhibited a bactericidal effect for MRSA at 20 min and MRGN-Pa at 60 min. The modulation of the intensity and time of ABL exposure offers an invaluable alternative approach to treating DROs.

Conclusion: A novel ABL optical fiber demonstrated bactericidal effect on MRSA and MRGN-Pa through clinically relevant in-vitro studies and may be a potential therapeutic treatment for DROs.

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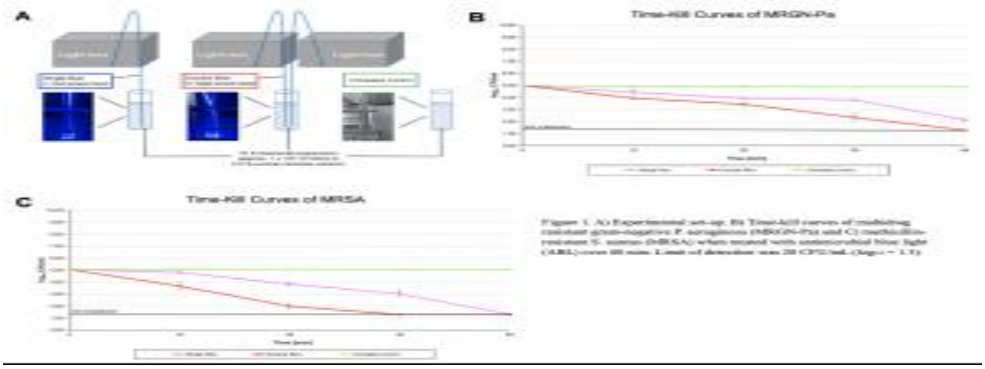

1262 Improved MSC Function on Nanotube Surfaces While Reducing Bacterial Adhesion and Biofilm Formation

Authors: **David Detwiler**

Background And Rationale: Orthopedic devices have a primary function to mechanically support the musculoskeletal system. The implant is subject to inflammatory conditions, micromotion, and infection. Mechanical fixation needs to be replaced by biological fixation to the implant surface to support osseointegration and the healing of the patient.

Study Question: Can an implant surface provide both resistance to bacterial colonization and stem cell differentiation?

Methods: Titanium coupons and pins were treated with an anodization process to create nanotubes of titanium dioxide on the surface with diameters at 70 nm or left untreated. Bacteria were allowed to adhere to the surfaces in culture media with FBS and without antibiotics for 24hrs. Bacterial CFU were recovered with ultrasonication and quantified, Figure 1A. In vivo biofilm formation was quantified by placing titanium pins through the skin of guinea pigs and inoculating the exposed pins with 10^6 CFU S. Aureus. Biofilms formed over 7 days and then pins were extracted, rinsed and biofilm CFU were ultrasonically recovered and counted, Figure 1B. Extracellular matrix mineralization produced by mesenchymal stem cells was done on coupons in vitro as a measure of osteoblastic differentiation. Titanium coupons were seeded with 20,000 cells per cm^2. Cultures were maintained and fed every 24 hours in differentiation media. Cultures were maintained for 21 days then fixed and stained with Alizarin Red, Figure 1C.

Results: Mineralization of nanotube surfaces was significantly higher than control surfaces after 21 days. Bacterial adhesion after 24 hours in vitro was reduced by between 0.64 and 1.39 log when compared to control surfaces. Biofilm formation in vivo was also reduced by 78.5% on nanotube surfaces when compared to control titanium.

Discussion: The nanoVIS TI™ Surface Technology has been specifically designed to improve the osseointegration of titanium devices and has been successfully cleared through the FDA. The same nanofeatures that improve the differentiation of MSCs also decrease the chance of bacterial adhesion during surgery. Even if bacteria are present in the surgical wound, the nanoVIS Ti surface helps reduce the biofilm that can occur on the implant in vivo.

Conclusion: It is possible to create surfaces that can both improve osseointegration and help reduce the risk of biofilm formation on the implant surface, providing the patient with the best opportunity to heal.

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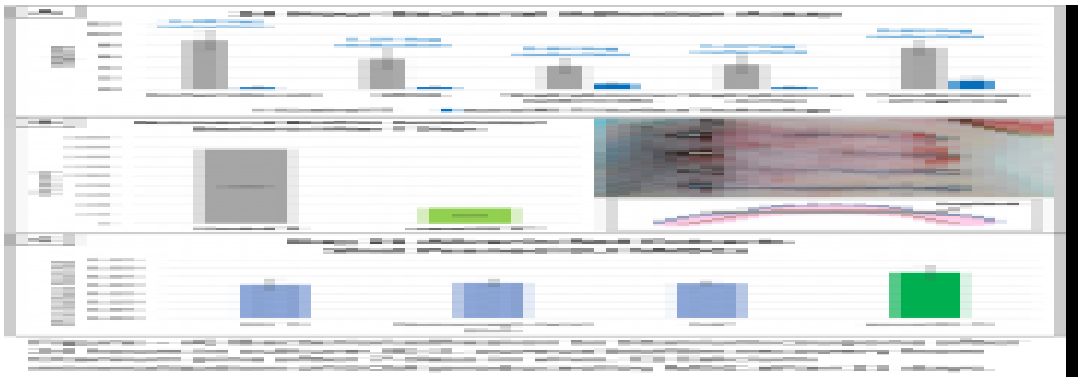

1239 Halicin combinations with conventional antibiotics are more effective than monotherapy against both planktonic and biofilm-residing Staphylococcus aureus.

Authors: **Roman M Natoli**, Edward M Greenfield

Background And Rationale: Biofilms protect bacteria from the host immune system and antibiotics in skeletal infections. Halicin was recently repurposed as an antimicrobial agent with broad-spectrum bacterial activity irrespective of proliferation or quiescence. We further found halicin eradicates S. Aureus biofilms on orthopaedically-relevant substrates. Antibiotic combinations can act synergistically.

Study Question: Are halicin combinations with conventional antibiotics more effective than monotherapy against planktonic or biofilm-residing S. Aureus?

Methods: Antibiotics conventionally utilized in orthopaedic infections were tested in combination with halicin in checkerboard assays of planktonic S. Aureus. Combination efficacy was evaluated using fractional inhibitory concentration index (FICI). Minimum biofilm eradication concentrations (MBECs) were defined as no detectable colony formation after biofilm disruption. Combinations with or without halicin (1/4 of its MBEC) were tested against less-mature (24-hour) or more-mature (7-days) biofilms on titanium alloy discs.

Results: Planktonic checkerboard assays showed halicin synergy (FICI <0.5) with gentamycin, tobramycin, and cefazolin (Fig 1A), but not with rifampicin or vancomycin. In biofilm experiments, halicin decreased the concentration of rifampicin required to eradicate both less-mature and more-mature biofilms by >100-fold (Fig 1B). Halicin also decreased the concentrations of gentamycin and tobramycin required to eradicate less-mature biofilms by 8-fold, but the effect was lost against more-mature biofilms. In contrast, halicin prevented vancomycin's ability to eradicate biofilms. Cefazolin (+halicin) was ineffective against biofilms at doses well above clinically achievable concentrations in bone.

Discussion: Our results that different antibiotics have superior combinatorial activity with halicin against biofilms than against planktonic cultures demonstrate the importance of studying biofilms. Highlighting this study's translatability, the doses of conventional antibiotics in combination with halicin required to affect both planktonic and biofilm-residing S. Aureus were all clinically achievable based on the published literature.

Conclusion: Halicin synergized with gentamycin, tobramycin, and cefazolin against planktonic S. Aureus, and increased the effectiveness of rifampicin against less-mature and more-mature biofilms.

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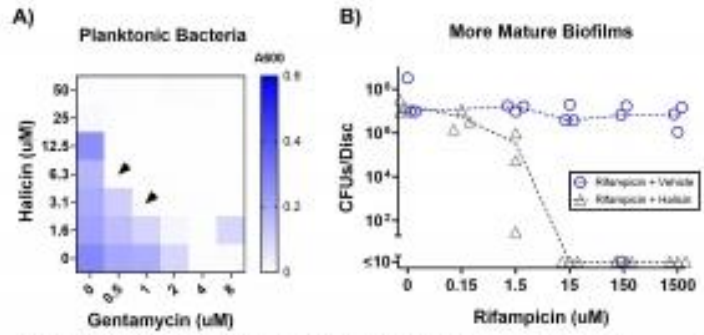

Fig 1: Combinatorial activity of halicin with conventional antibiotics against planktonic (**A**) and biofilm-residing (**B**) *S. aureus*. Arrowheads in (**A**) indicate concentrations with lowest fractional inhibitory concentration index (=0.375). Each symbol in (**B**) indicates the median for each group from an independent experiment, with 4 biofilms per group in each experiment.

1232 Complete Eradication of Biofilm Using Low Frequency Electromagnetic Force (EMF) and Antibiotics at MIC

Authors: **Gerhard E Maale**

Background And Rationale: Introduction: Approximately 1-3% of patients with total joint replacements develop bacterial or fungal infections which respond poorly to antibiotic treatment. These infections are often serious enough to warrant removal, debridement, and replacement of the implant. There is a need to provide a non-invasive solution for treating infections occurring on medical implants.

Study Question: Does very low to low frequency EMF at high Tesla eradicate mature biofilm formed on prosthesis?

Methods: Methods: Coupons (19 mm x 25.4 mm x 2 mm) composed of 430 stainless steel, were inoculated with MRSA M2 Methicillin and incubated for one week at 37 C in Tryptic Soy Broth (TSB) to culture biofilms. M2 MRSA was minimally susceptible to 1 µg/ml of vancomycin. After biofilm growth, the coupons were washed to remove non-adherent bacteria and transferred to 50 mL tubes containing 40 mL TSB with and without vancomycin. Bacteria were exposed to an AC-EMF at 10.7 mTelsa at low radio frequency of 30-100kHz frequency for varying times to heat the coupons to 45, 55, 60, and 65 degrees C. After exposure to EMF and overnight incubation, the coupons were washed four times with PBS. Biofilm bacteria were removed from the coupons using a plastic scraper. Bacteria in the culture supernatant and in the biofilm were enumerated by plating on agar plates and colony-forming units (CFU) were determined.

Results: Results: The increased temperatures had little effect on the CFU/mL when cultured without the addition of vancomycin. However, in the presence of 1 µg/ml of vancomycin, temperatures increase of 45C and 55C resulted in significant reductions of CFU. The CFU had a log 3 reduction at 45C and went below the limit of detection at 55C. Increases in temperatures from 37 C to 55C and to 65C results in reductions of CFU's dropped to below the limit of detection in the supernatant at 65C.

Discussion: Discussion: EMF at very low to low frequency and low Tesla can eradicate biofilm when externally applied through AC wires with MIC amounts of antibiotics. This may result in in the non-invasive treatment of biofilm related infection on implants or give higher rates of success with procedures like DAIR.

Conclusion: Very low to low frequency EMF eradicated biofilm on metal disc when used with antibiotics at MIC.

Attachments:

There is no figure for this abstract.

1350 Pulsatile lavage is not enough to remove implant biofilm: the in-vitro case for sonication brushing

Authors: Christina A Chao, Tyler K Khilnani, Mathias Bostrom, **Alberto V Carli**

Background And Rationale: During periprosthetic joint infection (PJI) revisions surgeries, pulsatile irrigation is performed in to clear debris and microbes from the surgical wound. The dental literature suggests that mechanical brushing is effective in removing established biofilms.

Study Question: The purpose of this study was to quantify and compare the effect of pulsatile irrigation, sonication brushing and the combination of the two on removing mature staphylococcal biofilm from human-sized clinical arthroplasty components.

Methods: Five identically sized, never implanted tibial base plates (TBPs, Persona; Zimmer-Biomet) underwent keel removal with a wire electrical discharge machine. Implants were then passivated in 25% nitric acid, autoclaved, and submerged in 45mL of 107 CFU/ml of infected MSSA (Xen 36, Staph aureus) infected tryptic soy broth. Biofilm was grown for 72 hours, with media replaced every 24 hours. Following growth, TBPs with mature biofilm were assigned to 6 treatment modalities: 1) control conditions, 2) low speed pulsatile lavage, 3) high speed pulsatile lavage, 4) sonication brushing, 5) combination low speed pulsatile lavage and sonication brushing, and 6) combination high speed pulsatile lavage and sonication brushing. Pulsatile lavage (Pulsavac Plus; Zimmer-Biomet) was administered for 5 seconds while sonication brushing was performed for 20 seconds with a custom sonication brush (minimum 40,000 movements/minute). Experiments were performed in sextuplicate, with positive controls present. Post-treatment TBPs were either put in a sonication bath to dislodge remaining bacteria to count colony forming units (CFUs), or stained with 0.1% crystal violet to quantify residual biofilm biomass.

Results: Low speed pulsatile lavage, high speed pulsatile lavage, and sonication brushing reduced CFU counts by 2.5, 3.5, and 4.4-fold, and reduced biofilm biomass by 74%, 69% and 72% respectively as compared to controls. When pulsatile lavage was combined with the sonication brush, CFU counts were lowered 226-fold and 300-fold, for low and high-speed pulsatile lavage respectively. Biofilm biomass was respectively reduced by 90% and 88%. This reduction was confirmed with SEM imaging (figure 1)

Discussion: Mechanical methods work synergistically with irrigation to remove biofilm from implants.

Conclusion: Sonication brushing is an exciting adjuvant to irrigation for removing biofilm from implants.

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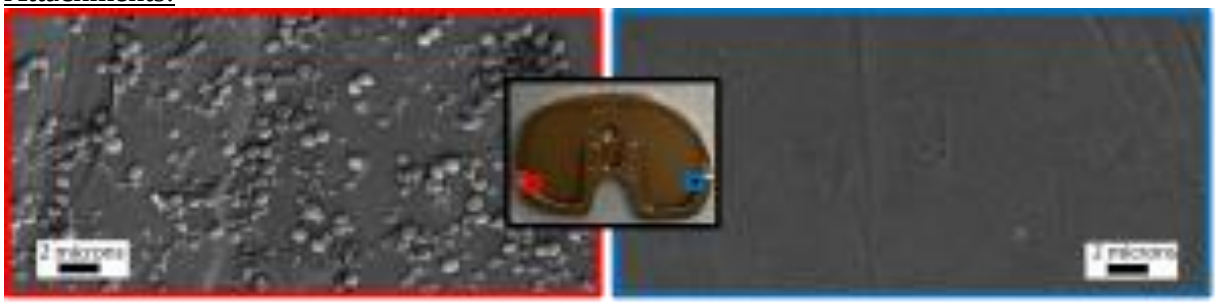

Figure 1: Scanning Electron Microscopy of mature staphylococcal biofilm grown in the locking mechanisms of a tibial base plate after rinsing (Red) or 20 seconds of sonication brushing (Blue). Biofilm is no longer identified after sonication brushing.

1285 Exploring and Quantifying the Pathogenic Mechanisms Contributing to Osteolysis in the Context of Prosthetic Joint Infections (PJI)

Authors: **Beethi Sinha**, Elizabeth Stewart, Matthew Dietz

Background And Rationale: Prosthetic Joint Infection (PJI), is a serious complication of joint arthroplasty with significant morbidity and mortality. Chronic infection and inflammation, induced by bacteria and wear particles, can result in septic and aseptic loosening in the surgical joint, thereby causing osteolysis. Osteolysis can deteriorate the bone quality to the point where the prosthesis fails or any attempts at reimplantation are made more challenging. Current treatments primarily target PJI control, often neglecting the crucial role of bone health in the surgical area. Our research aims to bridge this gap by prioritizing the enhancement of bone integrity during PJI.

Study Question: Quantifying the degree of osteolysis during PJI

Methods: Using the Methicillin Sensitive Staphylococcus aureus ATCC 25923 strain, simulated PJI was established in our in-vivo model (Sprague Dawley). Animals were divided into two groups (n=8); a non-infected and an infected group. The right leg of each rat was subjected to k-wire surgeries. The infected group was inoculated with 10^5 CFU of ATCC 25923 strain and after postoperative day 21, all the animals were euthanized. To quantify bone resorption rate the whole femurs were collected and underwent Micro CT analysis using a Bruker Skyscanner 1172.

Results: The infected group has significantly lower bone mineral density, trabecular thickness, trabecular number, BV/TV, and BS/TV compared to the control and non-infected groups. Conversely, the trabecular separation and the BS/BV ratio are significantly higher in the infected group compared to the non-infected and control groups. Interestingly, we found that at this particular age, the bone mineral density in the femur of female control animals is significantly higher than the femur of male animals.

Discussion: In this study, we found that the degree of osteolysis resulting solely from the surgery is not as high as that observed in joints infected with Staphylococcus aureus. The increased osteolysis is likely the result of an interaction of immune cells and bone cells with DAMP and PAMP, triggering upregulation of inflammatory cytokines, chemokines, ROS, and an increased release of RANKL. This leads to enhanced osteoclastogenesis in the surgical joint area.

Conclusion: During PJI, DAMP and PAMP interaction with bone cells results in the upregulation of osteoclastogenesis causing osteolysis in the surgical joint area.

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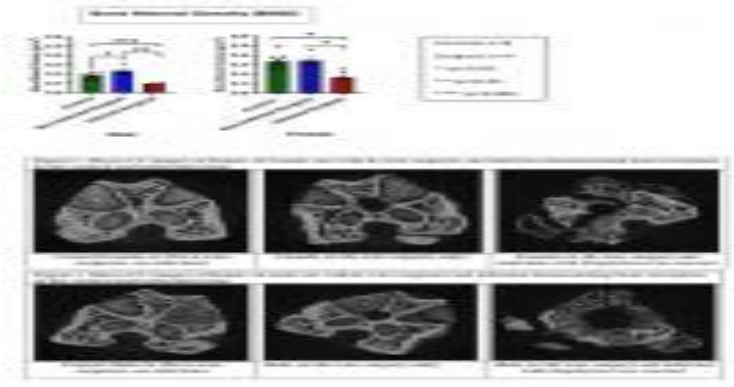

Session II

1241 International Delphi consensus on wound closure and dressing management in total knee and total hip arthroplasty

Authors: **Antonia Chen,** Ryan Nunley, Timothy Board, Michael Mont

Background And Rationale: Optimal wound healing is extremely important when trying to avoid various complications after total knee arthroplasty (TKA) and total hip arthroplasty (THA). Published systematic literature reviews indicate that there are few studies on wound closure and dressing management after TKA and THA, with little consensus on best practices.

Study Question: The purpose of this modified Delphi study was to obtain consensus on optimal wound closure and dressing management in TKA and THA using an evidence-based approach.

Methods: The panel included 20 orthopaedic surgeons from Europe, the United States, and Canada. There were 40 statements identified using a targeted literature review. Topics evaluated included surgical technique, tourniquets, drains, venous thromboembolism prophylaxis, barbed sutures, triclosan-coated sutures, mesh adhesives, silver-impregnated dressings, and negative pressure wound therapy. Consensus was developed on the statements with up to three rounds of anonymous voting per topic. Panelists ranked their agreement with each statement on a five-point Likert scale. An a priori threshold of >=75% was required for consensus.

Results: All 40 statements reached consensus (Figure 1). Notable recommendations include: 1) TKA-: Closing in semi-flexion versus extension (superior range of motion); 2) TKA-using aspirin for venous thromboembolism prophylaxis over other agents (reduces wound complications); 3) TKA and THA-using barbed sutures over non-barbed sutures (lower wound complications, better cosmetic appearances, shorter closing times, and overall cost savings); 4) TKA and THA-using mesh adhesives over other skin closure methods (lower wound complications, higher patient satisfaction scores, lower rates of readmission); 5) TKA and THA-using negative pressure wound therapy over other dressings for at-risk patients (lower wound complications, fewer reoperations, and fewer dressing changes); and 6) TKA and THA use triclosan-coated sutures over standard sutures (lower risk of surgical site infection).

Discussion: These findings provide a guide to physicians on appropriate wound management after TKA and THA procedures and form a basis for identifying critical evidence gaps to help reduce variability in procedural outcomes.

Conclusion: Using a modified Delphi approach, a panel of 20 orthopaedic surgeons achieved consensus on 40 statements pertaining to wound closure and dressing management in TKA and THA.

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1255 Suppressive Antibiotic Therapy in Patients with Prosthetic Joint Infection and Retained Hardware: How Much is Enough

Authors: Anne SpichlerMoffarah, Jane O'Bryan, Lee E Rubin, **Marjorie Golden**

Background And Rationale: Patients with prosthetic joint infection managed with debridement and implant retention (DAIR) are often given prolonged courses of antibiotics. Optimal duration and benefits of prolonged suppression are unclear. This study evaluated the role of suppressive antibiotics in preventing failure in patients undergoing DAIR for first PJI of hip or knee

Study Question: What are cure rates at 2 years, defined by MSIS Tier in patients receiving suppressive antibiotics following DAIR. Did failure rates vary based on duration of suppression

Methods: Retrospective study of patients admitted 9/2017-12/2021 with first PJI of hip or knee. Chi-Square tests and logistic regression models used to evaluate associations between clinical variables and outcomes. Univariate logistic regression models created to assess associations between clinical characteristics and odds of treatment failure. Kaplan-Meier curves used to model probability of failure-free survival by suppression status.

Results: 71 patients underwent DAIR, most (77.5%) received suppression. Nearly half (49.3%) were suppressed for at least 2 years. When assessed for cure at 2 years, 25.4% classified as Tier 1, 47.9% Tier 2 and 24% Tier 3. 26.8% patients failed during the observation period. Nonsuppressed patients accounted for nearly 2/3 of treatment failures. Percent failure during the 2 years post PJI differed by duration of suppression. We found significant differences in period prevalence of failure between no suppression and suppression for at least 2 years ($p<0.001$). Significant difference in percent failure seen between those suppressed for <1 year vs 2 years or more ($p=0.023$). Highest probability of failure free survival occurred if suppressed for at least 2 years. 60% of smokers had treatment failure vs 21.3% of nonsmokers. Smokers failed more often, especially if not suppressed

Discussion: Small, retrospective study but our findings suggest that prolonged suppression may be beneficial. We noted a difference in period prevalence of failure between smokers and non smokers. The retrospective nature of our study prevented us from quantifying daily smoking, calculating pack year history or clarifying former vs never smokers

Conclusion: Patients diagnosed with first PJI of hip or knee with retained hardware may benefit from antibiotics suppression and longer duration of suppression may confer additional benefit

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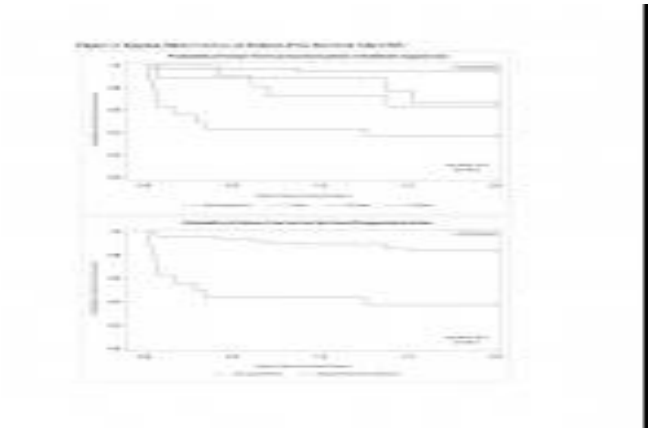

1260 Timing of Acute Peri-Prosthetic Joint Infections of Total Knee Arthroplasties does not Affect Failure Rates of Debridement, Antibiotics, and Implant Retention (DAIR) Procedure

Authors: Andrew J Frear, Shaan Sadhwani, Anthony O Kamson, Christian Cisneros, Richard Chao, Muhammad W Feroze, Clair Smith, Neel B Shah, **Kenneth L Urish**

Background And Rationale: In total knee arthroplasty (TKA) periprosthetic joint infection (PJI), Debridement, Antibiotics, and Implant Retention (DAIR) is a common procedure with a high failure rate. Our objective was to evaluate differences in DAIR outcomes on acute PJI performed at post-operative vs intermediate vs hematogenous time points from index TKA procedure.

Study Question: Does the timing of acute TKA PJI affect the failure rates of DAIR procedure?

Methods: Retrospective review of 122 patients diagnosed with acute PJI after TKA who underwent DAIR from 2016 to 2020 was performed. Categorization was based on timing of DAIR, with 0-6 weeks termed post-operative (n=43), 6 weeks to 1 year termed intermediate (n=19), and > 1 year termed hematogenous (n=60). All patients presented with acute infections of <4 weeks of symptoms. Exclusion criteria for this cohort included any patient with revision TKA before PJI diagnosis. The primary outcome was failure rate based on infection recurrence as defined as any reoperation on the joint.

Results: The overall failure rate was 42% following DAIR operation. 78.4% of DAIR failures occurred within 1 year. At 3 months, 34 postoperative, 14 intermediate, and 54 hematogenous group patients remained failure-free (79% vs. 74% vs. 90%, p=0.15). At 6 months, 30 post-operative, 13 intermediate, and 48 hematogenous group patients remained failure-free (70% vs. 68% vs. 80%, p=0.40). At 1 year, 25 postoperative, 11 intermediate, and 46 hematogenous group patients remained failure-free (58% vs. 58% vs. 77%, p=0.09). At 2-years, 23 postoperative, 9 intermediate, and 42 hematogenous group patients remained failure-free (53% vs. 47% vs. 70%, p=0.10).

Discussion: The overall failure rate following a DAIR for acute TKA PJI is high. No significant difference in DAIR failure rates between any PJI cohort was observed at any measured time point, although there was a trend toward post-operative and intermediate PJI DAIRs having a higher failure rate than hematogenous PJI DAIRs.

Conclusion: There was no significant difference in DAIR failure rates based on the timing of acute TKA PJI.

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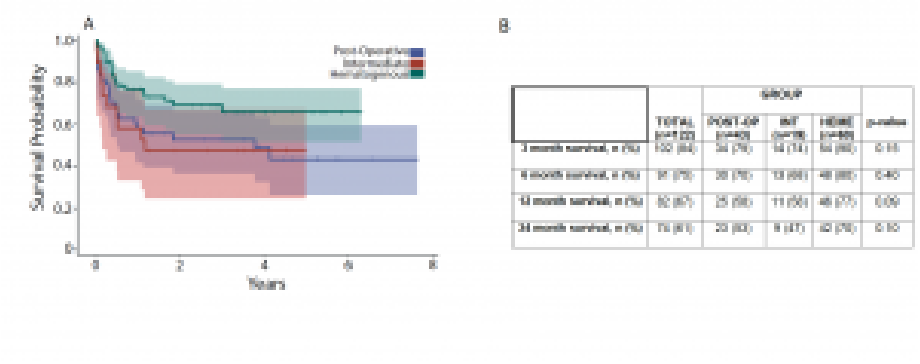


1359 Timing from Admission to Debridement, Antibiotic and Implant Retention (DAIR) Affects Treatment Success in Total Knee Arthroplasty Prosthetic Joint Infection

Authors: Samuel Morgan, Hesham Abdelbary, George Grammatopoulos, **Simon Garceau**

Background And Rationale: DAIR is an attractive treatment option in patients presenting with acute prosthetic joint infection (PJI) due to its relative simplicity, reduced morbidity and cost. However, little is known on the influence that timing from admission to DAIR has on treatment success.

Study Question: This study aims to assess the association of factors, notably timing from admission to surgery, with failure of DAIR in total knee arthroplasty (TKA).

Methods: This is a retrospective, consecutive series from a single academic, tertiary referral centre specializing in the treatment of PJI. A search of our institutional PJI database was conducted for DAIR performed in TKA patients between 2008-2021, with minimum 2-year follow-up. Baseline patient and surgical characteristics were collected. The primary outcome assessed was reoperation for recalcitrant PJI. Secondary outcomes assessed were: 90-day readmission, 90- day and 1- year mortality, post-operative complications, and chronic antibiotic therapy. Multivariate regression analysis was performed to determine the effect of variables on outcomes.

Results: 121 patients were included in study. Multivariate regression analysis of primary outcome demonstrated that time from admission to DAIR > 48 hours was associated with increased risk of reoperation for PJI (OR: 8.7, CI95% 1.5-51.1, p = 0.017) and post-operative complications (OR: 47.7, CI95% 2.7 - 827.1, p = 0.008). 90-day readmission was associated with lower preoperative Hb (OR: 1.04, CI95% 1.01 - 1.07, p = 0.014).

Discussion: Delayed time from admission to DAIR increases the risk of PJI reoperation and post-operative complications. Lower preoperative hemoglobin levels were associated with increased likelihood of 90-day readmission. Similar to the care of hip fracture patients, rapid OR access <48 hours after admission, and preoperative Hb optimization can lead to improved patient outcomes and better healthcare resource utilization.

Conclusion: Surgical treatment >48 hours after admission in patients treated with DAIR is associated with inferior outcomes. Treatment guidelines should advocate for rapid OR access in this patient population.

Attachments:

Table 4. Multivariate analysis analysing timing from admission to DAIR and other variables with outcomes of interest.

Multivariate Analysis		
Outcome	**Variable**	**Significance**
Re-operation	Time from admission to DAIR (<48 vs. >48 hours)	OR: 8.69 (CI 95% 1.48-51.14), p = 0.01
	Age	OR: 0.92 (CI 95% 0.89-1.01), p = 0.12
	Pre-operative CRP	OR: 1.01 (CI 95% 100-1.02), p = 0.11
Post-operative complication	Time from admission to DAIR (<48 vs. >48 hours)	OR: 47.67 (CI 95% 2.75-827.12), p = 0.01
	Age	OR: 0.95 (CI 95% 0.89-1.03), p = 0.21
	Pre-operative CRP	OR: 1.01 (CI 95% 1.00-1.02), p = 0.20
	DAIR (primary vs. revision)	OR: 0.11 (CI 95% 0.01-1.44), p = 0.09
	Time from symptom onset	OR: 0.99 (CI 95% 0.98-1.00), p = 0.03
90-day Readmission	Lower pre-Hgb	OR: 1.04 (CI 95% 1.01-1.07), p = 0.01
	DAIR (primary vs. revision)	OR: 0.30 (CI 95% 0.05-1.93), p = 0.21
90-day Mortality	Time from admission to DAIR (<48 vs >48 hours)	OR: 7.85 (CI 95% 0.36-173.35), p = 0.19
	DAIR (primary vs. revision)	OR: 9.08 (CI 95% 0.41-200.85), p = 0.16
1-year Mortality	Lower pre-Hgb	OR: 1.06 (CI 95% 0.99-1.14), p = 0.08
	Pre-operative CRP	OR: 0.99 (CI 95% 0.97-1.01), p = 0.19

1267 Rifampin Therapy in Prosthetic Joint Infections – A Retrospective Study of Barriers to Therapy Initiation and Completion in Guideline Indicated Patients

Authors: David N Kugelman, Justin Leal, Sharrieff N Shah, Amy Mackowiak, Rebekah Wrenn, Thorsten M Seyler, **Jessica Seidelman**

Background And Rationale: Current Infectious Diseases Society of America (IDSA) guidelines for treating PJI following debridement, antibiotics and implant retention (DAIR) recommend initiating antibiotic therapy with a pathogen specific medication plus rifampin.

Study Question: The purpose of this study was to evaluate the utilization of rifampin therapy for the treatment of staphylococcal PJI in patients that underwent DAIR or 1-stage revision as per IDSA guidelines.

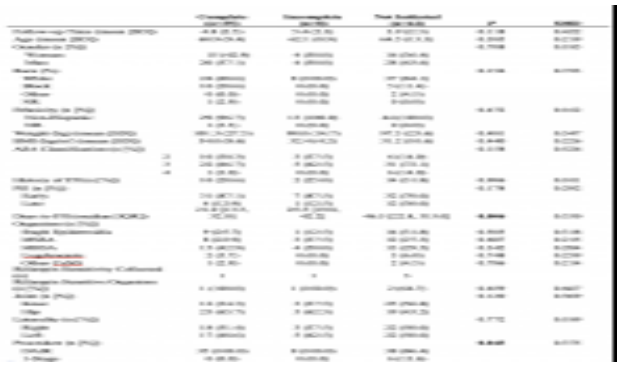
Methods: Using the institutional database patients who had a staphylococcal PJI and underwent a DAIR or a 1-stage revision from January 2013 to April 2023 were identified. Data collected included patient demographics, medical history, medication history, pre- and post-operative clinical, radiographic, microbiological results, and treatment outcomes were all collected. These variables were subsequently compared depending on whether rifampin therapy was completed, initiated but not completed, or not initiated.

Results: 87 patients at a mean follow-up time of 4.4 years met inclusion criteria and were indicated to take rifampin as per IDSA guidelines. Overall, 43 (49.4%) patients were initiated on rifampin therapy. There were 8 (18.6%) patients that did not complete their rifampin therapy due to side effects (Table 1). There were 44 (50.6%) patients that did not start rifampin therapy. When available, the reason rifampin was not initiated was due to DDIs (61.5% 8/13). Of those patients with DDIs, 62.5% (5/8) were medium to high risk for interaction with rifampin co-administration. The implicated drugs included warfarin, apixaban, antidepressants, and tacrolimus. When adjusted for covariates using logistic regression, those who did not initiate rifampin therapy were less likely to have successful treatment of their PJI (odds ratio OR: 0.76 0.59 to 0.97; P = 0.030).

Discussion: At a tertiary academic center rifampin has been underutilized with only 43 (49.4%) of indicated patients receiving combo therapy.

Conclusion: The literature suggests that rifampin as combo therapy in the setting of DAIR or 1-stage in Staphylococcal PJI leads to better outcomes. This study highlighted the underuse of rifampin in indicated patients as well as what barriers may be involved. It is of upmost importance that orthopaedic and infectious disease physicians collaborate to maximize the implementation of rifampin in accordance with IDSA guidelines.

Attachments:



1341 Initial Success of Seven-Day Intra-Articular Antibiotic Irrigation for the Treatment of Chronic Periprosthetic Joint Infection: Results from Two Prospective Randomized Comparative Studies.

Authors: Bryan D Springer, Carlos A Higuera Rueda, Brian C De Beaubien, Kevin D Warner, Andrew H Glassman, Hari K Parvataneni, Kenneth Urish, Edward J Stolarski, **Nicolas S Piuzzi**

Background And Rationale: Periprosthetic joint infection (PJI) remains a serious complication following total joint arthroplasty. Two-stage exchange arthroplasty is the standard of care, but treatment success is low.

Study Question: What is the efficacy of a novel method for optimizing the delivery of intra-articular antibiotics for PJI?

Methods: Two prospective, multicenter, randomized studies were conducted evaluating the efficacy of a rapid (7-day) exchange arthroplasty with intra-articular antibiotic irrigation (Experimental) vs two-stage exchange arthroplasty (Control) (NCT04662632; NCT05607030). The Experimental Group received 7 days of intra-articular irrigation using 80 mg of tobramycin once daily followed by hourly irrigation of 125 mg of vancomycin. Both groups received 12 weeks of systemic antibiotics post-Stage 2. Patients were considered a success at 180 days post-Stage 1 surgery if they received a permanent implant at Stage 2 surgery, survived, had no recurrent PJI, had no re-operation on the index joint, and were not taking antibiotics. Seventy-six (76) patients were enrolled in each group. There were no differences in baseline demographics or comorbidities between the groups.

Results: Success criteria were met in 70% of Experimental and 30% of Control patients 180 days post-Stage 1 surgery ($p<0.01$). More Experimental patients were implanted with a permanent prosthesis by 180 days (100% vs 75%; $p<0.01$). Mean time to reimplantation in patients who had Stage 2 surgery prior to 180 days was 7 days for Experimental and 99 days for Control patients ($p<0.01$). There was no statistically significant difference in the incidence of septic failure (Experimental: 4 vs. Control: 4), re-operation (Experimental: 8 vs. Control: 11; $p=0.46$) or death (Experimental: 2 vs Control: 3; $p=0.65$) prior to 180 days.

Discussion: More Experimental patients received a permanent implant in a significantly shorter time with an overall higher treatment success at 180 days.

Conclusion: Results demonstrate the clinical advantage of rapid exchange arthroplasty with intra-articular antibiotic irrigation.

Attachments:

There is no figure for this abstract.

1295 Unsupervised Machine Learning Can Group Synovial Fluid Samples into Disease-Relevant Clusters: AI Diagnosis is Near

Authors: Van Thai-Paquette, Krista Toler, Pearl Paranjape, **Carl Deirmengian**

Background And Rationale: Machine learning can be applied to evaluate multidimensional biomarker datasets, extracting previously unappreciated relationships that are useful for diagnostic classification.

Study Question: Can unsupervised machine learning (ML) techniques use rapidly available synovial fluid (SF) tests to group joint arthroplasty samples into diagnostically relevant clusters?

Methods: SF samples were collected at a centralized clinical laboratory from 67,551 hip and knee arthroplasties across 2,359 institutions in the United States from 2017 to 2023. All rapidly available results including age, SF-CRP, alpha-defensin, SF-WBC count, SF-PMN%, SF-RBC count, SF-absorbance (A280), and microbial antigen test results were used as inputs. Delayed results such as culture were not included as inputs. Principal component analysis (PCA) reduced input dataset complexity to five components, which were then used for K-means clustering. These cluster results were then compared to a modified 2018 International Consensus Meeting (ICM) classification.

Results: Unsupervised clustering, based on the rapidly available data from each SF-sample, yielded three naturally occurring groups of synovial fluid samples (Table 1). Cluster 1 (N=15,425) was characterized by 56.9% SF-culture positivity along with markedly elevated biomarker results. Clusters 2 (N=33,324) and 3 (N=18,802) yielded 0.3% and 1.2% SF-culture positivity respectively and were characterized by low biomarker values. When labelling Cluster 1 as “Infected” and Clusters 2 and 3 as “Not-Infected”, concordance with the modified 2018 ICM definition of PJI yielded a sensitivity and specificity of 98.7% (95% CI: 98.5-98.9%) and 98.7% (95% CI: 98.6-98.8%), respectively.

Discussion: Artificial intelligence applied in the clinical laboratory could improve and simplify the diagnostic process by matching complex, criteria-based diagnostic systems, thus reducing the likelihood of human error and democratizing expert-level diagnostic capabilities across a broader range of clinicians.

Conclusion: Unsupervised machine learning techniques can effectively simplify and analyze the multidimensional data from rapidly available SF fluid tests to accurately classify samples, matching a modified 2018 ICM criteria for PJI.

Attachments:

	Culture Positive %	MID Positive %	Mean SF-CRP	Mean AD	Mean WBCs	Mean PMNs	Mean RBCs
Cluster 1	56.9%	79.6%	14.9	2.45	17,276	91.8	23,000
Cluster 2	0.3%	0.5%	0.6	0.08	391	29.2	8,000
Cluster 3	1.2%	6.8%	1.9	0.11	764	43.5	49,000

Session III

1265 Defining Native Vertebral Osteomyelitis: The Quest for a Unified Diagnostic Framework Using a Meta-Epidemiological Approach

Authors: **Petri Francesco**, Omar Mahmoud, Seyed Mohammad Amin Alavi, Said El Zein, Jared T Verdoorn, Ahmad Nassr, Brett Freedman, Mohammad H Murad, Elie F Berbari

Background And Rationale: A significant impediment to advancements in Native Vertebral Osteomyelitis (NVO) research is the absence of a uniform definition. Our study attempts to develop a unified framework of evidence-based diagnostic criteria for this syndrome, aiming to improve research comparability and enhance patient care.

Study Question: What are the diverse definitions of NVO in the literature, and what are the common diagnostic criteria combinations?

Methods: We conducted a comprehensive search into Cochrane, Embase, Medline, and Scopus databases from Jan 2005 to Aug 2023, targeting publications that defined NVO with at least 50 NVO cases. The methodology strictly followed meta-epidemiological studies guidelines adapted from PRISMA. We analyzed all the minimum possible combinations of diagnostic criteria for NVO extrapolated from the definitions provided, organizing them into eight categories and using a saturation method.

Results: After manual screening of 8,460 studies, 171 (2%) were included in the review, covering 21,791 patients. Most of the studies were retrospective (156/171, 91.2%), citing a reference for definition in just 50/171 (29.2%). Only 13/171 (7.6%) studies provided a score. Ninety unique combinations of criteria were identified from the definitions (Figure 1). The most commonly used diagnostic criteria were MRI (157/171, 92%), clinical features (124/171, 72%), and other imaging (118/171, 69%), while histopathology (46/171, 27%) and clinical improvement after treatment (21/171, 12%) were less frequently utilized. Over the years, there was an increased use of all criteria, particularly MRI, microbiology, and histopathology.

Discussion: We showed wide variability of the definition of NVO, overall of low-quality evidence. Three prevalent patterns of combinations of criteria are used: clinical features and imaging; clinical features and imaging and blood cultures; MRI and microbiology. In recent years, MRI and histopathology have been increasingly used across literature, while clinical improvement after treatment did not increase at the same pace, suggesting the need to limit culture-negative cases.

Conclusion: Significant heterogeneity of the definitions for NVO exists, and there is a compelling need for higher-quality evidence. Greater insights on microbiology, imaging and histopathology are needed. This analysis will set the basis for a future Delphi consensus on a universal definition of NVO.

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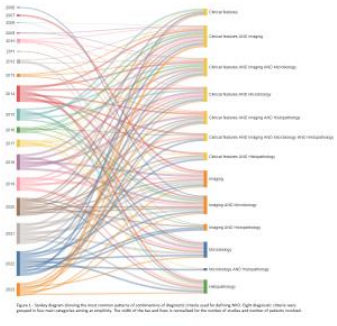

1282 A Decade of Culture-Negative Native Vertebral Osteomyelitis: Insights from the Mayo Clinic

Authors: **Rita Igwilo-Alaneme**, Said El Zein, Ryan Khodadadi, Francesco Petri, Omar Mahmoud, Elie Berbari

Background And Rationale: Culture-negative native vertebral osteomyelitis (CN-NVO) is increasingly common, rising from 0.3 to 1.8 cases per 100,000 between 1995 and 2008. The lack of microbial identification complicates optimal treatment and creates prognostic uncertainties.

Study Question: What are the patient characteristics, treatment modalities and outcomes in patients with CN-NVO?

Methods: We retrospectively analyzed adult patients with radiographic evidence of NVO between January 1, 2011, and July 31, 2021. CN-NVO required clinical indicators such as back pain and fever, elevated inflammatory markers, and negative cultures from at least one spine biopsy. Patients with infected instrumentation were excluded.

Results: Seventy-two patients were included. Their characteristics are presented in Table 1. Most (77.8%) had received antibiotics within the 4 weeks preceding the biopsy. Disc space enhancement on MRI was the primary finding, with the lumbar spine being the most frequently involved (Table 2). Blood cultures were positive in 39.4% of the patients within 3 months of symptom onset. Streptococcus spp. (n=9, median time between positive culture and diagnosis: 6.5 days IQR 2.25, 26.75) and Staphylococcus aureus (n=7, 40 days IQR 37.5, 51.5) were most common. Definitive antibiotics were administered in 98.6% of the cases, primarily IV β-lactam + vancomycin. Oral antibiotics (PO) were used in 46.5% of the patients, primarily as step-down therapy (91%) (Table 3). Surgery was required in 8.5% of the patients for abscess drainage or relief of spinal cord compression. Treatment failure occurred in 9.4% of patients, and 37.5% died during the median follow-up of 568.5 days, with two deaths related to the infection.

Discussion: Our treatment failure rate is similar to other studies, although comparability may be limited by heterogeneity in definitions. Failure rates of CN-NVO appear to be lower than those reported in studies done on microbiologically defined cases. Mortality rates in the range of 6 and 36% have been reported, with the higher end driven mostly by comorbidities.

Conclusion: Patients with CN-NVO often require prolonged antibiotic therapy, typically combination regimens, with favorable treatment outcomes. Enhanced diagnostics and standardized treatment protocols are needed to further improve patient outcomes.

Attachments:

1275 The Diagnostic Accuracy of Molecular Diagnostic Techniques in The Diagnosis of Native Vertebral Osteomyelitis: A Systematic Review and Meta-Analysis

Authors: Omar Mahmoud, Francesco Petri, Said El Zein, Jared T Verdoorn, Audrey N Schuetz, Mohammad H Murad, Ahmad Nassr, **Elie F Berbari**

Background And Rationale: Identifying a microorganism in patients with native vertebral osteomyelitis (NVO) presents diagnostic challenges. Microorganism identification through culture-based methods is constrained by prolonged processing times and sensitivity limitations. This meta-analysis evaluates molecular techniques' diagnostic accuracy on direct specimens from patients with suspected NVO.

Study Question: What is the diagnostic accuracy of molecular techniques for the diagnosis of NVO?

Methods: We searched Cochrane, Embase, Medline, and Scopus from Jan 1970 to Aug 2023. Included studies involved suspected NVO patients undergoing molecular diagnostics – 16S bacterial broad-range PCR followed by Sanger sequencing (16S) and shotgun or targeted metagenomic next-generation sequencing (NGS) – for the detection of bacteria. Our gold standard was a composite clinical and investigator defined NVO diagnosis. Diagnostic performance was assessed using a bivariate random effect model. Risk or bias and diagnostic applicability were evaluated with the QUADAS-2 tool.

Results: After manual screening of 3403 studies, ten studies (five on 16S; five on NGS) covering 391 patients were included. 16S showed 63.6% sensitivity and 86.9% specificity, while NGS 81.7% sensitivity and 59.0% specificity and a diagnostic odds ratio (DOR) of 25.1 and 9.81 for 16S and NGS, respectively. Inspection of summary receiver operating (ROC) curves suggested better test performance for 16S than NGS (Figure 1). Quality assessment via QUADAS-2 criteria showed moderate risk of bias and good applicability. Certainty in estimates was moderate due to sample size limitations.

Discussion: This meta-analysis found low to moderate sensitivity and specificity of molecular methods on direct patient specimens for the diagnosis of NVO. NGS showed superior sensitivity compared to 16S. Despite promise, challenges such as false positives and cost persist, urging standardization and reducing false positives in NGS. Variability in reporting poses limitations.

Conclusion: We showed that 16S broad-range PCR has moderate specificity, and NGS showed a high sensitivity for diagnosing NVO. Therefore, compared to the gold standard, NGS can help rule out the diagnosis, as a complementary test to cultures. Further research is needed to increase standardization across studies.

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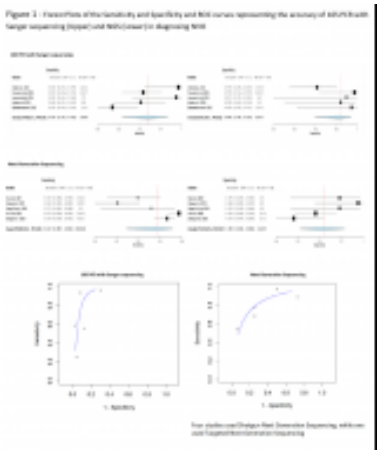


1308 Assessment of Periprosthetic Joint Infection in Revision Shoulder Arthroplasty

Authors: **Mark M Cullen**, Tom R Doyle, Mikhail Bethell, Samuel G Lorentz, Bryan S Crook, Eoghan T Hurley, Thorsten M Seyler, Oke A Anakwenze, Christopher S Klifto

Background And Rationale: In those undergoing revision shoulder arthroplasty, diagnosing periprosthetic joint infection (PJI) poses challenges due to numerous clinical and diagnostic variables. This study aims to evaluate patients undergoing revision shoulder arthroplasty using the 2018 International Consensus Meeting (ICM) criteria for PJI.

Study Question: Can revision shoulder arthroplasties be characterized by the 2018 International Consensus Meeting criteria for PJI? What organisms are most commonly isolated from revision shoulder arthroplasties?

Methods: All revision shoulder arthroplasties performed from July 2013 to January 2024 at a single institution were retrospectively analyzed. Patients were evaluated based on the ICM criteria, and were categorized into definitive, probable, possible, or unlikely infection groups. Positive cultures and identified organisms were documented.

Results: A total of 357 patients underwent revision shoulder arthroplasty. Applying the ICM criteria, 32 (9.0%) were diagnosed as definite PJI, 5 (1.4%) as probable PJI, 29 (8.1%) as possible PJI, and 291 (81.5%) as unlikely PJI. The most common minor criterion was a single positive culture, observed in 51 (14.3%) patients. Positive intra-operative cultures were detected in 98 (27.5%) cases, predominantly C. acnes (16.5%), S. epidermidis (5.3%), and S. aureus (3.4%).

Discussion: The majority of revision shoulder arthroplasties are performed for patients who are unlikely to have a PJI, with less than 10% found to be definite PJI in this study. The most common minor criteria met was a single positive culture. The most common species were C. Acnes and S. Epidermidis, which are known to be slow growing organisms. Thus, it is imperative to initiate appropriate antibiotic coverage for these organisms when PJI is suspected and to follow cultures for a longer duration when there is concern for infection.

Conclusion: The ICM criteria for PJI can effectively characterize revision shoulder arthroplasties. Of those that were culture positive, the most common organisms identified were C. Acnes, S. Epidermidis, and S. Aureus, which is consistent with previous studies on PJI.

Attachments:

There is no figure for this abstract.

1247 A Comparative Analysis of 1.5-Stage and 2-Stage Revision for Periprosthetic Joint Infection after Total Hip Arthroplasty: Is 1.5-Stage Really Equivalent?

Authors: Shayan Hosseinzadeh, Katherine Rajschmir, Jesus Villa, Jorge Manrique, Aldo Riesgo, **Carlos Higuera**

Background And Rationale: Periprosthetic joint infection (PJI) following total hip arthroplasty (THA) traditionally received treatment through the gold standard of 2-stage revision surgeries. However, recent trends have shown a shift towards alternative methods like the 1.5-stage revision, particularly in high-risk patients. This shift arises from concerns regarding the substantial morbidity, mortality, and psychological impact associated with the conventional two major surgeries. Given the increasing adoption of the 1.5-stage revision, our study aims to compare its re-revision rate with the conventional 2-stage revision.

Study Question: Is there a difference in early re-revision rates between the 1.5-stage and 2-stage revision surgeries for PJI following THA?

Methods: We conducted a retrospective review of medical records from patients who underwent revision THA (rTHA) due to PJI between 2019 and 2023 at our institution (Table 1). We collected patient-related variables, operative details, and adverse outcomes for both groups. The primary outcome assessed was the re-revision rate during the study period for both groups. Statistical analysis included t-tests and chi-square tests to compare groups, followed by a logistic regression model for re-revision prediction.

Results: A total of 77 patients who underwent rTHA for PJI were included in the study, with a mean follow-up duration of 56.4 ±15.9 months. The re-revision rates were found to be 28.9% in the 1.5-stage group and 10.3% in the 2-stage group (P=0.038). Additionally, the 1.5-stage group exhibited an overall higher ASA level (P<0.001) and a higher incidence of polymicrobial infections (23.7 vs 5.1%, P=0.020). Operative time (508±74 vs 271±73 minutes, P<0.001) and length of follow-up (945±476 vs 458±339 days, P=0.002) were significantly higher in the 2-stage group. Furthermore, the 1.5-stage revision was identified as an independent predictor of more re-revisions in the regression model (P<0.001).

Discussion: While we recognize the potential benefits of the 1.5-stage strategy in reducing operative time and associated risks by minimizing surgeries, the observed higher re-revision rates emphasize the need for careful patient selection and further investigation into optimizing treatment approaches for this challenging condition.

Conclusion: The re-revision rate for periprosthetic joint infection following total hip arthroplasty is higher in th

Attachments:

1355 Lower Reported Success Rate of 2-Stage Revision for Total Hip Arthroplasty at a Prosthetic Joint Infection Specialty Referral Center: Treating "The Worst of the Worst"

Authors: Nicholas Tubin, **Hesham Abdelbary**, George Grammatopoulos, Paul Beaule, Simon Garceau

Background And Rationale: Two stage revision arthroplasty is the gold standard for the treatment of chronic prosthetic joint infections (PJI) following total hip arthroplasty (THA). Currently, there is limited literature highlighting the results of specialty PJI referral centers treating "the worst of the worst".

Study Question: 1. To report the results of two stage revision for THA PJI at our PJI specialty referral center. 2. To identify factors associated with two stage revision failure in THA PJI.

Methods: Sixty-seven patients with minimum 2-year follow-up having undergone two stage revision for THA PJI at our institution between 2007 and 2021 were identified: Mean age of 70 (SD: 11.9); 37 (SD: 55.2) males; 30 (SD: 44.8) females, mean BMI: 29.9 (SD: 6.4). 21% PJIs had virulent organisms defined as: polymicrobial/Fungal, MRSA, enterococcus & gram -ve species. Treatment failure was based on the Tier 1 International Consensus Meeting definition of infection control. Independent Student T-test was used to compare means and Mann-Whitney U test was used to compare medians. Chi-square test or Fisher's Exact test was used to examine the differences between categorical variables.

Results: Overall success rate was 57% (38/67) at a mean follow-up was 8.6 years SD = 4.3. Virulence of the causative microorganisms was associated with treatment failure ($p = 0.038$) with only a 35% success rate. There were no demographic parameters associated with treatment outcome. Time from primary replacement to failure, and time between 1st stage and 2nd stage reimplantation was not associated with treatment outcome. Type of spacer along with the specific antibiotics added to cement were not associated with treatment outcome.

Discussion: Two Stage revision arthroplasty remains a lengthy and morbid treatment option. The results of this study suggest that success rates at specialty PJI referral centers treating the “worst of the worst” may be lower than what is reported in the literature and should be further analyzed. Such elevated failure rates highlight the urgent need for enhancement of regional PJI delivery of care.

Conclusion: Outcomes of two stage revision for THA at specialty PJI referral centers may be significantly lower than what is reported in the overall literature. Further enhancement of regional, multidisciplinary PJI care models is needed.

Attachments:

There is no figure for this abstract.

1256 Utilization of Dalbavancin for Periprosthetic Joint Infections: A Single Institution Experience in North America

Authors: Peter P Hsiue, Mia J Fowler, Shay I Warren, Michael Henry, Andy O Miller, **Alberto V Carli**

Background And Rationale: Periprosthetic joint infection (PJI) is a devastating complication following total joint arthroplasty. Gram-positive bacteria, which are the leading cause of PJI, are typically treated with vancomycin or daptomycin, which often require outpatient parenteral therapy. Dalbavancin, a novel lipoglycopeptide antibiotic with broad activity against Gram-positive bacteria, possesses a longer half life (~14 days), and therefore requires less frequent dosing. Very few studies have evaluated the use of dalbavancin in PJI.

Study Question: The purpose of this study is to describe the utilization of dalbavancin for PJI at a single institution in North America.

Methods: Pharmacy records were retrospectively evaluated. Intravenous dalbavancin was used in 55 cases following an orthopaedic procedure for infection, of which 18 (32.7%) were for PJI and were retained for review. Details regarding antibiotic use, including the dose, treatment length, and the use of additional antibiotics was collected. Patient demographics, surgical details, and infecting organism characteristics were recorded. Medical records were reviewed for outcomes of interest including complications related to dalbavancin use and recurrence of infection.

Results: Eighteen patients received dalbavancin to treat PJI, including 8 knees and 10 hips. The cohort had a mean age of 66 years old, was 40% female, and had a mean follow-up of 456 days (range 104-1060 days). Surgical procedures prior to dalbavancin included 5 debridement, antibiotics, and implant retention (DAIR) procedures, 4 explants with spacer placement, 3 spacer exchanges, 2 reimplantations with positive cultures, and 4 single-stage revisions. Twelve cases were attributed to a single organism, 5 were polymicrobial, and 1 was culture negative. The most common indication for dalbavancin use was to avoid a PICC line (12 patients 67%). Sixteen patients (89%) were infection free at final follow-up, with 12 (67%) on chronic oral antibiotic suppression. No severe or treatment-limiting side effects were observed.

Discussion: In our case series of 18 patients who received dalbavancin for PJI, infection control was achieved in 89% of patients without dalbavancin allergy or significant toxicity.

Conclusion: Given the improved convenience, safety, and efficacy of dalbavancin, future studies are warranted to prospectively compare dalbavancin to comparable antibiotics for Gram-positive PJI treatment.

Attachments:

There is no figure for this abstract.

Session IV

1343 Enhancing Predictive Precision: Onodera’s Prognostic Nutritional Index Outperforms Serum Albumin in Predicting Infection Risk After TKA

Authors: Alisina Shahi, **Kenneth Mathis**, David Rodriguez-Quintana, Ali Oliashirazi, Adam Freedhand, Robert Frangie

Background And Rationale: The assessment of nutritional status before total knee arthroplasty (TKA) is crucial for predicting postoperative outcomes. The ideal marker for evaluating nutritional status remains uncertain. Traditional markers such as serum albumin have been used, but recent studies suggest that Onodera's prognostic nutritional index (OPNI) may offer superior predictive accuracy due to its incorporation of both serum albumin levels and lymphocyte count. The utility of OPNI in predicting early complications after TKA and how it compares to serum albumin levels is yet to be fully understood.

Study Question: What is the utility of OPNI in predicting early complications following TKA? How does the predictive accuracy of OPNI compare to serum albumin levels?

Methods: This prospective study evaluated primary TKAs. The OPNI was measured in patients within 14 days of surgery. Complications were assessed for 12 weeks from surgery and included prosthetic joint infection (PJI), wound complications, re-admission, and re-operation. The Youden's index was used to determine the cut-off for OPNI and albumin. A multivariate regression model was also performed using the Charlson comorbidity index to compare the outcomes using OPNI and albumin levels as independent variables.

Results: Overall, 1,325 patients (562 males, 763 females) were included in the study. OPNI cutoff score of 45.1 was determined as the optimal threshold. Patients with lower OPNI (<45.1) were 9.8 times more likely to develop PJI compared to patients with higher OPNI (p=0.001). Re-admission and re-operation rates were 4.6 and 4.2 times higher in patients low OPNI ($p = 0.017$ and $p = 0.005$, respectively). These complications remained statistically significant in multiple regression analysis. Unlike OPNI, albumin failed to show a significant association with complications (cutoff: 38.2 g/L, p=0.92). Moreover, 27% of patients who had normal albumin, but low OPNI developed complications.

Discussion: OPNI emerges as a robust predictor, reflecting nutritional status and metabolic balance, with superior predictive power. It outperforms conventional markers, aiding in risk assessment and delineating anabolic versus catabolic states.

Conclusion: Given the superior performance of OPNI, we advocate its use over serum albumin in preoperative risk assessment for TKA patients. Screening with OPNI, especially below 45.1, optimizes risk evaluation.

Attachments:

There is no figure for this abstract.

1276 Efficacy and Limitations of a Web-Based Septic Arthritis Calculator in Urban Trauma Care

Authors: **Ryan Serbin**, Joseph Burger, Sarah Welch, Ashley Duncan, Susan Odum, Meghan K Wally, William Lack, Madhav A Karunakar, Rachel B Seymour

Background And Rationale: Diagnosis and management of septic knee arthritis demands a balance of accuracy, timeliness, and resources. While patient history, physical exam, and labs remain foundational, tools to improve decision-making are needed. The web-based calculator (Holzmeister et al.) gives a quantifiable approach when evaluating for septic arthritis.

Study Question: How useful is a web-based calculator for offering a quantifiable approach to evaluating septic knee arthritis?

Methods: 412 septic joint consults were analyzed at a Level 1 Trauma Center, with 125 meeting inclusion criteria (age >18 and underwent knee arthrocentesis). Newman's criteria were used for definitive septic arthritis diagnosis. The web-based tool variables (knee pain duration, white blood cell count, crystal presence, positive gram stain, septic arthritis history, and knee effusion) were used in a logistic regression model to calculate septic arthritis probability. A receiver operator characteristic (ROC) cutpoint analysis determined the optimal threshold value of calculated risk and diagnostic accuracy.

Results: 46 patients were negative and 76 were positive for septic arthritis. Diagnostic criteria was positive intraarticular culture (71%), operative purulence (24%), recurrent symptoms leading to diagnosis (4%), and organism isolated elsewhere (1%). Median calculator probability was 79.1% (IQR69.3, 99.5%) in septic patients and 4.2% (IQR 1.5, 69.5%) in uninfected patients. The ROC-derived optimal cutpoints for septic and uninfected were probabilities of 35.8% (sensitivity 96%, specificity 13%, 1 false positive (FP), 8 false negative (FN)) and 94.0% (sensitivity 89%, specificity 2.1%, 6 FP, 3 FN) for a correct classification rate of 93% for both.

Discussion: Median calculator probability was high for confirmed septic cases and low for uninfected cases, suggesting the calculator distinguishes between both groups. Cutpoints of 35.8% (uninfected) and 94% (infected) would be reasonable thresholds for clinical decision making as it would correctly classify 93% of cases.

Conclusion: This study shows a web-based calculator as a supportive tool in evaluating for septic arthritis, while emphasizing the need of further refinement and testing. Results suggest the calculator's suitability as a supplementary tool in the decision-making process for septic arthritis, along with thorough clinical evaluation.

Attachments:

There is no figure for this abstract.

1245 Bacteriophage Dosing and its Effect on Bacterial Suppression in a Staphylococcus Epidermidis Model: An In Vitro Study

Authors: **Jason Young**, Mohamad J Shariati, Ahmad H Razavi, Ara Nazarian, Edward K Rodriguez

Background And Rationale: Treating prosthetic infections involves addressing bacterial biofilms, with phages emerging as a potential therapy. Challenges include an incomplete understanding of optimal phage dosing. Some studies suggest higher dosing reduces bacterial persistence, while others posit high phage dosing elicits selective pressure accelerating resistance development.

Study Question: Our in vitro study assesses how phage dosing (Multiplicity of Infection, MOI) impacts bacterial growth in planktonic and biofilm conditions using a Staphylococcus Epidermidis (S. Epi) model. We hypothesize that higher phage dosing is associated with greater bacterial growth suppression.

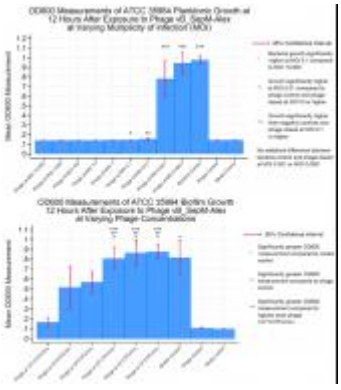
Methods: For our planktonic assay, S. Epi ATCC 35984, a known biofilm forming strain, was combined at exponential phase with phage vB_SepM-Alex, an obligate lytic phage specific to S. Epi, at varying concentrations. Bacterial growth was tracked over 12 hours using a spectrophotometer (SP) calibrated to ATCC 35984 growth. For our biofilm assay, ATCC 35984 was grown in 96-well polystyrene plates for 48 hours and subsequently exposed to 1) phage at various concentrations, 2) vancomycin at 15 micrograms per mililiter (mL), or 3) both. Plates were washed and stained with 0.1% crystal violet and spectrophotometer readings taken at 12 hours. Kruskal-Wallis Tests with Dunn's pairwise comparisons were performed with Bonferroni corrections to assess differences in planktonic and biofilm bacterial growth at 12 hours post-phage exposure. Alpha was set at 0.05.

Results: In our planktonic analysis, bacterial growth was significantly higher when MOI<=0.01 compared to MOI>=10 ($p<0.05$). In our biofilm analysis, wells with phage dosing at <=10^4 plaque-forming units (PFU)/mL had significantly greater SP readings than those dosed at 10^10 PFU/mL ($p<0.05$). No differences in mean SP readings were observed between various phage doses when given with vancomycin.

Discussion: Our planktonic and biofilm assays support the idea that higher applied phage doses are associated with lower levels of detectable bacteria at 12 hours compared to lower doses.

Conclusion: Our findings suggest lower, not higher, phage dosing is associated with greater bacterial persistence. However, differences in phage doses do not impact bacterial levels when co-administered with antibiotics. Our study helps inform dosing and delivery of this novel form of antibiosis.

Attachments:



1225 Mononuclear Phagocyte Gene Expression Suppresses the Neutrophil Response and May Obscure the Accurate Diagnosis of Infection

Authors: **Derek F Amanatullah**, Robert Manasherob, David W Lowenberg, William J Maloney, Stuart B Goodman

Background And Rationale: Diagnosing infected joint replacements relies heavily on assessing the neutrophil response to bacteria. Bacteria form biofilms on joint replacements. Biofilms are sessile bacterial communities encased in a protective extracellular matrix making them notoriously difficult to culture, remarkably tolerant to antibiotics, and able to evade phagocytosis. Phagocytosed bacteria dramatically alter local cytokine production and compromise antigen presentation.

Study Question: We hypothesize that a subset of joint replacements may harbor a dormant infection that suppresses the neutrophil response to bacteria but can be identified by the mononuclear phagocyte systems response to residual biofilm.

Methods: Single cell RNA sequencing of the cellular transcriptome was performed on periarticular tissue collected from 4 knee replacements with a infection and 3 knee replacements without an infection as well as 6 knee replacements with a prior infection deemed "infection-free" by the 2018 MSIS criteria (follow-up of 24 +/- 3 months).

Results: Comparing the single cell RNA profile of the local tissue from joint replacements with (positive control: n=4, ESR: 82 +/- 30 m/h, CRP: 12.7 +/- 14.3 mg/dL, sWBC: 403,690 +/- 571,843 cells/mL, PMN%: 93 +/- 4%, alpha-defensin: 100%, culture: 100%) and without an active infection (negative control: n=3, ESR: 15 +/- 17 mm/h, CRP: 0.5 +/- 0.8 mg/dL, sWBC: 853 +/- 731 cells/mL, PMN%: 17 +/- 8%, alpha-defensin: 0%, culture: 0%) as well as joint replacements with a prior infection deemed “infection-free” at a mean follow-up of 24 +/- 3 months (n=6, ESR: 12 +/- 9 mm/h, CRP: 1.1 +/- 1.0 mg/dL, sWBC: 488 +/- 424 cells/mL, PMN%: 34 +/- 23%, alpha-defensin: 0%, culture: 0%) revealed a persistent mononuclear phagocytic response within half of joint replacements deemed “infection-free” prior to re-implantation that closely resembled an active infection ($p=0.843$) in the absence of neutrophil recruitment ($p<0.001$) but was statistically distinct from uninfected joint replacements ($p<0.001$) (Figure 1).

Discussion: The local cellular response to a dormant infection at the time of surgery failed to trigger the neutrophil response required to diagnose an active infection leading to the erroneous characterization as “infection-free” prior to re-implantation.

Conclusion: Joint replacements characterized as uninfected may harbor dormant infections that can suppresses the neutrophil response.

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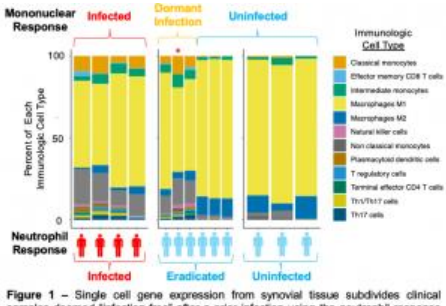

Figure 1 – Single cell gene expression from synovial tissue subdivides clinical samples deemed “infection-free” after a prior infection using the neutrophil response (blue text) into two subpopulations one with no infection and another with a dormant infection (yellow text) that appears more like active infection (red text). One patient with a dormant infection a reinfection after reimplantation (red star).

1286 Assessment of implant-associated host cell response reveals distinct immune cell populations

Authors: **Bailey Fearing**, Sarah Romereim, Matthew Smykowski, Susan Odum, Rachel B Seymour, Joseph R Hsu

Background And Rationale: The mechanism by which host cells respond to coated implants in humans is not well known. Recent work has shown the importance of facilitating a robust host cell response, indicating the first week after implant placement is critical for host cell attachment and protection from biofilm formation. We utilize external fixator (ex-fix) pins as a model of human host cell implant attachment to investigate the effect of localized antibiotics on cell phenotype and inflammatory response toward the goal of preventing implant-associated infections.

Study Question: What is the effect of localized antibiotics on preventing implant-associated infections?

Methods: Patients were consented for collection and of ex-fix pins and blood samples. Data captured from EHR included demographic, injury characteristics, treatment information, and documentation of complications including infection. Upon removal, ex-fix pins were treated with an enzymatic solution for isolation of adherent cells. Resulting implant-adherent cell population was stained for flow cytometric analysis. Cells were separated based on CD45 staining, and then analyzed for surface expression of CD90 (stem cells, fibroblasts), CD11b (monocyte, macrophage), or CD68 (macrophage).

Results: Using a CD45 parent gating strategy, a primarily haematopoietic cell lineage response was observed as host cell responder attachment cells. Cell populations were identified as (1) fibroblasts (CD45-/CD90+), (2) fibrocytes (CD45+/CD90+), (3) innate lymphoid (CD45int/CD90bright), and (4) leukocytes (CD45+/CD90-). The latter group comprised three subgroups of monocytes (CD11bbright/CD68-), macrophages (CD11bint/CD68+), and other leukocytes. Of the major cell-types, leukocytes represented ~75%, followed by fibroblasts (~17%). Leukocytes included ~55% monocytes and 15% macrophages.

Discussion: Leukocytes were comprised mainly of monocytes and macrophages. These play key roles in the inflammatory response and may be effective at reducing implant associated infections.

Conclusion: The study observed distinct local immune populations on the surface of orthopaedic implants. Over 75% of the haematopoietic cells on the surface of the ex-fix pins had differentiated into monocytes and macrophages. These data provide further guidance for development of local antibiotic coatings and applications to prevent bacterial attachment and promote host integration regarding orthopaedic implant-associated infections.

Attachments:

There is no figure for this abstract.

Session V

1280 Applications and outcomes of physician-directed antibiotic-loaded cement and calcium sulfate in orthopaedic surgeries: a retrospective study

Authors: **Bailey Fearing**, Sarah Romereim, Komi E Afetse, Elaina Ball, Ziqing Yu, Benjamin Averkamp, Rodney Y Arthur, Rachel B Seymour, Joseph R Hsu

Background And Rationale: Surgical site infections (SSIs) in orthopaedic trauma patients continue to be a widespread problem despite perioperative delivery of systemic antibiotics. Antibiotic-loaded calcium sulfate (CS) or bone cement (BC) can deliver locally high doses of antibiotics and osteoconductive materials. This study shows the incidence and nature of these antibiotic delivery strategies and associated outcomes.

Study Question: Are antibiotic-loaded cement and calcium sulfate viable solutions to reducing SSIs?

Methods: Retrospective review was conducted of patients (≥18 years) with musculoskeletal injuries over an 8-year period (2010–2018) to orthopaedic trauma services at the Atrium Health Level 1 trauma center. Patients requiring surgical intervention with implants including the use of antibiotic-loaded BC and/or CS were included. Demographic data, injury characteristics, treatment, and post-operative outcomes were collected.

Results: Study surgeries (n=204) used antibiotic-loaded CS and/or BC to treat existing infections (n=113) or prophylactically (n=91). BC was used most often ($p<0.0005$) prophylactically (80%) vs. for infection-treatment (53%). The frequency of BC and CS application format (beads, implant coating, formed into nail, space filler) was different ($p<0.0005$). The antibiotics selected were different ($p<0.0005$) with vancomycin plus gentamicin most often mixed into CS and vancomycin, gentamycin, and tobramycin the most common BC combination. For prophylactic cases, subsequent infection occurrence was more common for CS (n=91, $p<0.05$), and the time between surgery and infection diagnosis wasshorter for CS (n=28, $p<0.05$). There were more antibiotics complications reported but fewer implant failures in CS cases ($p<0.05$) For cases treating pre-existing infections, there were no differences in complications between CS and BC.

Discussion: We determined infection was more likely after prophylactic antibiotic-CS use than antibiotic-BC use even though no differences were detected in patient risk factors. However, the application method and antibiotics used varied between the two groups.

Conclusion: With the increasing utilization of antibiotic-loaded CS and BC, it is important to document application methods and track patient outcomes associated with specific techniques. Our results suggest antibiotic-BC might be more effective at reducing infection; however a definitive trial is needed.

Attachments:

There is no figure for this abstract.

1324 Evaluating the Safety and Efficacy of Low-dose Chlorhexidine Gluconate Irrigation for Open Fracture Management

Authors: Kyle Auger, Ian S Hong, Nicole Badalyan, Christian Zapf, Daniel R Dziadosz, Frank A Liporace, Richard S Yoon, **Jaclyn M Jankowski**

Background And Rationale: Open fractures(openFx) pose a high risk for surgical site infections(SSI). Previous literature has reported up to 7.4%and17.3% readmission rates at 30-and90-days respectively and infection rates as high as 15% within 90days have been observed. Despite this recognized risk, there is currently no consensus on the optimal wound irrigation solution to minimize SSI risk.

Study Question: Does 0.05%low-dose chlorhexidine gluconate wound irrigation and lavage minimize the incidence of SSIs and related complications in the management of openFx? What is the safety and efficacy of CHG wound irrigation in openFx?

Methods: Institutional fracture registry was queried identifying all openFx patients aged>=18years that received intraoperative wound irrigation and lavage utilizing CHG between 2020-2023. Patients with incomplete medical records and ≤6month follow-up were excluded. Baseline demographics, perioperative, and postoperative outcomes were reported.

Results: Forty-one pts(61%male;24%smokers;22%diabetes) avgAge:48±21.3yrs met inclusion criteria. Majority were GAclassification typeII(37%) and typeIIIa(29%). Open tibial shaftFx(24%) were the most common diagnosis, followed by openAnkleFx(17%),and openAnkleFx-dislocations(10%). Flap reconstructions were used for coverage in 10%of pts with the majority being free flaps(75%). Postoperatively, 17% were seen in the emergency department(ED)≤30days and 5%readmission rate. Within90days, 2pts were seen in the ED and 1readmitted for ex-fix pin site pain. Soft tissue complications were observed in 15%cases;7%managed conservatively with oral antibiotics(5%-delayed wound healing and drainage,2%-cellulitis) and 7%necessitating return to OR(5%-complete wound dehiscence,2%-necrosis requiring amputation). Reoperations within 1yr were seen in 6/41(15%)pts:failure-of-fixation(2%),complete wound dehiscence(5%),septic arthritis(2%),nonunion(2%),and amputation(2%).

Discussion: Despite the high-risk patient profile, CHG irrigation was associated with relatively low soft tissue complications and reoperation rates within 1year. The readmission rates at 30- and 90-days were lower than previously reported rates, suggesting that CHG may mitigate short term complications.

Conclusion: Although SSIs were mitigated,17% were seen in the ED=<30days and 5% were readmitted. While CHG can potentially reduce infection risk, it does not eliminate the need for close postoperative care and monitoring.

Attachments:

There is no figure for this abstract.

1235 Does prophylactic antibiotic strategy affect outcomes of type III open fractures?

Authors: Joseph Cohen, Hobie D Summers, Robert Hand, **Aaron Hoyt**, Andrew D Marten, Carlo Eikani, Ashley E Levack

Background And Rationale: Historically, cefazolin and gentamicin has been the antibiotic strategy of choice for Gustilo-Anderson (GA) Type III open fractures. More recently, there has been a shift towards alternative prophylactic strategies to reduce the risk of toxicity associated with gentamicin use. The purpose of this study was to compare rates of fracture-related infection (FRI) and nonunion for type III open fractures receiving peri-operative ceftriaxone (CTX) alone versus cefazolin and gentamicin (C/G).

Study Question: Does prophylactic antibiotic strategy affect outcomes of type III open fractures?

Methods: Patients with type III open fractures of the lower extremity were identified from a single academic level I trauma center from 2005 - 2022. Patients were included if they received prophylaxis with either CTX or C/G perioperatively. Electronic medical records were reviewed to obtain patient demographics, comorbidities, smoking status, fracture characteristics, and outcomes of FRI and nonunion. Univariable and multivariable logistic regressions were used to estimate the association between antibiotic strategy and the odds of experiencing each outcome, with and without adjusting covariates of sex, GA classification, BMI, diabetes, smoking status, and whether the fracture was staged with an external fixator.

Results: 158 patients were included: 76 receiving CTX and 82 receiving C/G. The CTX group had more GA IIIA fractures (75%) compared to the C/G group (35.4%, p=0.0001). Mean number of debridements was higher in the CTX group (3.6 vs 1.8, p=0.001). The C/G group had a higher percentage of patients with infection (40.2%) and nonunion (26.8%) compared to the CTX group (10.5%, 9.2%, and 14.5% respectively). On multivariable regression, patients receiving C/G had an estimated 3.78 times higher odds of infection when compared to ceftriaxone when adjusting for GA classification (95% CI: 1.49, 9.54; p=0.0049). The odds of nonunion were 2.83 times greater for the C/G group when adjusting for BMI and external fixation status (95% CI: 1.09, 7.73; p=0.033).

Discussion: CTX offers lower infection and non-union rates ($p<0.05$).

Conclusion: Our multivariable analysis adjusting for fracture severity demonstrates that ceftriaxone is an acceptable prophylactic strategy for type III open fractures compared to cefazolin with gentamicin. This strategy may result in lower infection and nonunion rates, with fewer drug-related toxicities compared with historical strategies.

Attachments:

There is no figure for this abstract.

1271 Plasma Microbial Cell-free DNA Next-generation Sequencing can be a Useful Diagnostic Tool in Patients with Osteoarticular Infections

Authors: **Francesco Petri**, Omar Mahmoud, Said El Zein, Omar Abu Saleh, Elie F Berbari

Background And Rationale: The introduction of shotgun metagenomic sequencing (sMGS) methods that identify the presence of microbial cell-free DNA (mcfDNA) in peripheral blood has shown promising results in various patient populations. However, there is a pressing need to evaluate their application for osteoarticular infections (OAIs) in a real-world setting.

Study Question: What is the real-world usefulness of mcfDNA sMGS for the diagnosis and clinical management of OAIs?

Methods: We retrospectively collected data on adult patients who presented to the Mayo Clinic with suspected OAIs between 2019 and 2023 and for whom mcfDNA sMGS (Karius®, KT) testing was part of their diagnostic workup. The primary objective was to evaluate KT's clinical impact on OAI diagnoses and management, distinguishing into four categories: (1) KT was able to confirm an established diagnosis, (2) KT supported a non-ID diagnosis, (3) KT established an unsuspected diagnosis, (4) KT did not add relevant information.

Results: In our cohort, KT was performed on 73 patients. KT yielded positive results among the infected individuals in 22/43 (51.2%) cases. Out of these 22 cases, 11 (50%) showed agreement with conventional diagnostic workup, while in five (22.7%) cases, the KT established an unsuspected diagnosis, improving the diagnostic power from 11/43 (25.6%) to 16/43 (37.2%). We yielded a negative result in 19/26 (73.1%) patients with non-infectious diagnoses (Figure 1). Native Vertebral Osteomyelitis (NVO) diagnosis ($p < 0.001$) or OAIs with concomitant presence of endocarditis or endovascular infection ($p = 0.005$) were statistically associated with a definite, probable, or possible diagnostic certainty of KT result. Overall, KT influenced antibiotic therapy in six cases (8.2%).

Discussion: This is the first retrospective study aiming to assess the real-world usefulness of KT in the clinical management of patients with OAIs, with a special focus on NVO. It underscores KT's real-world application in cases where traditional diagnostic methods fall short. KT revealed unexpected diagnoses in 5 cases, showcasing its potential to identify atypical pathogens. However, careful diagnostic stewardship is essential.

Conclusion: In highly complex OAI cases, KT added 11.6% to the diagnostic power by establishing unsuspected diagnoses, particularly aiding diagnosis in patients with NVO or OAIs and concomitant endocarditis or endovascular infections.

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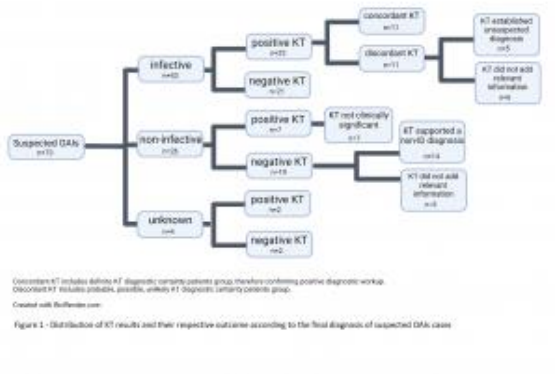

1283 Infectious Diseases Pharmacists Review of Post-Discharge Musculoskeletal Infection Microbiology Results

Authors: **Margaret Pertzborn**, Amy Van Abel, Kristin Cole, Trudi Lane, Douglas Osmon, Diana Schreier, Hilary Teaford, Courtney Willis, Anna Woods, Christina River

Background And Rationale: Post-discharge microbiology result review has yet to be described for musculoskeletal (MSK) infections. Awaiting final microbiology results can impede timely patient discharge. However, discharging patients while microbiology results are pending may result in suboptimal therapy or lost opportunity for additional testing/follow up. We implemented a novel process utilizing a custom report in the electronic medical record (EMR) to identify microbiology tests resulting post-discharge.

Study Question: What is the impact of infectious disease (ID) trained pharmacists review of post discharge microbiology results in MSK infections?

Methods: This retrospective descriptive cohort study included adult patients (>18 years of age) at 4 sites within Mayo Clinic from 1/1/2019 to 2/28/2023. Eligible patients had a hospitalization with an ID consult and an abnormal microbiology result from a site commonly associated with MSK infection reviewed by an ID pharmacist after discharge. The details of pharmacist-initiated interventions based on the microbiology result review were identified by an EMR based report.

Results: A total of 1662 patient encounters with at least 1 MSK infection related microbiology result reviewed post-discharge were identified. Patients were 38% female with a mean age of 61.2 years, predominantly white, and most patient encounters were from the Minnesota region. Of these patients, 592 (35.6%) had at least one pharmacist intervention. A random sample of approximately 10% of the intervention cohort (N=60) was further analyzed. The most common interventions included: therapy modification (35%), requesting further antimicrobial susceptibility (18.7%), and facilitation of result review with the primary ID team (ID consultant, fellow, or APP) (16.7%). Severity of interventions made are outlined in Figure 1.

Discussion: This is the first study to describe post-hospital discharge microbiology results from MSK infections reviewed by ID pharmacists. Our study found that over 35% of microbiology results resulted in an intervention by ID trained pharmacists, illustrating the substantial utility of these reviews.

Conclusion: For patients with MSK infections seen by an inpatient ID consult service, a post-hospital discharge microbiology result review process performed by ID trained pharmacists effectively addressed abnormal results during the transition of care.

Attachments:

Figure 1. Severity of Pharmacist Intervention

1335 Comparative Analysis of a Polymerase Chain Reaction Infection Panel Versus Conventional Culture Techniques in Patients with Presumptive Joint Infection

Authors: **Anzar Sarfraz**, Guiqing H Wang, Caitlin Otto, Ran Schwarzkopf, Vinh P Pham, Vinay K Aggarwal

Background And Rationale: Musculoskeletal joint infection (JI) remains a diagnostic challenge, with increasing efforts being made in developing more efficient diagnostic methods to identify the causative pathogens. While conventional culture remains the standard for identification of causative pathogens in JI, rapid identification techniques such as polymerase chain reaction (PCR) are becoming increasingly popular with little comparative data available for analysis.

Study Question: Our study aims to explore the efficacy of a specific PCR analysis compared to culture of synovial fluid aspirates in detecting the causative organisms.

Methods: A retrospective study of 1,560 patients suspected for joint infection (including native and prosthetic) at a single, urban academic health institute was conducted. Between Dec 2022 and January 2024, 2,263 synovial fluid specimens were collected, out of which 1,982 were sent for cultures and 281 were sent for BIOFIRE joint infection PCR (JIPCR). 219 out of 281 specimens were sent for both cultures and JIPCR. Specimens were compared for culture and JIPCR positivity or negativity, and causative infective organisms were analyzed via chart review.

Results: Of the specimens sent for both cultures and JIPCR, 48/219 (21.9 %) were positive by JIPCR and 43/219 (19.6 %) were positive by cultures. The JIPCR panel demonstrated a positive percent agreement (PPA) of 81% with cultures. Of the eight pathogens not detected by JIPCR, five were not part of the JIPCR panel. The JIPCR identified additional bacterial pathogens that didn't show growth in cultures. The JIPCR demonstrated a negative percent agreement (NPA) of 92%. The median turn-around time (TAT) was 73 hours for positive cultures and <24 hours for JIPCR, respectively.

Discussion: The BIOFIRE JIPCR test showed utility in effectively diagnosing joint infections in our study. Although not a comprehensive organism panel, as demonstrated by inability to detect certain organisms such as coagulase-negative Staph species, there are also a subset of certain infections that JIPCR likely picked up that were otherwise culture negative.

Conclusion: The high concordance between the JIPCR and conventional culture techniques suggests that PCR may be added as an adjunctive diagnostic tool. PCR's advantage of rapid turnaround time can be helpful in timely optimization of antibiotic therapy.

Attachments:

1226 Pediatric clavicular osteomyelitis: radiographic appearance guides evaluation

Authors: **Jessica D Burns**

Background And Rationale: Chronic noninfectious osteomyelitis (CNO) referred to as chronic recurrent multifocal osteomyelitis (CRMO), is an uncommon condition, but is relatively more common in the clavicle. The condition is treated medically and does not require open orthopaedic surgical intervention. The purpose of this study was to quantify, describe, and compare CNO of the clavicle to clavicular acute hematogenous osteomyelitis (AHO) and other clavicular lesions in pediatric patients presenting to a tertiary care referral center.

Study Question: What are the similarities and differences in demographics, radiographic appearance, diagnosis and treatment between noninfectious and infectious osteomyelitis of the clavicle in children?

Methods: This is a retrospective review of pediatric patients at tertiary care referral center from 2008-2024 presenting with lesions of the clavicle who underwent formal evaluation with advanced imaging and/or biopsy. The demographics, radiographic characteristics, laboratory analyses, and treatment course of these patients were reviewed. A new radiographic sign was developed.

Results: A total of 24 patients with clavicular lesions were identified, 12 with CNO, 7 with acute hematogenous osteomyelitis (AHO), and 5 with another diagnosis (2 aneurysmal bone cyst, 2 Langerhans cell histiocytosis, and 1 fibrous dysplasia). In the CNO cohort, 11/12 (91.7%) of the patients were female compared to 2/7 (28.6%) in AHO ($p = 0.004$). C-reactive protein (CRP) was elevated in 6/7 (85.7%) of AHO patients but only 3/11 (27.3%) of those with CNO ($p = 0.02$). Open orthopaedic surgery occurred in 7/12 (58.3%) of CNO patients. There were 4/7 (57.1%) immunocompromised patients in the AHO group with atypical AHO microbiology. CNO clavicular lesions had similar radiographic presentation including medical clavicle bony expansion, sclerosis, and chronic remodeling, defining the “platypus sign.”

Discussion: Adult clavicular osteomyelitis also shows a higher incidence of noninfectious etiology than other anatomic areas. The pathogens in this group of 7 AHO patients showed a high incidence of atypical pathogens.

Conclusion: CNO of the clavicle was nearly twice as common as AHO in children who underwent evaluation for a clavicular lesion. CNO patients were more likely to be female, less likely to have an elevated CRP and many were treated with open surgery. Orthopaedic surgeons should recognize the platypus sign to properly direct diagnosis and treatment modalities.

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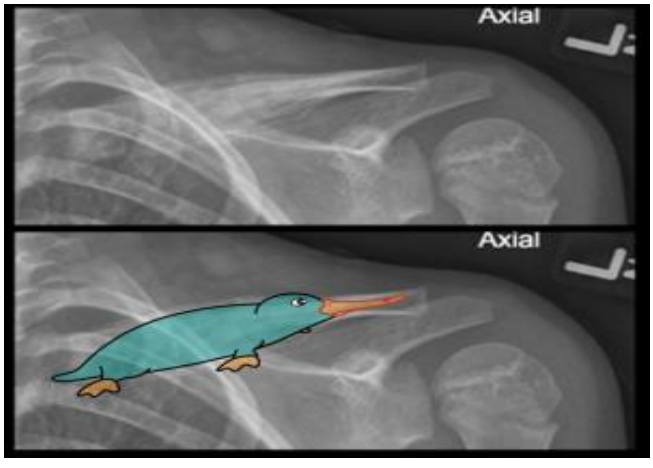

Session VI

1229 Longer Antibiotic Duration Is Protective Against Repeated Periprosthetic Joint Infections

Authors: **Richard Chao**, Scott Rothenberger, Andrew Frear, Brian R Hamlin, Brian A Klatt, Neel B Shah, Kenneth L Urish

Background And Rationale: Our previous retrospective study suggested extended antibiotics following DAIR decreased failure rates and were not associated with increased adverse events. Further, extended antibiotics beyond one year did not provide additional benefits. These observations were tested in a prospective cohort study.

Study Question: The objectives of our study included: 1) identifying protective and risk factors that cause PJI treatment failure 2) determining if extended antibiotic exposes patients to more adverse events 3) comparing the rates of treatment failure between patients who underwent DAIR with and without the use of extended oral antibiotics.

Methods: A multicenter prospective cohort of patients who underwent DAIR for total knee arthroplasty PJI and received primary antibiotics were compared to patients that received primary antibiotics combined with extended antibiotics for one year. Participants had a minimum of 2-year follow-up. The primary outcome of interest was the failure rate derived from the survival time between the DAIR procedure and future treatment failure. Secondary endpoints included adverse events associated with antibiotics.

Results: A prospective cohort of 79 patients were followed where 39 participants (52.7%) received primary antibiotics and 35 participants (47.3%) received both primary and extended antibiotics following DAIR. Multivariable time-to-event analyses revealed that extended antibiotic use as an independent predictor of treatment success. Infection-free survival differed significantly between the two treatment regimens, as the hazard of PJI failure was significantly lower for extended antibiotics as compared to primary antibiotics alone (adjusted HR=0.46 0.24, 0.87, p= 0.017). Adverse event rates did not significantly differ between patients treated with primary antibiotics only versus primary combined with extended antibiotics.

Discussion: Our retrospective study found 1 year to be the optimal duration of length for extended antibiotics. The current study also supports this previous finding.

Conclusion: This prospective cohort study supports previous observations that extended antibiotics for one year was associated with lower failure rates as compared to primary antibiotics alone. Extended antibiotics after primary antibiotics was not found to be associated with increased adverse events as compared to only primary antibiotics.

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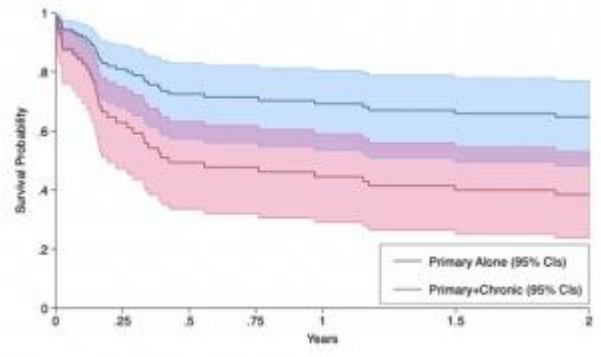


1240 Outcome of Debridement and Implant Retention for Treatment of Late Acute Hematogenous Periprosthetic Joint Infections

Authors: Thomas K Fehring, Michael A McHugh, Jeffrey Frandsen, **Jesse Otero**

Background And Rationale: Late acute hematogenous prosthetic joint infections (PJI) pose a unique challenge to the arthroplasty surgeon. Several treatment options exist for late acute hematogenous periprosthetic joint infections ranging from debridement, antibiotic administration, and implant retention (DAIR) to two-stage revision. Reported success rates vary widely, ranging from 39% to 70% over the last decade.

Study Question: Is DAIR an effective treatment option for late acute hematogenous PJI? Does success of DAIR depend on patient demographics and comorbidities?

Methods: A retrospective study of all late acute hematogenous PJI that underwent DAIR at a single institution was performed. Demographics, complications, reoperation rates and patient-reported outcomes were obtained for each patient. Patients were divided into cohorts based on MSIS systemic host grade (A, B, or C). Failure of treatment was defined as recurrent infection before final follow up. Chi-squared, Fisher's exact, and t-tests were used to compare demographics and outcomes.

Results: In total, 152 patients were included in this study. 110 underwent knee DAIR and 42 underwent hip DAIR. Median follow up was 6.4 years. All MSIS systemic host grades were included with 23 patients being Type A, 82 Type B, 45 Type C and 2 unreported. Our patient population had a 73% success rate in eradicating infection at final follow up. Systemic host grade predicted success of DAIR. Of those patients that became reinfected, 5% were Type A, 50% were Type B, and 45% were Type C ($p=0.02$). Multivariable regression analysis showed that Type C hosts were over five times more likely to fail treatment than Type A hosts with an odds ratio of 5.3 95% (CI 1.1-26.7).

Discussion: Debridement, antibiotic administration, and implant retention (DAIR) is successful to varying degrees in patients with different MSIS systemic host grades. In patients who are Type A hosts, you should consider performing DAIR. Our experience shows that you can perform DAIR on Type A hosts with a good chance of success while avoiding the surgical insult of a two-stage revision. In poorer hosts (Type B and C), success rates of DAIR drop, making a two-stage revision a better option in that patient population.

Conclusion: Debridement, antibiotic administration, and implant retention (DAIR) is a viable treatment option for late acute hematogenous PJI but should be used with caution in medically compromised hosts.

Attachments:

There is no figure for this abstract.

1228 1 To 5 Years Of Follow-Up May Capture Most Total Arthroplasty Acute Periprosthetic Joint Infections After Debridement Antibiotics and Implant Retention

Authors: **Richard Chao**, Scott Rothenberger, Johanna Plates, Brian Klatt, Neel B Shah, Kenneth L Urish

Background And Rationale: Periprosthetic joint infection (PJI) is a leading cause of total knee arthroplasty (TKA) failure. It has been suggested that one year of monitoring is sufficient for accurate reporting of treatment failure of periprosthetic joint infections of the hip and knee. However, there has been only one study on this topic.

Study Question: The study's objectives included: 1. Determining the length of time TKA PJIs should be monitored after DAIR; 2. Determining the time point where the majority of PJI treatment failure occurs; 3. Determining if there is a clinical difference in time to failure between acute PJI treated with DAIR using acute antibiotic therapy alone as compared to using acute and extended oral antibiotics.

Methods: This study, spanning 2005-2022, involved 108 patients from 16 hospitals within a regional health system. Patients received either acute antibiotics alone (n=57) or acute and extended oral antibiotics (n=51) following surgery and had an average follow-up of 9.78 years. Bayesian regression with Monte Carlo Markov Chain simulation was employed to identify significant breakpoints in cumulative failure curves.

Results: Our single and double breakpoint models identified significant decreases in the failure rates at 1.02 and 0.92 years for the entire cohort, respectively. Our double breakpoint model also identified 4.49 years as a point of significant decrease in failure rate. Stratifying by antibiotic regimen revealed a clinically similar breakpoint for patients receiving acute antibiotics alone at 0.79 years compared to those with acute and extended oral antibiotics at 1.03 years.

Discussion: These results highlight that prospective studies with follow-up beyond 5 years may be impractical, as most failures occur within 1 to 5 years. Extended studies beyond 5 years may also risk rendering a study’s question obsolete due to field advancements

Conclusion: This study suggests that most failures for acute TKA PJI treated with DAIR occur within one year, with significant breakpoints identified at approximately 1 and 5 years. Our results suggest monitoring these patients between a range of 1 year to 5 years. Clinically, there is little difference in time to failure between patients treated with acute or extended oral antibiotics.

Attachments:

There is no figure for this abstract.

1346 Absolute Neutrophil Count in Synovial Fluid: A Promising Biomarker for Diagnosing Periprosthetic Joint Infections

Authors: Alisina Shahi, **Kenneth Mathis**, David Rodriguez, Adam Freedhand, Ali Oliashirazi

Background And Rationale: In the absence of a definitive gold standard for diagnosing periprosthetic joint infections (PJI), clinicians facing suspected cases typically rely on multiple tests. While the absolute neutrophil count (ANC) has proven valuable in diagnosing systemic infections, its utility in synovial fluid (SF) remains unexplored. This study evaluates the performance of ANC in SF (SFANC) and compares it with other markers such as synovial fluid polymorphonuclear percentage (SFPMN%) and synovial fluid white blood cell count (SFWBC).

Study Question: How do the sensitivity and specificity of SFANC compare to those of SFWBC and SFPMN% in diagnosing PJI? What is the optimal cutoff value for SFANC in the diagnosis of PJI?

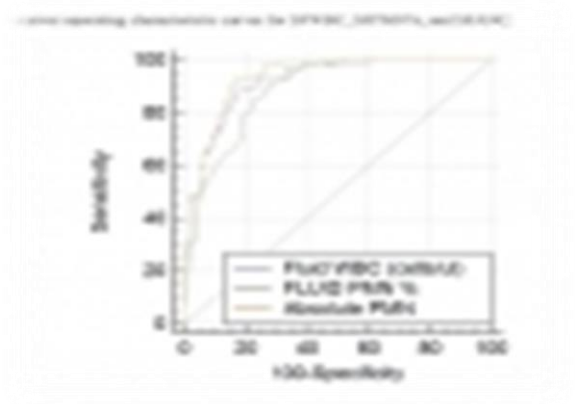
Methods: This retrospective multicenter study reviewed clinical records from patients undergoing revision surgery between 2020 and 2022. Inclusion criteria were a complete data set of SFWBC, SFPMN%, and SFANC. The cohort comprised 231 patients, categorized into aseptic revisions (N=136) and septic revisions (N=95). For each test, we calculated sensitivity, specificity, positive and negative likelihood ratios (LR), and diagnostic odds ratios (DOR). The optimal cutoff for SFANC, determined using Youden's Index, was set at greater than 1950 cells/μL.

Results: SFANC had a sensitivity of 88.4%, specificity of 85.2%, positive and negative likelihood ratio of 6.0 and 0.1, and a DOR of 44.2(95%CI: 20.1-97.3). SFWBC showed 84.2% sensitivity, 83.8 specificity, 5.2 +LR, 0.1 –LR, and 27.6 (95%CI: 13.5-56.5) DOR. Synovial PMN% had a sensitivity of 80.0%, a specificity of 80.8%, + and – LR of 4.1 and 0.2 respectively, and a DOR of 16.9(95%CI:8.7-32.7). SFANC with an area under the curve (AUC) of 0.93 was a significantly better predictor of PJI than both SF WBC (AUC=0.91, p=0.007) and SF PMN% (AUC=0.88, p=0.016). The AUC was comparable for SF WBC and SF PMN, p=0.16 .

Discussion: The study underscores SFANC's diagnostic superiority over SFWBC and SFPMN% in detecting PJI, particularly highlighting its enhanced sensitivity by including band cells in the analysis. SFANC's ability to count band cells provides a more detailed and nuanced picture of immune response, which likely contributes to its higher sensitivity.

Conclusion: This pioneering study affirms SFANC's utility in diagnosing PJI, providing a reliable cutoff for clinical use.

Attachments:



1354 Routine Psycho-Periprosthetic Joint Infection Assessment Highlights an Alarming Prevalence of Anxiety and Depression During PJI Treatment

Authors: Alberto Telias, Sophie Henke Tarnow, George Grammatopoulos, Hesham Abdelbary, Paul Beaule, Amanda Pontefract, Patricia Poulin, **Simon Garceau**

Background And Rationale: Akin to oncology care, prosthetic joint infection (PJI) places a high psychological burden of distress on patients resulting from prolonged hospitalization following treatment, pain, and physical disability. Quantifiable data highlighting the psychosocial impact on patients is lacking.

Study Question: This study aims to assess the mental health status of hip and knee PJI patients admitted to our institutional PJI service through the administration of Health-Related Quality of Life surveys (HRQOLs).

Methods: This prospective observational study assessed patients admitted to our PJI service with a diagnosis of hip or knee PJI from November 2023 until April 2024. Baseline patient and surgical characteristics were collected. HRQOLs collected were as follows: Oxford Hip/Knee score, PROMIS, EQ-5D-5L, The Patient Health Questionnaire-4 (PHQ-4) and Demoralization scale (DS). These were administered pre-operatively, 5 days post-operatively and 3 months post-operatively following PJI surgery.

Results: 34 patients were included: 23 males, and 11 females. Mean age was 70.2 (+/-)10.9 years. 17 hip and 17 knee PJIs were included. HRQOLs pre-operatively indicated anxiety in 47%, depression in 52% and high demoralization in 74% of patients. HRQOLs 5-days post-operatively indicated anxiety in 50%, depression in 47% and high demoralization in 87% of patients. 7 patients completed HRQOLs at 3 months post-op with 57% demonstrating high demoralization. 6 patients refused to complete HRQOLs at this time point due to severe mental distress.

Discussion: We observed an alarming prevalence of anxiety and depression in patients treated for hip and knee PJI, which was more severe at the beginning of the PJI treatment. Moreover, patient refusal to answer HRQOLs at 3 months was also indicative of significant mental distress. These results demonstrate the urgent need for improvement in psychosocial PJI care.

Conclusion: Mental health of PJI patients is alarmingly poor, with majority of PJI patients experiencing high demoralization and roughly half meeting the threshold for anxiety and/or depression. There is an urgent need to enhance psycho-social care in this population.

Attachments:

There is no figure for this abstract.

1243 Periprosthetic Joint Infection Mortality Following Total Knee Arthroplasty Surpasses 5-Year Rates for Common Cancers: A Meta-Analysis

Authors: Michael S Ramos, Brian Benyamini, Varun Kompala, Shujaa T Khan, **Alison K Klika**, Kyle Kunze, Anabelle Visperas, Nicolas S Piuzzi

Background And Rationale: Periprosthetic joint infection (PJI) after total knee arthroplasty (TKA) is a well-recognized complication and many studies have demonstrated the significant morbidity and mortality associated with PJI. Despite this, PJI as a serious healthcare problem remains underappreciated.

Study Question: What is the pooled incidence of mortality associated with PJI following TKA in the published orthopaedic literature?

Methods: Five databases were searched from time of inception through December 2023 for full-length articles reporting on PJI-related mortality after TKA were included. Articles with oncologic, infectious, or traumatic indications for TKA were excluded. Additionally, articles in which >5% of patients were treated with amputation or resection arthroplasty only were excluded. Overall mortality and mortality by-treatment (debridement, antibiotics, and implant retention (DAIR), 1-stage revision, and 2-stage revision) were collected. For overall mortality, a meta-analysis of proportions with inverse-variance proportion models using Freeman-Tukey Double-Arscine Transformations and Dersimonian-Laerd random-effects estimators were constructed. Potential associations between treatment and mortality were investigated by random-effects comparative proportional subgroup analyses. A two-tailed p-value less than 0.05 was considered significant.

Results: 79,764 patients (31 studies) with PJI after TKA were included. Overall mortality was 11.5% (95%CI:6.9-17.1%) at mean follow-up of 46.9 months (range,1-204). Pooled analysis demonstrated significant differences ($p<0.0001$) in mortality between PJI treatments: DAIR: 7.3%(95%CI:1.2-17.1%); 1-stage: 0.6%(95%CI:0-3.4%); 2-stage: 12%(95%CI:8.6-15.8%). Differences in incidences of mortality for DAIR and 2-stage revision at 3-month (2.7%vs.3.9%,$p=0.44$) and 12-month (5.0%vs.4.6%,$p=0.91$) were not significant. PJI mortality at 3, 12, and 24 months after TKA was 4.1%, 7.0%, and 4.6%, respectively, based on pooled analysis.

Discussion: This is the largest study to assess PJI mortality following TKA over time and after treatment. Overall PJI-associated mortality after TKA was high (11.5%). DAIR and 2-stage revision demonstrated similar incidences of mortality at 3 and 12 months after TKA.

Conclusion: PJI is a devastating complication of TKA with a mortality rate higher than 5-year mortality rates in common cancers such as breast (11%) and prostate (1%).

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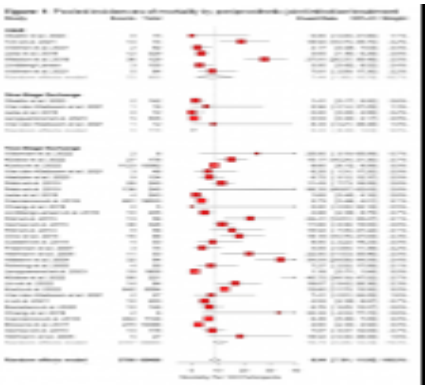

1244 Mortality Associated with Periprosthetic Joint Infection After Total Hip Arthroplasty: Comparable to 5-Year Rates of Common Cancers

Authors: Michael S Ramos, Brian Benyamini, Varun Kampala, Shujaa T Khan, Alison K Klika, Kyle N Kunze, **Anabelle Visperas,** Nicolas S Piuzzi

Background And Rationale: Periprosthetic joint infection (PJI) after total hip arthroplasty (THA) is widely acknowledged as a significantly morbid complication and one with high mortality. However, the gravity of PJI as a healthcare concern often goes underestimated.

Study Question: What is the pooled incidence of PJI-associated mortality after THA over time and by treatment?

Methods: Ovid MEDLINE, Embase, Cochrane Library, SCOPUS, Web of Science, and Cumulative Index to Nursing and Allied Health Literature databases were queried from time of inception through December 2023. Full-length, original articles that reported mortality associated with PJI after THA were included. Articles with oncologic, infectious, or traumatic THA indications were excluded. Additionally, articles in which >5% of patients were treated with resection arthroplasty only were excluded. Overall mortality and mortality by treatment (debridement, antibiotics, and implant retention (DAIR), 1-stage revision, and 2-stage revision) were collected. For overall mortality, a meta-analysis of proportions with inverse-variance proportion models using Freeman-Tukey Double-Arscine Transformations and Dersimonian-Laerd random-effects estimators were constructed. Potential associations between treatment and mortality were investigated by random-effects comparative proportional subgroup analyses. A two-tailed p-value less than 0.05 was considered significant.

Results: 19,917 patients with PJI after THA from 20 studies were included. Overall mortality was 11.0% (95% CI:5-18.8%) at mean follow-up of 40.3 months (range, 1-240). Pooled analysis demonstrated incidences of mortality following DAIR, 1-stage, and 2-stage were 7.8% (95% CI:2.3-15.9%), 1.6% (95% CI:0-14%), and 9.2% (95% CI:5.4-13.9%), respectively; however, there were too few studies for further testing. Pooled incidences of mortality at 3, 12, and 24 months were 1.1%, 3.7%, and 1.0%, respectively.

Discussion: This is the largest study to date evaluating PJI-associated mortality after THA and the first to evaluate mortality over time and by PJI treatment (DAIR, 1-stage, and 2-stage). PJI following THA is a significant complication with a high mortality reported in the available literature.

Conclusion: The incidence of mortality following PJI after THA is similar to 5-year mortality rates for common cancers such as breast (11%) and prostate (1%).

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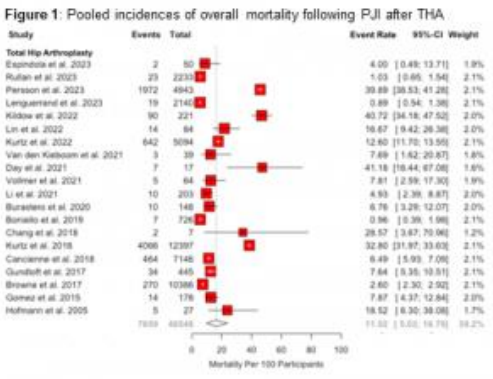

Monitor 1

1279 Prosthetic Joint Infection after Hip Arthroplasty Can Be Accurately Identified in Veterans Health Administration (VHA) Data

Authors: **Jessica O'Neil**, Yixuan Pei, Craig Newcomb, Randi Silibovsky, Judith O'Donnell, Charles Nelson, Evelyn Hsieh, Joseph King, Vincent Lo Re, Erica Weinstein

Background And Rationale: PJI is a devastating complication of THA. Large population-representative studies using real-world data are key to evaluating the determinants and outcomes of PJI after THA. Such analyses have rarely been conducted in the US. Electronic health record (EHR) databases could serve as valuable resources for understanding PJI epidemiology. However, the performance of diagnosis codes alone for the identification of PJI may be limited. We sought to develop and validate case finding algorithms for PJI based on International Classification of Diseases, Ninth Revision (ICD-9) and Tenth Revision (ICD-10) diagnoses after THA using current procedural terminology (CPT) codes within the EHR of the VHA.

Study Question: Can hospitalization with PJI after THA be accurately identified within VHA data using a diagnostic coding-based algorithm?

Methods: We performed a cross-sectional study of patients within VA EHR data to identify potential PJI events using ICD-9 diagnoses (Algorithm A) from October 1999-September 2015 and ICD-10 diagnoses (Algorithm B) from October 2015-September 2022 (Figure 1). For each ICD era, we randomly sampled 90 hospitalizations with PJI. Sampling was stratified by center volume so low, medium and high-volume centers were evenly represented. Musculoskeletal Infection Society (MSIS) diagnostic criteria were adapted to create a case definition to adjudicate potential events. A trained abstractor recorded relevant data from records of potential events. Two infectious diseases physicians independently adjudicated potential events as no PJI, probable PJI, or definite PJI. Probable PJI or definite PJI were considered confirmed PJI events. The positive predictive values (PPVs) with 95% confidence intervals (CIs) for the ICD-9 and ICD-10 PJI algorithms were calculated.

Results: Of 90 potential PJI events identified by the ICD-9 algorithm, 71 were confirmed, yielding a PPV of 78% (95% CI, 70%-87%). Of 90 potential PJI events identified by the ICD-10 algorithm, 68 were confirmed, yielding a PPV of 75% (95% CI 67-84).

Discussion: We developed ICD-9 and ICD-10-based algorithms to identify PJI following THA within VHA data. These algorithms could be applied in future studies to evaluate the determinants and outcomes of PJI after THA within the VHA, the largest integrated health system in the US.

Conclusion: PJI after THA can be identified with reasonable accuracy in VHA data.

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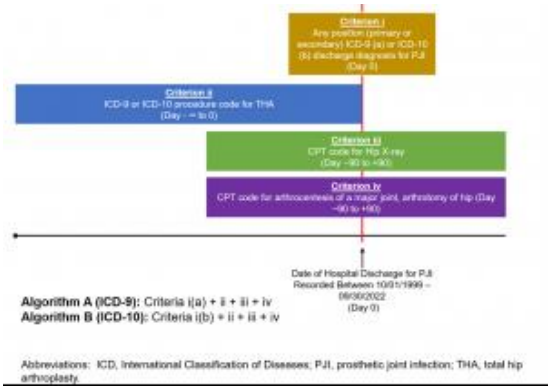

1274 KLIC and CRIME-80 Scores Are Not Predictive of Treatment Outcome After Prosthetic Joint Infection with Retained Hardware

Authors: Jane O'Bryan, **Marjorie Golden**, Anne SpichlerMoffarah, Lee E Rubin

Background And Rationale: Debridement, antibiotics and implant retention (DAIR) is often used to treat patients with prosthetic joint infection (PJI). Several scoring systems have been developed to predict likelihood of treatment failure or success following DAIR. The KLIC score is typically used for risk stratification in early postoperative infections, whereas the CRIME-80 score predicts treatment failure in late acute PJI presumed to be the result of hematogenous spread. Existing scoring tools should be tested in diverse patient populations to validate their accuracy and determine both predictive value and clinical utility.

Study Question: Do the KLIC and CRIME-80 scores accurately predict treatment success vs failure in patients with PJI and retained hardware treated at a large U.S.-based tertiary care hospital?

Methods: We conducted a retrospective review of patients >=18 years of age who had undergone surgical management for PJI of the hip or knee with retention of hardware. Cases of PJI from 9/2017-12/2021 were included and treatment outcomes were assessed during a 2-year follow-up period. KLIC scores were calculated for patients with early-onset PJI. CRIME-80 scores were tabulated for bacteremic patients with delayed or late-onset PJI. Chi-Square and Fisher's Exact tests were used to assess the associations between score tiers and treatment outcome. Statistical analyses were conducted in SAS Studio.

Results: N=71 patients met inclusion criteria (mean age 70.0 ± 12.5 years, 53.5% female, 80.3% white/Caucasian). Most underwent DAIR (78.9%) or single-stage procedures (18.3%). Among patients with early onset PJI (n=35), there was no significant association between KLIC score and treatment failure (p=0.315). Among bacteremic patients with delayed or late-onset PJI (n=11), there was no significant association between CRIME-80 score and treatment failure (p=0.273).

Discussion: In our study population, KLIC and CRIME-80 scores were not predictive of treatment outcome after PJI with retained hardware. Notably, the scores are narrowly focused to the exclusion of certain risk factors for treatment failure that have been well documented in the literature including time to surgical debridement, infectious etiology and certain co-morbid conditions that predispose patients to higher post-op infection risk and poor wound healing.

Conclusion: Further research is needed to develop validated scoring tools to better predict treatment

Attachments:

1348 Next Generation Sequencing Test for Diagnosing Periprosthetic Joint Infection Is Not Affected by Premature Therapeutic Antibiotic Administration

Authors: Alisina Shahi, **Kenneth Mathis**, David Rodriguez, Adam Freedhand, Ali Oliashirazi

Background And Rationale: Premature administration of antibiotics prior to the collection of diagnostic samples for periprosthetic joint infection (PJI) can adversely affect the accuracy of conventional tests, particularly culture results. Next generation sequencing (NGS) has shown promising results when cultures failed to detect the infecting organism. This study evaluates the impact of premature antibiotic use on the results of various diagnostic tests; serum erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), synovial WBC count and PMN%, synovial culture, and NGS in diagnosing PJI.

Study Question: How does premature antibiotic administration affect the diagnostic accuracy of serum ESR, CRP, synovial WBC count, PMN%, culture and NGS in the context of PJI?

Methods: A retrospective analysis of 132 patients who underwent revision hip or knee arthroplasty due to MSIS confirmed PJI. All patients underwent synovial NGS testing for detecting the infecting organism in addition to serum ESR and CRP, synovial WBC and PMN% and synovial cultures. Among the patients, 46% received antibiotic therapy before the diagnostic workup, while the rest did not. The patients were categorized into two groups depending on whether or not they received antibiotics and the sensitivity of the mentioned diagnostic tests were compared.

Results: Patients in the antibiotic group had lower median in serum ESR (87vs62mm/hr;p=0.007), CRP (17.8vs11.2 mg/L;p=0.0042) synovial WBC (48,252vs8,788;p=0.002) and PMN% (95%vs84.2%;p=0.004). Administration of antibiotics negatively impacted the sensitivity of all the diagnostic tests ESR (75.2%vs91.5% relative risk (RR) for false-negative results,2.4;p=0.04), CRP (65.4%vs82.5%RR,2.1;p=0.03), synovial WBC(70.2%vs94.4%RR, 5.2;p=0.001), PMN% (75.8%vs93.5% RR,3.4;p=0.01).The rate of negative cultures were higher in the antibiotics group at 36.0% compared to the no-antibiotics group at 18.3% (p=0.029). NGS was overall significantly more sensitive than cultures 96.2% vs. 73.5% RR, 5.3; p = 0.001. Administration of antibiotics did not impact the NGS results 95.1% in the antibiotic group vs 97.2%.

Discussion: Administration of antibiotics prematurely can have negative consequences on the accuracy of standard diagnostic tests for PJI.

Conclusion: NGS can reliably detect the infecting organism even if premature antibiotics are administered prior to sampling.

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There is no figure for this abstract.

1259 Temporal Trends in Postoperative Oral Antibiotic Prophylaxis and Infections for Outpatient Total Hip and Knee Arthroplasty from 2015-2020

Authors: **Priya Singh**, Jiwoo Park, Avanish Yendluri, Kyle Rako, Brocha Z Stern, Jashvant Poeran, Darwin D Chen, Calin S Moucha, Brett L Hayden

Background And Rationale: Increased utilization of outpatient total hip and knee arthroplasty (THA/TKA) may coincide with changing patterns in perioperative care, including antibiotic infection prophylaxis.

Study Question: What do the temporal trends look like for oral antibiotic prophylaxis prescriptions, 90-day surgical site infection (SSI), and 1-year periprosthetic joint infection (PJI) for outpatient THA/TKA from 2015-2020?

Methods: This retrospective cohort study included outpatient THA (n=9,548) and TKA (n=17,751) procedures in patients aged 18-64 (Merative MarketScan Commercial Claims and Encounters database). We identified oral antibiotic prescriptions filled perioperatively (5 days preoperatively to 3 days postoperatively) to represent postoperative antibiotic prophylaxis. We examined annual unadjusted trends of antibiotic prophylaxis, specific medications, and infection outcomes and also visually trended adjusted annual estimates for prophylaxis and outcomes using percentages and 95% confidence intervals (CI).

Results: In the study period, 17.5% of THA and 14.1% of TKA patients received prophylaxis. There were no significant unadjusted temporal trends in antibiotic prophylaxis for either THA or TKA; however, there were visual trends toward increased prescribing from after 2017 per adjusted estimates, including a significant increase in 2020 for TKA versus earlier years. There were no significant trends in infection for THA. However, for TKA, there were significant unadjusted temporal trends for decreasing 90-day SSI (P=0.003) and decreasing 1-year PJI (P=0.004) as well as a significant decrease in adjusted 1-year PJI from 2.2% CI 1.5-3.3% in 2017 to 1.1% CI 0.9-1.4% in 2020.

Discussion: We did not identify significant overall temporal trends in prescribing patterns of prophylactic oral antibiotics in this outpatient cohort. However, there were some significant changes in both prophylaxis and infection for TKA.

Conclusion: Further research is needed to understand how prescribing patterns coincide with the incidence of periprosthetic joint infection, especially for TKA.

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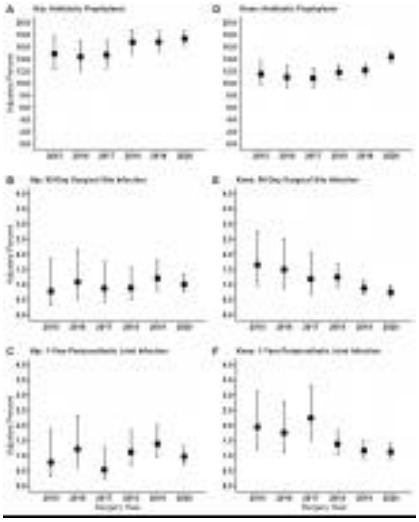

1302 One-Year Efficacy and Safety Demonstrated in the Treatment of Acute Prosthetic Knee Infection, using PLG0206 a novel Antimicrobial Peptide

Authors: **Matthew J Dietz**, Nicolas S Piuzzi, Antonia F Chen, Javad Parvizi, Edward J Stolarski, Christopher E Pelt, David Rodriguez-Quintana, Barbara W Trautner, Despina X Dobbins

Background And Rationale: This study aimed to assess the safety and tolerability of PLG0206, a newly developed 24-amino acid peptide with broad-spectrum antimicrobial properties, administered via irrigation solution in patients with periprosthetic joint infections (PJI) post total knee arthroplasty (TKA) during debridement, antibiotics, and implant retention (DAIR). Secondary objectives included evaluating pharmacokinetics (PK), biomarkers, and initial clinical efficacy one-year post-DAIR procedure.

Study Question: To assess the one-year efficacy, safety and tolerability of a novel antimicrobial peptide, PLG0206, in the setting of acute prosthetic knee infection.

Methods: This prospective, multicenter, open-label intervention study evaluated two dose levels of PLG0206 in fourteen patients undergoing revision for PJI after TKA. Following debridement, patients received a single intra-articular irrigation of PLG0206 into the wound cavity lasting 15 minutes at concentrations of 3 mg/mL (n=7) or 10 mg/mL (n=7). Post-operative care and antimicrobial therapy followed institutional guidelines. Safety, signs of infection, PK, and blood biomarkers were monitored for 12 months.

Results: All patients completed the final assessment at Day 365. One recurrence (7%) occurred at Day 169 in the low-dose group. Following dosing, 64.3% of patients had limited systemic levels, with peak plasma concentration at 1-hour post-administration declining rapidly to undetectable levels within 24 hours. Incidence of drug-related adverse events was low. The incidence of drug related treatment-emergent adverse events (TEAEs) was low. Two patients in the higher dose group experienced transient, moderate adverse events—one of hypertransaminasemia and one of neuralgia—which resolved within two weeks.

Discussion: A single 15-minute irrigation of PLG0206 during DAIR for PJI post TKA is safe and well-tolerated. With only one recurrence during the one-year follow-up period, this novel antimicrobial peptide presents a promising therapeutic option in musculoskeletal infections.

Conclusion: The safety and tolerability of PLG0206 have been demonstrated, and while initial clinical efficacy is encouraging, further investigation in larger trials is warranted.

Attachments:

There is no figure for this abstract.

Authors: **Andy O Miller**, Alberto V Carli, Amy Chin, Diana Chee, Sam Simon, Catherine Maclean

Background And Rationale: While much is written about prosthetic joint infection (PJI) diagnostics, less is known about how well minimal diagnostic standards are followed. Previously, using a modified RAND-UCLA appropriateness method, we specified five electronic clinical quality measures (eCQM): likelihood of appropriate PJI testing (1) before and (2) during PJI surgery, proportion of patients with (3) high-risk PJI symptoms and (4) undergoing revision arthroplasty who underwent appropriate preoperative testing, and (5) receipt of perioperative infectious disease consultative care. These eCQM may provide insight into care gaps in the diagnosis of PJI.

Study Question: We sought to assess the feasibility and validity of, and performance on, each of the eCQM across institutions.

Methods: The five previously specified eCQMs were applied to the electronic health records (EHRs) of three health care providers: one orthopedic specialty hospital, one university medical center, and one private medical group. The identified numerators and denominators were compared to a contemporary research registry at one institution.

Results: Of the five measures, four could be fully specified for use in the EHR. For one measure, we were unable to reliably identify high risk patients with joint warmth, erythema, swelling, prosthesis loosening or osteolysis. Performance on the measures varied substantially across institutions (Figure 1).

Discussion: These eCQM identified substantial differences in diagnostic practice within and among institutions.

Conclusion: ECQMs have the potential to efficiently analyze the quality of diagnostic care of PJI within and among hospitals and health systems, improving evidence-based clinical practice. Their utility in registries should be evaluated.

Attachments:

Figure 1: eCQM Performance for 3 Sites, Measures 1-5. For each measure, institutional electronic health records were queried to establish eligible populations and to assess completion of quality measures.

1250 Diagnosis of Periprosthetic Joint Infection: The Impact of Intraoperative Direct Sonication on Time to Positivity

Authors: **Wenbo Mu**, Javad Parvizi, Li Cao

Background And Rationale: PJI severely impacts knee and hip arthroplasty outcomes, necessitating effective diagnostic strategies. Traditional cultures face challenges with biofilm-forming bacteria, reducing sensitivity. Sonication may improve diagnostic yields but has contamination risks. This study evaluates whether intraoperative direct sonication enhances culture yields and reduces TTP for PJI.

Study Question: Assess the impact of intraoperative direct sonication on culture yield and TTP in diagnosing PJI, aiming to enhance diagnostic efficiency and minimize contamination.

Methods: A prospective study at a tertiary center included 190 patients undergoing PJI revision surgery from August 2021 to January 2024. A novel sonication protocol was applied, followed by incubation in a BACT/ALERT 3D system. Outcomes measured were positive culture samples, identified microorganisms, and TTP, analyzed using R software.

Results: From 510 positive cultures, sonication significantly improved positivity rates for tissue and prosthesis specimens ($p < 0.05$) and shortened median TTP to 3.13 days. Sonicated samples showed a notably shorter TTP, especially for Gram-positive organisms. Higher positivity rates were observed in chronic PJIs with sonication.

Discussion: The findings indicate that intraoperative direct sonication effectively disrupts biofilms, enhancing pathogen detection and potentially facilitating quicker targeted antibiotic therapy initiation. Sonication's impact varies among microorganisms, with Gram-positive cocci showing shorter TTPs. This suggests sonication's utility in improving diagnostic accuracy, particularly for chronic PJIs where biofilms are prevalent.

Conclusion: Intraoperative direct sonication with the BACT/ALERT 3D system significantly enhances culture diagnostic yield and reduces TTP for PJI pathogens. This technique could transform PJI management by streamlining pathogen detection and reducing contamination risk. Further research is needed to explore TTP's clinical implications and validate findings across broader settings.

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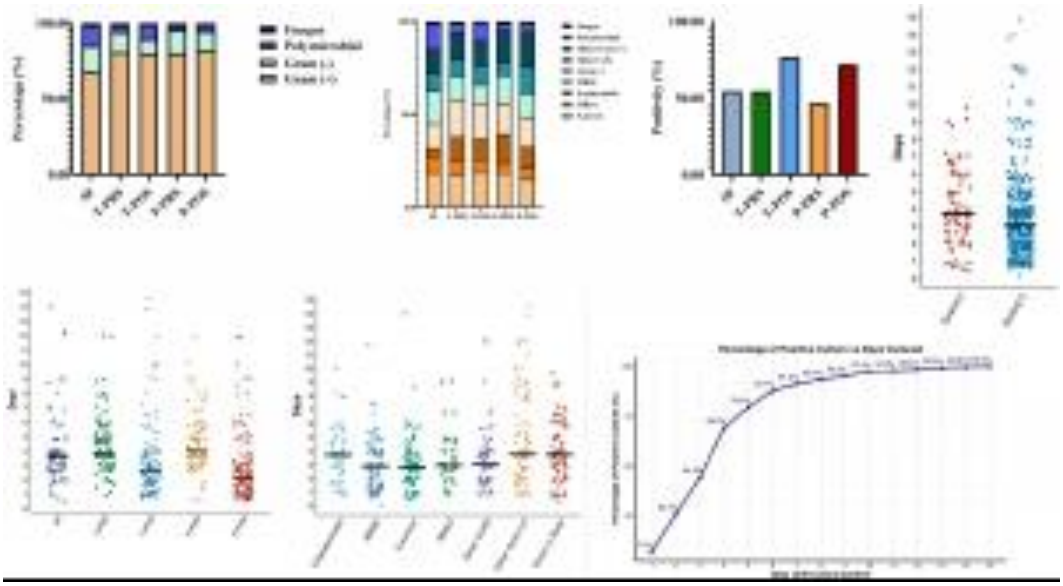


1288 Impact of immunomodulatory medications on preoperative laboratory assessment for periprosthetic joint infection: A case series study.

Authors: **Fowler J Mia**, Edward H Grabov, Shay I Warren, Michael Henry, Andy O Miller, Elizabeth Robilotti

Background And Rationale: Diagnosing periprosthetic joint infection (PJI) relies on assessment of host immune response to bacteria. Underlying autoimmune disease, immune deficiencies, and medications can affect diagnostic accuracy. Glucagon-like peptide-1 receptor agonists (GLP-1RAs), which are commonly used for the treatment of diabetes and obesity, are known to affect immune functions. However, their effect on laboratory parameters used to diagnosis PJI is unknown.

Study Question: The purpose of this study is to describe preoperative laboratory parameters in a group of patients who underwent a PJI procedure while on a GLP-1RA at a single institution.

Methods: In a single institution case series of 70 patients who underwent operative treatment for PJI while on a GLP-1RA from September 2017 to October 2023, 33 cases were identified that met inclusion criteria. Cases were retained for analysis if they occurred after TKA (N=18, 55%) or THA (N=15, 45%), and underwent a septic revision procedure. Serum and synovial studies collected prior to PJI procedure were analyzed. Treatment failure was defined as persistent or recurrent infection after surgical treatment.

Results: Twenty-four patients who underwent 33 operations for PJI while on a GLP1-RA, confirmed by positive synovial fluid and tissue culture, were included. Eighteen operations were debridement with antibiotics, and implant retention (DAIR), 13 were explants with spacer placement, and 2 were spacer exchanges. All preoperative tests were evaluated, and the mean, median, and range was calculated (Table 1). Aspirates from 6 of 29 (21%) joints had < 80% neutrophils. Of these 6 patients, 4 had > 30% lymphocytes and 2 had > 30% monocytes. Ten joints (30%) failed treatment.

Discussion: A proportion of patients on GLP-1RA with a PJI may have a synovial leukocyte differential that skews away from neutrophils towards lymphocyte predominance and therefore away from MSIS criteria threshold for pre-operative diagnosis of PJI. Physicians should be aware of this possibility during diagnostic workup.

Conclusion: Further comparison studies are needed to clarify the impact of GLP-1Ras on synovial neutrophil concentration and to identify the optimal diagnostic criteria in this population.

Attachments:

1257 How Often Bacteraemia Occurs in Patients with Chronic Periprosthetic Joint Infection --a prospective, two-arm cohort study

Authors: **Baochao Ji**, Li Cao

Background And Rationale: Periprosthetic joint infection (PJI) poses a formidable challenge following total joint arthroplasty (TJA), especially for chronic infection with a mature biofilm. In Chronic stage, the planktonic bacteria release from the biofilm makes the infected prosthesis more of a possible source of infection rather than a result of bacteremia.The prevalence and impact of bacteremia in chronic PJI remain unknown.

Study Question: (1) How Often Bacteraemia Occurs in Patients with Chronic PJI? (2)Whether positive blood culture will affect the outcome of one-stage revision in treating chronic PJI?

Methods: A prospective two-arm cohort study was conducted from June 2021 to May 2022. To eliminate influence of false positives in the culture process, the primary TJA cohorts was set as the control group and the chronic PJI cohorts as the observation group. A standard set of two blood culture bottles (anaerobic and aerobic) defined one culture, and two cultures were routinely obtained for both groups. Furthermore, patients with chronic PJI routinely underwent preoperative joint fluid culture and intraoperative pathogen culture. After one-stage revision, patients underwent postoperative follow-ups at one, three, and six months, with annual evaluations thereafter for re-infection.

Results: Finally,108 met the criteria (56 chronic PJI,52primary TJA). A 19.6% rate of positive blood cultures in chronic PJI did not significantly differ from the primary TJA group (21.2%) Among all the PJI patients with positive blood culture, no same organism was identified when compared preoperative blood culture result and intraoperative tissue culture.There was no significant difference in the Kaplan-Meier survivorship for infection-free survival at 27 months between chronic PJI patients with positive blood cultures and culture-negative results (88.9% vs 93.5%).

Discussion: The high rate of positive blood cultures in the primary TJA group may stem from (1) the use of high-yield BACT/ALERT FA/FN blood culture bottles and (2) susceptibility to sample contamination in the microbiology laboratory. Our study shows a low rate of asymptomatic bacteremia in chronic PJI, reducing the need for unnecessary treatment and testing based on source of infection concerns.

Conclusion: The Bacteremia is rare in chronic PJI, suggesting chronically infected prostheses as unlikely sources of disseminated bacteremia and will not affect the treatment outcome.

Attachments:

Monitor 2

1291 Combined Orthopaedic and Infectious Disease Periprosthetic Joint Infection Clinic: A Survey Study

Authors: Eric Dilbone, Justin Leal, Edward Hendershot, Erin Gettler, Jessica Seidelman, William Jiranek

Background And Rationale: The rising incidence of total joint arthroplasties being performed is leading to an increased number of prosthetic joint infections (PJI). PJI treatment is complex, thus a collaborative approach involving orthopaedic surgeons and infectious disease (ID) providers is growing. This single institution has a weekly combined Ortho-ID (OID) clinic that sees PJI patients and is staffed by joint replacement fellows and ID attendings.

Study Question: This project sought to survey the joint replacement fellow participants from recent years regarding the impact of this experience on their subsequent clinical practice.

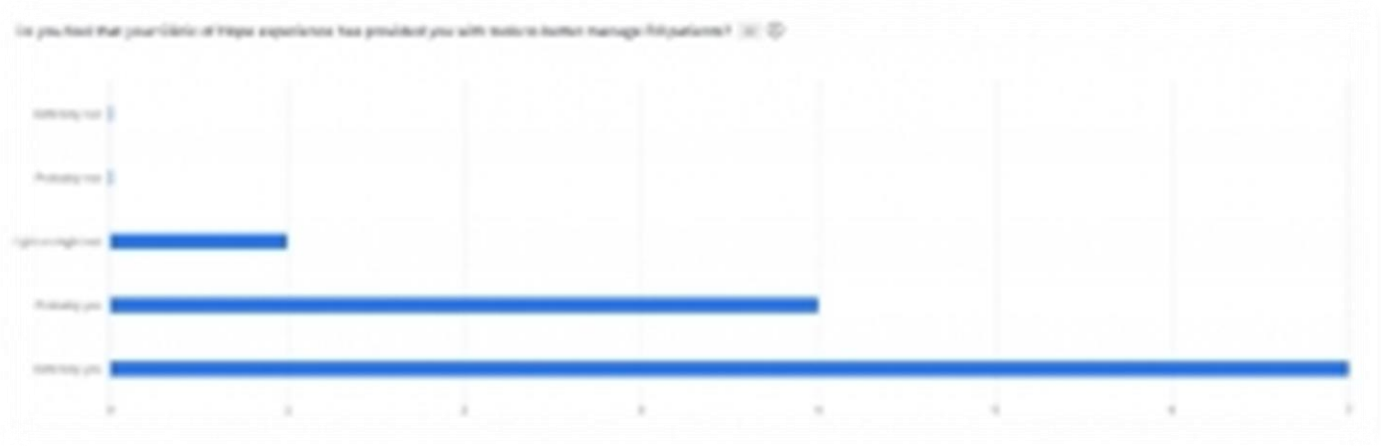
Methods: A survey was distributed to fellows who participated in the combined OID clinic during their single year of fellowship from 2020 through 2023 to evaluate the impact of this experience on their development as clinicians and current clinical practice. An anonymous survey included all current and former fellows since the inception of this clinic in 2020. Institutional review board (IRB) approval was obtained prior to the distribution of the survey.

Results: A total of 14 current and former fellows received the survey and 12 responded. The majority of the respondents are currently in an academic practice setting (75%), with the rest being hospital employed (17%) or private practice (8%). Taking care of PJI patients makes up anywhere from 0-40% of the respondents' practices. 92% of former fellows felt that the multi-disciplinary approach to this clinic helped prepare them for managing PJI patients in practice today. 92% also felt that this experience would be beneficial going forward for future fellows and that the current model of ½ day clinic once per month was sufficient.

Discussion: A combined OID clinic is increasingly a popular approach to the management of PJI patients, but little is known about the utility of this clinic setting for trainees. The results of this study suggest that trainees overwhelmingly benefit from this experience.

Conclusion: This survey of participants in this model of clinic shows that once in practice, many orthopedic surgeons found that this experience gave them tools to better manage their PJI patients. Arthroplasty fellowship programs should consider including a combined OID clinic as part of their fellowship.

Attachments:



1296 The Alpha Defensin Lateral Flow (AD-LF) Test Maintains Performance Through Standardized User and Environmental Stress Scenario Testing

Authors: John Miamidian, Subramanium Somasundaram, Kenny Tran, Krista Toler, **Carl Deirmengian**

Background And Rationale: Standardized flex testing is conducted to demonstrate a diagnostic test is robust and resistant to environmental or usage variation. This testing assesses diagnostic test usage outside the laboratory.

Study Question: Does the AD-LF test maintain its diagnostic accuracy when subjected to standardized user and environmental stress scenarios?

Methods: The AD-LF test was subjected to user stresses (Control Reconstitution, Sample Transfer to Dilution, Test Disturbance, Non-Level Testing, Equilibration Time, and Result Window Contamination) and environmental stresses (Humidity, Draft, and Lighting). Study design included 2 users testing blinded controls from the AD LF Test Kit. Positive and negative samples were tested on 10 devices each for 20 total determinations of each stress condition, yielding 660 total tests. The test was considered accurate if the result was correct, inaccurate if the result was incorrect, and invalid if formation of an incomplete line or failure of the control line to appear prevented a result determination.

Results: Standardized user and environmental stress scenarios resulted in a 0.9% (6/660) rate of an invalid test due to formation of a partial line (n = 1) or absence of the control line (n = 5). Of the 654 valid tests that were performed, there were no cases of an incorrect result (control samples) due to environmental stressors. Overall reliability was 99.5%. Invalid results were observed in the setting of intentional contamination of the result window (N=1) and high-speed air flow (N=5).

Discussion: Stress scenario testing of the AD-LF test for PJI suggests that the test would maintain its performance when used by personnel that are not under the stringent guidance of a clinical laboratory setting. Further regulatory consideration is needed to allow for use outside of clinical laboratory guidance.

Conclusion: Standardized stress testing revealed that the AD-LF test maintained its accuracy despite user and environmental stressors. The only impact of environmental stressors on test results was a slight (0.91%) increase in the invalid rate, reflecting proper functionality of the control-line to indicate the need to retest.

Attachments:

There is no figure for this abstract.

1304 C. Difficile infection prior to total knee arthroplasty independently increases the risk of prosthetic joint infection

Authors: Henry D Clarke, Jens T Verhey, David G Deckey, Mark J Spangehl, **Joshua S Bingham**

Background And Rationale: Increasing evidence suggests that the gut microbiome is important in immune system function and influences risk of peri-prosthetic joint infection (PJI) after total knee arthroplasty (TKA). C. Difficile infection (CDI) is an indicator of poor gut microbiome health. However, no prior studies have evaluated the independent risk of CDI on long-term rates of PJI after TKA.

Study Question: Is C. Difficile an independent risk factor for PJI in patients undergoing primary TKA?

Methods: Patients undergoing TKA from 2010 to 2021 were identified in the PearlDiver database (n = 1,453,574). Patients with a history of CDI within 2 years prior to TKA (n = 2,853) were included and propensity matched to a control group. The exposed CDI cohort was also stratified into four groups by time of CDI prior to TKA (0-3 months, 3-6 months, 6-12 months, and 1-2 years). The incidence of PJI within 2 years following TKA was compared between the exposed and control cohorts. Logistic regression was used to evaluate the association of CDI occurring in each time interval prior to TKA and PJI after TKA.

Results: CDI within 2 years prior to TKA was independently associated with higher odds of PJI (OR: 1.82). Closer time of CDI cohorts to TKA was associated with an increasing risk of post-operative PJI (CDI 0-3 months before TKA: OR 3.17; CDI 6-12 months: OR 1.96; CDI 1-2 years: OR 1.20).

Discussion: CDI prior to TKA is an independent risk factor for PJI. Closer proximity of CDI to surgery is associated with a “dose dependent” increased PJI risk.

Conclusion: Surgeons should consider delaying TKA until one year after a diagnosis of CDI.

Attachments:

There is no figure for this abstract.

1311 Total Knee Arthroplasty Conversion May be Superior to Debridement and Implant Retention in Treating Infected Unicompartmental Knee Arthroplasty

Authors: **Kranti V Peddada**, Joshua Davis, Noelle E Wojciechowski, Antonia F Chen, Adam S Olsen

Background And Rationale: Optimal surgical management of patients with periprosthetic joint infection (PJI) following unicompartmental knee arthroplasty (UKA) remains unclear. Treatment includes debridement, antibiotics, and implant retention (DAIR) and conversion to total knee arthroplasty (TKA), but evidence of their efficacy is scant.

Study Question: What is the infection-free survival of DAIR and TKA conversion in patients with PJI following UKA?

Methods: We performed a retrospective case series using a multi-institutional database to identify patients with UKA diagnosed with PJI between January 2000 to August 2023. Patient demographics, type of UKA, acuity of symptoms (acute, <90 days, and chronic, >90 days), synovial white blood cell (WBC) count, type of revision surgery, and infection-free follow-up time were recorded. Statistical significance was assessed with Fisher's test.

Results: 35 UKA infection patients were identified. The mean age was 58 and 54% were male. Medial UKA was the most common procedure (n=21, 60%) followed by lateral UKA (n=8, 23%) and patellofemoral (n=6, 17%). Patients with acute PJI (n=21, 60%) and chronic PJI (n=14, 40%) had median synovial WBC counts of 67,065 and 48,000, respectively. Most patients underwent DAIR (n=25, 71%) compared to conversion TKA (n=8, 23%), while 2 patients (6%) underwent revision UKA. The failure rate of DAIR was 36% compared to 13% for conversion TKA (p=0.38). More specifically, failure rates for arthroscopic I&D, open I&D without polyethylene exchange, open I&D with polyethylene exchange, single stage conversion TKA, and two stage conversion TKA were 60%, 33%, 27%, 20%, and 0%, respectively (p=0.56). Average follow-up time for infection-free patients was 2.3 years.

Discussion: We demonstrated a trend towards improved infection-free survival in patients undergoing conversion TKA compared to DAIR, with arthroscopic I&D having the highest failure rate and two stage conversion TKA the lowest. This may suggest cartilage debridement is critical to treat PJI in UKA. Interpretation of our findings should be tempered by lack of statistical significance, likely due to insufficient power given the rarity of infected UKA, but also buoyed in appreciating this is the largest cohort of patients studied with infected UKA to our knowledge.

Conclusion: Conversion TKA may lead to higher infection-free survival compared to DAIR in the treatment of infected UKA.

Attachments:

There is no figure for this abstract.

1317 Intrawound Antiseptics Do Not Decrease the Risk of Periprosthetic Joint Infection Following Primary Arthroplasty for Femoral Neck Fracture

Authors: Elizabeth Carlino, Arthroplasty For Hip Fracture Consortium, **Kyle H Cichos**

Background And Rationale: Patients undergoing total hip arthroplasty (THA) or hemiarthroplasty (HA) for femoral neck fracture (FNF) are disproportionately affected by PJI, likely due to their suboptimal health status and the urgent need for surgical intervention. While many strategies are currently recommended to mitigate the risk of PJI in these patients, little is known about the effectiveness of different intrawound antiseptic techniques for PJI prevention in the hip fracture population.

Study Question: Do intrawound antiseptics prior to closure in primary arthroplasty for FNFs decrease the risk of periprosthetic joint infection?

Methods: A retrospective review of patients undergoing primary arthroplasty for FNFs was conducted at 11 institutions across the US from 2010 to 2019 (Northeast, 3; Midwest, 1; South, 4; West, 3). Patients with bilateral FNFs, concomitant ipsilateral acetabular fracture, pathologic FNF, and those without minimum 1-year follow-up were excluded. PJI were diagnosed using MSIS criteria and compared between groups at 90-days and 1-year postoperatively. Extensive patient demographic, comorbid, injury, and perioperative variables were compared. Multivariable logistic regression models were performed to address potential confounding variables.

Results: A total of 1,775 patients were included (925 HA and 850 THA). Of these, 1,246 received normal saline (NS), 278 dilute betadine (DB), and 251 antibiotic powder (AP) for intrawound antisepsis. Rates of PJI at 90-days (NS, 2.97%; DB, 3.24%; AP, 4.38%; P = 0.27) and 1-year (NS, 3.61%; DB, 3.24%; AP, 4.38%; P = 0.64) were compared. Multivariable logistic regression models showed OR 0.99 (95% CI, 0.44-2.03; P=0.97) for AP group and OR 1.00 (95% CI, 0.43-2.11; P>0.99) for DB group when compared to the NS group, controlling for age, BMI, DM, operative duration, EBL, ASA status, pre-injury ambulation, injury energy, CVA/stroke, and discharge disposition.

Discussion: Intrawound antisepsis was not associated with decreased risk of PJI compared to NS wash in patients undergoing primary arthroplasty for FNFs in a diverse patient population from across the US. Routine use of these antiseptics should be reconsidered in FNF patients given the lack of effectiveness.

Conclusion: There is no difference in risk of PJI at 90-days or 1-year with intrawound antisepsis using either DB or AP compared to NS wash in patients undergoing arthroplasty for FNF.

Attachments:

There is no figure for this abstract.

1353 Longer Persistent Wound Leakage is Associated with Increased Treatment Failure During Treatment of Prosthetic Joint Infections

Authors: **Alberto Telias**, Sanjula Costa, Paul Beaule, Hesham Abdelbary, George Grammatopoulos, Simon Garceau

Background And Rationale: Persistent leaking wounds (PLW) after primary hip and knee arthroplasty treated for prosthetic joint infections (PJI) are common. There is a lack of clinical studies or guidelines for PLW reintervention in PJI. This study seeks to fill the existing knowledge gap and provide evidence-based guidelines.

Study Question: What is the temporal association between PLW and treatment failure? What factors are associated with PLW after hip PJI surgery?

Methods: A retrospective cohort study of THA PJI patients was conducted at our PJI referral center from March 2019 to December 2022, with a minimum follow-up of 1 year. Regression analysis was performed to assess for association of treatment failure with covariates. Analysis was performed for association of PLW with patient and surgery related factors. PLW was defined as >14 days. Failure of treatment was defined as the need for repeat surgery for persistent PJI, the presence of a chronic fistula, or death related to the infection.

Results: 174 cases in 103 patients were identified: 103 females (59%) and 71 males (41%), with a mean age of 68.7(+/-)13.8 years. 55 (53.3%) patients required one, 33 (32%) two, 13 (12.5%) three or more PJI surgeries. The mortality rate was 9.7% at 1 year, and five (4.8%) patients suffered from persistent PJI. PLW was present in 41.3% of cases and was associated with treatment failure (coefficient = -1.42, SE=0.44, z=-3.208 p=0.00134). Wound drainage was significantly associated with the use of VAC dressings (p = 0.048).

Discussion: Wound drainage >14 days was associated with an elevated risk of failure after PJI surgery, emphasizing the need for early management and prevention of PWL. Additionally, the association between wound drainage and the use of VAC dressings may suggest an over-reliance on VAC rather than water-tight closure. These results highlight the importance of “getting the closure right the first time”, as failure to do so is associated with increased treatment failure.

Conclusion: Wound drainage exceeding 14 days poses a heightened risk of treatment failure across PJI surgeries. Optimizing reversible factors perioperatively can mitigate prolonged drainage, and early repeat surgery within 2 weeks post-revision surgery may reduce treatment failure risks, thus optimizing healthcare resource utilization.

Attachments:

There is no figure for this abstract.

1301 Discrepancies in PJI Criteria Reporting and Use: A Call for CLEAR-Dx-PJI Standards

Authors: **Alexandra L Hohmann**, Cristian A DeSimone, Natalie A Lowenstein, Carl A Deirmengian, Yale A Fillingham

Background And Rationale: Since 2011, authoritative bodies have endorsed various criterion-based definitions of periprosthetic joint infection (PJI) with differing criteria and point systems.

Study Question: Which PJI definitions are most prevalent in the literature, and how accurately are they cited and used?

Methods: The 2011 MSIS, 2013 MSIS/ICM, 2013 IDSA, 2018 ICM, and 2021 EBJIS definitions, and an unendorsed definition published in 2018, were included. Back citation identified 466 studies (JOA: 288, CORR: 71, BJJ: 62, JBJS: 45) from 2012-2022 using a PJI definition. Trends in PJI definition citation and use were assessed, focusing on 1) PJI definition claimed in methods, 2) The cited reference to this claim, 3) Description of definition in manuscript, 4) Definition modification.

Results: Of 466 studies, the 2011/2013 MSIS definitions remain predominant over time, despite newer definitions. Only 32% (147/466) detailed the PJI definition beyond its name and citation. Definitions were modified by authors in 19% (89/466) of studies. Of 99 studies using a definition with an "inconclusive" category, only 19% (19/99) provided details on the inconclusive group. The PJI definition stated in methods did not align with the cited source in 21% (99/466) of cases, varying by journal. Of these, 74% (73/99) cited the unendorsed definition published in 2018 while claiming use of an endorsed MSIS or ICM definition. An audit of studies with sufficient data commonly found mistaken use of the unendorsed definition of PJI instead of the reported 2018 ICM definition.

Discussion: This study found systematic failures in the reporting and use of PJI definitions, impacting study integrity. There is clearly confusion regarding the numerous definitions of PJI. We urge authors and journals to include a detailed reporting format, which we term the 2024 CLEAR-Dx-PJI (Citation, Legibility, and Exactness in Academic Reporting of Diagnostic Criteria for Periprosthetic Joint Infections) Standards (Table 1), when publishing studies using an endorsed PJI definition.

Conclusion: The 2011/2013 MSIS definitions of PJI remain the most used definitions through 2022. Among top-tier journals, the PJI definition claimed in the methods often (21%) contradicted the cited reference. Studies frequently failed to clearly report the definition used, cited the wrong definition, or used an unendorsed definition despite claiming use of an endorsed version.

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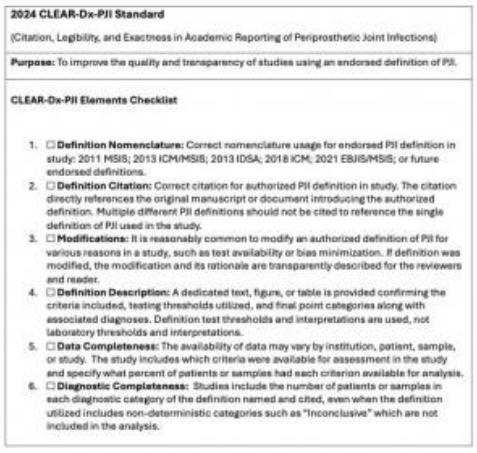


2024 CLEAR-Dx-PJI Standard

(Citation, Legibility, and Exactness in Academic Reporting of Periprosthetic Joint Infections)

Purpose: To improve the quality and transparency of studies using an endorsed definition of PJI.

CLEAR-Dx-PJI Elements Checklist

1. ☐ **Definition Nomenclature:** Correct nomenclature usage for endorsed PJI definition in study: 2011 MSIS; 2013 ICM/MSIS; 2013 IDSA; 2018 ICM; 2021 EBJIS/MSIS; or future endorsed definitions.
2. ☐ **Definition Citation:** Correct citation for authorized PJI definition in study. The citation directly references the original manuscript or document introducing the authorized definition. Multiple different PJI definitions should not be cited to reference the single definition of PJI used in the study.
3. ☐ **Modifications:** It is reasonably common to modify an authorized definition of PJI for various reasons in a study, such as test availability or bias minimization. If definition was modified, the modification and its rationale are transparently described for the reviewers and reader.
4. ☐ **Definition Description:** A dedicated text, figure, or table is provided confirming the criteria included, testing thresholds utilized, and final point categories along with associated diagnoses. Definition test thresholds and interpretations are used, not laboratory thresholds and interpretations.
5. ☐ **Data Completeness:** The availability of data may vary by institution, patient, sample, or study. The study includes which criteria were available for assessment in the study and specify what percent of patients or samples had each criterion available for analysis.
6. ☐ **Diagnostic Completeness:** Studies include the number of patients or samples in each diagnostic category of the definition named and cited, even when the definition utilized includes non-deterministic categories such as "Inconclusive" which are not included in the analysis.

1307 Reimbursement for the Treatment of Periprosthetic Joint Infections of the Knee Declined Significantly Over the Past Twelve Years

Authors: **Sayi P Boddu**, David G Deckey, Jack M Haglin, Zachary K Christopher, Mark J Spangehl, Henry D Clarke, Joshua S Bingham

Background And Rationale: Prior studies have reported an increasing number of total knee arthroplasties (TKA) performed and declining reimbursements over the past decade. However, many of these prior reports focus solely on Medicare data, or small cohorts of commercial data.

Study Question: The purpose of this study was to examine the evolving trends concerning both the volume of TKA prosthetic joint infection (PJI) and the reimbursement provided by public and private insurances over the past 12 years.

Methods: All patients undergoing primary TKA between 2010 and 2021 were identified in the PearlDiver administrative claims database. Subsequently, all patients diagnosed with PJI of the knee were identified. Rates were broken down by year. To control for all reimbursements associated with PJI diagnosis, reimbursement over the course of an entire calendar year was included. Final overall reimbursement data per patient was calculated over a 1-year period from index TKA and from the diagnosis of PJI. Consumer Price Index (CPI) was then used to control for inflation and normalize all data to 2021 dollars.

Results: Overall, 2,649,013 primary TKAs were identified over the 12-year period, with 81,457 knee PJIs, for an overall infection rate of 3.1%. Rates of PJI over the twelve-year period have risen from 1.2% to 3.3%. On average, 220,751 TKAs were performed each year. Mean, per-patient, one-year reimbursement following TKA decreased from $16,837 dollars in 2010 to $5,763 in 2021. Mean, per-patient one-year reimbursement following the diagnosis of TKA PJI decreased from $18,817 in 2010 to $10,754 in 2021. These decreases in reimbursement for both TKA and TKA PJI represents a 66% and 43% decrease in reimbursement from 2010 to 2021, respectively.

Discussion: Despite an increase in the total number of PJIs treated, the total reimbursements from insurance companies for these frequently complex and costly treatments have decreased significantly over the past 12 years. This finding holds significance as it suggests that physicians are performing an increasing number of these challenging procedures annually, while overall reimbursement per procedure is declining. The decreased incentive to perform these complex cases may make it difficult for these patients to find the care they need.

Conclusion: This situation raises the necessity for a re-evaluation of billing and reimbursement rates for the treatment of PJI.

Attachments:

There is no figure for this abstract.

1322 Amphotericin B-Impregnated Antibiotic Spacers a Double-Edged Sword? High Fungal Infection Eradication Rate and Associated AKI in Renal Patients

Authors: Luke G Menken, Pasquale Gencarelli Jr, Ian S Hong, Christian Zapf, Frank A Liporace, Richard S Yoon, **Jaclyn M Jankowski**

Background And Rationale: Fungal periprosthetic joint infections(PJI) have a higher failure rate as these pathogens are often more difficult to diagnose and treat. Institutional protocol dictated adding Amphotericin B to our antibiotic-spacers(AmpB-AbxSpcr) in patients diagnosed with fungal infection and those who have suffered from chronic infections that have not responded to previous antibiotic spacers.

Study Question: Is AmpB-AbxSpcr effective in eradicating fungal infections in patients with culture-proven fungal PJIs? What is the incidence of acute kidney injury(AKI) among patients treated with AmpB-AbxSpcr?

Methods: Institutional joint reconstruction registry was screened between2019-2023 identifying patients aged>=18years who underwent explant of total hip arthroplasty(THA) or total knee arthroplasty(TKA) and received stage1AmpB-AbxSpcr with positive fungal culture results. Patients with incomplete medical records or =< 6months follow-up were excluded.

Results: Eighteen patients(avg age:64.6±11.5years;avg follow-up:20±13.9months) were identified(56%-KneePJI;44%-HipPJI) meeting inclusion criteria. Thirteen(72%)patients had 1 previous history of PJI and 2(11%) had 2 previous PJI. Spacer explant and definitive revisions were performed for 12(67%)patients. Four(22%) spacers required recharge due to: 2persistent infection, 1periprosthetic dislocation, 1periprosthetic fracture. Fungal infection eradication rate after definitive revision or spacer recharge was 15/18(83%). AKI was observed in 5(28%)patients, and 3/4(75%)patients with CKD or ESRD having a higher susceptibility to AKI compared to 2/14(14%)without.

Discussion: Combining the use of AmpB-AbxSpcr and antifungal regimen achieved a fungal infection eradication rate of 83% in patients predominantly with 1-2 previous histories of PJI. Despite the inherent challenges in treating patients with prior history of PJI, including the high-risk of re-infection, this study demonstrates the efficacy of the AmpB-AbxSpcr in reducing the recurrence of infections. The incidence of AKI in 28%patients and specifically the high rate found in patients with CKD or ESR raises important clinical considerations when utilizing AmpB-AbxSpcr.

Conclusion: AmpB-AbxSpcr is effective in eradicating fungal infections in patients with culture-proven fungal PJIs. However, there is considerable risk of AKI, especially in patients with pre-existing renal conditions.

Attachments:

1329 Outcome of Gram-Negative Periprosthetic Joint Infection after Primary and Revision Total Hip and Knee Arthroplasty

Authors: **Pansachee Damronglerd**, Omar M Abu Saleh, Nicholas Bedard, Douglas R Osmon

Background And Rationale: Gram-negative bacteria (GNB) account for 5-23% of all periprosthetic joint infections (PJI), following total knee or hip arthroplasties (TKA, THA). Literature on the management of Gram-negative PJI is limited.

Study Question: We want to know about our experience with the presentation, management, and outcomes of Gram-negative PJI.

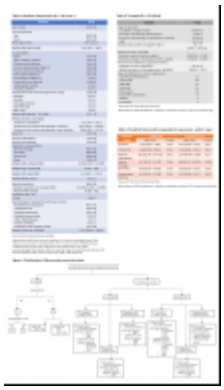
Methods: A retrospective review of our infected institutional total joint registry from 2012-2023 identified 125 patients with 126 GNB PJI (60 THA and 66 TKA) according to MSIS criteria for PJI. Seventy-two cases (57%) of GNB PJI in this series were classified as acute based on the duration of symptoms of less than 4 weeks. Treatment failure was defined as reoperation for any reason, persistent infection, or reinfection post-surgery. Baseline demographics, presenting symptoms, microbiological data, and treatment outcomes were reviewed.

Results: For baseline demographics, see Table 1. Notably, 10% of patients included in the study were immunosuppressed. Fifty-five cases (43.6%) had a history of revision prior to the diagnosis of PJI, including 44 cases with history of prior PJI. Pseudomonas aeruginosa was the most commonly isolated pathogen (31.7%). Wound drainage was associated with polymicrobial growth (40.8%). Debridement, antibiotics, and implant retention (DAIR) was utilized in 42 cases with 9.8% failure rate. Eighty-four cases underwent resection arthroplasty (RA), 73 had antimicrobial spacer, of those, 60 patients completed two-stage revision (TSR). At the time of reimplantation, 45/60 (75%) of cases had negative cultures (Table 2). The overall failure rate in resection group failure rate was 45.2%. The Failure rate in this cohort was 33%. Fluoroquinolones had a 90% susceptibility rate.

Discussion: History of revision arthroplasty, chronic PJI and the presence of sinus tract in DAIR group were associated with higher odds of reoperation within 1 year. Wound drainage was associated with higher odds of reoperation in the resection group (Table 3). Fluoroquinolones were used infrequently for chronic suppression (25%)

Conclusion: Pseudomonas aeruginosa was the predominant pathogen in GNB PJI, with a high failure rate observed in the resection group. History of revision arthroplasty, chronic PJI, sinus tracts and wound drainage were associated with increased risk of reoperation within 1 year.

Attachments:



Monitor 3

1330 Evaluating the Efficacy of Tobramycin or Gentamicin Spacers in Managing Prosthetic Joint Infections Caused by Pseudomonas aeruginosa, Implications of Changing MIC Breakpoints

Authors: **Pansachee Damronglerd**, Omar M Abu Saleh, Nicholas Bedard, Douglas R Osmon

Background And Rationale: Prosthetic joint infection (PJI) after total hip and knee arthroplasty (THA and TKA), especially by Pseudomonas aeruginosa (PSA), remains a challenging complication. Polymethylmethacrylate (PMMA) antibiotic spacers, containing with either tobramycin or gentamicin, have improved outcomes in resection arthroplasty and two-stage exchange. Given the 2023 adjustment of PSA susceptibility breakpoints for these antibiotics (Figure 1), we assessed the efficacy of PMMA spacers impregnated with either tobramycin or gentamicin for PSA PJI treatment at our institution.

Study Question: What are the risks of microbial failure and overall treatment failure in PSA PJI with resection arthroplasty using of a tobramycin or gentamicin impregnated spacer with systemic therapy with or without delayed reimplantation?

Methods: We conducted a retrospective review of PJI cases caused by PSA at Mayo Clinic, using data from the Total Joint Registry between 2012 - 2023. We reviewed demographics, presenting symptoms, microbiology, and treatment outcomes, defining microbial failure was defined as a positive tissue culture of any organism post-treatment, and surgical failure as any reoperation within one year.

Results: 31 PSA PJI cases underwent resection arthroplasty with tobramycin or gentamicin spacers and received 6 weeks of effective intravenous anti-pseudomonal antibiotics. 20 cases (64.5%) had a prior revision. Acute presentations occurred in 45.2% of cases, mainly with joint pain and wound drainage. Additional baseline demographics are showed in Table 1. 22 (70.9%) of cases also received a short course of oral ciprofloxacin or levofloxacin. 27 (87.1%) of cases had PSA isolates susceptible to tobramycin and gentamicin based on existing breakpoints at the time of spacer implantation. Treatment details are provided in Table 2. Only one case showed PSA in subsequent surgery, indicating a microbial failure rate of 3.2%. (Figure 2).

Discussion: This study demonstrated high surgical success rates with only two cases experienced reinfection requiring subsequent reoperation.

Conclusion: The microbial failure rate with the use of tobramycin or gentamicin impregnated spacers due to all organisms and PSA was low. The potential of other anti-pseudomonal agents in PMMA spacers would improve the microbial or overall treatment failure rate is unclear and needs additional study.

Attachments:

1303 Accuracy of Synovial White Blood Cell Count and Differential in Predicting Failure Following Reimplantation: A Multicenter Analysis

Authors: **Saad Tarabichi**, Juan D Lizcano, Elizabeth A Abe, Javad Parvizi, Jason M Jennings, Carlos A Higuera, Paul M Courtney

Background And Rationale: Two-stage exchange arthroplasty remains the preferred surgical treatment for chronic periprosthetic joint infection (PJI). There are no accurate metrics that can help with optimal timing of reimplantation. The purpose of this study was to assess the utility of synovial markers in predicting failure following reimplantation.

Study Question: What is the prognostic utility of synovial markers in determining timing of reimplantation?

Methods: This retrospective study identified patients undergoing hip or knee reimplantation with preoperative joint aspiration and synovial fluid analysis between 2009 and 2021. Patients with an extended time to reimplantation (>180 days) and those without minimum 1-year follow-up were excluded. Treatment success was defined using the Musculoskeletal Infection Society Outcome-Reporting Tool. Receiver operating characteristic curves were used to assess the prognostic utility of white blood cell count (WBC), polymorphonuclear leukocyte percentage (PMN%), as well as the combination of the two markers in predicting failure following reimplantation at minimum 1-year follow-up.

Results: 289 patients were included in the analysis. Of these, 62 (21.5%) patients subsequently failed treatment at a mean follow-up of 3.4 years (range, 1–5.9). WBC/PMN% combination (AUC 0.667, sensitivity 47.5%, specificity 87.8%) demonstrated the highest prognostic utility followed by PMN% (AUC 0.658, sensitivity 44.3%, specificity 82.5%) and WBC count (AUC 0.612, sensitivity 37.1%, specificity 89.9%). Using the Youden index, WBC □1,898 cells/□L and PMN% □70.0 were identified as the optimal cutoffs

Discussion: Although synovial markers could not predict treatment failure with definitive accuracy, the combination of WBC and PMN% appears to have moderate predictive value in this setting.

Conclusion: Future studies should explore the role of novel synovial markers for the assessment of infection eradication following two-stage exchange arthroplasty.

Attachments:

There is no figure for this abstract.

1345 Rethinking PJI Screening: Unveiling the Limitations of Serum ESR and CRP as Diagnostic Markers

Authors: Alisina Shahi, **Kenneth Mathis**, David Rodriguez, Ali Oliashirazi, Adam Freedhand

Background And Rationale: Based on the recommendations of the American Academy of Orthopaedic Surgeons (AAOS), serum ESR and CRP are designated as the frontline tools for periprosthetic joint infection (PJI) evaluation. However, the studies underpinning these guidelines frequently featured small sample sizes and lacked a standardized PJI definition. Hence, this paper seeks to reevaluate the sensitivity of serological tests utilizing a contemporary definition of PJI.

Study Question: How does the sensitivity of serum ESR and CRP as screening tools for PJI fare when assessed against a standardized definition of PJI?

Methods: A retrospective review of an institutional database of 689 total joint arthroplasties (368 knees , 321 hips) that underwent surgery for PJI. The 2018 ICM definition of PJI, and the defined thresholds for various parameters, were used to categorize patients into infected and non-infected (only the major criteria). Sensitivities were calculated for serum CRP among all PJIs, ESR for chronic infections, and for both tests together.

Results: The sensitivity of these markers for diagnosing chronic PJI (defined as infection occurring greater than 6 weeks from index arthroplasty), was 74.3% (95% CI: 67.7-80.9%) for CRP, and 80.0% (95% CI: 75.4-84.6%) for ESR. The sensitivity of these tests combined was 82.5% (95% CI: 73.3-85.7%) for ESR or CRP to be abnormal and 78.4% (72.7-90.6%) for both markers to be elevated. The sensitivity of CRP (threshold of >100mg/L) was 64.2% (95% CI: 61.3-67.1%) for acute PJIs.

Discussion: The study findings reveal a notable discrepancy between the observed false negative rates of serum ESR and CRP and prior expectations, particularly in acute PJI cases. Factors such as antibiotic administration prior to testing, infections caused by low virulent organisms, and higher thresholds for these tests than previously described contribute to this disparity. These results underscore the importance of reevaluating the current thresholds recommended by the ICM to potentially improve the sensitivity of these screening tests.

Conclusion: Surgeons must remain cognizant that PJI can still occur despite normal serological findings, necessitating ongoing clinical vigilance. Negative serum ESR and CRP results do not necessarily rule out PJI, emphasizing the need for continued clinical suspicion and complementary diagnostic modalities in suspected cases.

Attachments:

There is no figure for this abstract.

1316 A Comprehensive Analysis of Synovial Fluid Test Results Across the Range of Red Blood Cell Counts

Authors: Alex McLaren, Krista Toler, **Carl Deirmengian**

Background And Rationale: Prior studies suggest that synovial fluid (SF) red blood cells (RBCs) may impact the integrity of certain SF periprosthetic joint infection (PJI) tests. The relationship between RBCs and PJI tests has not been comprehensively evaluated.

Study Question: What is the relationship between SF-RBCs and SF culture and biomarkers for PJI?

Methods: We analyzed 105,917 consecutive SF samples from prosthetic hips, knees, and shoulders, including biomarker (SF-CRP, alpha-defensin, SF-WBCs, SF-PMN%, microbial antigen tests) and culture data. Laboratory test results were assessed across the SF-RBC count range (0 to 3E+07 cells/ul), focusing on trends in their association with SF-RBC count and potential impacts on test integrity.

Results: A three-phase association (Fig. 1) was observed for all laboratory values versus SF-RBCs. Very low SF-RBCs (<5,000 cells/ul) correlated with culture positivity under 6% and very low mean values for all biomarkers. Moderate RBCs (5k–300k) showed increasing culture positivity (6% to 21%) and rising biomarker levels. Extremely high RBCs (>300k-5 million) correlated with a decline in culture positivity to 3%. At high SF-RBC counts, WBCs and PMNs closely followed SF-RBC increases, with WBCs approaching 6k cells/ul and PMN% approaching 60%, both typical of normal blood levels. The CRP, alpha-defensin, and microbial antigen tests showed no increase with SF-RBC values (Fig 2a-b – WBCs and microbial antigen test vs. RBCs).

Discussion: This comprehensive assessment of SF-laboratory test variations across the SF-RBC range shows an increasing infection likelihood with rising SF-RBC counts. However, extremely high SF-RBC counts, likely from erroneous aspirations or hematomas, can misguide diagnostic efforts, and artificially elevate the SF-WBCs and SF-PMN%.

Conclusion: Culture positivity and biomarker levels show a three-phase variation across the SF-RBC count range. The progressive elevation of SF-WBCs and SF-PMN% with SF-RBCs is consistent with the fact that normal blood values are greater than normal SF values. Conversely, the SF-CRP, alpha-defensin, and microbial antigen tests do not increase with SF-RBC values. Extremely high RBC levels (>1M) are associated with decreases in culture-positivity and highest baseline levels of SF-WBCs.

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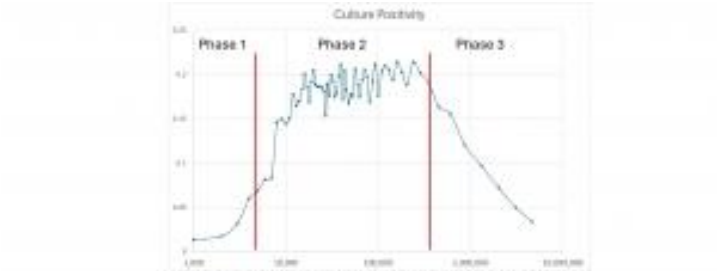

Fig. 1 – Three-phase association of culture positivity vs. RBC count.

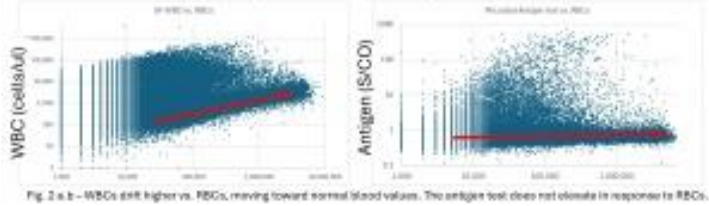

Fig. 2 a-b – WBCs drift higher vs. RBCs, moving toward normal blood values. The antigen test does not elevate in response to RBCs.

1325 Low-Dose Chlorhexidine Gluconate versus Saline Wound Irrigation in Primary Total Hip Arthroplasty: A Propensity Score-Matched Analysis

Authors: McKenzie A Mayer, Ian S Hong, Andrew-Gerard Baddoo, Daniel R Dziadosz, Frank A Liporace, Richard S Yoon, **Jaclyn M Jankowski**

Background And Rationale: Surgical site infections(SSI) and their associated complications negatively affect the postoperative recovery after primary total hip arthroplasty(THA). Currently, there is no gold standard wound irrigation solution that may potentially reduce infections postoperatively.

Study Question: Does 0.5%low-dose chlorhexidine gluconate(CHG)irrigation reduce SSIs and related complications in primaryTHA compared to saline? Are there differences in the incidence of emergency department(ED) visits and readmissions within 30-and90-days postoperatively?

Methods:

Institutional joint reconstruction registry was screened to identify patients>=18yrs who underwent primaryTHA with wound irrigation utilizing saline only and saline+CHG. A total of 773pts were initially reviewed and propensity score matched using age, BMI, sex, tobacco use, diabetes mellitus(DM) status and A1c to ensure 1:1comparison.

Results: 204 pts were matched based on criteria:102 pts in each of the saline group and CHG group(avgAge:62.4±12.7vs62.5±12.5years, %female:59%vs59%, meanBMI: 29.4±5.6vs29.6, meanA1c:5.7±0.7vs5.7±0.8). Smoking status between groups were current (10%vs11%) and former (43%vs41%) and proportion of DM was 28%vs22%. Mean Charlson Comorbidity Index was saline-3.0±2.2 vs CHG-2.7±2.2,p=0.433. Within 30-days (14%vs9%,p=0.179) and 90-days (21%vs15%,p=0.179), the CHG group had lower incidence of ED visits; however, the 30-day readmission rates were the same (4%vs4%,p=1.0) and at 90-days the CHG group had marginally lower rates (9%vs7%,p=0.398). Within 1-year, the overall hip related complications were significantly lower in the CHG group (24%vs13%,p=0.034) and reoperation rates were lower without statistical significance in the CHG group (7%vs3%,p=0.266) with 1 case of periprosthetic joint infection(PJI) treated with antibiotic spacer in the saline group at 3 months. All other reoperations were either due to dislocation or periprosthetic fracture.

Discussion: This propensity score-matched analysis showed a consistent trend towards lower incidence of Edvisits and readmissions in the CHGgroup, with no reported cases of PJI within the early postoperative period. Furthermore, there were significantly lower hip-related complications within 1yr in the CHGgroup.

Conclusion: CHG irrigation may enhance early postoperative outcomes, however, continued investigation with larger cohorts is essential to validate these findings.

Attachments:

There is no figure for this abstract.

1326 Low-Dose Chlorhexidine Gluconate Wound Irrigation Reduces Surgical Site Infections Compared to Saline in Primary Total Knee Arthroplasty: A Propensity Score-Matched Analysis

Authors: Nicole Campbell, Ian S Hong, Christian Zapf, Daniel R Dziadosz, Frank A Liporace, Richard S Yoon, **Jaclyn M Jankowski**

Background And Rationale: Periprosthetic joint infections following joint arthroplasty are a devastating complication that can result in patient morbidity and future revisions. Intraoperative adjuncts such as low-dose chlorhexidine gluconate(CHG) wound irrigation and lavage provide a potential opportunity to mitigate infections in patients undergoing primary total knee arthroplasty(TKA).

Study Question: What is the difference in surgical site infection(SSI) rates and reoperations in a propensity matched patient cohorts who underwent primaryTKA using CHG vs. Saline wound irrigation and lavage? How do emergency department(ED) and readmission rates compare at postoperative 30- and 90-day timeframe in the same matched cohorts?

Methods:Institutional joint reconstruction registry was screened to identify patients>=18years old who underwent primaryTKA with intraoperative wound irrigation utilizing saline only and saline plus CHG. A total of 807 patients were initially reviewed and propensity score matched based in nearest neighbor using age, BMI, sex, tobacco use, diabetes mellitus(DM) status and A1c to ensure 1:1 comparison.

Results: Two-hundred and sixteen patients were matched based on criteria resulting in 108 saline group and 108 CHG group. The average age was 65.4±9.9 and 65.4±10.3 years, between Saline and CHG cohorts, respectively. Mean Charlson Comorbidity Index(CCI) was 3.3±1.8 vs 3.3±1.9 and mean preoperative hemoglobin A1C 5.8±0.8 vs 5.8±0.7. The incidence of superficial SSI (12%vs3%,p=0.008) and periprosthetic joint infection(PJI) (3%vs0%,p=0.123) was lower in the CHG group, however, wound dehiscence rates were elevated(3%vs8%,p=0.067). Within 30-days both ED visits (23%vs12%,p-0.042) and readmission rates (10%vs1%,p=0.005) were significantly lower in the CHG group; however, at 90-days were comparable for both ED visits (13%vs12%,p=0.13) and readmission(4%vs3%,p=0.123). Within 1-year, the reoperation rates were comparable (6%vs4%,p=0.269) between groups.

Discussion: CHG was observed to reduce SSIs significantly compared to saline following primaryTKA, with lower ED visits and readmissions at 30days despite similar numbers at 90days.

Conclusion: CHG irrigation in primaryTKAs significantly lowers SSIs and short-term complications compared to saline wound irrigation, supporting its use as an effective intraoperative adjunct for enhancing early postoperative outcomes.

Attachments:

There is no figure for this abstract.

1320 Impact of Antibiotic-laden Cement on Organism Resistance in Acute Periprosthetic Joint Infections

Authors: **Mohammed Hammad**, Mia J Fowler, Elizabeth Robilotti, Michael Henry, Andy Miller, Alberto V Carli

Background And Rationale: Periprosthetic joint infection (PJI) presents a significant challenge post-total knee arthroplasty (TKA). Antibiotic-loaded bone cement (ALBC) is commonly used to reduce PJI risk by enhancing local antibiotic delivery. Yet, it remains unclear whether the prolonged antibiotic release from ALBC could promote increased resistance among organisms when PJI occurs. This study aims to clarify the relationship between the use of ALBC and the development of antibiotic resistance in acute postoperative PJIs.

Study Question: Does the use of antibiotic-laden cement in primary TKA contribute to increased organism resistance in acute postoperative periprosthetic joint infections compared to regular bone cement?

Methods: We conducted a retrospective analysis of 114 acute postoperative PJI cases from primary TKAs or aseptic revised TKAs at a single institution between 2018 and 2023. Data collected included the type of cement used, antibiotic presence (premanufactured or hand-mixed), and details from the index surgery and subsequent PJI revisions. The primary outcome was resistance to the antibiotics commonly used in the cement, as determined through preoperative aspirations and intraoperative cultures.

Results: In the 54 cases using ALBC, 11 (20.37%) showed aminoglycoside resistance. Among the 40 cases with regular bone cement, 4 (10%) exhibited resistance. No cases in either group showed vancomycin resistance. Statistical analysis using the chi-square test indicated no significant difference in aminoglycoside resistance between the two groups (p=0.1746), with an odds ratio of 2.302 favoring higher resistance in the ALBC group, though this was not statistically significant (95% CI: 0.7015 to 6.985).

Discussion: While the ALBC group demonstrated a higher incidence of aminoglycoside resistance, the difference was not statistically significant. This suggests that while ALBC may be associated with a higher rate of resistance, the effect size and clinical significance remain uncertain. Both groups showed no resistance to vancomycin, indicating effective prophylaxis against vancomycin-sensitive organisms regardless of cement type.

Conclusion: The study found that using ALBC does not significantly influence organism resistance to aminoglycosides or vancomycin in acute PJIs following primary TKA. This highlights the continued efficacy of ALBC in managing infection risks without substantially altering resistance patterns among pathogens

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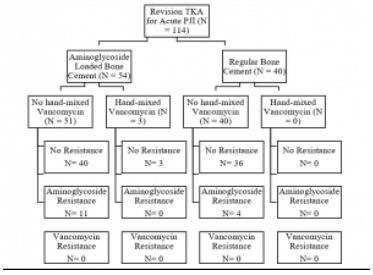
Table 1: Cohort breakdown



1336 Superimposed Crystalline Arthropathy in Total Joint Arthroplasty: Impact on Periprosthetic Joint Infection Workup

Authors: **Anzar Sarfraz**, Casey Cardillo, Shiv Lamba, Harrison Potak, Ran Schwarzkopf, VInay Aggarwal

Background And Rationale: Periprosthetic joint infection (PJI) diagnosis remains a challenge and topic of much debate, yet little has been studied regarding the potential impact of superimposed crystalline arthropathy (CA) on PJI workup. This is the largest study to our knowledge to assess the prevalence of superimposed CA after total joint arthroplasty (TJA) and to investigate how patients with CA affect the diagnostic workup of PJI.

Study Question: What is the prevalence of CA following TJA and how does its presence influence the diagnostic approach for PJI?

Methods: A retrospective study of 703 TJA patients who underwent joint aspiration sent for crystal analysis and PJI workup between June 2011 and January 2024 was conducted. Patient baseline demographics, serum (erythrocyte sedimentation rate ESR, C-reactive protein CRP), and synovial (white blood cell WBC count, neutrophil percentage PMN) lab values were collected. Patients were categorized into three cohorts based on PJI status and presence of crystals (monosodium urate crystals MSU and calcium pyrophosphate dihydrate CPPD) from synovial fluid aspirate. Mann-Whitney U and Kruskal-Wallis analyses were used to assess statistical significance of median lab values between the cohorts.

Results: Of the 703 patients, 87 patients (12.4%) were positive for crystals, of which 11 were MSU (1.4%) and 76 were CPPD (11%). Patients who were negative for crystals and positive for PJI had higher median serum ESR (P<0.030) and synovial fluid PMN % (P<0.001) values compared to the cohort that was positive crystals and positive PJI. The patient cohort with positive crystals and positive PJI had a higher serum CRP (P<0.001) and synovial fluid WBC (P<0.001) median values compared to the cohort negative for crystals and positive for PJI. Patient cohort with negative crystals and negative PJI had lower values for all labs except serum ESR which was higher than cohort positive crystals and positive PJI.

Discussion: The presence of CA somewhat complicates the diagnostic process for PJI following TJA, as evidenced by the variations in serum and synovial laboratory values among the different cohorts. In the presence of positive PJI, the presence of CA further elevated serum CRP and synovial WBC significantly.

Conclusion: These findings demonstrate CA may be present in a greater than previously reported proportion of TJA patients, and its presence may confound the workup of PJI.

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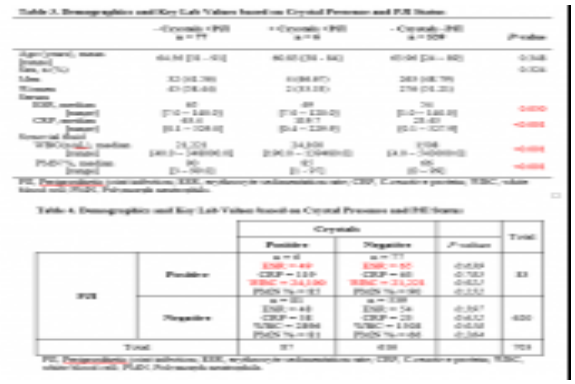

1323 Low-Dose Chlorhexidine Gluconate Irrigation for Hip Fractures Undergoing Arthroplasty is Associated with Low Surgical Site Infections

Authors: John Flacco, Matthew T Bernhard, Christian Zapf, Ian S Hong, Andrew-Gerard Baddoo, Amish Naik, Daniel R Dziadosz, Frank A Liporace, Richard S Yoon, Jaclyn M Jankowski

Background And Rationale: Periprosthetic joint infections following joint arthroplasty are a devastating complication that can result in significant patient morbidity. Intraoperative adjuncts offer a potential opportunity for reducing surgical site infections.

Study Question: What is the safety and efficacy of low-dose (0.05%) chlorhexidine gluconate(CHG) wound irrigation and lavage in the surgical treatment of hip fractures? To what extent can CHG reduce surgical-site-infections(SSI) following total hip arthroplasty(THA) or hemiarthroplasty(HHA)?

Methods: Institutional joint reconstruction registry was screened identifying all hip fracture patients ages>=18years that underwent intraoperative wound irrigation and lavage using CHG between 2020-2024. Baseline demographics, perioperative, and postoperative outcomes were reported.

Results: Fifty-nine hip fracture patients, 40(67.8%) surgically treated with HHA and 19(32%) with THA met inclusion criteria and were included in the final analysis. A majority of the indications for surgery were due to femoral neck fracture(84.7%), conversion of previous ORIF to THA(8.47%), and pathological fracture(3.4%) with a mean Charlson Comorbidity Index(CCI) of 3.34±2.29. The mean delay to surgical management was 42.46±50.67 hours, and operative time was 119.36±38.41minutes. Postoperatively, we observed 2(3.4%) patients with wound dehiscence, 3(5.1%) with soft tissue complications, and 1(1.7%) prosthetic joint infection(PJI). At postoperative 30 days, 9(15.3%) had a visit to the emergency department(ED) with 7(11.9%) readmitted. At postoperative 30-90 days, 11(18.6%) had a visit to the ED, with 11(18.6%) readmitted. Two (3.4%) patients underwent revision surgery (1 due to PJI and 1 due to periprosthetic fracture). Five(8.5%) Patients experienced mortality within 1 year due to underlying medical comorbidities.

Discussion: The application of low-dose CHG irrigation and lavage is associated with relatively low SSIs and one reoperation due to infectious etiology, supporting its use as an effective intraoperative adjunct for infection prophylaxis.

Conclusion: Low dose CHG during hip arthroplasty is safe and is associated with low SSIs, suggesting its efficacy as an intraoperative adjunct when managing hip fractures. Further studies are needed to validate our results and explore definitive CHG protocols.

Attachments:

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Authors: Hayley E Raymond, **Anzar Sarfraz**, Harrison Potak, Braden V Saba, Joshua C Rozell, Ran Schwarzkopf, Vinay K Aggarwal

Background And Rationale: Two-stage component exchange continues to be the gold standard for chronic periprosthetic joint infections (PJI). Articulating spacers have become the standard of care in two-stage exchange total hip arthroplasty (THA) for a majority of patients to provide patients with functional joints and help facilitate second-stage reimplantation. While several studies have evaluated articulating versus non-articulating spacers in PJI, this is the first to specifically compare complications and outcomes for articulating spacers stratified by level of spacer constraint.

Study Question: Do surgical outcomes and complications following first- and second-stage total hip revisions differ by the level of constraint in the selected hip spacers?

Methods: We retrospectively reviewed 155 THA patients who underwent two-stage revision at a single academic institution from 2011 to 2023. Patients were classified according to the constraint level of the spacer that they received in their first stage revision: articulating non-constrained, articulating constrained, or non-articulating. We collected demographic data for all patients, as well as surgical data for the first stage revision. We collected data on complications after the first stage, including wound complication, deep vein thrombosis, dislocation, periprosthetic fracture, and persistent infection. We also examined outcomes after the second stage revision, including readmissions, reoperations, or emergency department visits.

Results: Patients with non-constrained articulating spacers had the greatest rates of wound complications among any spacer type after their first stage revision (P=0.035, Table 1). Although there was a trend towards higher dislocation rates in the articulating non-constrained group (7/68, 10.3%) compared to the articulating constrained group (3/72, 4.2%), this difference did not reach statistical significance (P=0.190, Table 1). Additionally, there were no differences in any of the other outcome measures after the first or second stage (Table 1).

Discussion: Although patients with articulating non-constrained liners had a slightly higher dislocation rate than constrained or non-articulating spacers, this difference was not statistically significant. There were no other significant differences in outcome measures.

Conclusion: Given the lack of significant differences, the choice of articulating spacer construct can be left up to surgeon discretion in patients with chronic PJI.

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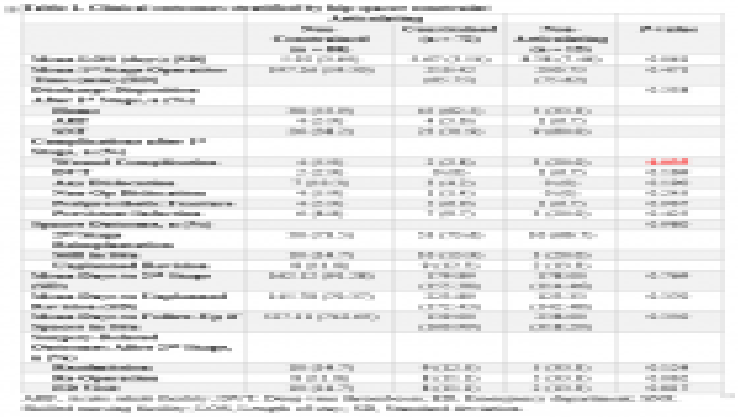

Monitor 4

1281 Metformin use in a Prosthetic Joint Infection Model: Efficacy and Impact on Mitochondria

Authors: **Nour Bouji**, Elizabeth Stewart, Ethan M Meadows, John Hollander, Matthew J Dietz

Background And Rationale: PJI continues to face a burden of bacterial resistance as antibiotic usage increases. Metformin is a popular antidiabetic medicine with anti-infective and antioxidant properties that have been found to treat a variety of conditions, including cancer, aging, and infectious disorders. Mitochondria are known as the cell's powerhouse, yet recent research has connected their malfunction to infection-induced sepsis and bactericidal antibiotic therapy. There has been no research on the effectiveness and mitochondrial effects of Metformin in PJI.

Study Question: To evaluate the efficacy of metformin in treating PJI compared to standard systemic vancomycin administration and its potential effects on mitochondria

Methods: Using an MSSA-associated in vivo model, animals (n=6) were assigned to either a control group (no treatment) or a 10-day course of treatment with either vancomycin (50mg/kg) VAN or Metformin(100mg/kg) MET. Both treatments were administered systematically via intraperitoneal (IP) injection. Bone and tissues were harvested from surgical limbs to assess efficacy and quantify the bacterial burden of colony-forming units (CFU) per gram of bone. To evaluate mitochondrial function, all groups underwent coupling assays to measure oxygen consumption rate (OCR) and extracellular acidification rate (ECAR). Standard statistical analysis was performed

Results: Both VAN and MET treatment groups demonstrated at least a 2-log reduction in CFU/g of bone. Bacterial burden was greatest in the CON group (4.16x109 CFU/g) compared to the VAN (1.7x106 CFU/g) and MET (2.1x106 CFU/g), though no statistical significance was observed (p=0.39). Mitochondrial function in the VAN group showed higher ECAR, lower OCR, and a significant decrease in maximal respiration and oxygen consumption due to ATP synthesis (P<0.04) compared to the MET group

Discussion: Comparison between metformin and vancomycin on mitochondrial function demonstrated favorable results for mitochondrial respiration with metformin. Metformin treatment exhibited reduced bacterial counts similar to vancomycin treatment compared to the infected control group

Conclusion: Our findings suggest that Metformin could be a potent and safe adjuvant to systemic vancomycin administration for PJI control. Furthermore, it may mitigate the adverse effects of antibiotics on mitochondria. These promising results offer hope for improved PJI treatment strategies

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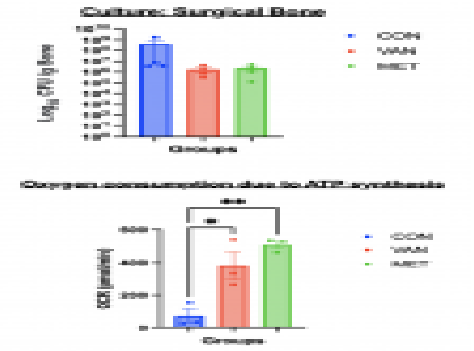

1344 Pre-treating PJI with systemic antibiotics decreases tissue and implant bacterial counts: results from an in vivo model

Authors: **Christina A Chao**, Tyler K Khilnani, Xu Yang, Mathias Bostrom, Alberto V Carli

Background And Rationale: Systemic antibiotics are usually held prior to Periprosthetic joint infection (PJI) revision surgery. However, recent studies suggest that preoperative aspirations have a high concordance with intraoperative cultures, which may allow surgeons to initiate antibiotic treatment earlier.

Study Question: The purpose of the study was to investigate the effect of Pre-surgical systemic antibiotic therapy on the bacterial burden within the periprosthetic space and systemic immune reaction.

Methods: MSSA (Xen36) S. Aureus PJI was induced in the right rear legs of twenty-four mice using a previously validated in vivo murine model of PJI. Mice were randomized to a control group or to receive two weeks of systemic vancomycin (Sub-Q delivery) or vancomycin plus rifampin (Sub-Q delivery and IV, respectively). Bacterial burden was quantified in the periprosthetic soft tissue, on the tibia, and on the implant via ex vivo counting of colony forming units (CFUs). Following treatment completion, mice were euthanized and tissue and the implant were harvested. Tissues were homogenized and serially plated to quantify bacterial burden in CFUs. The implant was sonicated and then plated for CFUs. Local and systemic inflammation were assessed via weighing of bilateral inguinal and iliac lymph nodes as well as through serum amyloid A analysis (SAA). Non-parametric pairwise group comparisons were performed using a Mann-Whitney U test.

Results: Vancomycin plus rifampin (VancRif) treatment significantly reduced bacterial burden in the periprosthetic soft tissue, bone, and implant compared to control ($p<0.001$) and vancomycin (Vanc) alone ($p<0.001$). Both antibiotic treatment groups reduced the weight of the right iliac lymph nodes, with the comparison groups of control-Vanc, control-VanRif, and Vanc-VanRif, showing significance of $p<0.001$ when run using a Mann-Whitney U test. Neither antibiotic treatment significantly reduced SAA compared to controls. Upon surgical harvesting, both antibiotic treatment groups displayed minimal amounts of purulence on visible inspection, compared to controls.

Discussion: The combination of vancomycin plus rifampin reduced bacterial burden in the soft tissue, on the bone, and on the implant, and was more effective than vancomycin monotherapy.

Conclusion: Administration of antibiotics in PJI cases prior to surgery reduces joint infection burden and could lead to more effective surgical resection.

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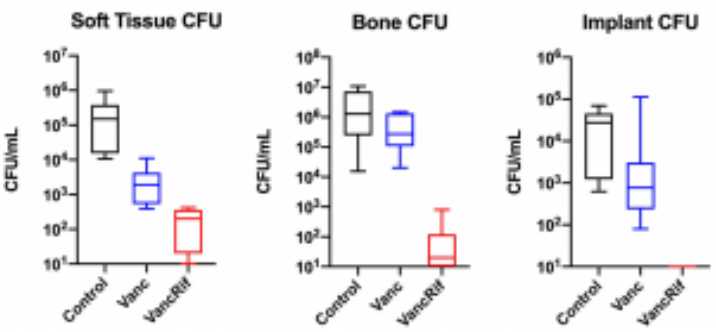


1278 Rapid Reduction in Porcine Dermal Staph. Aureus Infection Using Combination Nanosecond Pulsed Electric Fields and Antibiotics

Authors: **Alan M Kraft**

Background And Rationale: Nanosecond pulses have been used to create pores in cellular membranes to enhance the effectiveness of drug diffusion into cells. Recently that effect has been translated to the use with antibiotics on bacteria. Until this work, the effect has not been demonstrated in-vivo which historically has been shown to be more challenging. Study Question: Can nanosecond pulses and antibiotics be used to more effectively treat a dermal infection In-Vivo?

Study Question: Can nanosecond pulses and antibiotics be used to more effectively treat a dermal infection In-Vivo?

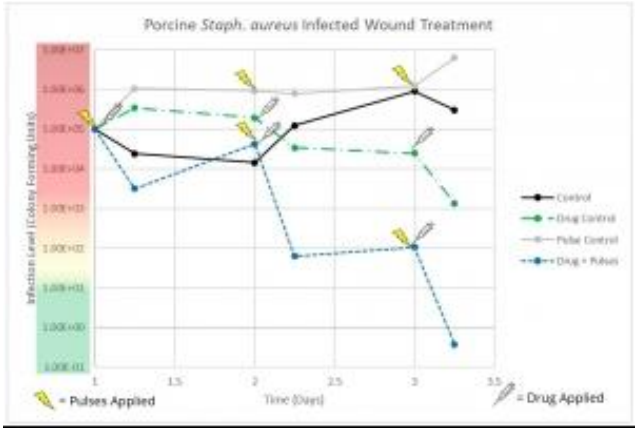
Methods: Pigs were put under anesthesia then 12 20x20mm full thickness dermal wounds were created exposing the subcutaneous fat layer. The wounds were infected with 10^5 CFU of Staph. Aureus with treatments performed 24hrs later. Treatment was with electric field pulses, tobramycin, and the combination. The drug was applied to the wound site locally at time of treatment, no systemic antibiotics present. Pulses were delivered with a wand with flat electrodes pressed against the wound and had a duration of approximately 10mins. After 6 hours the wounds were s……

Results: The results showed that the individual components of the treatment were ineffective. Alternatively, the combination showed to have a meaningful effect. The study results indicated that lower-power treatments, which minimized tissue damage, were the most effective. Higher power treatment that were most effective invitro damaged the tissue allowing the infection to rebound.

Discussion: A series of preliminary treatments were done to understand the individual effect that nanosecond pulses and drugs were having on wounds. There also was incremental refinement of our treatment procedures and the device used to treat the wounds. As anticipated, there is an optimal region of treatment power delivery where effective drug and pulsing synergy is most effective. We demonstrated that the optimal region was mi……

Conclusion: New more rigorous testing methods were developed in preparation of the study which proved to be closer to in-vivo. Significant progress was made to better understanding the capabilities of the use of pulsed electric fields to treat infections. The study proved there is a region that electroporation can be effective in reducing bacterial infection while having minimum damage to the host tissue.

Attachments:



1284 Characterization of a Transtibial Amputation Model of Osseointegrated Implant Infection

Authors: **Bailey Fearing**, Sarah Romereim, Matthew Smykowski, Jana Davis, Ryan Serbin, Nainisha Chintalapudi, Rachel B Seymour, Joseph R Hsu

Background And Rationale: Osseointegrated (OI) prostheses have advantages tosocket-based prostheses, yet a barrier to widespread use is infection and challenges with treating OI-associated infections. A preclinical animal model must exist of the human model to test potential interventions. We describe a novel rabbit model of OI implant-related infection that can be a platform for rapid translation and development of therapeutic approaches to combat these challenging infections.

Study Question: Can a preclinical osseointegration animal model be developed for use in future research

Methods: Conducted studies as a single-stage amputation via exposure, transection, reaming, and tapping of the tibia, followed by placement of a 3.5 mm x 75 mm Ti-6Al-4V cortical screw implant. The remaining muscle and skin was closed and a prosthetic attached to the screw. CBC hematology and clinical chemistry and imaging performed up to 8-weeks. High-resolution μCT and histology were conducted at terminal endpoints. Separately, pharmacokinetic testing of intraosseous (IO) vancomycin delivery was performed with 30 mg/kg vancomycin in 5 mL saline delivered over 30 min via peripheral IV cannula or IO administration via 18G needle. Serum and bone marrow collection occurred across a 5-hour period.

Results: Hematology and clinical chemistry results indicate normal ranges over the study course. Three rabbits (38%) had aseptic loosening of the implant, likely due to anatomical features of the rabbit tibia. Terminal μCT and histology demonstrate osseointegration between the threads of the implanted screw in the medullary cavity. Pharmacokinetic data determined IO vancomycin delivery results in lower vancomycin concentrations compared to IO delivery of vancomycin ($p < 0.05$) and higher peak vancomycin concentration within the tibial canal.

Discussion: We describe a novel rabbit model of OI and IO administration of antibiotics. This model can be used for future studies on OI and infection.

Conclusion: This translational model has reproduced a small animal model of OI transtibial amputation that recreates the bone-skin-implant interface, material-bone interactions to match human OI, and a similar immune response. Preclinical efficacy of IO administration of vancomycin compared to IV vancomycin delivery will be investigated, with potential for translation to clinical studies.

Attachments:

There is no figure for this abstract.

1331 Understanding Orthopaedic Infections: A Conceptual Approach

Authors: **Gregory Laborde**

Background And Rationale: In a 1992 Internal Medicine Grand Rounds presentation that focused on medical education, Dr. Frank Griffin, Jr. Made the comment that "understanding is the key to learning" (Griffin, 1992). His contention was that for information to be effectively retrieved, it must first be efficiently stored. Griffin said that the focus is usually on acquiring a "morass of details," which precludes the commitment of time to consider concepts. Memorizing mounds of facts without having an effective conceptual framework to store them is often an unsuccessful learning style because memory frequently fails without understanding. To accomplish this goal, we offer a framework of ideas called "concept maps". Of the many strategies for metacognition (that is, thinking about thinking), concept mapping is proven to improve meaningful and independent learning (Walvekar et al., 2021). We used this approach to guide understanding of common orthopaedic infections. This paper is not meant to serve as an approach on how to treat, but rather as a storage system with the ability to assist in understanding orthopaedic infections.

Study Question: How can orthopaedic infections be effectively organized?

Methods: Concept maps are constructed using information from over 40 sources of orthopaedic or infectious disease literature. The sequential levels of each concept map are referred to as levels of hierarchy. Boxes of each level of hierarchy are designed to be a point of differentiation between a similar concept. Branches form lower levels of hierarchy to further divide specific concepts.

Results: Using our hierarchical system, orthopaedic infections are first classified as either native tissue or foreign material. We further divide native tissue into hard and soft tissue. Foreign material is divided into hardware and retained foreign bodies. The next hierarchical level consists of various types of tissue or types of hardware that we further sub-classify using other specific characteristics.

Discussion: The produced concept maps provide a clear, concise form of organization for orthopaedic infections.

Conclusion: A framework to organize the many concepts of orthopaedic infections contributes to an insightful understanding of this vast topic. A desired goal of enhanced understanding is a more informed approach to both diagnosis and treatment. The production of these concept maps can assist in efficiently learning the material while providing a strong foundation for life-long learning.

Attachments:

1318 Enhancing Vancomycin Elution in PMMA Cement: The Impact of Mixing Order and Aminoglycoside Addition Across Different Brands and Viscosities

Authors: **Mohammed Hammad**, Christina A Chao, Suenghwan Jo, Mathias Bostrom, Alberto V Carli

Background And Rationale: Polymethylmethacrylate (PMMA) cement is essential in total joint arthroplasty for implant fixation and delivering local antibiotics to prevent infections. While pre-loaded aminoglycosides in PMMA show predictable elution, the release of manually added vancomycin is less consistent. With no standardized mixing method established to maximize vancomycin elution, understanding the optimal approach is crucial for enhancing therapeutic outcomes.

Study Question: Does the order of mixing vancomycin (powder first vs. Liquid first) affect its elution from PMMA, and does it maintain antimicrobial activity? Additionally, are there changes in the mechanical properties of PMMA based on the mixing order?

Methods: This study used two PMMA brands (Simplex and Palacos) and two viscosities (Palacos R, Palacos MV), testing six scenarios with and without aminoglycosides. Vancomycin was added as powder first or as a liquid first. Cement pucks were immersed in PBS for 28 days, with vancomycin elution measured by a colorimetric assay. MIC against MSSA assessed antimicrobial activity, and µCT scans checked for porosity changes.

Results: The 'Liquid First' method resulted in significantly higher vancomycin elution in Simplex P ($p=0.0024$), but not in Palacos. Simplex P 'Powder First' showed lower elution levels than Palacos R in both mixing conditions. The presence of pre-mixed aminoglycosides enhanced vancomycin elution in Palacos MV significantly ($p<0.001$) but had no effect in Palacos R. The antimicrobial efficacy of vancomycin remained consistent across all conditions. µCT scans indicated no significant changes in PMMA porosity regardless of mixing order or elution duration.

Discussion: The study shows that PMMA formulation and mixing order impact vancomycin elution, highlighting the importance of both factors in clinical applications. Vancomycin's consistent antimicrobial efficacy across all conditions underscores its role in infection control, unaffected by PMMA type or mixing method. No significant changes in PMMA porosity indicate structural integrity was maintained.

Conclusion: Mixing vancomycin with liquid monomer before powder enhances elution from Simplex P, optimizing antibiotic delivery. Adding pre-mixed aminoglycosides to Palacos MV boosts release, suggesting a synergistic clinical benefit. These insights are key for improving PMMA-based antibiotic delivery in total joint arthroplasty.

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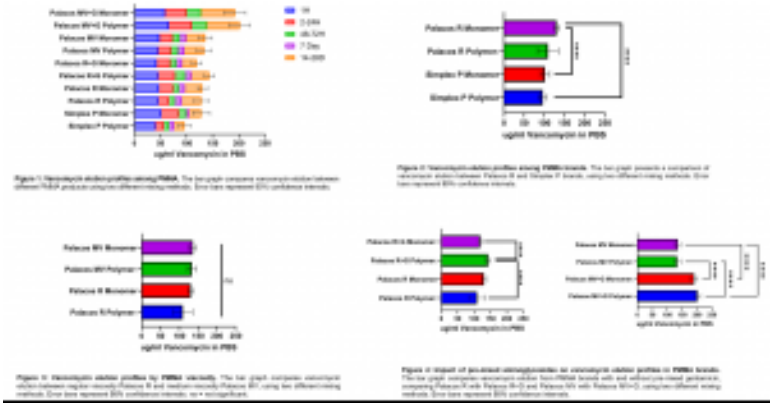

1340 Measuring the Quality of Periprosthetic Joint Infection Diagnosis: An Administrative Database Study

Authors: Daniel B Buchalter, **Andy Miller**, Shinhye Kim, Edward H Grabov, Diana Chee, Amy Chin, Alexander S McLawhorn, Catherine Maclean

Background And Rationale: The timely and accurate management of periprosthetic joint infection (PJI) remains a challenge. We assessed the quality of PJI diagnosis using an administrative claims database by determining whether preoperative erythrocyte sedimentation rate (ESR), c-reactive protein (CRP), and aspiration with cell count and culture were obtained prior to PJI surgery.

Study Question: Do hospitals nationwide adhere to established PJI diagnostic guidelines?

Methods: Using relevant International Classification of Disease Tenth Revision (ICD-10) and Current Procedural Terminology (CPT) codes, inpatient and outpatient Merative MarketScan claims data between 2019 and 2021 were queried for records with continuous enrollment 1-year prior, through 1-year after PJI surgery. Records were excluded if in the past year they had PJI surgery or a hospital visit, presented to the ER <= 2 days from surgery, or if they were transferred from another hospital. Demographics, geography, payor status, and comorbidities were collected. CPT codes were used to identify those that had preoperative ESR, CRP, and aspiration with cell count and culture. Compliance with preoperative testing by gender, age, geography, and employment status were compared using Chi-squared tests.

Results: 946 revision and 509 PJI eligible records were identified. In the revision and PJI cohorts, respectively, 464/946 (49.1%) and 225/509 (44.2%) were female, and 659/946 (69.7%) and 351/509 (69.0%) were 55-64 years old. In the revision cohort, 382 (40.4%) had no preoperative testing, and 481 (50.9%) had both ESR and CRP performed. In the PJI cohort, 186 (36.6%) had ESR, CRP, CC, and culture performed; 98 (19.3%) had three of these tests; 108 (21.3%) two; 37 (7.1%) one; and 80 (15.8%) none. For the revision and PJI cohorts with zero versus any number of tests performed, respectively, there were no significant differences by gender (p=0.467; p=0.086), age (p=0.260; p=0.988), geography (p=0.074; p=0.608), nor employment status (p=0.847; p=0.375).

Discussion: This novel application of administrative claims data found that no preoperative inflammatory markers are sent for 40.4% of revision arthroplasty patients, and only 36.6% of PJI patients receive a complete, standard-of-care, preoperative workup.

Conclusion: While administrative databases have their limitations, our findings will help improve management of PJI nationally.

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1351 Twelve-Year National Assessment of Trends in the Development of Prosthetic Joint Infections of the Hip and Knee

Authors: Sayi P Boddy, David G Deckey, Zachary Christopher, Mark J Spangehl, Henry D Clarke, **Joshua S Bingham**

Background And Rationale: Periprosthetic joint infections (PJI) are devastating with increased morbidity, mortality, a decreased quality of life, and potential for decreased level of mobility and ambulation.

Study Question: The goal of this study was to assess national trends in the diagnosis of prosthetic joint infection of the hip and knee.

Methods: All patient undergoing primary total hip (THA) and total knee arthroplasty (TKA) between 2010 and 2021 were identified in the PearlDiver administrative claims database. Subsequently, all patients diagnosed with PJI of the hip and knee were identified. Rates were broken down by year. Demographics and patient characteristics were assessed to identify trends in the development of PJI over this 12-year period.

Results: Overall, 770,075 THAs and 1,4533,574 TKAs were identified over the 12-year period, with 20,939 hip and 44,459 knee PJIs, for an overall infection rate of 0.027 and 0.031, respectively. Rates of PJI over the twelve-year period have risen for both THA and TKA, from 1.3 and 1.2% to 3.5% and 4.6%, respectively (Table 1). There were no differences in rates of PJI based on sex, age, or region. Patients with Medicaid (Table 2) and higher Charleston Morbidity Scores were significantly more likely to develop PJI of the hip or knee ($P<0.001$). Overall, median time to THA and TKA PJI diagnoses were 148 days (SD: 821 days) and 286 days (SD: 837 days), respectively (Table 3). Median length of stay for treatment of PJI was 12 days for both THA and TKA patients.

Discussion: While overall rates of PJI have not improved over the past 12 years, the vast the majority of diagnoses are chronic infections. Moreover, patients with Medicaid insurance and higher CCI are at increased risk for the development of PJI.

Conclusion: While tremendous emphasis has been placed on acute infection prevention, future efforts should work to decrease risk of chronic or acute hematogenous infections.

Attachments:

There is no figure for this abstract.

1223 Detecting Contamination Events during Robotic Total Joint Arthroplasty

Authors: **Jonathan J Lee**, Kingsley A Oladeji, Andrea K Finlay, Robert Manasherob, Derek F Amanatullah

Background And Rationale: Robot-assisted total joint arthroplasty (robotic-TJA) has become more widespread over the last 20 years due to higher patient satisfaction and reduced complications. However, robotic-TJA may have longer operative times and increased operating room traffic, which are known risk factors for contamination events. Contamination of surgical instruments may be contact- or airborne-related with documented scalpel blade contamination rates of up to 9%. Unique to robotic-TJA, the robot-arm is a novel instrument that comes in and out of the surgical field. However, the degree to which contamination of the robot arm occurs compared to other surgical instruments during robotic-TJA remains unknown.

Study Question: Our objective was to assess whether the robot-arm is a source of contamination when used in robotic-TJA compared to other surgical instruments.

Methods: This was a prospective, single-institution, single-surgeon pilot study involving 103 robotic TJAs. The only inclusion criteria were that a patient would be undergoing a robot-assisted (MAKO, Stryker, Mahwah, NJ) primary total knee or total hip arthroplasty. Samples were collected using culture swabs from 3 items in the operating room - the robot-arm, the scalpel blade used to make the skin incision, and the suction tip to assess for contamination events. All swabs were performed at two different time points: (1) after draping and prior to incision and (2) at closure. Swabs were incubated for at least 48 hours on tryptic soy agar followed by inspection for growth.

Results: A contamination event was detected in 10 cases (10%). Demographic data are presented in Table 1. The scalpel blade was the most common site of contamination (8%) followed by the robot-arm (2%) and suction tip (0%). There were no significant differences in the operative time (139 ± 22 v 138 ± 39 minutes, P = 0.953) or number of people present in the operating room (13 ± 2 v 13 ± 2 people, P = 0.935) of patients with or without a contamination event.

Discussion: The robot-arm maintains its sterility during robotic-TJA despite coming in and out of the operating field and interacting with multiple operating room personnel. However, contamination of other surgical instruments, predominantly related to the scalpel blade, still occur in robotic-TJA.

Conclusion: Contamination of the robot-arm during robotic-TJA is minimal compared to contamination of the scalpel blade.

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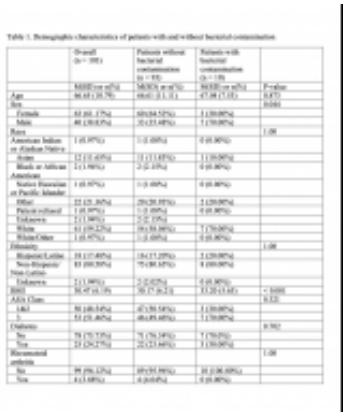

1294 Exploring the Diagnostic Utility of Leukocyte Esterase for Exclusion of Periprosthetic Joint Infections in Patients Presenting with Culture-Negative Results

Authors: **Alisina Shahi**, Adam Freedhand, Ali Oliashirazi, David Rodriguez-Quintana, Kenneth B Mathis

Background And Rationale: Diagnosis of periprosthetic joint infection (PJI) is very challenging especially when the cultures are negative. The Leukocyte Esterase (LE) test strip has emerged as a cost-effective modality for diagnosing PJI and is one of the minor Musculoskeletal Infection Society (MSIS) criteria for the diagnosis of PJI. The purpose of this study was to assess the performance of the LE strip test in identifying culture negative PJIs.

Study Question: How effective is the leukocyte esterase (LE) strip test at identifying periprosthetic joint infections in patients with negative culture results when using different diagnostic thresholds (++ vs ++/+) for interpretation?

Methods: We conducted a retrospective study and identified 294 revision arthroplasties that were performed in our institution between 2014-2022. The included patients had negative cultures and available results of LE strip test. Of these patients 43 were infected. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (+LR), and negative likelihood ratio (-LR) were calculated using both the ++ and ++/+ cutoff for the LE strip test.

Results: Using the ++ threshold, LE test had a sensitivity of 30.0%, specificity of 97.1%, PPV of 42.1%, NPV of 95.0%, +LR of 10.3, and –LR of 0.7. When the ++/+ threshold was used the LE test had 95.0% sensitivity, 85.8% specificity, 32.8% PPV, and 99.58% NPV. The +LR and –LR were 6.67 and 0.05 respectively.

Discussion: It appears that the LE test could effectively rule out PJI in culture negative patients given its high NPV and sensitivity and very low -LR when the ++/+ threshold was used. Currently available LE strip tests are designed based on the quantitative values of the LE activity in the urine. This arises the point that a synovial fluid specific LE strip test needs to be developed with an optimized sensitivity and specificity.

Conclusion: The leukocyte esterase (LE) strip test demonstrates considerable utility in ruling out periprosthetic joint infections in patients with negative culture results, particularly when the ++/+ threshold is applied. This study highlights the test's high negative predictive value and sensitivity, along with a significantly low negative likelihood ratio under this threshold, suggesting its effectiveness in clinical decision-making.

Attachments:

There is no figure for this abstract.

1339 Impact of Spacer Constraint on Outcomes in Two-Stage Exchange Revision Total Knee Arthroplasty

Authors: **Anzar Sarfraz**, Muhammad A Haider, Mackenzie A Roof, Braden V Saba, Joshua C Rozell, Ran Schwarzkopf, Vinay Aggarwal

Background And Rationale: Two-stage component exchange has long been the gold standard for chronic periprosthetic joint infections (PJI) with real-component functional articulating spacers becoming overwhelmingly popular. While several studies have evaluated the success of real-component articulating spacers in total knee arthroplasty (TKA), this is the first to specifically compare complications and outcomes for articulating spacers stratified by level of liner constraint.

Study Question: Does level of spacer constraint affect outcomes following a two-stage exchange for PJI in total knee arthroplasty (TKA)?

Methods: We retrospectively reviewed 70 patients who underwent two-stage revision after primary TKA at a single academic institution from 2011 to 2020. Cohorts were categorized according to the level of liner constraint: posterior stabilized (PS), cruciate retaining (CR) and varus valgus constrained (VVC). Demographic and surgical data were collected for all patients for both stage 1 and stage 2 revisions. Range of motion (ROM) change was collected from pre-stage 1 to post-stage 1 and from pre-stage 2 to post-stage 2. Postoperative outcomes and complications were manually chart-reviewed

Results: The VVC cohort was significantly younger when compared to both the PS and CR cohorts (P=0.047). The constrained cohort demonstrated the worst ROM changes both after Stage 1 (-17.0 degrees constrained vs. – 9.5 degrees PS vs. -14.1 degrees CR, p=0.785)) and after Stage 2 (-0.8 degrees constrained vs. 4.4 degrees PS vs. 15 degrees CR, p=0.121), although neither of these reached statistical significance. Reoperation rates due to re-infection were highest in the constrained group both post-stage 1 and post-stage 2, although this was not statistically significant either

Discussion: Although not statistically significant across cohorts, the VVC group showed the biggest decline in motion as well as highest reinfection rates over the course of the two-stage exchange period. The use of constraint in these spacers could represent a surgeon choice in those cases with most complex infection burden, bone loss, and difficult reconstruction.

Conclusion: The present study showed no statistically significant differences in outcomes during the perioperative periods of two-stage exchange arthroplasty including ROM and reinfection across different levels of spacer constraint. Further studies, with larger sample sizes are warranted for optimal decision on spacer constraint.

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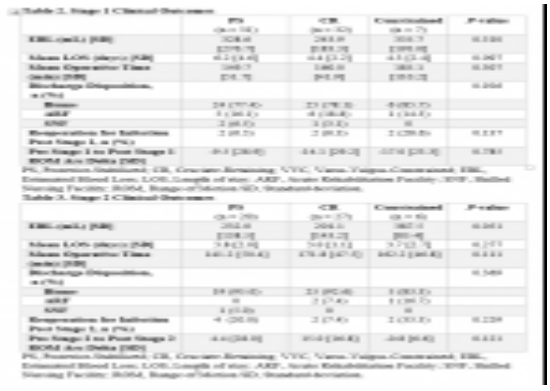

Monitor 5

1249 Coccidioidal vertebral osteomyelitis: a 10-year descriptive study

Authors: Sona Wolf, Fariba Donovan, Jacob Robishaw-Denton, **Talha Riaz**

Background And Rationale: Vertebral osteomyelitis is a severe manifestation of disseminated coccidioidomycosis with limited published data on clinical presentations and outcomes.

Study Question: The purpose of this study was to describe the epidemiology, risk factors, clinical features, management, and outcomes of coccidioidal vertebral osteomyelitis (CVO) in a cohort of patients in an endemic region.

Methods: We conducted a retrospective chart review of patients treated for CVO between 2013 and 2022 at an academic health system in Arizona. Demographic and clinical data were extracted.

Results: Forty-two patients with CVO were identified. The mean age at diagnosis was 36.3 (range, 18.9-73.2 years). Thirty-four (81%) patients were males and 33 (79%) were African American. Nine (21%) had a prior or current history of incarceration. Fifteen (36%) patients had a history of coccidioidomycosis including pulmonary (n=9), skin/musculoskeletal (n=5), and CNS infection (n=1) prior to diagnosis of CVO. Known comorbidities included long-term corticosteroid use (n=2), HIV infection (n=2), and pregnancy at time of CVO diagnosis (n=3 of 8 females). Back pain was the most frequent symptom (80%), most often in the lumbosacral region. Of the 37 patients with complement fixation titers available at time of presentation, 25 patients had a titer >=1:128. The most frequent imaging findings identified via CT or MRI were paraspinal/epidural abscesses (n=32) or bone lytic lesions/erosions (n=32). All patients received triazole therapy, 32 (76%) received amphotericin B (median 15.5 days) at some point during their treatment course, and 4 (10%) received an investigational drug. Sixteen (38%) patients underwent surgical debridement and spinal fixation hardware was placed in 13 (31%). Thirteen (31%) patients experienced disease progression warranting re-admission. Four (10%) died within 3.5 years of diagnosis and all deaths were secondary to complications associated with CVO.

Discussion: Most patients with CVO are African American males and few have predisposing comorbidities. A remarkably high proportion (21%) have a history of incarceration suggesting it may be a risk factor for CVO. Treatment often includes surgical debridement in addition to long-term triazole therapy.

Conclusion: There is a high morbidity and mortality due to CVO. A better understanding of the factors that predispose individuals to CVO and better therapies are urgently needed to improve outcomes in this frequently devastating illness.

Attachments:

There is no figure for this abstract.

1293 Oritavancin for the Treatment and/or Suppression of Bone and Joint Infections Caused by Vancomycin-Resistant Enterococci: A Real-World Observational Cohort Study

Authors: Laura Damioli, Kyle C Molina, Brandon R Flues, Eugene W Liu, Anna Y Zhou, Abdulwhab Shremo Msdi, Caleb C Mcleod, Saagar Akundi, Mark Redell, **Martin Krsak**

Background And Rationale: Oritavancin(ORI) demonstrates potent in vitro activity against vancomycin-resistant enterococci(VRE). Clinical data on use in VRE in bone and joint infections(BJI) remains sparse.

Study Question: What is the effectiveness and safety of ORI in VRE BJI when used as curative treatment and/or suppressive antimicrobial therapy(SAT)?

Methods: We conducted a multicenter, retrospective cohort study from April 2017 to April 2024 evaluating adult patients with VRE BJI treated with ORI. Included patients received ≥1 ORI dose (≥ half the total treatment time) for curative treatment, SAT, or both. Primary outcomes were clinical or microbiological success for treatment and SAT. Secondary outcomes were 30-and 90-day all-cause mortality. Safety and tolerability were assessed throughout the study.

Results: Eleven cases (6 treatment, 5 SAT) were included. All received ORI for VR-E. faecium BJI. Of 6 treatment cases, 4 were male, median (IQR) age was 64 (13) years. Infectious diagnoses were hardware-associated (HW-a) vertebral osteomyelitis (OM) (2), sacral (OM) (2), tibial OM (1) and prosthetic joint infection (PJI) of the knee (1). ORI susceptibilities (3) ranged 0.12 to 0.5 mg/L. Treatment ranged from a single 1,200 mg dose to 9 weekly doses with median (IQR) dose number of 2 (5). Median (IQR) length of stay was 21 (19) days. Two (28.5%) patients achieved clinical and microbiological success (1 HW-a vertebral OM & 1 sacral OM) , 3 (42.8%) had treatment failure, and 2 (28.5%) were lost to follow-up. 30- and 90-day all-cause mortality were both 42.8%. Among SAT cases (5), median (IQR) age was 61 (33) years and 2 were male. Diagnoses were HW-a vertebral OM (3), disseminated infection, including OM at multiple sites (1), and PJI of the hip (1). All 5 SAT cases achieved clinical and microbiological success with therapy ranging from 0.5 to 42 months. No side effects or resistance was observed with ORI in treatment or SAT groups.

Discussion: ORI may be effective SAT for VR E. Faecium BJI, as all SAT cases achieved success with varying treatment durations. ORI treatment effectiveness appears more limited, however, may reflect the underlying comorbid cohort.

Conclusion: ORI appears promising as treatment or SAT for difficult VR-E. Faecium BJI. Various regimens were well tolerated, often for prolonged periods. Larger studies are needed to further define the role of ORI in VRE BJI.

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1231 Generative artificial intelligence performs well in assessing the clarity of definitions of variables in periprosthetic joint infection studies

Authors: Bettina Gabrielle Tenorio, Melody Hope Lee Yu, Angelica Bernadette Deslate, **Don Bambino Geno Tai**

Background And Rationale: Advancements in artificial intelligence (AI) can potentially improve healthcare research, particularly the clarity of the definition of variables in observational studies. However, there are concerns regarding the accuracy of AI.

Study Question: What is the accuracy of a large language model in evaluating the clarity of variable definitions in observational studies?

Methods: We reviewed 75 observational studies conducted from Jan 2017 to Jan 2023 that analyzed PJI treatment outcomes and their association with patient variables. We focused on 13 categories of variables for a total of 369 variables across all the studies analyzed. We used ClaudeAI 2 (Anthropic, San Francisco, CA) to analyze the variables from full article texts. The model was instructed to classify definitions as objective, subjective, or undefined. AI performance was evaluated against manual analyses. Some examples of a highly objective definition are the presence of time element, severity, staging, frequencies, laboratory cut-off, and medication dependence. A simple chart review was deemed subjective.

Results: The overall AI detection rate was 88% (324/369). Among the variables it detected, 74% were correctly classified (241/324). It correctly identified antibiotic use and type of infection as the variables most frequently defined objectively (94%). For nine out of thirteen categories of variables, it appropriately assessed that most of the studies did not provide a definition. The least frequently defined variables were smoking (20%) and alcohol use (33%). Notably, five variables were supposedly detected by the program but did not exist in the manuscripts. See the table for the performance of AI in the detection and classification of all variables.

Discussion: This study highlights the ability of AI to accurately assess the clarity of definitions. This could prove valuable in improving the consistency and replicability of PJI research. Looking ahead, AI may even assist researchers in objectively defining study variables from the outset and verifying the correct application of definitions. However, the false positive detections serve as an important reminder that human oversight remains crucial to ensuring accuracy when integrating AI into the research process.

Conclusion: While AI demonstrated high accuracy, more studies are needed on how to optimally integrate its capabilities into the research process.

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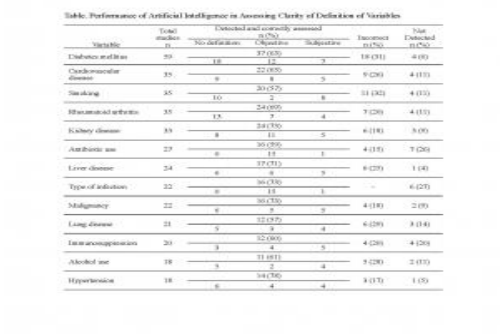

Table. Performance of Artificial Intelligence in Assessing Clarity of Definition of Variables

Variable	Total studies n	Detected and correctly assessed n (%)			Incorrect n (%)	Not Detected n (%)
		No definition	Objective	Subjective		
Diabetes mellitus	59	18	37 (63) 12	7	15 (31)	6 (0)
Cardiovascular disease	35	9	22 (95) 8	5	9 (26)	4 (11)
Smoking	35	10	20 (57) 2	8	11 (32)	4 (11)
Rheumatoid arthritis	35	13	24 (69) 7	4	7 (20)	4 (11)
Kidney disease	33	8	24 (73) 11	5	6 (18)	3 (9)
Antibiotic use	27	6	30 (59) 15	1	4 (15)	7 (26)
Liver disease	24	6	17 (71) 8	3	6 (25)	1 (4)
Type of infection	32	8	16 (50) 15	1	-	6 (25)
Malignancy	22	6	16 (73) 7	3	4 (18)	2 (9)
Lung disease	21	5	12 (57) 3	4	6 (29)	3 (14)
Immunosuppression	20	3	12 (60) 4	5	4 (20)	4 (20)
Alcohol use	18	5	11 (61) 2	4	5 (28)	2 (11)
Hypertension	18	6	14 (78) 4	4	3 (17)	1 (5)

1319 Blood and Biopsy Cultures may Differ and are Affected by Antibiotic Administration in Pyogenic Spinal Infections

Authors: John J Pisquiy, Halee N Sowinski, **Christopher Wilson**, Tyler E Drummond, Ashley Gall, Joseph C Chavarria, John C France

Background And Rationale: Pyogenic spinal infections are a spectrum of bacterial infections affecting the spine and surrounding structures. Patients often present with non-specific clinical symptoms making diagnosis of these infections difficult. The goals of treatment are to obtain a definitive diagnosis and eradicate the infection via antibiotics. The type of antibiotics given is guided by blood cultures and image guided biopsy, which yield results of 60% and 75%, respectively.

Study Question: 1. Are there differences in blood culture versus biopsy results in the setting of pyogenic spinal infection? 2. Does antibiotic administration prior to blood culture or biopsy culture played a role in culture yields?

Methods: 1. This retrospective cohort study recruited patients with spinal infections between 2018-2022. Charts were reviewed for detailed results of blood cultures and biopsies including positivity, organism, inflammatory lab levels.
2. This retrospective cohort study recruited patients with spinal infections between 2018-2022. Charts were reviewed for detailed results of antibiotic administration, timing of administration in hours, history of antibiotic use, and results of blood culture and biopsies.

Results: A total of 343 patients with pyogenic spinal infections were included in this study. 1. 45% (157/343) of patients included did not have a blood culture versus biopsy match. Of this 54% had a negative blood culture, but biopsies were positive. Conversely, 32% had a positive blood culture, but biopsies were negative. Our data showed no statistically significant difference ($x^2 = 0.69$) between the bacteria identified on blood culture versus biopsy. 2. 73% of patients with positive blood cultures and negative biopsies had received antibiotics before their biopsy, while 53% of patients who did not have positive blood cultures and negative biopsies did not have antibiotics prior to their biopsy ($x^2 < 0.05$)

Discussion: This study found a difference in organisms on blood cultures and biopsies, although not statistically significant. This study also found that empiric antibiotics prior to sterile site culture can negatively affect the yield of cultures and delay targeted antibiotic therapy.

Conclusion: There is no significant difference in culture outcomes, but empiric antibiotic administration dose affect outcomes of the culture results.

Attachments:

There is no figure for this abstract.

1347 Combined Surgical Cure of Pelvic Osteomyelitis: A Preliminary Report

Authors: **Jenny R Aronson**, David Lowenberg

Background And Rationale: Pelvic osteomyelitis presents a challenging clinical entity characterized by its rarity and complex management. This condition is known to occur in male patients with a history of prostate cancer who have undergone external beam radiation, causing fistulization between the genitourinary tract and pubic symphysis. Despite treatment, there remains a subset of patients with refractory disease or significant complications.

Study Question: What are the outcomes of combined orthopedic and urologic surgical interventions in patients with pelvic osteomyelitis complicated by genitourinary fistulization, and how do these outcomes compare to traditional treatment approaches?

Methods: All patients who underwent surgery for pelvic osteomyelitis from May 2017 to May of 2024 were reviewed and 17 patients treated by the senior author were identified. The parameters investigated were need for repeat surgery following index surgical excision chronic osteomyelitis and major complications, as well as recurrence of osteomyelitis after treatment completion.

Results: Of the 17 patients, all were male with a mean age of 71. All but 2 patients had at least 12 months of follow up; the index patient had over 7 years of follow up. All patients had prior prostate cancer treated with external beam radiation and radiographic evidence of pubic symphysis osteomyelitis with a fistula connecting the urethra and the pubic symphysis, although in some early on the fistula was less well appreciated. Surgical intervention included excisional debridement of osteomyelitis and placement of a local antibiotic delivery device, as well as urologic intervention. Major complications occurred in 3 patients, including post-operative dehiscence of the ureteral anastomoses to the ileal conduit in 2 patients and bowel perforation during the last stage of treatment in 1. All patients recovered, and no patients had evidence of recurrence of osteomyelitis to date.

Discussion: Pelvic osteomyelitis is a complex condition that is challenging to manage, especially when complicated by fistulization to the genitourinary system. Typically, these patients do poorly and are placed on chronic suppressive antibiotics. In this series, patients underwent combined orthopedic and urologic surgical intervention, which proved to be successful in all cases though some complications were noted.

Conclusion: Our findings demonstrate that cure of pelvic osteomyelitis is achievable with a combined surgical approach.

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1342 THIS EPOSTER WAS REMOVED FROM THE PROGRAM AFTER PRINTING

Radiographic Soft Tissue Thickness is not a Risk Factor for Infection after Primary Total Ankle Arthroplasty

Authors: **Kevin A Wu**, Albert T Anastasio, Alexandra N Krez, Katerine M Kutzer, James K DeOrio, Samuel B Adams, Mark E Easley

Background And Rationale: As the incidence of total ankle arthroplasty (TAA) for the management of end-stage arthritis is on the rise, identification of risk factors for periprosthetic joint infection (PJI) is essential. Previous studies have suggested that the radiographic soft tissue thickness may be a predictor of infection after several forms of arthroplasty. However, there has been limited studies exploring the use of radiographic soft tissue thickness in TAA. The purpose of this study was to evaluate the predictive capabilities of radiographic soft-tissue thickness for PJI following TAA.

Study Question: What are the predictive capabilities of a radiographic soft-tissue thickness measurement for PJI following TAA.

Methods: A retrospective analysis of 323 patients at a single institution who underwent primary TAA from 2003 to 2019 was conducted. Patient demographics, comorbidities, indication for surgery, prosthesis type and tourniquet time were recorded. Tibial-Tissue and Talus-Tissue distances were measured on preoperative lateral radiographic imaging. Logistic regression was utilized to determine the Odds Ratio (OR) of risk factors for the occurrence of PJI.

Results: Of the 323 patients, 6 patients (1.86%) developed a PJI. Average duration of follow-up was 8.42 ± 2.52 years. The logistic regression analysis revealed that neither Tibial-Tissue (OR= 0.975; 95% CI 0.947 - 1.004; p = 0.09) nor Talus-Tissue thickness (OR= 0.976; 95% CI 0.940 - 1.012; p = 0.18) were significant predictors of PJI. Although not statistically significant, the infected cohort had smaller average Tibial-Tissue (2.20 vs. 2.53 cm; p=0.05) and Talus-Tissue thickness (2.19 vs. 2.44 cm; p=0.36) compared to the non-infected cohort.

Discussion: Despite an association between radiographic soft tissue thickness and infection in other arthroplasty procedures, measurements such as Tibial-Tissue length and Talus-Tissue length were not significant predictors of PJI following primary TAA. These findings underscore the necessity for additional research to identify modifiable risk factors aimed at reducing PJI rates and enhancing patient outcomes.

Conclusion: Notably, this study did not indicate an increased risk of PJI associated with greater soft tissue thickness, which contrasts with findings in other joint arthroplasties where increased thickness was linked to a higher risk. This difference in risk association could be attributed to anatomical differences specific

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1269 Eczema is Not Associated with Postoperative Infection Following Common Orthopedic Knee Surgeries

Authors: Olivia C Tracey, Ruth H Jones, Akshitha Adhiyaman, Emilie Lijesen, Daniel W Green, Moira M McCarthy, **Andy O Miller**, Peter D Fabricant

Background And Rationale: Recent literature suggests a possible association between eczema and postoperative surgical site infections (SSI) following anterior cruciate ligament reconstruction (ACL-R), presumably due to higher rates of staphylococcal species colonization in eczema patients. The current study aimed to determine if patients with a history of eczema are at an increased risk for postoperative SSI following commonly-performed knee surgeries.

Study Question: Is there any association between eczema and overall surgical site infection following common orthopedic sports knee surgeries in otherwise healthy patients 25-years-old and younger?

Methods: This matched case-control study utilized patients aged 5-25 who underwent ACL-R, medial patellofemoral ligament reconstruction (MPFL-R), and/or knee arthroscopy, none of whom underwent a preoperative staphylococcus decolonization procedure. Cases of postoperative infection were identified within 6 months of the indexed procedure as those requiring surgical I&D and/or postoperative oral antibiotics or had a visit with an infectious disease specialist for postoperative infection. Cases and controls were matched 1:2 by sex, age ±1 year, BMI ±1 kg/m2, and primary procedure code. Preoperative eczema diagnosis and postoperative diagnosis of infection were compared between cases and controls using a binary conditional logistic regression allowing for the calculation of an odds ratio (OR) with 95% confidence intervals (CI).

Results: 300 patients were analyzed (mean age 18.2±3.8 years). 4% of both cases and controls had a documented medical history of eczema. Zero of 36 ACL-R cases, 1 of 18 MPFL-R cases, and 3 of 46 knee arthroscopy cases had a history of eczema. Patients with postoperative SSI did not have greater odds of an eczema diagnosis preoperatively when compared with matched controls (OR: 0.88, 95% CI: 0.26, 2.99, p=0.84). 32% of perioperative infection cases required an I&D procedure; these patients also did not have greater odds of an eczema diagnosis preoperatively when compared with matched controls (Table 1).

Discussion: History or current diagnosis of eczema or atopic dermatitis was not associated with SSI following ACL-R, MPFL-R, or knee arthroscopy in this age, sex, and BMI-matched case-control study.

Conclusion: Patients with eczema may not require different infection risk-reduction practices than routine patients.

Attachments:

Table 1. Odds of Eczema History Among Cases and Controls and Sub-Analysis of Odds of Eczema History of Cases Requiring I&D and Controls.

	Cases (n=100)	**Controls (n=200)**	**Odds Ratio**
Eczema History	4	9	OR: 0.88, [95% CI: 0.26, 2.99], p=0.84
No Eczema History	96	191	
	I&D Cases (n=32)	**Controls (n=64)**	**Odds Ratio**
Eczema History	1	1	OR: 0.69, [95% CI: 0.13, 32.00] p=0.60
No Eczema History	31	63	

1236 Autofluorescence Imaging for Stage 4 Chronic Wounds Reveals Improved Bacterial Clearance With Jet Lavage And Combined Antiseptic Irrigation

Authors: **James B Stiehl**

Background And Rationale: For irrigation and debridement of wounds, assessment of biofilm removal with early wound bed preparation typically has been limited to visual cues. The addition of autofluorescence imaging creates an evolutionary improvement for identifying bacterial biofilm on wound surfaces and has been validated with large clinical studies.

Study Question: This prehypothesis study evaluated the ability of jet lavage irrigation combined with irrigation of a standard buffered hypochlorite antiseptic to clear active biofilm forming bacteria on a surgical subfascial wound.

Methods: From an IRB study group of 27 Stage 4 subfascial injuries (#6066, Sterling IRB, Atlanta Georgia) one unique 74-year-old male emerged who had been treated 8 years for a large wound that included the sacrum, ischium, and greater trochanter. This area measured 260 square centimeters and had been debrided 18 times. The wound had been assessed with cultures and polymerase chain reaction test revealing Pseudomonas aeruginosa, group D streptococcus, and Acinetobacter baumannii, all known to produce chronic biofilm. Autofluorescence imaging (Moleculight, Moleculight Inc, Toronto, CA) was used in 21 examinations performed after a 72-hour delay over a long weekend. Pulsatile irrigation treatment was done with 3 liters of saline followed by 250 ccs of an off the shelf buffered sodium hypochlorite.

Results: The AFI bacterial contamination exceeded log 4 colony forming units/gram of tissue(red) in all pretreatment examinations and was reduced to <log 2(black) colony forming units in 6 of 21 examinations with the remaining 15 showing an estimated 80% or higher removal of the bacterial porphyrin(red) appearance. A total of 54 AFI examinations were performed using the combination treatment and no adverse reactions were encountered.

Discussion: The key technology is the ability of 405 nm wavelength ultraviolet light in darkness to image heme protein(red) in bacteria. The sensitivity to log 2 or 100 bacteria per gram of tissue is an important treatment landmark demonstrated by the general experience of this study. This one case was an exception allowing us to assess AFI efficacy.

Conclusion: This novel treatment paradigm demonstrated improved clearance of biofilm forming bacteria using low pressure irrigation and an antiseptic irrigated through the irrigator. The major effect was created by pulsatile irrigation debridement, but the antiseptic addition appears to be an important adjunct.

Attachments:

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Affinergy: Research support
ArcBio: Stock or stock Options
Astra Zeneca: Paid presenter or speaker; Research support
AstraZeneca: Paid consultant
Basilea, Janssen: Research support
C3J, Armata, Akagera, Aridis, Roche, Pfizer, GSK: Paid consultant
Contrafect: Research support
Debiopharm, Affinium, Basilea, Affinergy, Janssen, Contrafect, Destiny: Paid Consultant
Amphliphi Biosciences, Integrated Biotherapeutics: Paid consultant
EDE: Research support
GlaxoSmithKline: Paid presenter or speaker
Karius: Research support
Merck: Research support
MicroRx: Paid presenter or speaker
UpToDate: Publishing royalties, financial or material support
Valanbio: Stock or stock Options

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AOSpine: Board or committee memberGlobal Spine Journal: Editorial or governing board
North American Spine Society: Board or committee member

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Robert Frangie, MD (Bellaire, TX): (This individual reported nothing to disclose); Submitted on: 05/14/2024

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DJ Orthopaedics: IP royalties; Paid consultant, Paid presenter or speaker
Stryker: Paid consultant, Paid presenter or speaker

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Ankasa: Research support
AO Spine: Paid presenter or speaker
Clear Choice Therapeutics: Stock or stock Options
Kuros: Paid consultant.
Medtronic: Paid consultant, Research support
Neuroinnovations: Stock or stock Options
Synthes: Paid consultant.
Theradaptive: Paid consultant.

G

Ashley Gall (Morgantown, WV): (This individual reported nothing to disclose); Submitted on: 05/06/2024

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NextScience: Research support
Smith & Nephew: Research support

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PSI: Stock or stock Options

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Innomed: IP royalties

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MicroGen: IP royalties
Pfizer: Stock or stock Options

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Accelalox: Stock or stock Options; UnPaid consultant.
ARCO: Board or committee member
Bioengineering: Editorial or governing board
Biomaterials: Editorial or governing board; Publishing royalties, financial or material support
Bone and Joint Research: Editorial or governing board
Clinical Orthopaedics and Related Research: Editorial or governing board
Hyalex: IP royalties; Stock or stock Options
J Arthroplasty: Editorial or governing board
J Biomed Mater Res: Editorial or governing board
Journal of Orthopaedic Research: Editorial or governing board; Publishing royalties, financial or material support
Journal of Orthopaedic Translation: Editorial or governing board
Marine Biomedical: Stock or stock Options
Orthopedics: Editorial or governing board
PLOS ONE: Editorial or governing board
Regenerative Engineering and Translational Medicine: Editorial or governing board

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AAOS: Board or committee member
AO Trauma International: Paid presenter or speaker
Arthrex, Inc: IP royalties; Paid consultant, Paid presenter or speaker
Current Opinion in Pediatrics: Editorial or governing board; Publishing royalties, financial or material support
New York County Medical Society: Board or committee member
New york state society of orthopedic surgeons: Board or committee member
PatelloFemoral Foundation: Board or committee member
Pediatric Orthopaedic Society of North America: Board or committee member
Pediatric Research in Sport Medicine: Board or committee member
Pega Medical: IP royalties
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support

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Fronteirs in Endocrinology: Bone Research: Editorial or governing boardJournal of Orthopaedic Research: Editorial or governing board

H

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AAOS: Board or committee member
Bodycad: IP royalties; Paid consultant, Stock or stock Options
DePuy, A Johnson & Johnson Company: Paid consultant.
Journal of Arthroplasty: Editorial or governing board
Knee: Editorial or governing board
Smith & Nephew: Paid consultant.

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Bristol-Myers Squibb: Stock or stock Options
DePuy, A Johnson & Johnson Company: Paid consultant.
Heraeus Medical: Paid consultant.
Johnson & Johnson: Stock or stock Options
Monogram Orthopedics: Paid consultant.
Pfizer: Stock or stock Options

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AAOS: Board or committee member
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Journal of Arthroplasty: Editorial or governing board
Journal of Bone and Joint infection: Editorial or governing board
Journal of Hip Surgery: Editorial or governing board
OREF: Research support
Osteal Therapeutics: Research support
PSI: Stock or stock Options
SICOT: Board or committee member
Solventum a 3M Company: Paid consultant; Paid presenter or speaker
Stryker: Paid consultant; Research support
Zimmer: Research support

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Bristol-Myers Squibb: Stock or stock Options
Pfizer: Stock or stock Options

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Foundation for Orthopedic Trauma: Research support
Irrimax Corporation: Research support
LifeNet Health: Paid consultant.

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BMC Musculoskeletal Disorders: Editorial or governing board
Journal of Bone and Joint Surgery - American: Editorial or governing board

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Austin Medical: Paid consultant.
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Stryker: IP royalties; Paid consultant, Paid presenter or speaker

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Arthroscopy: Editorial or governing board
European Society for Surgery of the Shoulder and Elbow: Board or committee member
Journal of Shoulder and Elbow Surgery: Editorial or governing board

I

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Innomed: IP royalties
Kyocera: IP royalties
Osteoremedies: IP royalties
Smith & Nephew: IP royalties
Wright Medical Technology, Inc.: IP royalties
Zimmer: IP royalties

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J

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Total Joint Orthopedics: IP royalties; Paid consultant.
Xenex: Paid consultant, Stock or stock Options

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American Association of Hip and Knee Surgeons: Board or committee member
Biomech Holdings LLC: Stock or stock Options
DePuy, A Johnson & Johnson Company: IP royalties
Hip Society: Board or committee member
Med IQ: Publishing royalties, financial or material support
Moximed: Paid consultant.
Parvizi Surgical Innovation: Stock or stock Options

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Journal of Orthopaedic Trauma: Editorial or governing board
Orthopaedic Trauma Association: Board or committee member
Osteocentric: Stock or stock Options; UnPaid consultant.
Synthes: Paid presenter or speaker

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American Board of Venous and Lymphatic Medicine: Board or committee member
Foundation for Venous and Lymphatic Medicine: Board or committee member
Medtronic: Paid presenter or speaker
Phlebology: The Journal of Venous Disease: Editorial or governing board

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AAOS: Board or committee member
AAOS AAHKS Abstract Review Committee: Board or committee member American
Association of Hip and Knee Surgeons: Board or committee member
Biomet: Other financial or material support
Clinical Orthopaedics and Related Research: Editorial or governing board
DePuy, A Johnson & Johnson Company: Other financial or material support
Journal of Arthroplasty: Editorial or governing board
Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board
MSIS: Board or committee member
SLACK Incorporated: Publishing royalties, financial or material support
Smith & Nephew: Other financial or material support
Stryker: Other financial or material support
Zimmer: Other financial or material support

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Acumed, LLC: Paid consultant.
GE Healthcare: Stock or stock Options
Johnson & Johnson: Stock or stock Options
Merck: Stock or stock Options
Pfizer: Stock or stock Options
Restore3d: Paid consultant.
Smith & Nephew: Paid consultant.

Alison K Klika (Cleveland, OH): (This individual reported nothing to disclose); Submitted on: 04/18/2024

Varun Kompala, BA: (This individual reported nothing to disclose); Submitted on: 04/22/2024

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Nanovis LLC: Employee

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Kyle Kunze, MD: Submitted on: 10/18/2023
Arthroscopy: Editorial or governing board

* content of the activity is not related to the business lines or products of their employer/company.
** content of the accredited activity is limited to basic science research, such as preclinical research and drug discovery, or the methodologies of research, and they do not make care recommendations.

Kate Margaret Kutzer, BS(This: (This individual reported nothing to disclose); Submitted on: 06/01/2023

L

Gregory Laborde, BS: (This individual reported nothing to disclose); Submitted on: 05/13/2024

William Dean Lack, MD, FAAOS: Submitted on: 02/07/2024
AO Trauma NA Research Mentoring Subcommittee: Board or committee member
Center for Orthopaedic Trauma Advancement: Board or committee member
Global Society for Rare Genitourinary Tumors: Board or committee member
International Bladder Cancer Group: Board or committee member
Journal of Orthopaedic Trauma: Editorial or governing board
Society of Urologic Oncology: Board or committee member
Society of Urologic Oncology Clinical Trials Consortium: Board or committee member
Women in Urologic Oncology: Board or committee member

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Trudi L Lane, PharmD: (This individual reported nothing to disclose); Submitted on: 05/01/2024

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American Association of Hip and Knee Surgeons: Board or committee member
OnPoint Knee: IP royalties

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Emily Leary, PhD (Columbia, MO): Submitted on: 05/09/2024
JISAKOS: Editorial or governing board
The Journal of Knee Surgery: Editorial or governing board

Jonathan J Lee, BA (Redwood City, CA): (This individual reported nothing to disclose); Submitted on: 03/21/2024

Nicole Lee (Singapore): (This individual reported nothing to disclose); Submitted on: 05/13/2024

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Orthopaedic Trauma Association: Board or committee member

Adriana P Liimakka (Brookline, MA): (This individual reported nothing to disclose); Submitted on: 05/06/2024

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AAOS: Board or committee member
AO: UnPaid consultant.
Biomet: IP royalties; Paid consultant, Paid presenter or speaker; Research support
DePuy, A Johnson & Johnson Company: IP royalties; Research support
Orthopaedic Trauma Association: Board or committee member
Stryker: IP royalties
Synthes: Paid consultant, Paid presenter or speaker

Eugene Wei-Kang Liu, MD (Loma Linda, CA): (This individual reported nothing to disclose); Submitted on: 05/03/2024

Shujaa T Khan (Cleveland, OH): (This individual reported nothing to disclose); Submitted on: 04/29/2024

Samuel G Lorentz, MD: (This individual reported nothing to disclose); Submitted on: 10/26/2023

David W Lowenberg, MD, FAAOS (Redwood City, CA): Submitted on: 02/25/2024
Healthpoint Capital: Stock or stock Options
Orthoplastics, Elsevier: Editorial or governing board

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M

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Bone Fusion: Research support
cerament: Paid presenter or speaker
implantacast: Paid presenter or speaker
Implantcast: Research support
Link: Paid presenter or speaker; Research support
Micocalis: Stock or stock Options
Rapid Molecular Diagnostics: Stock or stock Options

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AAOS: Board or committee member
Knee Society: Board or committee member
Stryker: IP royalties; Paid consultant.
TJO: Stock or stock Options
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Zimmer: IP royalties

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Colombian Journal of Orthopedics and Traumatology: Editorial or governing board
International Consensus Meeting on Periprosthetic Joint Infection: Editorial or governing board
Parvizi Surgical Innovations: Stock or stock Options
Physician Direct: Other financial or material support
Stryker: Research support
Stryker Colombia: Paid consultant.
Zimmer: Research support

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Joint Development: Paid consultant. Smith & Nephew: Paid consultant, Research support

McKenzie A Mayer: (This individual reported nothing to disclose); Submitted on: 05/06/2024

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ForCast Orthopaedics: Stock or stock Options; UnPaid consultant.
Hayes Diagnostics Inc: Stock or stock Options

Musculoskeletal Infection Society: Board or committee member
Sonoran Biosciences: Stock or stock Options

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Globus Medical: Paid consultant.

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Innoviva: Paid presenter or speaker
Melinta: Paid presenter or speaker
Merck: Research support
Shionogi: Paid presenter or speaker

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3M: Paid consultant.
American Association of Hip and Knee Surgeons: Board or committee member
CERAS Health: Stock or stock Options
Exactech, Inc: Paid consultant.
Hip Society: Board or committee member
Johnson & Johnson: Paid consultant, Research support
Journal of Arthroplasty: Editorial or governing board
Journal of Knee Surgery: Editorial or governing board
Knee Society: Board or committee member
Kolon Tissue Gene: Paid consultant.
Medicus Works LLC: Publishing royalties, financial or material support
Medtronic: Research support
MirrorAR: Stock or stock Options
National Institutes of Health (NIAMS & NICHD): Research support
Next Science: Paid consultant.
Organogenesis: Research support
Orthofix, Inc.: Research support
Pacira: Paid consultant.
Patient-Centered Outcomes Research Institute (PCORI): Research support
Peerwell: Stock or stock Options
Smith & Nephew: Paid consultant.
Stryker: IP royalties; Paid consultant, Research support
Surgical Techniques International: Editorial or governing board
Up-to Date: Publishing royalties, financial or material support
USMI: Stock or stock Options
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support

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Abdulwhab Shremo Msdi, PharmD(Riverside CA): (This individual reported nothing to disclose); Submitted on: 05/01/2024

* content of the activity is not related to the business lines or products of their employer/company.
** content of the accredited activity is limited to basic science research, such as preclinical research and drug discovery, or the methodologies of research, and they do not make care recommendations.

Wenbo Mu, MD, PhD (China)(This individual reported nothing to disclose Submitted on: 05/02/2024

Sonal s Munsiff, MD (Rochester, NY): (This individual reported nothing to disclose); Submitted on: 05/06/2024

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American Association of Hip and Knee Surgeons: Board or committee member
Concentric Analgesics: Research support
Journal of Arthroplasty: Editorial or governing board

N

Amish Naik MD, FAAOS: (This individual reported nothing to disclose); Submitted on: 05/07/2024

Suhas Nalla: (This individual reported nothing to disclose); Submitted on: 05/01/2024

Ahman Nassr, MD, FAAOS: Submitted on: 05/06/2024
3Spine: Research support
Allosource: Paid consultant.
American Orthopaedic Association: Board or committee member
AO Spine: Research support
Cervical Spine Research Society: Board or committee member
Lumbar spine research society: Board or committee member
Premia Spine: Research support
Scoliosis Research Society: Board or committee member
Techniques in Orthopedics: Editorial or governing board

Roman Natoli, MD, PhD, FAAOS: Submitted on: 04/08/2024
AO Trauma North America: Board or committee member
Current Osteoporosis Reports: Editorial or governing board
Morgan & Claypool: Publishing royalties, financial or material support
Orthopaedic Trauma Association: Board or committee member

Ara Nazarian: (This individual reported nothing to disclose); Submitted on: 04/29/2024

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American Board of Orthopaedic Surgery, Inc.: Board or committee member
American Orthopaedic Association: Board or committee member
Hip Society: Board or committee member
Journal of Hip Surgery: Editorial or governing board
Journal of the American Academy of Orthopaedic Surgeons: Editorial or governing board

Sandra Bliss Nelson, MD: Submitted on: 10/23/2023
Journal of Bone and Joint Infection: Editorial or governing board
Musculoskeletal Infection Society: Board or committee member
Sonoran Biosciences: Stock or stock Options
UpToDate: Publishing royalties, financial or material support

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DePuy, A Johnson & Johnson Company: Employee; IP royalties; Stock or stock Options
Stryker: Stock or stock Options

James Albert Nunley II, MD, FAAOS: Submitted on: 04/29/2024
Bristol-Myers Squibb: Stock or stock Options

DTMedTech: Research support
Exactech, Inc: IP royalties; Paid consultant.
Springer, Datatrace: Publishing royalties, financial or material support
Treace Medical: Paid presenter or speaker
Trimed: Paid presenter or speaker

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American Association of Hip and Knee Surgeons, Board of Directors and Treasurer: Board or committee member
Depuy: IP royalties
DePuy, A Johnson & Johnson Company: Paid consultant.
Ethicon: Paid consultant.
Medtronic: Paid consultant.
Mirus: Paid consultant.
Rom Tech: Paid consultant, Stock or stock Options
Smith & Nephew: IP royalties; Paid consultant, Research support
Southern Orthopaedic Association, 2018 President: Board or committee member
Stryker: Research support
Zimmer: Research support

O

Jane O'Bryan, MPH (New Haven, CT): (This individual reported nothing to disclose); Submitted on: 04/30/2024

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American Association of Hip and Knee Surgeons: Board or committee member
DePuy, A Johnson & Johnson Company: IP royalties; Paid consultant, Research support
Onkos Surgical: Paid consultant.
Zimmer: Paid consultant.

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P

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Biorez: Paid consultant; Stock or stock Options
GID Bio: Paid consultant; Stock or stock Options
Peptilogics: Employee; Stock or stock Options
Zygofix: Paid consultant; Stock or stock Options

Jude Paganelli, MS:** Submitted on: 04/29/2024
Osteal Therapeutics: Employee; Stock or stock Options
Responsive Arthroscopy: Stock or stock Options
Spine Innovation: Stock or stock Options

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Zimmer: Employee

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Arthroplasty Today: Editorial or governing board
Journal of Arthroplasty: Editorial or governing board
Operative Techniques in Orthopaedics: Editorial or governing board

Javad Parvizi, MD, FAAOS, FRCS (Philadelphia, PA): Submitted on: 03/04/2024
Acumed, LLC: Stock or stock Options
Alphaeon: Stock or stock Options
Becton Dickenson: IP royalties; Paid consultant.
Cardinal Health: Paid consultant, Research support
Ceribell: Stock or stock Options
Convatec: Paid consultant.
Coracoid: Stock or stock Options
Corentec: IP royalties; Paid consultant.
Corin U.S.A.: Stock or stock Options
Datatrace: Publishing royalties, financial or material support
Department of Defense: Research support
DePuy: Research supportEfferent: Stock or stock Options
Elsevier: Publishing royalties, financial or material support
Elute: Stock or stock Options
Ethicon: Paid consultant.
G-21: Paid consultant.
Hip Innovation Technology: Stock or stock Options
Illuminus: Stock or stock Options
Intellijoint: Stock or stock Options
Jaypee Publishers: Publishing royalties, financial or material support
KCI / 3M (Acelity): Paid consultant.
MicroGenDx: Research support
Molecular Surface Technologies: Stock or stock Options
Nanooxygenic: Stock or stock Options
National Institutes of Health (NIAMS & NICHD): Research support
NDRI: Research support
OREF: Research support
Osteal: Stock or stock Options
Parvizi Surgical Innovations and Subsidiaries: Stock or stock Options
Peptilogic: Stock or stock Options
Plasmology4: Stock or stock Options
SLACK Incorporated: Publishing royalties, financial or material support
Smith & Nephew: Research support
Sonata: Stock or stock Options
Sonogen: Stock or stock Options
Stryker: Research support
Tangen: Stock or stock Options
TissueGene: Research support
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support
Zimmer Biomet: Paid consultant, Research support

* content of the activity is not related to the business lines or products of their employer/company.
** content of the accredited activity is limited to basic science research, such as preclinical research and drug discovery, or the methodologies of research, and they do not make care recommendations.

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Azra Care Inc.: Paid consultant; Stock or stock Options
Kaizen Clinical Partners: Paid consultant

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3M: Paid consultant, Paid presenter or speaker
AAOS: Board or committee member
American Association of Hip and Knee Surgeons: Board or committee member
Joint Development, LLC: Stock or stock Options
Peptilogics: Research support
Smith & Nephew: IP royalties; Research support
TJO (Total Joint Orthopedics): IP royalties; Paid consultant, Paid presenter or speaker
Zimmer Biomet: Research support

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Anesthesia & Analgesia: Editorial or governing board
Clinical Orthopaedics and Related Research: Editorial or governing board
Research Committee, American Society of Regional Anesthesia and Pain Medicine: Board or committee member

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Francesco Petri, MD: (This individual reported nothing to disclose); Submitted on: 05/04/2024

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American Association of Hip and Knee Surgeons: Board or committee member
ISCT: Board or committee member
Journal of Hip Surgery: Editorial or governing board
Journal of Knee Surgery: Editorial or governing board
Orthopaedic Research Society: Board or committee member
Osteal Therapeutics: Research support
Pacira: Paid consultant.
Peptilogics: Research support
RegenLab: Research support
Signature Orthopaedics: Research support
Stryker: Paid consultant.
Zimmer: Research support

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American Association of Hip and Knee Surgeons: Board or committee member
Eventum Orthopaedics: Stock or stock Options
Journal of Arthroplasty: Editorial or governing board
Osteal Therapeutics, Inc: Research support
Smith & Nephew: Paid consultant

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Q

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R

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ABL Medical Inc: Employee
IlluminOss Medical Inc: Stock or stock Options
IlluminOss Medical Inc.: Employee

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Johnson & Johnson: Other financial or material support; Stock or stock Options
Melinta Therapeutics: Employee

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CLEU Diagnostics, LLC: Research support
Sanara MedTech: Paid consultant.
Stryker: Paid consultant.
Zimmer: Paid consultant.

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Gilead Sciences: Paid consultant, Paid presenter or speaker

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BMC Musculoskeletal Disorders: Editorial or governing board
Globus Medical: IP royalties; Paid consultant.
Mass Orthopedic Society: Board or committee member
Ortholevo: Stock or stock Options
Riverside Partners: Paid consultant.
Sona Global: UnPaid consultant.

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American Association of Hip and Knee Surgeons: Board or committee member
Zimmer: Paid consultant.

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AAOS: Board or committee member
Aerobiotix: Paid consultant.
American Association of Hip and Knee Surgeons: Board or committee member
DePuy, A Johnson & Johnson Company: Paid consultant.
Stryker: Paid consultant.
Zimmer: Paid consultant.

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Arthroplasty Today: Editorial or governing board
DePuy, A Johnson & Johnson Company: Paid consultant.
Innovative Medical Products, Inc.: Paid consultant.
Johns Hopkins University Press: Publishing royalties, financial or material support
Journal of Arthroplasty: Editorial or governing board
Reconstructive Review: Editorial or governing board
SLACK Incorporated: Publishing royalties, financial or material support
Thompson Surgical Instruments, Inc.: Paid consultant.
Wolters Kluwer: Publishing royalties, financial or material support

S

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HipInsight: Paid consultant.

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Anaerobe: Editorial or governing board
Clinical Microbiology Reviews: Editorial or governing board
Journal of Clinical Microbiology: Editorial or governing board

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AAOS: Board or committee member
American Association of Hip and Knee Surgeons: Board or committee member
Arthroplasty Today: Editorial or governing board
Gauss surgical: Stock or stock Options
Intelijoint: Paid consultant, Stock or stock
OptionsJournal of Arthroplasty: Editorial or governing board
PSI: Stock or stock Options
Smith & Nephew: IP royalties; Paid consultant, Research support
Zimmer: Paid consultant.

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3M: Employee
Infectious Disease Society of America: Board or committee member
Society of Healthcare and Epidemiology of America: Board or committee member

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American Association of Hip and Knee Surgeons: Board or committee member
Lippincott Williams & Wilkins: Publishing royalties, financial or material support
MiCare Path: Stock or stock Options
Musculoskeletal Infection Society: Board or committee member
Pattern Health: IP royalties
Peptilogics: Paid consultant.
Restor3d: IP royalties; Paid consultant, Stock or stock Options
Smith & Nephew: IP royalties; Paid consultant.
Zimmer: Research support

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Orthopaedic Trauma Association: Board or committee member

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Peptilogics: Paid consultant.

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AAOS: Board or committee member
American Association of Hip and Knee Surgeons: Board or committee member
Zimmer: Paid consultant.

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Bonefoam: Paid consultant.
MicrogenDx: Paid consultant.
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AOSpine NA: Other financial or material support
Cervical Spine Research Society: Board or committee member
Editorial Board Member with Operative Techniques in Orthopaedics: Editorial or governing board
Elsevier: Editorial or governing board
Lumbar Spine Research Society: Board or committee member
Purgo Scientific LLC: Stock or stock Options

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Samantha Simon, BA (Boston, MA): (This individual reported nothing to disclose); Submitted on: 10/31/2023

Priya Singh, BA: (This individual reported nothing to disclose); Submitted on: 10/20/2023

Beethi Sinha, MSc: (This individual reported nothing to disclose); Submitted on: 05/06/2024

Clair Smith, MS: (This individual reported nothing to disclose); Submitted on: 04/15/2024

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Merck: Stock or stock Options
Zimmer: Employee; Stock or stock Options

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Stryker: Stock or stock Options

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Arthroplasty Today: Editorial or governing board
DePuy, A Johnson & Johnson Company: Research support
Journal of Arthroplasty: Editorial or governing board
Sonoran Biosciences: Stock or stock Options
Stryker: Research support

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AJRR: Board or committee member
American Association of Hip and Knee Surgeons: Board or committee member
Arthroplasty Today: Editorial or governing board
Convatec: Paid consultant.
IOEN: Board or committee member
Journal bone and joint infection: Editorial or governing board
Journal of Arthroplasty: Editorial or governing board
Osteoremedies: IP royalties; Paid consultant.
Stryker: IP royalties; Paid consultant.

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AcademyHealth: Board or committee member
American Association for Hand Surgery: Board or committee member
American Congress of Rehabilitation Medicine: Board or committee member
American Occupational Therapy Association: Board or committee member
American Society of Hand Therapists: Board or committee member
PROMIS Health Organization: Board or committee member

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Esential Robotics: Stock or stock Options
Innomed: IP royalties
International Academy Of Independent Medical Examiners: Board or committee member
Kinamed: IP royalties
Stiehl Tech LLC: Research support; Stock or stock Options; UnPaid consultant.

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AAOS: Board or committee member
Biomet: Paid presenter or speaker
BiometMedacta: Paid consultant.
Biometric: Paid presenter or speaker
Gulfcoast Research: Research support
OSI: Stock or stock Options

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* content of the activity is not related to the business lines or products of their employer/company.
** content of the accredited activity is limited to basic science research, such as preclinical research and drug discovery, or the methodologies of research, and they do not make care recommendations.

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Musculoskeletal Infection Society: Board or committee member
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support

T

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Zimmer: Employee; Stock or stock Options

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Patrick James Treacy, BSME, MS**(Parsippany, NJ)Submitted on: 05/01/2024
Onkos surgical: Employee; Stock or stock Options

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Ashley Marie Treanor, BS: (This individual reported nothing to disclose); Submitted on: 03/04/2024

Nicholas Tubin, MD: (This individual reported nothing to disclose); Submitted on: 05/09/2024

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AAOS: Board or committee member
Adaptive Phage Therapeutics: Paid consultant.
ASTM: Board or committee member
BiomX: Paid consultant.
MSIS: Board or committee member
Osteal: Stock or stock Options
Peptilogics: IP royalties; Paid consultant, Research support; Stock or stock Options
Smith & Nephew: Paid consultant, Research support

V

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W

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Johnson & Johnson: Other financial or material support

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Pfizer: Stock or stock Options

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Bristol-Myers Squibb: Stock or stock Options
Heron Therapeutics: Employee; Paid presenter or speaker
Johnson & Johnson: Stock or stock Options
Osteal Therapeutics: Paid consultant, Stock or stock Options
Pfizer: Stock or stock Options
Stryker: Stock or stock Options
Zimmer: Stock or stock Options

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Y

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American Association of Hip and Knee Surgeons: Board or committee member
AO Foundation: Research support
AO Innovation Translation Center: Research support
Arthrex, Inc: IP royalties; Paid consultant.
Bicomposites: Research supportBiomet: Research support
COTA: Research support
DePuy, A Johnson & Johnson Company: Paid consultant, Research support

Foundation for Orthopedic Trauma: Board or committee member
Foundation for Physician Advancement: Board or committee member
Irrimax: Research support
LifeNet Health: Paid consultant, Research support
MiCare Health: Paid consultant.
OMEGA: Research support
Organogenesis: Research support
ORintelligence: Stock or stock Options
OrthoGrid: Paid consultant.
Orthopaedic Trauma Association: Board or committee member
ORTHOXEL: Paid consultant.
Pacira: Research support
SI-Bone: Paid consultant, Research support
Smith & Nephew: Research support
Springer: Publishing royalties, financial or material support
Stryker: IP royalties; Paid consultant.
Synthes: Paid consultant, Research support
Use-Lab: Paid consultant.
WNT Scientific: Stock or stock Options

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melinta therapeutics: Paid presenter or speaker