



# Eastern Orthopaedic Association

*45th Annual Meeting*

October 22-25, 2014

*The Ritz-Carlton  
Amelia Island, FL*

# Grantor & Exhibitor Acknowledgements

The Eastern Orthopaedic Association is grateful for the support of its educational grantors and exhibitors. Thank you for your participation and commitment to EOA.

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Pacira Pharmaceuticals, Inc.

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VirtaMed AG



## Eastern Orthopaedic Association

**45<sup>th</sup> Annual Meeting**

October 22-25, 2014

The Ritz-Carlton  
Amelia Island, Florida

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## 2014 Meeting Program

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**Chuck Freitag**

*Executive Director,*

*Data Trace Management Services, a Data Trace Company*

**Cynthia Lichfeld**

*Director of Operations,*

*Data Trace Management Services, a Data Trace Company*

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*Please notify the EOA Central Office of any changes in your home or office address.*

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 Eastern Orthopaedic Association. 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 for a maximum of **26.5 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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## *EOA President's Message*



David W. Romness, MD

### *Dear Colleagues:*

Karen and I are honored to welcome you to the 45th Annual Meeting of the Eastern Orthopaedic Association. Thank you for attending what will be a fantastic academic and social program at the luxurious Ritz-Carlton, Amelia Island. You will experience the unique collegial and educational experience that only regional meetings offer.

Program Chairman, Amar Ranawat, MD from New York, and the Program Committee have prepared an informative program with a unique blend of over 200 podium presentations, 7 symposia with outstanding presenting faculty, 30 poster presentations, and, new to EOA, "rapid fire" sessions. There will be plenty of opportunity for discussion and interaction with faculty and once again, awards will be given to the top 15 papers. You can also earn 10 SAE credits toward your MOC requirements with the EOA online Self-Assessment Exam.

I am honored to welcome Mary O'Connor, MD, Chair, Department of Orthopaedic Surgery, Mayo Clinic, Jacksonville, as the Presidential Guest Speaker. She is a true orthopaedic leader and a former Olympian. The Steel Lecturer will be YouTube and Comedy Central sensation GoRemy (Remy Munasifi), who is very creative with comedy and political comedy. His YouTube channel has been viewed over 80 million times.

Our Spouse's Committee and management team, Data Trace, have also put together a dynamic social program so there will be plenty to keep you and your family busy. Amelia Island offers endless recreational and historic opportunities.

I hope you will enjoy all that the EOA Annual Meeting and Amelia Island have to offer.

Sincerely,

*David W. Romness*

David W. Romness, MD  
President, Eastern Orthopaedic Association

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## Meeting-at-a-Glance

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*Times and locations are subject to change.*

**Badges or wrist bands are required for admittance to all events.**

### Wednesday, October 22, 2014

6:30am–8:00am	<b>President's Council Meeting</b> ( <i>Amelia Room</i> )
8:00am–12:00pm	<b>Board of Directors Meeting</b> ( <i>Amelia Room</i> )
9:00am–10:00am	<b>Spouse's Board Meeting</b> ( <i>Ambassador Room</i> )
12:00pm–5:00pm	<b>Meeting Registration</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
12:00pm–5:00pm	<b>Sponsor/Exhibit Setup</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
12:00pm–5:00pm	<b>Speaker Ready Room</b> ( <i>Ambassador Room</i> )
12:00pm–5:00pm	<b>Scientific Poster Setup</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )

### Thursday, October 23, 2014

6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
6:00am–5:00pm	<b>Speaker Ready Room</b> ( <i>Ambassador Room</i> )
6:30am–3:00pm	<b>Meeting Registration</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
6:30am–3:00pm	<b>Technical Exhibits, Continental Breakfast, Coffee Breaks and Daily Drawing</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> ) The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
7:00am–3:00pm	<b>Scientific Sessions and Symposia</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
8:00am	<b>Beach Walk</b> ( <i>Meet in Lobby</i> )
8:25am–8:40am	<b>First Business Meeting</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
8:45am–10:15am	<b>Spouse/Children's Hospitality</b> ( <i>Salt Restaurant</i> )
9:45am–10:15am	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
10:35am–11:05am	<b>Presidential Address</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
11:05am–11:50am	<b>Howard Steel Lecture</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
11:50am–12:50pm	<b>EOA Luncheon — Industry Presentations by Convatec and Mallinckrodt Pharmaceuticals – Hospital Division</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> ) *Not for CME Credit
1:42pm–2:12pm	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
2:00pm–4:00pm	<b>Fort Clinch Tour</b> ( <i>Meet in Lobby</i> )

\* See Activities Information on pages 10-12 for more details

3:00pm–4:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
4:00pm–5:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )
6:15pm–7:00pm	<b>New Member Reception</b> ( <i>Spa Pool</i> )
7:00pm–9:30pm	<b>Welcome Reception</b> ( <i>Oceanfront Lawn</i> )

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**Friday, October 24, 2014**

6:00am–7:00am	<b>Regional and AAOS President's Breakfast Meeting with State Presidents and Board of Councilors</b> ( <i>Santa Maria Room</i> )
6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
6:00am–5:00pm	<b>Speaker Ready Room</b> ( <i>Ambassador Room</i> )
6:45am–3:00pm	<b>Meeting Registration</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
6:45am–3:00pm	<b>Technical Exhibits, Continental Breakfast, Coffee Breaks and Daily Drawing</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> ) The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
7:00am–3:00pm	<b>Scientific Sessions and Symposia</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
8:00am	<b>Beach Walk</b> ( <i>Meet in Lobby</i> )
8:20am–8:50am	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
10:00am	<b>Party Bridge</b> (All Levels Welcome) ( <i>Lobby</i> )
10:30am–2:30pm	<b>Culinary at Ritz-Carlton — Salt Cooking School</b> ( <i>Meet in Salt Restaurant</i> )
10:50am–11:30am	<b>Presidential Guest Speaker</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
11:30am–12:30pm	<b>EOA Luncheon — Industry Presentation by Pacira Pharmaceuticals, Inc.</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> ) <i>*Not for CME Credit</i>
12:00pm–5:00pm	<b>Back Water Fishing</b> ( <i>Meet in Lobby</i> )
12:30pm–5:30pm	<b>Golf Tournament</b> ( <i>Meet at Pro Shop</i> )
1:30pm–2:00pm	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
3:00pm–4:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
4:00pm–5:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )
5:30pm–7:30pm	<b>Exhibitor Reception</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
5:30pm–7:30pm	<b>Kid's Movie and Arts &amp; Crafts</b> ( <i>Santa Maria Room</i> )

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\* See Activities Information on pages 10-12 for more details

**Saturday, October 25, 2014**

6:00am–7:00am	<b>Board of Directors Meeting</b> ( <i>Amelia Room</i> )
6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
6:00am–2:00pm	<b>Speaker Ready Room</b> ( <i>Ambassador Room</i> )
6:45am–2:00pm	<b>Meeting Registration</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
6:45am–2:00pm	<b>Technical Exhibits, Continental Breakfast, Coffee Breaks and Daily Drawing</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> ) The drawing will take place at the end of the first break in the exhibit area. You must be present to win!
7:00am–2:02pm	<b>Scientific Sessions and Symposia</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
8:00am	<b>Beach Walk</b> ( <i>Meet in Lobby</i> )
8:27am–8:42am	<b>Second Business Meeting</b> ( <i>Ritz-Carlton Ballroom Salon 1</i> )
9:30am	<b>Book Discussion</b> ( <i>Café 4750</i> )
9:39am–10:09am	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
11:00am–12:30pm	<b>Salt of the Earth/Custom Blending-Bar Experience</b> ( <i>Meet in Spa Boutique</i> )
1:00pm–5:00pm	<b>Cumberland Island Walking Tour</b> ( <i>Meet in Lobby</i> )
1:00pm–6:00pm	<b>Deep Sea Fishing</b> ( <i>Meet in Lobby</i> )
12:24pm–12:54pm	<b>Rapid Fire Sessions</b> ( <i>Plaza Ballroom 1 &amp; Ritz-Carlton Ballroom Foyer</i> )
2:00pm–4:00pm	<b>Tennis Round Robin</b> ( <i>Meet at Tennis Courts</i> )
2:02pm–3:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
3:00pm–4:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )
6:15pm–7:15pm	<b>Jazz Band Reception</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
6:15pm–11:00pm	<b>Kid's Movie and Arts &amp; Crafts</b> ( <i>Santa Maria Room</i> )
7:15pm–11:00pm	<b>Founder's Dinner Dance</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )

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\* See Activities Information on pages 10-12 for more details

## ***Scientific Program Agenda***

*Presenters and times are subject to change.*

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Ritz-Carlton Ballroom Salon 1, unless otherwise specified.

### **THURSDAY, OCTOBER 23, 2014**

6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
7:00am–7:05am	<b>Welcome to EOA's 45<sup>th</sup> Annual Meeting</b>
7:05am–7:45am	<b>General Session 1 — Sports Medicine</b>
7:45am–8:25am	<b>Symposium 1 — What's New in Foot and Ankle Surgery</b>
8:25am–8:40am	<b>First Business Meeting</b>
8:40am–9:00am	<b>Break — Please visit Exhibitors</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
9:00am–9:40am	<b>Symposium 2 — What's New in ACL Reconstruction Surgery</b>
9:40am–9:45am	<b>Go to Stations</b>
9:45am–10:15am	<b>Rapid Fire Session 2A — Sports Medicine</b> ( <i>Station A, Plaza Ballroom 1</i> )
9:45am–10:15am	<b>Rapid Fire Session 2B — Total Knee</b> ( <i>Station B, Plaza Ballroom 1</i> )
9:45am–10:15am	<b>Rapid Fire Session 2C — Total Hip</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
9:45am–10:15am	<b>Rapid Fire Session 2D — Spine</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
9:45am–10:15am	<b>Rapid Fire Session 2E — Health Policy</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
10:15am–10:35am	<b>Break — Please visit Exhibitors</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
10:35am–11:50am	<b>General Session 3 — Presidential Address and Howard Steel Lecture</b>
11:50am–12:50pm	<b>EOA Luncheon — Industry Presentation by ConvaTec and Mallinckrodt Pharmaceuticals – Hospital Division</b> <i>*Not for CME Credit</i>
12:50pm–1:38pm	<b>General Session 4 — Basic Science &amp; Total Hip</b>
1:38pm–1:42pm	<b>Go to Stations</b>
1:42pm–2:12pm	<b>Rapid Fire Session 5A — Hip</b> ( <i>Station A, Plaza Ballroom 1</i> )
1:42pm–2:12pm	<b>Rapid Fire Session 5B — Spine</b> ( <i>Station B, Plaza Ballroom 1</i> )
1:42pm–2:12pm	<b>Rapid Fire Session 5C — Total Knee Reconstruction</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
1:42pm–2:12pm	<b>Rapid Fire Session 5D — Knee</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
1:42pm–2:12pm	<b>Rapid Fire Session 5E — Upper Extremity</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
2:12pm–2:16pm	<b>Go to General Session Room</b>
2:16pm–3:00pm	<b>General Session 6 — Trauma/Sports/Misc. Case Presentations</b>

3:00pm–4:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
4:00pm–5:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )

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## FRIDAY, OCTOBER 24, 2014

6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
7:00am–7:48am	<b>General Session 7 — Foot &amp; Ankle and Spine</b>
7:48am–8:16am	<b>Symposium 3 — What's New in Trauma</b>
8:15am–8:20am	<b>Go to Stations</b>
8:20am–8:50am	<b>Rapid Fire Session 8A — Total Hip Reconstruction</b> ( <i>Station A, Plaza Ballroom 1</i> )
8:20am–8:50am	<b>Rapid Fire Session 8B — Total Knee Reconstruction</b> ( <i>Station B, Plaza Ballroom 1</i> )
8:20am–8:50am	<b>Rapid Fire Session 8C — Hip</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
8:20am–8:50am	<b>Rapid Fire Session 8D — Knee</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
8:20am–8:50am	<b>Rapid Fire Session 8E — Mixed Topics</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
8:50am–9:10am	<b>Break — Please visit Exhibitors</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
9:10am–10:00am	<b>Symposium 4 — What's New in Total Joints</b>
10:00am–10:20am	<b>Break — Please visit Exhibitors</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
10:20am–11:30am	<b>General Session 9 — BOC, OREF, AOA, AAOS Report &amp; Presidential Guest Speaker</b>
11:30am–12:30pm	<b>EOA Luncheon — Industry Presentation by Pacira Pharmaceuticals, Inc.</b> <i>*Not for CME Credit</i>
12:30pm–1:26pm	<b>General Session 10 — Mixed Topics</b>
1:26pm–1:30pm	<b>Go to Stations</b>
1:30pm–2:00pm	<b>Rapid Fire Session 11A — Hip</b> ( <i>Station A, Plaza Ballroom 1</i> )
1:30pm–2:00pm	<b>Rapid Fire Session 11B — Knee</b> ( <i>Station B, Plaza Ballroom 1</i> )
1:30pm–2:00pm	<b>Rapid Fire Session 11C — Tumor</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
1:30pm–2:00pm	<b>Rapid Fire Session 11D — Upper Extremity</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
1:30pm–2:00pm	<b>Rapid Fire Session 11E — Pediatrics</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
2:00pm–2:04pm	<b>Go To General Session Room</b>
2:04pm–3:00pm	<b>General Session 12 — Foot/Ankle Arthroplasty Case Presentations</b>
3:00pm–4:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
4:00pm–5:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )

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**SATURDAY, OCTOBER 25, 2014**

6:00am–7:00am	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
7:00am–7:56am	<b>General Session 13 — Mixed Topics</b>
7:56am–8:27am	<b>Symposium 5 — What's New in Hip Preservation Surgery</b>
8:27am–8:42am	<b>Second Business Meeting</b>
8:42am–9:07am	<b>Break — Please visit Exhibitors</b> ( <i>Ritz-Carlton Ballroom Salons 2 &amp; 3</i> )
9:07am–9:35am	<b>Symposium 6 — What's New in Spine Surgery</b>
9:35am–9:39am	<b>Go to Stations</b>
9:39am–10:09am	<b>Rapid Fire Session 14A — Foot</b> ( <i>Station A, Plaza Ballroom 1</i> )
9:39am–10:09am	<b>Rapid Fire Session 14B — Trauma</b> ( <i>Station B, Plaza Ballroom 1</i> )
9:39am–10:09am	<b>Rapid Fire Session 14C — Spine</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
9:39am–10:09am	<b>Rapid Fire Session 14D — Total Hip Reconstruction</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
9:39am–10:09am	<b>Rapid Fire Session 14E — Hand</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
10:09am–10:24am	<b>Refreshment Break</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
10:24am–11:20am	<b>General Session 15 — Mixed Topics</b>
11:20am–11:40am	<b>Refreshment Break</b> ( <i>Ritz-Carlton Ballroom Foyer</i> )
11:40am–12:20pm	<b>Symposium 7 — What's New in Shoulder and Elbow Surgery</b>
12:20pm–12:24pm	<b>Go to Stations</b>
12:24pm–12:54pm	<b>Rapid Fire Session 16A — Trauma</b> ( <i>Station A, Plaza Ballroom 1</i> )
12:24pm–12:54pm	<b>Rapid Fire Session 16B — Total Hip Reconstruction</b> ( <i>Station B, Plaza Ballroom 1</i> )
12:24pm–12:54pm	<b>Rapid Fire Session 16C — Knee</b> ( <i>Station C, Ritz-Carlton Ballroom Foyer</i> )
12:24pm–12:54pm	<b>Rapid Fire Session 16D — Shoulder</b> ( <i>Station D, Ritz-Carlton Ballroom Foyer</i> )
12:24pm–12:54pm	<b>Rapid Fire Session 16E — Basic Science</b> ( <i>Station E, Ritz-Carlton Ballroom Foyer</i> )
12:54pm–12:58pm	<b>Go to General Session Room</b>
12:58pm–2:02pm	<b>General Session 17 — Mixed Topics</b>
2:02pm–3:00pm	<b>Scientific Poster Session</b> ( <i>Ritz-Carlton Ballroom Foyer</i> ) Note: Presenters will be available to answer questions.
3:00pm–4:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )

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## Activities Information

*Badges or wristbands are required for admittance to all events.*

### THURSDAY, OCTOBER 23, 2014

#### Beach Walk

8:00am (*Meet in Lobby*)

**Price:** *Included in registration fee*

#### Spouse/Children's Hospitality

8:45am–10:15am (*Salt Restaurant*)

Join your friends and meet new spouses while enjoying a continental breakfast. The Salt Sommelier will tell us how the Chef infuses herbs, citrus and other flavors to make the resort's house-made gourmet salts. The Salt Sommelier will share different cooking tips and the healthy benefits of these infused salts. Participants may taste and sample salts from all over the world as well as learn the secrets of cooking on a salt platter that's 250 million years old.

**Price:** *Included in registration fee; \$40 per Unregistered Guest; \$20 per Unregistered Child*

#### EOA Luncheon — Industry Presentations by and ConvaTec Mallinckrodt Pharmaceuticals – Hospital Division

11:50am–12:50pm (*Ritz-Carlton Ballroom Salon 1*)

**Advances in Peri-Operative Care of the Hip & Knee Patient: Management of Surgical Site Infection & Acute Pain**

- Peri-Operative Pain Management for Orthopaedic Surgery
  - Changing Incidence of Arthroplasty and Burden of Infection, Risk Mitigation of Infection, and Recent Advances in Post-Operative Wound Management
- \*Not for CME credit

**Price:** *Included in registration fee, lunch provided*

#### Fort Clinch Tour

2:00pm–4:00pm (*Meet in Lobby*)

In 1847, the construction of Fort Clinch began here on Amelia Island. A part of the park system since 1935, Fort Clinch in one of the most well-preserved 19th Century forts is the country. Although no battles were fought here, it was garrisoned during both the Civil and Spanish-American wars. During the 1930s, the Civilian Conservation Corps began preserving and rebuilding many of the structures of the abandoned fort. The fort is

still maintained as a Union Garrison by Rangers dressed in authentic uniforms. Park "Interpretation Tours" guide you through the everyday life of a Civil War soldier. This state park is unusual in that it possesses both historical and natural qualities.

**Price:** *\$90 per person (12 person minimum); lunch not included*

#### New Member Reception

6:15pm–7:00pm (*Spa Pool*)

All EOA new members are invited to attend this reception. The EOA Board and Committee Members would like to take this opportunity to welcome you to the EOA.

**Price:** *Included in registration fee*

#### Welcome Reception

7:00pm–9:30pm (*Oceanfront Lawn*)

Have a wonderful evening on the Ocean Lawn overlooking the water with food delicacies and drinks to be enjoyed.

Attire: Resort Casual (no jacket required), spike heels not recommended.

**Price:** *Included in registration fee; \$75 per Unregistered Adult Guest; \$25 per Unregistered Child (5-17 years)*

### FRIDAY, OCTOBER 24, 2014

#### Beach Walk

8:00am (*Meet in Lobby*)

**Price:** *Included in registration fee*

#### Party Bridge (All levels welcome)

10:00am (*Lobby*)

**Price:** *Included in registration fee (Food and beverage on own.)*

#### Culinary at Ritz-Carlton — Salt Cooking School

10:30am–2:30pm (*Meet in Salt Restaurant*)

Spend the afternoon behind the scenes of the AAA Five Diamond Award winning restaurant. Salt Cooking School is a hands-on opportunity for those passionate about cooking to experience new techniques from the talented chefs. Guests will immerse themselves in the Salt Kitchen and learn how to artfully prepare the same dishes the chefs create each evening in the restaurant.

Salt Cooking School is an exclusive opportunity for guests to be inspired and learn new skills they can take home to their own kitchens. After class, guests will enjoy their own award winning lunch - Butternut Squash Soup, Halibut, Herb Gnocchi, Warm Chocolate Cake and other tidbits.

**Price:** \$155 per person (10 person minimum)

#### **EOA Luncheon — Industry Presentation by Pacira Pharmaceuticals, Inc.**

11:30am–12:30pm (*Ritz-Carlton Ballroom Salon 1*)

Pain Management

\*Not for CME credit

**Price:** Included in registration fee, lunch provided

#### **Back Water Fishing**

12:00pm–5:00pm (*Meet in Lobby*)

Enjoy fishing from 22' to 24' Bay boats. Captains with many years of local fishing experience will guide guests through the backwater creeks and rivers of Amelia Island. You will be fishing within 10 minutes of leaving the dock. Guests will enjoy the tranquil nature of the surrounding area with sea birds, dolphins, and manatees, while at the same time fishing for target species including the prized redfish, sea trout, fall flounder, blue fish, shark, and jack crevalle. Light tackle spinning rods are used, and anglers will fight these species that can exceed 10 pounds. After the charter, the captains will filet and ice the fish, which may be brought back to the hotel for the chef to prepare.

**Price:** \$325 per person (4 person minimum)

#### **Golf Tournament**

12:30pm–5:30pm (*Meet at Pro Shop*)

The 18-hole championship golf course is an avid golfer's dream. Designed by Mark McCumber and Gene Littler, this north Florida golf resort's breathtaking landscape is as beautiful as it is challenging. Meticulously maintained greens, strategically bunkered fairways and the ever-shifting ocean breeze ensure no two rounds are ever the same. The tournament will be a 1:00pm shotgun start with scramble format. Come rain or shine. Greens fees, lunch, beverage cart and transportation are included.

**Price:** \$185 per person

#### **Exhibitor Reception**

5:30pm–7:30pm (*Ritz-Carlton Ballroom Salons 2 & 3*)

Before you go to dinner, start your evening off with drinks and hors d'oeuvres with EOA.

Attire: Business Casual

**Price:** Included in registration fee or \$75 per Unregistered Adult Guest

#### **Kids' Movie Party and Arts & Crafts**

5:30pm–7:30pm (*Santa Maria Room*)

Dinner and a movie—fun! Watch a great movie and nibble on snacks and treats with your friends. If younger than 5 years old, must be accompanied by an adult.

**Price:** Included in registration fee or \$25 per Unregistered Child (5-17 years)

**SATURDAY, OCTOBER 25, 2014**

#### **Beach Walk**

8:00am (*Meet in Lobby*)

**Price:** Included in registration fee

#### **Book Discussion**

9:30am (*Café 4750*)

BYOB – Share ideas about great reads and make new friends.

**Price:** Included in registration fee (Food and beverage on own.)

#### **Salt of the Earth/Custom Blending-Bar Experience**

11:00am–12:30pm (*Meet in Spa Boutique*)

Hand-blend your very own salt or sugar scrub and whipped body crème with a scent you create from the resort's signature aroma collection. This fun and interactive experience includes your very own "Salt Barista" who will demonstrate how to custom create your own body indulgence product using their Salt of the Earth Blend-Bar. Enjoy learning about the benefits of using natural ingredients like Himalayan salt, sugar and vitamins A and E enriched grape seed oil to rebuild collagen, repair damaged skin and enhance the skin's resistance to oxidative damage. This experience will create a memory that will last, as each guest will personally choose or mix scents to create his or her own unique fragrance. Guests will then bottle their own body indulgence products, complete with a label they sign and date.

**Price:** \$45 per person (10 person minimum)

#### **Cumberland Island Walking Tour**

1:00pm–5:00pm (*Meet in Lobby*)

Relax on a sightseeing cruise to the National Seashore, Cumberland Island. Enjoy a 45-minute cruise aboard the "Cumberland Princess" and catch a glimpse of historic Fort Clinch and the backwaters and inlets of the St. Mary's River. Wildlife abounds both on land and in the water—and there is always a chance of sighting a dolphin! Visit majestic Cumberland Island, which is well known for its wildlife, natural settings, water fowl and

wild horses. For thousands of years people have lived on Cumberland Island (only 30 permanent residents live there today), but never in such numbers as to permanently alter the character of the landscape.

**Price:** *\$150 per person (30 person minimum); lunch not included*

#### **Deep Sea Fishing**

1:00pm–6:00pm (*Meet in Lobby*)

Enjoy the thrill of catching the fish of a lifetime aboard a state-of-the-art sport fishing boat. Troll for sailfish, marlin, dolphin, kingfish, tuna, cobia, and shark, or bottom fish for grouper, snapper, sea bass, and shark. During October you may experience the Giant Bull Redfish Run, where “bull reds” up to 50 pounds are caught around the surrounding jetties. The captain and mate provide all the fishing tackle, rigged bait, and instruction required. After the charter, the captains will filet and ice the fish, which may be brought back to the hotel for the chef to prepare. Box lunch and beverages included.

**Price:** *\$320 per person (6 person minimum)*

#### **Tennis Round Robin**

2:00pm–4:00pm (*Meet at Tennis Courts*)

**Price:** *\$40 per person (4 person minimum)*

#### **Jazz Reception/Founders' Dinner Dance**

6:15pm–11:00pm (*Ritz-Carlton Ballroom Foyer/Ritz-Carlton Ballroom Salons 2&3*)

The evening begins with a lovely reception and music brought to you by the EOA Jazz Band. The band plays popular jazz tunes that will be enjoyed by all. Dinner will also be an event to remember with a delicious meal, good company, and Big Band dancing music.

Attire: Jacket and Tie

**Price:** *Included in registration fee; \$150 per Unregistered Adult Guest; \$95 per Unregistered Child (5-17 years); \$75 Surcharge for Registered Child*

#### **Kids' Movie Party and Arts & Crafts**

6:15pm–11:00pm (*Santa Maria Room*)

While your parents are at the Founders' Dinner, enjoy dinner and crafts or a movie with your friends. If younger than 5 years old, must be accompanied by an adult. This is not a babysitting service, but provided only for parents attending the Founders' Dinner; children must be registered.

**Price:** *Included in registration fee or \$25 per Unregistered Child (5-17 years)*

## ***Meeting Information***

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### **FORMAT**

The educational sessions will be held October 23-25, 2014, from approximately 7:00am until 3:00pm.

### **TARGET AUDIENCE**

The 45<sup>th</sup> Annual Meeting of the Eastern Orthopaedic Association has been developed primarily for orthopaedic and trauma surgeons. Physician Assistants, LPNs, and Physical Therapists would also benefit from this program.

### **SPEAKER READY ROOM**

The Speaker Ready Room is available 24 hours a day. Please contact Hotel Security for access during unscheduled times. Must show ID/Badge to be admitted after hours.

### **PHYSICIAN REGISTRATION FEE**

Registration covers the Scientific Program Sessions, Meeting Syllabus, Poster Sessions, Multimedia Sessions, Daily Continental Breakfast, Welcome Reception, Exhibitor/Poster Reception, Jazz Band Reception/Founders' Dinner Dance, Coffee Breaks, and Daily Drawings.

### **BADGES/WRISTBANDS**

Badges or wristbands must be worn. They are proof of registration and are required for admittance to all functions and social events.

### **REGISTER FOR THE EXHIBITORS DAILY DRAWING**

Registered physicians will receive a Raffle Ticket every day during the meeting to register with the exhibitors and grantors. Place your ticket in the raffle box for a chance to win. Drawings will take place on Thursday and Friday at the end of the second break and on Saturday at the end of the first break in the Exhibit Area.

### **CME ACCREDITATION**

The American Academy of Orthopaedic Surgeons designates this live activity for a maximum of 26.5 **AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- \*17.5 CME Credits for Scientific Program
- \*6 CME Credits for Scientific Poster Sessions
- \*3 CME Credits for Multimedia Education Sessions

*To ensure correct CME credit is awarded, please complete the form in the back of this program, indicating the Sessions you attended or go online to [www.eoa-assn.org](http://www.eoa-assn.org) to complete the EOA 2014 Annual Meeting CME Credit Records. CME Certificates will be awarded to all registered participants.*

### **MANAGEMENT**

The Eastern Orthopaedic Association is managed by Data Trace Management Services, a Data Trace Company, Towson, Maryland.

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*The meeting function areas, including the registration area and meeting rooms, are designated non-smoking throughout the course of the meeting. Smoking is limited to areas where not prohibited by fire department regulations.*

***Please be considerate and silence your cell phones during the Scientific Program.***

## 2014 President

*45<sup>th</sup> Annual Meeting  
Amelia Island, Florida*

**David W. Romness, MD**  
*Arlington, Virginia*

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### *EOA Past Presidents*

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<b>1969-1970</b>	<b>Howard H. Steel, MD, PhD</b>	<b>1991-1992</b>	<b>George P. Bogumill, MD, PhD</b>
<b>1970-1971</b>	<b>Howard H. Steel, MD, PhD</b>	<b>1992-1993</b>	<b>Glen A. Barden, MD</b>
<b>1971-1972</b>	<b>Warner D. Bundens Jr., MD*</b>	<b>1993-1994</b>	<b>Henry R. Cowell, MD, PhD</b>
<b>1972-1973</b>	<b>R. Joe Burleson, MD*</b>	<b>1994-1995</b>	<b>Ronald C. Hillegass, MD</b>
<b>1973-1974</b>	<b>Joseph O. Romness, MD*</b>	<b>1995-1996</b>	<b>Stephen F. Gunther, MD</b>
<b>1974-1975</b>	<b>James D. Fisher, MD*</b>	<b>1996-1997</b>	<b>L. Andrew Koman, MD</b>
<b>1975-1976</b>	<b>Marvin E. Steinberg, MD</b>	<b>1997-1998</b>	<b>Chitranjan S. Ranawat, MD</b>
<b>1976-1977</b>	<b>Leslie C. Meyer, MD*</b>	<b>1998-1999</b>	<b>Charles H. Classen Jr., MD</b>
<b>1977-1978</b>	<b>Robert N. Richards Sr., MD</b>	<b>1999-2000</b>	<b>A. Lee Osterman, MD</b>
<b>1978-1979</b>	<b>Hugo A. Keim, MD</b>	<b>2000-2001</b>	<b>James A. Nunley II, MD</b>
<b>1979-1980</b>	<b>Wallace E. Miller, MD*</b>	<b>2001-2002</b>	<b>E. Anthony Rankin, MD</b>
<b>1980-1981</b>	<b>James R. Urbaniak, MD</b>	<b>2002-2003</b>	<b>Shepard R. Hurwitz, MD</b>
<b>1981-1982</b>	<b>Stanley W. Lipinski, MD</b>	<b>2003-2004</b>	<b>John D. Lubahn, MD</b>
<b>1982-1983</b>	<b>William T. Green Jr., MD</b>	<b>2004-2005</b>	<b>Thomas P. Vail, MD</b>
<b>1983-1984</b>	<b>Emmett M. Lunceford Jr., MD*</b>	<b>2005-2006</b>	<b>J. Richard Bowen, MD</b>
<b>1984-1985</b>	<b>John F. Mosher, MD</b>	<b>2006-2007</b>	<b>Scott D. Boden, MD</b>
<b>1985-1986</b>	<b>B. David Grant, MD</b>	<b>2007-2008</b>	<b>Robert V. Dawe, MD</b>
<b>1986-1987</b>	<b>Harry R. Gossling, MD*</b>	<b>2008-2009</b>	<b>Judith F. Baumhauer, MD, MPH</b>
<b>1987-1988</b>	<b>Andrew G. Hudacek, MD*</b>	<b>2009-2010</b>	<b>Robert N. Richards Jr., MD</b>
<b>1988-1989</b>	<b>Lamar L. Fleming, MD</b>	<b>2010-2011</b>	<b>John C. Richmond, MD</b>
<b>1989-1990</b>	<b>Thomas S. Renshaw, MD</b>	<b>2011-2012</b>	<b>Henry A. Backe Jr., MD</b>
<b>1990-1991</b>	<b>Edward E. Kimbrough III, MD*</b>	<b>2012-2013</b>	<b>David S. Zelouf, MD</b>

\* Deceased

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## *2014 Howard Steel Lecture*

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*Remy Munasifi  
Arlington, Virginia*

EOA is pleased to have comedian and YouTube sensation Remy Munasifi as the 2014 Howard Steel Lecturer.

Remy Munasifi launched his “GoRemy” channel on YouTube and has not stopped since. His videos have been viewed over 80 million times and he has entertained live audiences around the world. His latest record, “The Falafel Album,” is available now on Comedy Central Records. Remy currently resides in Arlington, Virginia.

## 2013 - 2014 EOA Leadership

### *Officers and Board of Directors*

*PRESIDENT*

**David W. Romness, MD**

*FIRST VICE PRESIDENT*

**Mark J. Lemos, MD**

*SECOND VICE PRESIDENT*

**Geoffrey H. Westrich, MD**

*IMMEDIATE PAST PRESIDENT*

**David S. Zelouf, MD**

*SECRETARY*

**Michael P. Bolognesi, MD**

*TREASURER*

**Javad Parvizi, MD, FRCS**

*HISTORIAN*

**Robert P. Boran Jr., MD**

*MEMBER AT LARGE (ONE YEAR)*

**Marc J. Levine, MD**

*MEMBER AT LARGE (TWO YEARS)*

**John D. Kelly IV, MD**

*MEMBER AT LARGE (THREE YEARS)*

**Richard M. Wilk, MD**

*MEMBERSHIP CHAIR*

**Anil S. Ranawat, MD**

*PROGRAM CHAIR*

**Amar S. Ranawat, MD**

*MANAGING DIRECTOR*

**E. Anthony Rankin, MD**

*BOC REPRESENTATIVE*

**John C. Richmond, MD**

*MEMBERSHIP COMMITTEE*

**Anil S. Ranawat, MD, Chair**

**Geoffrey H. Westrich, MD**

**Richard M. Wilk, MD**

**Michael P. Ast, MD**

**Marc J. Levine, MD**

**John D. Kelly IV, MD**

*PROGRAM/PROFESSIONAL EDUCATION COMMITTEE*

**Amar S. Ranawat, MD, Chair**

**Michael P. Bolognesi, MD**

**N. George Kasparyan, MD,  
PhD**

**Mark J. Lemos, MD**

**Javad Parvizi, MD, FRCS**

**Adam J. Rana, MD**

**Mark J. Romness, MD**

*NOMINATING COMMITTEE*

**David S. Zelouf, MD, Chair**

**Carlos J. Lavernia, MD**

**Michael Sidor, MD**

**Robert Heapes, MD**

**Robert P. Boran Jr., MD**

*FINANCE COMMITTEE*

**Javad Parvizi, MD, FRCS,  
Chair**

**E. Anthony Rankin, MD**

**Henry A. Backe Jr., MD**

**David S. Zelouf, MD**

*AUDIT COMMITTEE*

**Mark J. Lemos, MD, Chair**

**Michael Sidor, MD**

**Steve Longenecker, MD**

*BYLAWS COMMITTEE*

**John P. McConnell, MD, Chair**

*TECHNICAL EXHIBITS COMMITTEE*

**Kevin D. Plancher, MD, Chair**

**Henry A. Backe Jr., MD**

**Amar S. Ranawat, MD**

*PRESIDENT'S COUNCIL*

**David W. Romness, MD**

**Mark J. Lemos, MD**

**Geoffrey H. Westrich, MD**

**David S. Zelouf, MD**

**E. Anthony Rankin, MD**

*TELECOMMUNICATIONS COMMITTEE*

**James T. Guille, MD, Chair**

**John P. McConnell, MD**

**James Barber, MD**

*CME ACCREDITATION*

**Robert N. Richards Jr., MD**

*NEWSLETTER*

**Scott D. Boden, MD**

*JAZZ BAND COORDINATOR*

**Robert N. Richards Jr., MD**

### *EOA Spouse Committee*

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**Mrs. David W. Romness (Karen), Chair**

**Mrs. Henry A. Backe Jr. (Tara)**

**Mrs. Scott D. Boden (Mary)**

**Mrs. Michael P. Bolognesi (Kelly)**

**Mrs. Robert P. Boran Jr. (Kitsy)**

**Mrs. John D. Kelly IV (Marie)**

**Mrs. Mark J. Lemos (Marla)**

**Mrs. Marc J. Levine (Robin)**

**Mrs. Javad Parvizi (Fariba)**

**Mrs. Kevin D. Plancher (Jill)**

**Mrs. Anil S. Ranawat (Dana)**

**Mrs. Amar S. Ranawat (Andrea)**

**Mrs. Chitraranjan S. Ranawat (Gudie)**

**Mrs. E. Anthony Rankin (Frances)**

**Mrs. Robert N. Richards Jr. (Cindy)**

**Mrs. John C. Richmond (Chris)**

**Mrs. Geoffrey H. Westrich (Ellen)**

**Mrs. Richard M. Wilk (Susan)**

**Mrs. David S. Zelouf (Susan)**

## **Eastern Orthopaedic Educational Foundation**



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### *EOEF Officers*

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**Chitraranjan S. Ranawat, MD, President**

**Robert V. Dawe, MD, Secretary**

**John C. Richmond, MD Treasurer**

**Glen A. Barden, MD, ex-officio**

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### *EOA Board of Incorporators*

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**Howard H. Steel, MD, PhD**

**Warner D. Bundens Jr., MD**

**Henry R. Cowell, MD, PhD**

**B. David Grant, MD**

**Marvin E. Steinberg, MD**

**Theodore R. Lammot, III, MD**

**Edward J. Resnick, MD**

**George J. Schonholtz, MD**

**Joseph O. Romness, MD**

**Marcel J. Schulmann, MD**

**Frederick J. Knocke, MD**

**Arthur F. Seifer, MD**

**Stephan A. Christides, MD**

In witness whereof, we have made, subscribed, and acknowledged these  
Articles of Incorporation on the 25<sup>th</sup> day of May, 1970.



## *Eastern Orthopaedic Education Foundation*

**THANK YOU FOR YOUR SUPPORT!**

### **Egregia Cum Laude — Over \$140,000**

Chitranjan S. Ranawat, MD

### **Summa Cum Laude — \$20,000- \$50,000**

Glen A. Barden, MD

Scott D. Boden, MD

Shepard R. Hurwitz, MD

### **Maxima Cum Laude — \$10,000- \$19,999**

J. Richard Bowen, MD

Charles H. Classen Jr., MD

Kevin D. Plancher, MD

E. Anthony Rankin, MD

David W. Romness, MD

Geoffrey H. Westrich, MD

### **Magna Cum Laude — \$5,000- \$9,999**

Henry A. Backe Jr., MD

John J. Callahan Jr., MD

Robert V. Dawe, MD

James T. Guille, MD

Mark J. Lemos, MD

Dr. John D. & Terri Lubahn

Javad Parvizi, MD, FRCS

Ranawat Orthopaedic Research Foundation

Robert N. Richards Jr., MD

John C. Richmond, MD

David S. Zelouf, MD

**Cum Laude — \$1,000- \$4,999**

Hari Bezwada, MD  
William Banks, MD  
Judith F. Baumhauer, MD, MPH  
Oheneba Boachie-Adjei, MD  
George P. Bogumill, MD  
Michael P. Bolognesi, MD  
Robert P. Boran, MD  
Mark C. Buechel, MD  
Colin E. Couper, MD

Garry Hough, MD  
Andrew G. Hudacek, MD  
John D. Kelly IV, MD  
Marc J. Levine, MD  
Stanley W. Lipinski, MD  
Frederic E. Liss, MD  
Bob Mc Eneany, MD  
James A. Nunley II, MD  
Philadelphia Hand Center, PC

Premier Orthopaedics, Inc.  
Amar S. Ranawat, MD  
Robert N. Richards Sr., MD  
Enzo J. Sella, MD  
Douglas A. Shenkman, MD  
Thomas P. Vail, MD  
James C. Vailas, MD

Todd Albert, MD  
John Awad, MD  
Popa Anca, MD  
Norberto Baez, MD  
Jason Baynes, MD  
John Beachler, MD  
Melvin Brothman, MD  
Frank Bryan, MD  
Fred Carter, MD  
Gaylord Clark, MD  
Gary Cortina, MD  
Henry R. Cowell, MD, PhD  
Phani Dantuluri, MD  
Gregory DiFelice, MD  
Chester Dilallo, MD  
John DiPreta, MD  
Vincent Distefano, MD  
John Forrest, MD  
Brian J. Galinat, MD  
John Gordon, MD  
William Goulburn, MD  
David B. Grant, MD  
Lawrence Guess, MD

Stephen F. Gunther, MD  
John E. Handelsman, MD  
Robert Heaps, MD  
Douglas P. Hein, MD  
Ronald C. Hillegass, MD  
Charles Hummer, MD  
Thomas Hunt, MD  
Fredrick Jaffe, MD  
John R. Rowell Jr., MD  
Bryan T. Kelly, MD  
L. Andrew Koman, MD  
Paul Kovatis, MD  
William Kutner, MD  
Kent Lerner, MD  
Sheldon Lin, MD  
Thomas Lombardo, MD  
Paul A. Marchetto, MD  
David J. Mayman, MD  
Edward McClain, MD  
Charles Mess, MD  
D. Sewall Miller, MD  
Steven Neufeld, MD  
Terrence O'Donovan, MD

Vincent Paul, MD  
Vincent D. Pellegrini, Jr., MD  
Mark E. Pruzansky, MD  
Anil S. Ranawat, MD  
Steven Robbins, MD  
Jose Rodriguez, MD  
George Rowan, MD  
Vincent J. Sammarco, MD  
Thomas P. Sculco, MD  
Carl Seon, MD  
Edwin G. Singsen, MD  
Richard Smith, MD  
Charles Sommer, MD  
Edwin P. Su, MD  
John Tierney, MD  
Daniel Ward, MD  
Thomas Ward, MD  
Thomas Whitten, MD  
Richard M. Wilk, MD  
Winthrop University  
Gary Zartman, MD  
Eric Zitzman, MD

## 2014 EOA New Members

We are pleased to welcome the following new Active members to the Eastern Orthopaedic Association:

<b>Jack Abboudi, MD</b> <i>Newtown Square, PA</i>	<b>Jeff Dina, PA-C</b> <i>Lawrenceville, NJ</i>	<b>Keith Hechtman, MD</b> <i>Coral Gables, FL</i>
<b>John Abraham, MD</b> <i>Gladwyne, PA</i>	<b>Joshua Dines, MD</b> <i>Uniondale, NY</i>	<b>Jose Herrera-Soto, MD</b> <i>Orlando, FL</i>
<b>Daniel T. Altman, MD</b> <i>Pittsburgh, PA</i>	<b>Michael L. Dockery, MD</b> <i>Charlotte, NC</i>	<b>Chet Janecki, MD</b> <i>Seminole, FL</i>
<b>Glen D. Arvan, MD</b> <i>Babylon, NY</i>	<b>Frank R. Ebert, MD</b> <i>Baltimore, MD</i>	<b>Eric Johnson, MD</b> <i>Newark, DE</i>
<b>Michael Ast, MD</b> <i>Lawrenceville, NJ</i>	<b>Barry Fass, MD</b> <i>New Hope, PA</i>	<b>Randeep Kahlon, MD</b> <i>Newark, DE</i>
<b>Barry I. Berger, MD</b> <i>Allentown, PA</i>	<b>Amir Fayyazi, MD</b> <i>Allentown, PA</i>	<b>John Karpie, MD</b> <i>Williamsville, NY</i>
<b>Alex Bodenstab, MD</b> <i>Newark, DE</i>	<b>Brett Feldman, MD</b> <i>Port St. Lucie, FL</i>	<b>Bruce Katz, MD</b> <i>Newark, DE</i>
<b>Drew Brady, MD</b> <i>Newark, DE</i>	<b>Alexander Finger, MD</b> <i>East Patchogue, NY</i>	<b>Barry Kleeman, MD</b> <i>East Patchogue, NY</i>
<b>Christopher A. Brown, MD</b> <i>Plantation, FL</i>	<b>Stephen Finley, MD</b> <i>Greenville, SC</i>	<b>Reginald Q. Knight, MD</b> <i>Cooperstown, NY</i>
<b>James F. Bruce Jr., MD</b> <i>Lagrange, GA</i>	<b>Michael Flaherty, MD</b> <i>Albany, NY</i>	<b>Yevgeniy Korshunov, MD</b> <i>Staten Island, NY</i>
<b>Charles G. Caldwell, MD</b> <i>Waycross, GA</i>	<b>John Fowler, MD</b> <i>Gibsonia, PA</i>	<b>Keith A. Kurland, MD</b> <i>Coral Springs, FL</i>
<b>Mark Callenberger, MD</b> <i>Merritt Island, FL</i>	<b>Michael T. Freehill, MD</b> <i>Winston-Salem, NC</i>	<b>Harrison A. Latimer, MD</b> <i>Salisbury, NC</i>
<b>Eben Carroll, MD</b> <i>Winston-Salem, NC</i>	<b>Michael Freidl, MD</b> <i>Brunswick, GA</i>	<b>Eric Lebby, MD</b> <i>Allentown, PA</i>
<b>Kevin Cassidy, MD</b> <i>Great Neck, NY</i>	<b>John E. Gee, MD</b> <i>Valdosta, GA</i>	<b>Lee R. Leddy, MD</b> <i>Charleston, SC</i>
<b>Evan Crain, MD</b> <i>Newark, DE</i>	<b>Adam Ginsberg, DO</b> <i>Newark, DE</i>	<b>Elliott Leitman, MD</b> <i>Newark, DE</i>
<b>Michael B. Cross, MD</b> <i>New York, NY</i>	<b>Matthew Goldstein, MD</b> <i>Great Neck, NY</i>	<b>Frederic Liss, MD</b> <i>Phoenixville, PA</i>
<b>Karen Crowe, MD</b> <i>Albany, NY</i>	<b>Julio Gonzalez, MD</b> <i>Venice, FL</i>	<b>John G. Lunt, MD</b> <i>Danbury, CT</i>
<b>Gerard Cush Jr., MD</b> <i>Danville, PA</i>	<b>Brian M. Gordon, MD</b> <i>Latham, NY</i>	<b>Kevin N. Mabie, MD</b> <i>Fall River, MA</i>
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<b>Douglas F. Messina, MD</b> <i>Wilmington, NC</i>	<b>Mike Rigganbach, MD</b> <i>Orlando, FL</i>	<b>Jennifer Teeter, DO</b> <i>Williamsville, NY</i>
<b>Frederick N. Meyer, MD</b> <i>Mobile, AL</i>	<b>Matthew Roberts, MD</b> <i>New York, NY</i>	<b>Steven Tooze, MD</b> <i>Newark, DE</i>
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<b>Matthew D. Pepe, MD</b> <i>Egg Harbor Twp, NJ</i>	<b>Robert Steele, MD</b> <i>Newark, DE</i>	

### ***Membership by State***

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<b>Alabama</b>	<b>3</b>	<b>New Hampshire</b>	<b>10</b>
<b>California</b>	<b>1</b>	<b>New Jersey</b>	<b>82</b>
<b>Colorado</b>	<b>2</b>	<b>New York</b>	<b>86</b>
<b>Connecticut</b>	<b>46</b>	<b>Pennsylvania</b>	<b>151</b>
<b>District of Columbia</b>	<b>3</b>	<b>Puerdto Rico</b>	<b>3</b>
<b>Delaware</b>	<b>49</b>	<b>Rhode Island</b>	<b>11</b>
<b>Florida</b>	<b>71</b>	<b>South Carolina</b>	<b>21</b>
<b>Georgia</b>	<b>29</b>	<b>Tennessee</b>	<b>2</b>
<b>Louisiana</b>	<b>2</b>	<b>Texas</b>	<b>1</b>
<b>Massachusetts</b>	<b>57</b>	<b>Virginia</b>	<b>32</b>
<b>Maryland</b>	<b>54</b>	<b>Vermont</b>	<b>1</b>
<b>Maine</b>	<b>9</b>	<b>West Virginia</b>	<b>4</b>
<b>Michigan</b>	<b>1</b>	<b>Canada</b>	<b>3</b>
<b>North Carolina</b>	<b>47</b>	<b>Foreign</b>	<b>9</b>

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### ***Membership by Classification***

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<b>Active</b>	<b>689</b>
<b>Candidate</b>	<b>12</b>
<b>Emeritus</b>	<b>165</b>
<b>Allied Health</b>	<b>4</b>
<b>Honorary</b>	<b>20</b>
<b>TOTAL</b>	<b>890</b>

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Thank you for your participation and commitment to the EOA.

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## ***Grantor/Exhibitor Information***

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Arthrex is a global leader in new product development and medical education in orthopaedics. With a corporate mission of helping surgeons treat their patients better, Arthrex

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[www.bluebeltech.com](http://www.bluebeltech.com)

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Ceterix™ is committed to joint preservation through the development of surgical tools that expand and improve what is possible for physicians treating soft tissue injuries such as meniscus tears.

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ConforMIS develops and commercializes medical devices for the treatment of osteoarthritis and joint damage. The company's patented "Image-to-Implant"® technology enables the creation of customized patient-specific implants and instruments that are precisely sized and shaped to match the 3D topography of a patient's anatomy. To date, ConforMIS has developed a line of award winning personalized knee solutions to address all stages of osteoarthritis.

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Convatec is a leading developer and marketer of innovative medical technologies, including AQUACEL® Ag SURGICAL cover dressing. As the only cover dressing to incorporate unique patented Hydrofiber® Technology it helps improve outcomes by locking in fluid, including harmful bacteria, and releasing ionic silver to help reduce the risk of infection.

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[Renee.schafer@messolutions.com](mailto:Renee.schafer@messolutions.com).

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434-975-8000  
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[www.ortho.microport.com](http://www.ortho.microport.com)

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Miami, FL 33176  
305-596-7585  
[www.skeletaldynamics.com](http://www.skeletaldynamics.com)

Skeletal Dynamics designs and markets innovative orthopedic devices. Skeletal Dynamics is focused on designing innovative solutions that have not been addressed by other manufacturers. Our goal is to raise the bar with offerings for upper extremity orthopedic surgery. Skeletal Dynamics is a true believer in the team approach to success. Together, with the skills of our customers, we can make a positive impact in our patients' lives.

**Smith & Nephew, Inc.**

7135 Goodlett Farms Parkway  
Cordova, TN 38016  
901-396-2121  
[www.smith-nephew.com](http://www.smith-nephew.com)

Smith & Nephew is a global medical technology business with global leadership positions in Orthopaedic Reconstruction, Endoscopy, Sports Medicine, Trauma Fixation, Extremities & Limb Restoration, and Advanced Wound Management. Visit [www.smith-nephew.com](http://www.smith-nephew.com) for more information.

**Terason**

77 Terrace Hall Avenue  
Burlington, MA 01803  
781-270-4143  
[www.terason.com](http://www.terason.com)

Terason continues to revolutionize ultrasound, with high-performance, portable systems providing exceptional imaging

and advanced features. The new uSmart® 3300 and uSmart® 3200T Ultrasound Systems optimize workflow, enhance clinical efficacy, and increase productivity. Terason's complete MSKUS educational solution includes in-person and online training, as well as our unique uConnectTM remote access.

**THINK Surgical**

47320 Mission Falls Court  
Fremont, CA 94539  
510-249-2300  
[www.thinksurgical.com](http://www.thinksurgical.com)

THINK Surgical is committed to the future of orthopaedic surgery and to improving patient care through the development of leading-edge precision technology. THINK Surgical develops, manufactures, and markets a computer assisted surgical system for orthopaedic surgery. The system includes a 3D planning workstation for preoperative surgical planning of component selection, placement and surface preparation, and a computer assisted tool that executes the pre-surgical plan with unparalleled precision.

**VirtaMed AG**

Rutistrasse 12  
8952 Schlieren  
Zurich, Switzerland  
+ 41 44 500 96 90  
[www.virtamed.com](http://www.virtamed.com)

VirtaMed, a Swiss-based company, develops virtual reality simulators of highest realism. These simulators provide teaching and training of diagnostic and therapeutic interventions in endoscopic surgery.

**Zimmer, Inc.**

PO Box 708  
Warsaw, IN 46580  
800-613-6131  
[www.zimmer.com](http://www.zimmer.com)

Zimmer is a world leader in musculoskeletal health. We're creators of innovative and personalized joint replacement technologies. Founded in 1927, we remain true to our purpose of restoring mobility, alleviating pain, and helping millions of people around the world find renewed vitality. Zimmer has operations in more than 25 countries around the world, sells products in more than 100 countries and is supported by the efforts of more than 8,000 employees.

## EOA Business Meetings

### Eastern Orthopaedic Association

The Ritz-Carlton  
Amelia Island, Florida  
Ritz-Carlton Ballroom Salon 1

Thursday, October 23, 2014  
8:25am–8:40am

### First Business Meeting Agenda

- I. Reading of the Minutes of the previous meeting by the Secretary (and their approval) ..... Michael P. Bolognesi, MD
- II. Report of the President ..... David W. Romness, MD
- III. Report of the Immediate Past President ..... David S. Zelouf, MD
- IV. Report of the First Vice President ..... Mark J. Lemos, MD
- V. Report of the Second Vice President ..... Geoffrey H. Westrich, MD
- VI. Report of the Treasurer ..... Javad Parvizi, MD, FRCS
- VII. Report of the Historian ..... Robert P. Boran Jr., MD
- VIII. Report of the Program/Professional Education Committee ..... Amar S. Ranawat, MD
- IX. Report of the Membership Committee ..... Anil S. Ranawat, MD
- X. Report of the Managing Director ..... E. Anthony Rankin, MD
- XI. Report of Member at Large (1 yr) ..... Marc J. Levine, MD
- XII. Report of Member at Large (2 yrs) ..... John D. Kelly IV, MD
- XIII. Report of Member at Large (3 yrs) ..... Richard M. Wilk, MD
- XIV. Report of the Bylaws Committee ..... John P. McConnell, MD
  - (a) Presentation of Proposed Bylaws Changes
- XV. Report of the Technical Exhibit Committee ..... Kevin D. Plancher, MD
- XVI. Report of Finance Committee ..... Javad Parvizi, MD, FRCS
- XVII. Report of Audit Committee ..... Mark J. Lemos, MD
- XVIII. Report of Nominating Committee/Presentation of Slate ..... David S. Zelouf, MD  
2014-2015 Nominating Committee:
  - Carlos J. Lavernia, MD
  - Michael Sidar, MD
  - Robert Heapes, MD
  - Robert P. Boran Jr., MD
- XIX. New Business
  - (a) Nominations from the Floor for the Nominating Committee  
Nominating Committee Requirements:  
The Nominating Committee shall consist of five (5) Active Members of the Association, three (3) of whom shall be elected at the Annual Meeting of the Association, following nominations from the floor, the fourth member shall be

appointed by the President and may not be a previous officer of the Association. The fifth member, who shall act as the Chair, shall be the immediate available Past President, or, in the event of his/her inability to serve shall be appointed by the President with the approval of the Board of Directors.

With the exception of the Immediate Past President, the members of the Committee shall not be concurrently officers of the Association. No member shall serve for two (2) consecutive years on the Nominating Committee.

XX. Announcement

XXI. Adjournment

## **2013 Eastern Orthopaedic Association Annual First Business Meeting Minutes**

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Miami, Florida  
October 31, 2013

Meeting called to order at 6:46 am

1. Guille: Minutes approved
2. Zelouf: Recapped the year's events. Spoke of his travels to the other regional societies' meetings.
3. Backe: No report from the Past President.
4. Romness, Report of 1<sup>st</sup> Vice President: 2014 Annual Meeting at Ritz Carlton, Amelia Island, FL.
5. Lemos, Report of 2<sup>nd</sup> Vice President: 2015 Meeting will be in Hawaii at Grand Wailea Resort on June 17-20. Mike Bolognesi will be Program Chair. Doug Jackson will be Presidential Guest Speaker.
6. Westrich, Report of Treasurer: The association had a good year financially.
7. Boran, Historian: He will be taking photos during the meeting. 3 members died this past year.
8. Parvizi, Program Chair: Reviewed agenda. Asked people to spread word back home about the EOA meeting.
9. Plancher, Membership: We have 101 new members.
10. Rankin, Mgt. Director: Bylaws change to allow Dr. Chit Ranawat to continue as President of EOEF. Contract with Data Trace renewed.
11. Bylaws: Callahan not present. No report
12. Member at Large, Bolognesi: No report
13. Member at Large, Levin: New Jersey Orthopaedic Society present at this meeting.
14. Member at Large, Kelly: Not present
15. Technical Exhibits, Ranawat: 44 exhibitors
16. Finance Report, Westrich: EOA is doing well financially. Up 10%
17. Audit, Romness: Audit went well with no problems.
18. Nominating Committee, Backe: Slate reviewed.
19. New Business: Carlos Lavernia and Mike Sedor to nominating committee, Robert Heath New Hampshire; Steve Longnecker to Audit Committee

Ended 7 am.

Respectfully Submitted,

James T. Guille, M.D.  
Secretary

## Eastern Orthopaedic Association

The Ritz-Carlton  
Amelia Island, Florida  
Ritz-Carlton Ballroom Salon 1

Saturday, October 25, 2014  
8:27am–8:42am

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### Second Business Meeting Agenda

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- I. Reading of the Minutes of the previous meeting by the Secretary (and their approval)..... Michael P. Bolognesi, MD
- II. Report of Telecommunications Committee..... James T. Guille, MD
- III. Report on CME Accreditation..... Robert N. Richards Jr., MD
- IV. Report of Newsletter Editor ..... Scott D. Boden, MD
- V. Report of Jazz Band Coordinator ..... Robert N. Richards Jr., MD
- VI. Report of the EOEF..... Chitranjan S. Ranawat, MD
- VII. Unfinished Business
  - (a) Vote on proposed Bylaws changes
- VIII. New Business
  - (a) Election of 2015-2016 Nominating Committee
- IX. Election of the Slate of Nominees
- X. Installation of First Vice President as President
- XI. Adjourn

## **2013 Eastern Orthopaedic Association Second Business Meeting Minutes**

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Miami, Florida  
Saturday, November 2, 2013

Meeting called to order at 6:45 am

1. Guille: Minutes approved
2. Telecommunications, Wilk: No report
3. CME, Richards: This meeting offers 27.5 category 1 credits
4. Newsletter, Boden: No report. Open for suggestions for improvement.
5. Jazz Band, Richards: The band will perform tonight.
6. EOEF, Ranawat: Chit thanked those who donated and stated there was 100% participation by the BODs.
7. Old Business: None
8. New Business: Nominating Committee – Zelouf, chair; Sidor, elected; Lavernia, elected, Hemps. Appointment from President to be announced. Approved Slate.
9. New Slate: Steve Longnecker approved to Audit Committee.
10. Dave Zelouf gave Presidential Medal to Dave Romness
11. Romness thanked Zelouf
12. Zelouf thanked Jay Parvizi for work with Program

Ended 7:01 am.

Respectfully Submitted,

James T. Guille, M.D.  
Secretary

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## *Past Annual Meetings of the Eastern Orthopaedic Association 1970–2013*

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### **First Annual Meeting**

President: Howard H. Steel, MD, PhD  
Dates: November 18-21, 1970  
Location: Seaview Country Club  
Absecon, New Jersey  
Attendance: 169 physicians / 107 spouses  
Guest Speaker: Mr. John Wells Sharrard, FRCS  
*Sheffield, England*

### **Second Annual Meeting**

President: Howard H. Steel, MD, PhD  
Dates: October 23-26, 1971  
Location: The Greenbrier  
White Sulphur Springs, West Virginia  
Attendance: 244 physicians / 141 spouses  
Guest Speaker: Mr. J.S. Batchelor, FRCS  
*London, England*

### **Third Annual Meeting**

President: Warner D. Bundens Jr., MD  
Dates: October 18-22, 1972  
Location: Cerromar Beach Hotel  
Dorado Beach, Puerto Rico  
Attendance: 280 physicians / 230 spouses  
Guest Speaker: Professor J.I.P. James, FRCS  
*Edinburgh, Scotland*

### **Fourth Annual Meeting**

President: R. Joe Burleson, MD  
Dates: October 18-21, 1973  
Location: The Greenbrier  
White Sulphur Springs, West Virginia  
Attendance: 270 physicians / 197 spouses  
Guest Speaker: Professor Joseph Trueta, FRCS  
*Barcelona, Spain*

### **Fifth Annual Meeting**

President: Joseph O. Romness, MD  
Dates: October 16-20, 1974  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 389 physicians / 298 spouses  
Guest Speaker: Professor Sir John Charnley, FRCS  
*Manchester, England*

### **Sixth Annual Meeting**

President: James D. Fisher, MD  
Dates: October 15-19, 1975

Location: Cerromar Beach Hotel  
Dorado Beach, Puerto Rico  
Attendance: 319 physicians / 283 spouses  
Guest Speaker: Professor Pier Giorgio Marchetti  
*Pisa, Italy*

### **Seventh Annual Meeting**

President: Marvin E. Steinberg, MD  
Dates: October 13-17, 1976  
Location: The Breakers  
Palm Beach, Florida  
Attendance: 345 physicians / 271 spouses  
Guest Speaker: Professor Alf L. Nachemson, MD  
*Gothenburg, Sweden*

### **Eighth Annual Meeting**

President: Leslie C. Meyer, MD  
Dates: October 12-16, 1977  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 456 physicians / 366 spouses  
Guest Speaker: Maurice E. Muller, MD  
*Berne, Switzerland*

### **Ninth Annual Meeting**

President: Robert N. Richards Sr., MD  
Dates: October 18-22, 1978  
Location: Acapulco Princess Hotel  
Acapulco, Mexico  
Attendance: 392 physicians / 350 spouses  
Guest Speaker: Ian Macnab, MB, FRCS  
*Toronto, Ontario, Canada*

### **Tenth Anniversary Meeting**

President: Hugo A. Keim, MD  
Dates: October 17-21, 1979  
Location: The Breakers  
Palm Beach, Florida  
Attendance: 395 physicians / 334 spouses  
Guest Speaker: Jack Stevens, MS  
*Newcastle Upon Tyne, England*

### **Eleventh Annual Meeting**

President: Wallace E. Miller, MD  
Dates: October 15-19, 1980  
Location: Cerromar Beach Hotel  
Dorado Beach, Puerto Rico  
Attendance: 354 physicians / 309 spouses

Guest Speaker: John C. Kennedy, MD, FRCS  
*London, Ontario, Canada*

### **Twelfth Annual Meeting**

President: James R. Urbaniak, MD  
Dates: October 14-18, 1981  
Location: The Boca Raton Hotel  
Boca Raton, Florida  
Attendance: 365 physicians / 299 spouses  
Guest Speaker: Professor Heinz Wagner, MD  
*Nurnberg, Germany*

### **Thirteenth Annual Meeting**

President: Stanley W. Lipinski, MD  
Dates: October 13-17, 1982  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 458 physicians / 437 spouses  
Guest Speaker: Michael A.R. Freeman, MD, FRCS  
*London, England*

### **Fourteenth Annual Meeting**

President: William T. Green Jr., MD  
Dates: October 12-16, 1983  
Location: The Breakers  
Palm Beach, Florida  
Attendance: 316 physicians / 246 spouses  
Guest Speaker: Eduardo R. Luque, MD  
*Mexico City, Mexico*

### **Fifteenth Annual Meeting**

President: Emmett M. Lunceford Jr., MD  
Dates: October 10-14, 1984  
Location: The Acapulco Princess Hotel  
Acapulco, Mexico  
Attendance: 288 physicians / 248 spouses  
Guest Speaker: Sir Dennis Paterson, MD, FRCS  
*North Adelaide, South Australia*

### **Sixteenth Annual Meeting**

President: John F. Mosher, MD  
Dates: October 16-20, 1985  
Location: The Boca Raton Hotel  
Boca Raton, Florida  
Attendance: 290 physicians / 203 spouses  
Guest Speaker: Thomas P. Ruedi, MD, FACS  
*Basel, Switzerland*

### **Seventeenth Annual Meeting**

President: B. David Grant, MD  
Dates: October 15-19, 1986  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 389 physicians / 353 spouses

Guest Speaker: Richard J. Hawkins, MD  
*London, Ontario, Canada*

### **Eighteenth Annual Meeting**

President: Harry R. Gossling, MD  
Dates: October 14-18, 1987  
Location: The Homestead Hotel  
Hot Springs, Virginia  
Attendance: 227 physicians / 221 spouses  
Guest Speaker: George Bentley, ChM, FRCS  
*Stanmore, England*

### **Nineteenth Annual Meeting**

President: Andrew G. Hudacek, MD  
Dates: October 12-16, 1988  
Location: The Cerromar Beach Hotel  
Dorado, Puerto Rico  
Attendance: 321 physicians / 264 spouses  
Guest Speaker: Marvin Tile, MD  
*Toronto, Ontario, Canada*

### **Twentieth Anniversary Meeting**

President: Lamar L. Fleming, MD  
Dates: October 11-15, 1989  
Location: The Queen Elizabeth Hotel  
Montreal, Quebec, Canada  
Attendance: 300 physicians / 239 spouses  
Guest Speakers: William C. Hutton, DSc  
*Atlanta, Georgia*  
Peter J. Fowler, MD  
*London, Ontario, Canada*

### **Twenty-first Annual Meeting**

President: Thomas S. Renshaw, MD  
Dates: October 17-21, 1990  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 356 physicians / 324 spouses  
Guest Speaker: Mercer Rang, MB, FRCS(c)  
*Toronto, Ontario, Canada*

### **Twenty-second Annual Meeting**

President: Edward E. Kimbrough III, MD  
Dates: October 16-21, 1991  
Location: Melia Castilla Hotel  
Madrid, Spain  
Attendance: 300 physicians / 239 spouses  
Guest Speakers: Augusto Sarmiento, MD  
*Los Angeles, California*  
Mr. R. Lew Bennett

### **Twenty-third Annual Meeting**

President: George P. Bogumill, MD, PhD  
Dates: October 14-18, 1992

Location: Hyatt Regency Cerromar Beach Hotel  
Dorado, Puerto Rico  
Attendance: 429 physicians / 285 spouses  
Guest Speaker: Murray K. Dalinka, MD  
*Philadelphia, Pennsylvania*

#### **Twenty-fourth Annual Meeting**

President: Glen A. Barden, MD  
Dates: October 13-17, 1993  
Location: Disney's Grand Floridian Beach Resort  
Lake Buena Vista, Florida  
Attendance: 379 physicians / 299 spouses  
Guest Speaker: Cecil H. Rorabeck, MD  
*London, Ontario, Canada*

#### **Twenty-fifth Annual Meeting**

President: Henry R. Cowell, MD, PhD  
Dates: October 12-16, 1994  
Location: The Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 339 physicians / 280 spouses  
Guest Speakers: Mr. John W. Goodfellow  
*London, England*  
Robert B. Salter, MD  
*Toronto, Ontario, Canada*

#### **Twenty-sixth Annual Meeting**

President: Ronald C. Hillegass, MD  
Dates: October 11-15, 1995  
Location: Sheraton Roma Hotel  
Rome, Italy  
Attendance: 430 physicians / 259 spouses  
Guest Speaker: Robert D. D'Ambrosia, MD  
*New Orleans, Louisiana*

#### **Twenty-seventh Annual Meeting**

President: Stephen F. Gunther, MD  
Dates: October 16-20, 1996  
Location: Hyatt Regency Hilton Head  
Hilton Head Island, South Carolina  
Attendance: 239 physicians / 164 spouses  
Guest Speakers: George Cierny III, MD  
*Atlanta, Georgia*  
Michael J. Patzakis, MD  
*Los Angeles, California*

#### **Twenty-eighth Annual Meeting**

President: L. Andrew Koman, MD  
Dates: October 14-19, 1997  
Location: Scottsdale Princess  
Scottsdale, Arizona  
Attendance: 219 physicians / 164 spouses  
Guest Speaker: Russell F. Warren, MD  
*New York, New York*

#### **Twenty-ninth Annual Meeting**

President: Chitranjan S. Ranawat, MD  
Dates: October 14-18, 1998  
Location: Ritz Carlton Hotel  
Isla Verde, Puerto Rico  
Attendance: 268 physicians / 142 spouses  
Guest Speakers: Lawrence D. Dorr, MD  
*Los Angeles, California*  
Bernard F. Morrey, MD  
*Rochester, Minnesota*

#### **Thirtieth Anniversary Meeting**

President: Charles H. Classen Jr., MD  
Dates: October 13-17, 1999  
Location: Vienna Hilton Hotel  
Vienna, Austria  
Attendance: 272 physicians / 207 spouses  
Guest Speaker: Henry H. Bohlman, MD  
*Cleveland, Ohio*

#### **Thirty-first Annual Meeting**

President: A. Lee Osterman, MD  
Dates: October 11-15, 2000  
Location: Disney's Grand Floridian Resort and Spa  
Lake Buena Vista, Florida  
Attendance: 179 physicians / 89 spouses  
Guest Speakers: James D. Heckman, MD  
*Needham, Massachusetts*  
Peter J. Stern, MD  
*Cincinnati, Ohio*

#### **Thirty-second Annual Meeting**

President: James A. Nunley II, MD  
Dates: October 10-14, 2001  
Location: Fairmont Southampton Princess Hotel  
Southampton, Bermuda  
Attendance: 153 physicians / 110 spouses  
Guest Speakers: Leroy Walker, PhD  
*Durham, North Carolina*  
Michael B. Wood, MD  
*Rochester, Minnesota*

#### **Thirty-third Annual Meeting**

President: E. Anthony Rankin, MD  
Dates: October 16-20, 2002  
Location: Ritz Carlton Hotel  
Amelia Island, Florida  
Attendance: 230 physicians / 89 spouses  
Guest Speakers: Professor David C. Driskell  
*Baltimore, Maryland*  
Alvin H. Crawford, MD  
*Cincinnati, Ohio*

### **Thirty-fourth Annual Meeting**

President: Shepard R. Hurwitz, MD  
Dates: July 30-August 3, 2003  
Location: The Burlington Hotel  
Dublin, Ireland  
Attendance: 231 physicians / 142 spouses  
(In conjunction with SOA)  
Guest Speakers: Melvin Rosenwasser, MD  
*New York, New York*  
Pete Gillen  
*Charlottesville, Virginia*

### **Thirty-fifth Annual Meeting**

President: John D. Lubahn, MD  
Dates: October 13-17, 2004  
Location: The Westin Rio Mar Beach  
San Juan, Puerto Rico  
Attendance: 191 physicians / 152 spouses  
Guest Speaker: Terry Light, MD  
*Chicago, Illinois*

### **Thirty-sixth Annual Meeting**

President: Thomas P. Vail, MD  
Dates: October 5-8, 2005  
Location: Hyatt Regency Chesapeake Bay  
Cambridge, Maryland  
Attendance: 198 physicians / 86 spouses  
Guest Speaker: Ian D. Learmonth, MB, ChB, FRCS  
*Bristol, England*

### **Thirty-seventh Annual Meeting**

President: J. Richard Bowen, MD  
Dates: October 18-21, 2006  
Location: Boca Raton Resort and Club  
Boca Raton, Florida  
Attendance: 232 physicians / 63 spouses  
Guest Speaker: G. Dean MacEwen, MD  
*Newark, DE*

### **Thirty-eighth Annual Meeting**

President: Scott D. Boden, MD  
Dates: August 1-4, 2007  
Location: The Fairmont Empress Hotel  
Victoria, BC, Canada  
Attendance: 252 physicians / 103 spouses  
(In conjunction with SOA)  
Guest Speaker: Frederick S. Kaplan, MD  
*Pittsburgh, Pennsylvania*

### **Thirty-ninth Annual Meeting**

President: Robert V. Dawe, MD  
Dates: October 22-25, 2008

Location: The Ritz-Carlton  
Lake Las Vegas, Nevada  
Attendance: 160 physicians/55 spouses  
Guest Speaker: Chitranjan S. Ranawat, MD  
*New York, New York*

### **Fortieth Annual Meeting**

President: Judith F. Baumhauer, MD, MPH  
Dates: June 17-20, 2009  
Location: Atlantis Resort  
Paradise Island, Bahamas  
Attendance: 287 physicians / 121 spouses  
Guest Speaker: James N. Weinstein, MS, DO  
*Hanover, New Hampshire*

### **Forty-first Annual Meeting**

President: Robert N. Richards Jr., MD  
Dates: October 14-16, 2010  
Location: The Ritz-Carlton  
Naples, Florida  
Attendance: 300 physicians / 98 spouses  
Guest Speaker: Richard D. Lakshman, MD  
*Philadelphia, Pennsylvania*

### **Forty-second Annual Meeting**

President: John C. Richmond, MD  
Dates: October 19-22, 2011  
Location: The Kingsmill  
Williamsburg, Virginia  
Attendance: 312 physicians / 81 spouses  
Guest Speaker: Brian Day, MD  
*Vancouver, British Columbia, Canada*

### **Forty-third Annual Meeting**

President: Henry A. Backe Jr., MD  
Dates: June 20-23, 2012  
Location: The Sagamore  
Bolton Landing, New York  
Attendance: 293 physicians/83 spouses  
Guest Speaker: Derek McMinn  
*Birmingham, United Kingdom*

### **Forty-fourth Annual Meeting**

President: David S. Zelouf, MD  
Dates: October 30-November 2, 2013  
Location: Loews Miami Beach  
Miami Beach, Florida  
Attendance: 369 physicians/80 spouses  
Guest Speaker: Joseph D. Zuckerman, MD  
*New York, NY*



## Eastern Orthopaedic Association

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### Scientific Program

October 23-25, 2014

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The Ritz-Carlton  
Amelia Island, Florida

*Please be considerate and silence your cell phone during the Scientific Program.*



## 2014 Program Chair



**Amar S. Ranawat, MD**  
**New York, New York**

Dr. Amar S. Ranawat was born in New York City. After graduating from Cornell University Medical College, he completed his orthopaedic residency at the Hospital for Special Surgery. In 2002 he completed his fellowship training in Adult Reconstruction under the direction of his father, Dr. Chitranjan S. Ranawat. He is currently an Associate Professor of Orthopaedic Surgery at the Hospital for Special Surgery and a member of The Hip and Knee Societies. A large portion of his practice is dedicated to complex primary and revision total joint surgery. He is an active Clinical Orthopaedic Researcher with particular interests in alternative bearing surfaces for total hip replacement and rotating-platform total knee designs. He lectures extensively at both the national and international levels. He has over 100 peer-reviewed publications, book chapters, and presentations.

He has received numerous awards including: The 2013 Teaching Award given to the HSS Attending who is recognized for Outstanding Teaching on the Adult Reconstruction and Total Joint Service. The 2011 Mentorship Award given to the LHH Orthopaedic Attending who demonstrates an outstanding ability to guide, support and teach the Residents. The 2008 HAP Paul Award for the “best paper on new developments in the field of arthroplasty” awarded for *MRI in the Early Detection of Particle Disease Following Total Hip Arthroplasty: A Prospective Study* at the 2008 International Society for Technology in Arthroplasty, Seoul, South Korea. The 2007 Chief Resident’s Special Award given in recognition of excellent teaching in the LHH Orthopaedic Clinic. The Navy and Marine Corps Achievement Medal awarded in 2007 for performing emergency limb saving surgery on a Marine during exercises in Tan Tan, Morocco. The 2006 Hip Society British Traveling Fellowship awarded to two young surgeons allowing travel to selected hip centers in the United Kingdom for a period of 3 weeks in September 2006. The 2004 James A. Rand Award for the most outstanding paper in knee surgery presented at the Annual Meeting of the American Association of Hip and Knee Surgeons, November 2004.

He is married to Andrea. They live in NYC with their 3 sons: Cole (11), Conor (9), and Caden (5).

## ***EOA Honorary Members***

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Theodore R. Lammot III, MD	Incorporator
Mr. John Wells Sharrard, FRCS	Guest Speaker 1970
Professor J. I. P. James, FRCS	Guest Speaker 1972
Professor Pier Giorgio Marchetti	Guest Speaker 1975
Professor Alf L. Nachemson, MD	Guest Speaker 1976
Maurice E. Muller, MD	Guest Speaker 1977
Professor Heinz Wagner	Guest Speaker 1981
Mr. Michael A. R. Freeman, MD, FRCS	Guest Speaker 1982
Eduardo R. Luque, MD	Guest Speaker 1983
Sir Dennis Paterson, MD, FRCS	Guest Speaker 1984
Thomas P. Ruedi, MD, FACS	Guest Speaker 1985
Richard J. Hawkins, MD	Guest Speaker 1986
Mr. George Bentley, ChM, FRCS	Guest Speaker 1987
Marvin Tile, MD	Guest Speaker 1988
William C. Hutton, DSc	Guest Speaker 1989
Peter J. Fowler, MD	Guest Speaker 1989
Mercer Rang, MB, FRCS (C)	Guest Speaker 1990
Augusto Sarmiento, MD	Guest Speaker 1991
Mr. R. Lew Bennett	Guest Speaker 1991
Murray K. Dalinka, MD	Guest Speaker 1992
Cecil H. Rorabeck, MD	Guest Speaker 1993
Mr. John W. Goodfellow	Guest Speaker 1994
Robert B. Salter, MD	Guest Speaker 1994
Robert D. D'Ambrosia, MD	Guest Speaker 1995
Michael J. Patzakis, MD	Guest Speaker 1996
George Cierny III, MD	Guest Speaker 1996
Elizabeth Capella	Former Executive Director
Russell F. Warren, MD	Guest Speaker 1997
Lawrence D. Dorr, MD	Guest Speaker 1998
Bernard F. Morrey, MD	Guest Speaker 1998
Henry H. Bohlman, MD	Guest Speaker 1999
James D. Heckman, MD	Guest Speaker 2000
Peter J. Stern, MD	Guest Speaker 2000
Leroy Walker, PhD	Guest Speaker 2001
Michael B. Wood, MD	Guest Speaker 2001
Professor David C. Driskell	Guest Speaker 2002
Alvin H. Crawford, MD	Guest Speaker 2002
Melvin Rosenwasser, MD	Guest Speaker 2003
Pete Gillen	Guest Speaker 2003
Terry Light, MD	Guest Speaker 2004
Ian D. Learmonth, MB, ChB, FRCS	Guest Speaker 2005
G. Dean MacEwen, MD	Guest Speaker 2006
Fredrick S. Kaplan, MD	Guest Speaker 2007
Chitranjan S. Ranawat, MD	Guest Speaker 2008
James N. Weinstein, MS, DO	Guest Speaker 2009
Richard D. Lackman, MD	Guest Speaker 2010
Brian Day, MD	Guest Speaker 2011
Derek McMinn	Guest Speaker 2012
Joseph D. Zuckerman, MD	Guest Speaker 2013

## 2014 Presidential Guest Speaker



**Mary I. O'Connor, MD**

EOA is pleased to have Mary I. O'Connor, MD, Professor of Orthopedics at the Mayo Clinic College of Medicine in Florida as the 2014 Presidential Guest Speaker. Dr. O'Connor served as Chair of the Department of Orthopedic Surgery at Mayo Clinic in Florida from 2005 to 2013, 8 year tenure per Mayo policy. She continues to serve as the Medical Director for the Mayo Foundation Office of Integrity and Compliance and Associate Director of Development at Mayo Clinic Florida.

Dr. O'Connor received her MD from the Medical College of Pennsylvania in 1985. She completed her residency in orthopedics at the Mayo Clinic in Rochester, MN in 1990 and her fellowship in orthopedic oncology at the same institution in 1991. She is the past Associate Dean for Surgery Education and is the current Program Director of the Adult Reconstructive Fellowship at Mayo Clinic Florida. She has published extensively on oncology and arthroplasty related topics. Particular areas of focus include research on limb salvage in the management of sarcomas involving the pelvic and shoulder girdles and gender differences in outcomes related to joint replacement surgery. She is engaged in research to study sex differences in knee osteoarthritis and use of stem cells to treat early osteoarthritis.

Dr. O'Connor was the first woman to be elected into the Musculoskeletal Tumor Society (MSTS), the American Association of Hip and Knee Surgeons (AAHKS) and The Knee Society. She is the Past President of the International Society of Limb Salvage, Association of Bone and Joint Surgeons, AAHKS, MSTS, and the Ruth Jackson Orthopaedic Society. She is a member of the Board of the Perry Foundation, past member of the Advisory Committee on Research on Women's Health at the National Institutes of Health and past Chair of the American Academy of Orthopaedic Surgeons Women's Health Issues Advisory Board. She has served as the Co-Chair of the Movement is Life Caucus since its founding in 2010, a group focused on addressing musculoskeletal healthcare disparities in the United States.

Dr. O'Connor has received numerous awards and honors during her training and career, including being named a Distinguished Clinician at Mayo Clinic and receiving The Corinne Farrell Award from the International Skeletal Society in 2009. She received the Congressional Medal of Honor as a 1980 Olympian and was named a Health Care Hero by the *Jacksonville Business Journal* in 2011. She is honored to be the 2014 Eastern Orthopaedic Association Presidential Guest Speaker at the invitation of her friend, President David Romness.

## ***2014 EOA Resident/Fellow Award Recipients***

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### **Founders' Award**

C. Edward Hoffler II, MD, PhD

*Fluoroscopic Radiation Exposure: Are We Protecting Ourselves Adequately?*

Saturday, October 25, 2014; 1:06pm–1:12pm

### **Ranawat Award**

Alexander S. McLawhorn, MD, MBA

*Cost Effectiveness Of Bariatric Surgery Prior To Primary Total Knee Arthroplasty*

Saturday, October 25, 2014; 7:48am–7:54am

### **Resident Award**

Ryan Massimilla, BS

*Prospective, Randomized Study: Superior Early Outcomes Following THA Using Direct Anterior Approach*

Saturday, October 25, 2014; 11:04am–11:10am

Michael Pensak, MD

*Combination Therapy With DBM And PTH Can Not Heal A Critical Sized Murine Femoral Defect*

Saturday, October 25, 2014; 7:40am–7:46am

Christopher J. Williamson, MD

*Statins Adversely Affect Long Bones Of Corticosteroid Treated Rabbits*

Thursday, October 23, 2014; 12:58pm–1:04pm

### **EOA/OREF Resident Travel Grant Award**

Victor H. Hernandez, MD, MS

*When Is It Safe For Patients To Drive After Right Total Hip Arthroplasty?*

Saturday, October 25, 2014; 11:12am–11:18am

Adam E. Hyatt, MD

*Suture Anchor Behavior In The Setting Of Rotator Cuff Footprint Decortication*

Thursday, October 23, 2014; 7:21am–7:27am

Jonathan Oren, MD

*Implant Cost Reduction Initiative In Spine Surgery*

Friday, October 24, 2014; 7:40am–7:46am

### **Resident Travel Grant Award**

Jeffrey Alwine, DO

*Accessory Medial Portal For ACL Reconstruction: Safe Zone To Avoid Complications*

Thursday, October 23, 2014; 7:37am–7:43am

Alexander B. Christ, MD

*Targeting Skeletal Metastases Using HPMA Copolymer Nanoparticle Delivery And Retention*

Saturday, October 25, 2014; 1:22pm–1:28pm

Ian Hutchinson, MD

*Decreased T2 Relaxation In Articular Cartilage Following Modelled Therapeutic Irradiation At Long-Term Follow-Up*

Thursday, October 23, 2014; 1:06pm–1:12pm

Hemil H. Maniar, MD

*Head CT Scans With Low Energy Isolated Geriatric Femur Fractures*

Friday, October 24, 2014; 1:02pm–1:08pm

Eric M. Padegimas, MD

*What Factors Affect Medicare Reimbursement In Total Joint Arthroplasty?*

Saturday, October 25, 2014; 7:32am–7:38am

Joseph J. Schreiber, MD

*Conservative Management Of Elbow Dislocations With An Overhead Motion Protocol*

Saturday, October 25, 2014; 1:14pm–1:20pm

Jessica Viola, BS

*Preoperative Anemia Increases Postoperative Complications And Mortality Following Total Joint Arthroplasty*

Thursday, October 23, 2014; 1:30am–1:36pm

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David S. Wellman, MD (n.)	Akos Zahar, MD (2. Link Orthopaedics; 3b. Link Orthopaedics)
Samuel Wellman, MD (5. Stryker, Zimmer, Biomet, DePuy; 8. Journal of Arthroplasty)	David S. Zelouf, MD (8. Journal of Hand Surgery – American; 9. EOA)
Geoffrey H. Westrich, MD (2. Stryker Orthopedics, Exactech, DJO Global; 3b. Stryker Orthopedics, Exactech, DJO Global; 5. Stryker Orthopedics, Exactech, DJO Global; 9. Knee Society, EOA)	Adam C. Zoga, MD (n.)
Kenneth T. Wheeler, PhD (n.)	Benjamin Zmistowski, MD (n.)
Kris Wheeler, MD (n.)	Joseph D. Zuckerman, MD (1. Exactech, Inc.; 4. AposTherapy, Inc.; 6. Orthonet; 7. SLACK, Inc., Thieme, Inc., Wolters Kluwer Health - Lippincott Williams & Wilkins; 9. AOA, Musculoskeletal Transplant Foundation)
Peter White, BA (n.)	Hendrik A. Zuiderbaan, MD (n.)
James C. Widmaier Jr., MD (n.)	Steven D. Zumbrun, PhD (n.)
Garrison P. Wier, BS (n.)	Thomas Zumbrunn, MS (n.)
C. Luke Wilcox, DO (n.)	
Jeffrey L. Wild, MD (n.)	
Richard M. Wilk, MD (4. Johnson & Johnson)	

**Disclosures in bold indicate members of the EOA Program Committee and/or contributing staff.**

## Accreditation Information for the Scientific Program

### PROGRAM COMMITTEE

The Eastern Orthopaedic Association gratefully acknowledges these orthopaedic surgeons for their contribution to the development of the Scientific Program:

Amar S. Ranawat, MD, *Chair*

Michael P. Bolognesi, MD

N. George Kasparyan, MD, PhD

Mark J. Lemos, MD

Javad Parvizi, MD, FRCS

Adam J. Rana, MD

Mark J. Romness, MD

### MISSION

The Eastern Orthopaedic Association (EOA) was established in 1970 under the leadership of Howard H. Steel, MD and 12 prominent orthopaedic surgeons. Its purpose is to promote, encourage, foster, and advance the highest quality and most cost effective practice of orthopaedic surgery and matters related thereto by providing an educational format for the free discussion and teaching of orthopaedic methods and principles among orthopaedic surgeons, both member and non-member; and to establish a forum for practicing orthopaedic surgeons to update their knowledge and awareness of new techniques, treatment methods, and devices available for patient care, teaching, and research by using the most appropriate educational methods.

### PURPOSE

1. To provide the participants with an objective, unbiased educational experience that will enable them to remain current in both the knowledge and practical elements of contemporary orthopaedic surgery;
2. To provide the participants with a detailed, in depth education of selected topics relative to the practice of orthopedic surgery;
3. Allow participants to assess potential deficiencies in their knowledge base as it pertains to the practice of orthopedic surgery; and
4. Present ample opportunities for participants to exchange ideas with the presenters, the faculty and other enrollees through paper presentations, instruc-

tional courses, guest lectureships, symposia, multimedia educational sessions and poster sessions.

### OBJECTIVES

Educational objectives will be met through a combination of paper presentations, lectures and workshops in plenary, concurrent and specialty sessions with ample time afforded for open discussion. The following objectives will be addressed during the Scientific Program, such that at the conclusion of this course the attendees will be expected to:

1. Improve their diagnostic, treatment and technical skills in the management of orthopaedic afflictions by assimilation of scientific advances;
2. Discuss basic science paradigms as they relate to treatment advances;
3. Understand some of the basic principals in practice management; and
4. Critically assess emerging trends in orthopedic medicine and evaluate their evidence basis.

### SCIENTIFIC POSTER PRESENTATIONS

Scientific Posters are an important feature of the EOA Annual Meeting. Posters will be on display along with their presenters each day of the Scientific Program. Poster Presenters will also be available to answer questions before and after the Scientific Program.

### MULTIMEDIA EDUCATION

Multimedia education materials will be offered daily after the Scientific Program at the designated times. A comprehensive selection of AAOS DVDs will be available for your individual education.

### CME ACCREDITATION

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 Eastern Orthopaedic Association. 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 for a maximum of 26.5 **AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- \* 17.5 CME credits for Scientific Program
- \* 6 CME credits for Poster Sessions
- \* 3 CME credits for Multimedia Education Sessions

**To ensure correct CME credit is awarded, please complete the form in the back of this program, indicating the Sessions you attended or go online to [www.eoa-assn.org](http://www.eoa-assn.org) to complete the EOA 2014 Annual Meeting CME Credit Records. CME Certificates will be awarded to all registered participants.**

## CEC CREDIT

Physician's Assistants can receive up to 26.5 credit hours toward Continuing Education Credits. AAPA accepts American Medical Association Category I, Level 1 CME credit for the Physician's Recognition Award from organizations accredited by the ACCME.

## CME NOTE

To receive CME credit, you are required to turn in your completed CME Record Form at the end of your participation in the Sessions or go online to [www.eoa-assn.org](http://www.eoa-assn.org) to complete the EOA 2014 Annual Meeting CME Credit Records; otherwise, your CME credits cannot be certified. (**CME Credit Record, Needs Assessment and Course Evaluation Forms can be found in the back of this program.**)

Attendees are requested to complete a course evaluation for use in developing future EOA Annual Meeting Scientific Programs and to meet the unique educational requirements of orthopaedic surgeons.

Program design is based on participants' responses from the last annual meeting and expressed educational goals of the EOA. This program is designed specifically for the educational needs of the practicing orthopaedist. Others in the medical profession (such as physician assistants) or with an interest in orthopaedics will benefit from the program.

## DISCLAIMER

The material presented at the Eastern Orthopaedic Association Annual Meeting has been made available by the EOA for educational purposes only. This material is not intended to represent the only, nor necessarily best, method or procedure appropriate for the medical situations discussed, but rather is intended to present an approach, view, statement, or opinion of the faculty, which may be helpful to others who face similar situations.

The EOA disclaims any and all liability for injury or other damages resulting to any individuals attending a session for all claims, which may arise out of the use of the techniques demonstrated therein by such individuals, whether these claims shall be asserted by a physician or any other person.

No reproductions or recordings of any kind, may be made of the presentation at the EOA Annual Meeting. The EOA reserves all of its rights to such material, and commercial reproduction is specifically prohibited.

## FDA STATEMENT

Some pharmaceuticals or medical devices demonstrated at the EOA Annual Meeting have not been cleared by the FDA or have been cleared by the FDA for specific purposes only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of the pharmaceuticals or medical devices he or she wishes to use in clinical practice.

Academy policy provides that "off label" uses of a pharmaceutical or medical device may be described in the Academy's CME activities so long as the "off label" use of the pharmaceutical or medical device is also specifically disclosed (*i.e.*, it must be disclosed that the FDA has not cleared the pharmaceutical or medical device for the described purpose). Any pharmaceutical or medical device is being used "off label" if the described use is not set forth on the product's approval label.

# 2014 Scientific Program

## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

6:00am–7:00am	<b>Scientific Poster Session</b> (Poster Presenters Available) ( <i>Ritz-Carlton Ballroom Foyer</i> )	7:27am–7:29am	Discussion
7:00am–7:05am	<b>Welcome to EOA's 45<sup>th</sup> Annual Meeting</b> <i>David W. Romness, MD, President Amar S. Ranawat, MD, Program Chair</i>	7:29am–7:35am 7:35am–7:37am 7:37am–7:43am	Safety Of The Trans-Pec (East) Portal: An Anatomic Study <i>Albert S. Dunn, DO, Orthopaedic Foundation, Stamford, CT</i>  Discussion
7:05am–7:11am	Microfracture Versus Osteochondral Autologous Transplantation For High-Grade Osteochondral Lesions Of The Talus: A Prospective Comparative Analysis <i>Sameh A. Labib, MD, Emory University, Atlanta, GA</i>	7:43am–7:45am	Discussion
7:11am–7:13am	Discussion		
7:13am–7:19am	On-Field Performance Of NFL Players Following Return From Concussion <i>Neil Kumar, MD, Hahnemann University Hospital, Drexel University College of Medicine, Philadelphia, PA</i>	7:45am–7:55am	What Is New In Foot And Ankle Arthroscopy: Old Problems, New Solutions <i>Sameh A. Labib, MD, Emory University, Atlanta, GA</i>
7:19am–7:21am	Discussion	7:55am–8:05am	Orthobiologics for Foot and Ankle Surgery <i>Samuel B. Adams Jr, MD, Duke University Medical Center, Durham, NC</i>
7:21am–7:27am	<b>EOA/OREF Resident/Fellow Travel Grant Award</b> Suture Anchor Behavior In The Setting Of Rotator Cuff Footprint Decortication <i>Adam E. Hyatt, MD, Robert Wood Johnson University Hospital, New Brunswick, NJ</i>	8:05am–8:15am 8:15am–8:25am 8:25am–8:40am	Total Ankle Replacement <i>Brian S. Winters, MD, The Rothman Institute, Philadelphia, PA</i>  Discussion
<b>First Business Meeting</b>			

\* Institution by abstract presenter's name is the location where the research took place.

## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

8:40am–9:00am	Break — Please visit Exhibitors	9:57am–10:01am	Surgical Treatment Of Symptomatic SLAP Tears In The Middle-Aged Patient <i>John Erickson, MD, Rutgers University Robert Wood Johnson Medical School, New Brunswick, NJ</i>
<b>Symposium 2 — What's New in ACL Reconstruction Surgery</b>			
<b>Moderator:</b> John C. Richmond, MD			
9:00am–9:10am	Back to BPTB <i>Kevin D. Plancher, MD, Orthopaedic Foundation for Active Lifestyles, Cos Cob, CT</i>	10:01am–10:03am	Discussion
9:10am–9:20am	Primary Repair <i>Gregory S. DiFelice, MD, Hospital for Special Surgery, New York, NY</i>	10:03am–10:07am	Analysis Of Anchor Placement For Bankart Repair: Trans-Subscapularis Versus Inferior Rotator Interval Portal <i>Ehsan Jazini, MD, University of Maryland Medical Center, Baltimore, MD</i> *Presented by Brian Shiu, MD
9:20am–9:30am	Holistic ACL Reconstruction <i>John D. Kelly IV, MD, University of Pennsylvania, Philadelphia, PA</i>	10:07am–10:09am	Discussion
9:30am–9:40am	Discussion	10:09am–10:13am	Platelet-Rich Plasma Can Successfully Treat Elbow Ulnar Collateral Ligament Insufficiency in High-Level Throwers <i>Phillip N. Williams, MD, Hospital for Special Surgery, New York, NY</i>
9:40am–9:45am	Go to Stations	10:13am–10:15am	Discussion

### Rapid Fire Session 2A — Sports Medicine (Station A, Plaza Ballroom 1)

**Moderator:** Anil S. Ranawat, MD

9:45am–9:49am	Pediatric Shoulder Dislocation Resulting In Rotator Cuff Tear And Osteonecrosis <i>Matthew A. Tao, MD, Duke University Medical Center Durham, NC</i>
9:49am–9:51am	Discussion
9:51am–9:55am	Antegrade Versus Retrograde Bone Marrow Stimulation Techniques As A First Line Treatment Of Symptomatic Osteochondral Lesions Of The Talus (OLT) <i>Sameh A. Labib, MD, Emory University, Atlanta, GA</i>
9:55am–9:57am	Discussion

### Rapid Fire Session 2B — Total Knee (Station B, Plaza Ballroom 1)

**Moderator:** Amar S. Ranawat, MD

9:45am–9:49am	Total Knee Arthroplasty In Patients With Hardware In Situ: How These Patients Do In Short-Term? <i>Camilo Restrepo, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
9:49am–9:50am	Discussion
9:50am–9:54am	Pragmatic Approach To Decreasing Blood Loss In Total Knee Arthroplasty <i>David J. Mayman, MD, Hospital for Special Surgery, New York, NY</i> *Presented by Kaitlin M. Carroll, BS

\* Institution by abstract presenter's name is the location where the research took place.

## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

9:54am–9:55am	Discussion		<i>James Slover, MD, MS, NYU Hospital for Joint Diseases, New York, NY</i>
9:55am–9:59am	Previous Periprosthetic Joint Infection Predicts Infection After New Primary Arthroplasty <i>Jorge Manrique, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	9:49am–9:51am	Discussion
		9:51am–9:55am	MIS Posteriorlateral Total Hip Arthroplasty: Do We Need 6 Weeks Of Hip Precautions? <i>Brett Frykberg, MD, Hospital for Special Surgery, New York, NY</i>
9:59am–10:00am	Discussion		
10:00am–10:04am	Reasons For Revision Of Single Radius And Multi-Radius Total Knee Designs <i>Danielle Campbell, MS, Mahwah, NJ</i> *Presented by Eric L. Smith, MD	9:55am–9:57am	Discussion
		9:57am–10:01am	The Reliability of Modern Alumina Bearings in Total Hip Arthroplasty <i>Gwo-Chin Lee, MD, University of Pennsylvania Medical Center, Philadelphia, PA</i>
10:04am–10:05am	Discussion		
10:05am–10:09am	Postoperative Fever After Total Joint Arthroplasty: Use Of A Simple Medical Workup To Avoid Delayed Discharge <i>Patrick W. Kane, MD, The Rothman Institute, Philadelphia, PA/Egg Harbor Township, NJ</i>	10:01am–10:03am	Discussion
		10:03am–10:07am	Sexual Activity In Patients Undergoing Primary Total Hip Arthroplasty <i>Carlos J. Lavernia, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>
10:09am–10:10am	Discussion		
10:10am–10:14am	Technological Advances: The Learning Curve Effect <i>David A. Iacobelli, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i> *Presented by Jesus M. Villa, MD	10:07am–10:09am	Discussion
		10:09am–10:13am	Direct Anterior THA Requires Fewer Acetabular Screws Than Posterior THA <i>Eric L. Smith, MD, Tufts Medical Center, Boston, MA</i>
10:14am–10:15am	Discussion	10:13am–10:15am	Discussion

### Rapid Fire Session 2C — Total Hip (Station C, Ritz-Carlton Ballroom Foyer)

**Moderator:** **Javad Parvizi, MD, FRCS**

9:45am–9:49am	Cost-Analysis Of The Use Of Tranexamic Acid To Prevent Major Bleeding Complications In Hip And Knee Arthroplasty Surgery
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### Rapid Fire Session 2D — Spine (Station D, Ritz-Carlton Ballroom Foyer)

**Moderator:** **Bradford L. Currier, MD**

9:45am–9:49am	Biomechanical Stability Of The Stalif-C Stand-Alone Spacer In Multi-Level And Hybrid Cervical Fusion Constructs
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## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

	<i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> *Presented by Peter Formby, MD	<b>Rapid Fire Session 2E — Health Policy (Station E, Ritz-Carlton Ballroom Foyer)</b>
9:49am–9:51am	Discussion	9:45am–9:49am      The Role Of Marketing And Public Relations <i>Daniel Goldberg, NA, Gold Medical Marketing, Parsippany, NJ</i>
9:51am–9:55am	Finite Element Modeling Accurately Predicts Biomechanics Of Human Lumbosacral Spine <i>Scott C. Wagner, MD, Walter Reed National Military Medical Center, Bethesda, MD</i>	9:49am–9:52am      Discussion
9:55am–9:57am	Discussion	9:52am–9:56am      The Prevalence Of Obesity, Hypertension And Diabetes In Student Athletes Age 10-17 <i>Eric C. Stiefel, MD, Mississippi Sports Medicine and Orthopaedic Center, Valdosta, GA</i>
9:57am–10:01am	An 8 Year Trend Analysis Of The Off-Label Use Of BMP In Pediatric Deformity Spine Surgery <i>Paul D. Kiely, MCh, FRCS (Tr &amp; Orth), Hospital for Special Surgery, New York, NY</i>	9:56am–10:00am      Discussion
10:01am–10:03am	Discussion	10:00am–10:04am      What Drives Inpatient Charges For Total Joint Arthroplasty? <i>Benjamin Zmistowski, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i> *Presented by Eric M. Padegimas, MD
10:03am–10:07am	Does Antibiotic-Loaded Bone Graft Used In Scoliosis Surgery Lead To Superbugs? <i>Sujal Patel, MD, Nemours/Alfred I. duPont Hospital for Children, Wilmington, DE</i>	10:04am–10:07am      Discussion
10:07am–10:09am	Discussion	10:07am–10:11am      Transforming Resident Education — A New Horizon for Orthopaedic Skills Training <i>Matthew A. Tao, MD, Duke University Medical Center, Durham, NC</i>
10:09am–10:13am	Pedicle Screw Re-Insertion Using Previous Pilot Hole And Trajectory Does Not Reduce Fixation Strength <i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> *Presented by Scott C. Wagner, MD	10:11am–10:15am      Discussion
10:13am–10:15am	Discussion	10:15am–10:35am      Break — Please visit Exhibitors

\* Institution by abstract presenter's name is the location where the research took place.

## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.  
Ritz-Carlton Ballroom Salon I, unless otherwise specified

### General Session 3 — Presidential Address and Howard Steel Lecture

Moderator: **Mark J. Lemos, MD**

10:35am–10:40am	<b>Introduction of Presidential Address</b> <i>Mark J. Lemos, MD, Lahey Clinic, Peabody, MA</i>	12:58pm–1:04pm	<b>Resident/Fellow Award</b> Statins Adversely Affect Long Bones Of Corticosteroid Treated Rabbits <i>Christopher J. Williamson, MD, Einstein Medical Center, Philadelphia, PA</i>
10:40am–11:05am	<b>Presidential Address</b> Orthopaedic Legacy <i>David W. Romness, MD, Commonwealth Orthopaedics, Arlington, VA</i>	1:04pm–1:06 pm	Discussion
11:05am–11:10am	<b>Introduction of Howard Steel Lecturer</b> <i>David W. Romness, MD, Commonwealth Orthopaedics, Arlington, VA</i>	1:06pm–1:12pm	<b>Resident/Fellow Travel Grant Award</b> Decreased T2 Relaxation In Articular Cartilage Following Modelled Therapeutic Irradiation At Long-Term Follow-Up <i>Ian Hutchinson, MD, Wake Forest School of Medicine, Winston-Salem, NC</i>
11:10am–11:50am	<b>Howard Steel Lecturer</b> Onward! <i>Remy Munasifi, Arlington, VA</i>	1:12pm–1:14pm	Discussion
11:50am–12:50pm	<b>EOA Luncheon — Industry Presentations by Convatec and Mallinckrodt Pharmaceuticals – Hospital Division (Ritz-Carlton Ballroom Salon I)</b> <i>*Not for CME</i>	1:14pm–1:20pm	Risk Factors For Periprosthetic Infection Following TKA In Young Patients <i>Taylor R. McClellan, BS, Duke University Medical Center, Durham, NC</i> <i>*Presented by Michael P. Bolognesi, MD</i>
		1:20pm–1:22pm	Discussion
		1:22pm–1:28pm	Intraoperative Proximal Femoral Fracture In Primary Cementless Total Hip Arthroplasty <i>Ali Sina Shahi, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>

### General Session 4 — Basic Science & Total Hip

Moderators: **Geoffrey H. Westrich, MD**  
**Scott D. Boden, MD**

12:50pm–12:56pm	The Effect Of Platelet Rich Plasma And Hyaluronic Acid On Autologous Osteochondral Transplantation: An In Vivo Rabbit Model <i>Niall A. Smyth, MD, Hospital for Special Surgery, New York, NY</i>	1:28pm–1:30pm	Discussion
12:56pm–12:58pm	Discussion	1:30am–1:36pm	<b>Resident/Fellow Travel Grant Award</b> Preoperative Anemia Increases Postoperative Complications And Mortality Following Total Joint Arthroplasty

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Ritz-Carlton Ballroom Salon I, unless otherwise specified

	<i>Jessica Viola, BS, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	2:02pm–2:06pm	Revision THA Outcomes Using Cemented, Modular Proximal Femoral Replacement Stems <i>Michael B. Cross, MD, HELIOS ENDO-Klinik, Hamburg, Germany</i>
1:36pm–1:38pm	Discussion		
1:38pm–1:42pm	Go to Stations	2:06pm–2:07pm	Discussion
<b>Rapid Fire Session 5A — Hip (Station A, Plaza Ballroom 1)</b>			
		2:07pm–2:11pm	Dislocation Rate After Revision THA Using A Dual-Mobility Cup <i>Taylor R. McClellan, BS, Duke University Medical Center, Durham, NC</i> *Presented by Samuel Wellman, MD
1:42pm–1:46pm	Risk Factors Of Iliopsoas Tendonitis Following Total Hip Arthroplasty <i>Victor H. Hernandez, MD, MS, The Rothman Institute, Egg Harbor Township, NJ</i>	2:11pm–2:12pm	Discussion
1:46pm–1:47pm	Discussion		
1:47pm–1:51pm	A Next Generation Anatomically Contoured Ceramic Femoral Head <i>Andrew A. Freiberg, MD, Massachusetts General Hospital and Harvard Medical School, Boston, MA</i> *Presented by Kartik Mangudi Varadarajan, PhD		
1:51pm–1:52pm	Discussion	1:46pm–1:49pm	Biomechanical Comparison Of Sacro-Pelvic Fixation <i>Camden B. Burns, MD, SUNY Stony Brook, Stony Brook, NY</i>
1:52pm–1:56pm	Subsidence Of Tapered Wedge Femoral Stems Is Not Clinically Benign <i>Jonathan Robinson, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>	1:49pm–1:53pm	Cervical Posterior Foraminotomy's Effect On Segmental Range Of Motion In The Setting Of Total Disc Arthroplasty <i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> *Presented by Peter Formby, MD
1:56pm–1:57pm	Discussion		
1:57pm–2:01pm	The Economic Burden Of Home Visiting Nurse Services Following Total Joint Arthroplasty <i>Suneel Bhat, MD, MPhil, Philadelphia, PA</i> *Presented by Andrew G. Park, MD	1:53pm–1:57pm	Finite Element Modeling Of Stability In Transforaminal Lumbar Interbody Fusion <i>Scott C. Wagner, MD, Walter Reed National Military Medical Center, Bethesda, MD</i>
2:01pm–2:02pm	Discussion	1:57pm–2:01pm	
		2:01pm–2:04pm	Discussion

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Ritz-Carlton Ballroom Salon I, unless otherwise specified

2:04pm–2:08pm	Operative Treatment of Combat-Related Spine Trauma During the Conflicts in Iraq and Afghanistan <i>Scott C. Wagner, MD, Walter Reed National Military Medical Center, Bethesda, MD</i>	2:01pm–2:02pm	Discussion
		2:02pm–2:06pm	Predictors of Discharge to Inpatient Rehabilitation After Total Knee Arthroplasty <i>Zachary D. Post, MD, St. Vincent Hospital, Billings, MT</i>
2:08pm–2:12pm	Discussion	2:06pm–2:07pm	Discussion
		2:07pm–2:11pm	Predictors Of Early Discharge After Total Knee Replacement <i>Victor H. Hernandez, MD, MS, The Rothman Institute, Egg Harbor Township, NJ</i>
		2:11pm–2:12pm	Discussion
<b>Rapid Fire Session 5C — Total Knee Reconstruction (Station C, Ritz-Carlton Ballroom Foyer)</b>			
<b>Moderator:</b> James Slover, MD, MS			
1:42pm–1:46pm	Patient-Specific Total Knees Demonstrate a Higher Manipulation Compared to “Off-The-Shelf” <i>Amar S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>	1:42pm–1:46pm	Outcomes Of ACL Reconstruction Using Closed Versus Variable Loop Button Fixation <i>Brent T. Wise, MD, Emory Orthopaedics and Spine Center, Atlanta, GA</i>
1:46pm–1:47pm	Discussion	1:46pm–1:48pm	Discussion
1:47pm–1:51pm	Radiation Exposure Associated With Preoperative CT For Robotic-Assisted Knee Arthroplasty <i>Danielle Ponzio, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	1:48pm–1:52pm	Avoiding Complications And Technical Variability During ACL Reconstructions <i>Natasha Trentacosta, MD, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx, NY</i>
1:51pm–1:52pm	Discussion	1:52pm–1:54pm	Discussion
1:52pm–1:56pm	Patellar Thickness And Range Of Motion (ROM) In Primary Total Knee Arthroplasty (TKA) <i>Carlos J. Lavneria, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>	1:54pm–1:58pm	Quadriceps Tendon Repair Outcomes In A Worker’s Compensation Cohort <i>Elliot S. Mendelsohn, MD, The Rothman Institute, Philadelphia, PA</i>
1:56pm–1:57pm	Discussion		
1:57pm–2:01pm	Utility Of Synovial White Cell Count And Neutrophil Differential During Reimplantation Surgery <i>Corey Clyde, BS, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>		

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## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

1:58pm–2:00pm	Discussion	1:51pm–1:52pm	Discussion
2:00pm–2:04pm	Biomechanical Tensile Strength Analysis Of Current Techniques For MPFL Reconstruction <i>LCDR Patrick W. Joyner, MD, MS, Naval Medical Center Portsmouth/ Bone &amp; Joint - Sports Medicine Institute, Portsmouth, VA</i>	1:52pm–1:56pm	Distal Radius Fracture Fixation Using The T-Pin Device <i>Jason Saillant, MD, The Philadelphia Hand Center, Philadelphia, PA</i> *Presented by John S. Taras, MD
2:04pm–2:06pm	Discussion	1:56pm–1:57pm	Discussion
2:06pm–2:10pm	A Biomechanical Comparison Of Calcium Phosphate And Fibular Allograft In Split Depression Tibial Plateau Fractures <i>Maxwell L. Langfitt, MD, Wake Forest University, Winston Salem, NC</i> *Presented by Stuart M. Saunders, MD	1:57pm–2:01pm	Single Incision Distal Biceps Repair With Hemi-Krackow Suture Technique: Surgical Technique And Early Outcomes <i>Brandon Donnelly, MD, The Philadelphia Hand Center, Philadelphia, PA</i> *Presented by Justin Stull, BA
2:10pm–2:12pm	Discussion	2:01pm–2:02pm	Discussion

### Rapid Fire Session 5E — Upper Extremity (Station E, Ritz-Carlton Ballroom Foyer)

Moderator: N. George Kasparyan, MD, PhD

1:42pm–1:46pm	An Anatomical Study As A Basis For Endoscopic Cubital Tunnel Release And The Associated Clinical Outcomes <i>Justin B. Mirza, DO, North Shore Surgi-Center, Smithtown, NY</i>	2:06pm–2:07pm	Discussion
1:46pm–1:47pm	Discussion	2:07pm–2:11pm	Distal Radius Volar Plate Implant Prominence And Flexor Tendon Rupture: Safety Profile Of A Locking, Variable Axis Plate <i>Joel C. Klena, MD, Geisinger Health System, Danville, PA</i> *Presented by John Deegan, DO
1:47pm–1:51pm	Rate Of Utilization Of Physician-Owned Specialty Hospitals Versus University Facilities For Arthroscopic Shoulder Surgeries — Does Ownership Effect Utilization? <i>Eric M. Black, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>	2:11pm–2:12pm	Discussion
		2:12pm–2:16pm	Go To General Session Room

\* Institution by abstract presenter's name is the location where the research took place.

## Thursday, October 23, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.  
Ritz-Carlton Ballroom Salon I, unless otherwise specified

### General Session 6 — Trauma/Sports/Misc. Case Presentations

**Moderator:** Anil S. Ranawat, MD

2:16pm–3:00pm Case Presentations

*Panel David S. Wellman, MD,  
Hospital for Special Surgery,  
New York, NY  
Richard M. Wilk, MD, Lahey  
Clinic, Burlington, MA  
Craig S. Roberts, MD,  
MBA, Orthopaedic Trauma  
Associates, Louisville, KY*

*David W. Romness, MD,  
Commonwealth Orthopaedics,  
Arlington, VA*

*Henry A. Backe Jr., MD,  
Orthopaedic Specialty Group,  
Fairfield, CT*

**Scientific Poster Session** (Poster  
Presenters Available) (Ritz-Carlton  
Ballroom Foyer)

**Multimedia Education Session**  
(Ambassador Room)

\* Institution by abstract presenter's name is the location where the research took place.

## Friday, October 24, 2014

*(Presenters and times are subject to change.)*

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

6:00am–7:00am	<b>Scientific Poster Session</b> (Poster Presenters Available) ( <i>Ritz-Carlton Ballroom Foyer</i> )	<i>Jason L. Codding, MD, Thomas Jefferson University, Philadelphia, PA</i>  Discussion
<b>General Session 7 — Foot &amp; Ankle and Spine</b>		
Moderators:	<b>Matthew M. Roberts, MD</b> <b>Samuel B. Adams Jr., MD</b>	
7:00am–7:06am	Level Of Evidence And Methodical Quality Of Ankle Cartilage Repair Studies <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i> <i>*Presented by John M. Pinski, MS</i>	<i>Implant Cost Reduction Initiative In Spine Surgery</i> <i>Jonathan Oren, MD, NYU Hospital for Joint Diseases, New York, NY</i>
7:06am–7:08am	Discussion	Discussion
7:08am–7:14am	Comparative Study Of Assisted Ambulation And Perceived Exertion With The Wheeled Knee Walker And Axillary Crutches In Healthy Subject <i>Matthew A. Napierala, MD, San Antonio Military Medical Center, Fort Sam Houston, TX</i> <i>*Presented by Benjamin Kocher, PA-C</i>	<b>What's New in Trauma</b> <i>David S. Wellman, MD, Hospital for Special Surgery, New York, NY</i>
7:14am–7:16am	Discussion	Discussion
7:16am–7:22am	Peroneal Tendon Abnormalities On Routine Magnetic Resonance Imaging Of The Ankle <i>Joseph T. O'Neil, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	Go To Stations
7:22am–7:24am	Discussion	
7:24am–7:30am	Open Calcaneus Fractures And Associated Injuries <i>Jacob R. Worsham, MD, University of Florida Health, Jacksonville, FL</i>	Effect Of Fixed Spinal Deformity On Functional Pelvic Orientation From Standing To Sitting <i>Morteza Meftah, MD, Hospital for Special Surgery, New York, NY</i>
7:30am–7:32am	Discussion	Discussion
7:32am–7:38am	Factors Contributing To Hospital Stay And Charges In Ankle Arthroplasty	Dynamic Hip Spacers Reduce Operative Time During Reimplantation <i>Anthony Tokarski, BS, The Rothman Institute, Philadelphia PA</i>
<b>Rapid Fire Session 8A — Total Hip Reconstruction</b>		
<i>(Station A, Plaza Ballroom 1)</i>		
Moderator:	<b>Douglas E. Padgett, MD</b>	
8:20am–8:24am		
8:24am–8:25am		Discussion
8:25am–8:29am		
8:29am–8:30am		Discussion

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8:30am–8:34am	Radiographic Patterns Of Osteointegration In Cementless Tapered Wedge Stems <i>Jonathan Robinson, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>	8:24am–8:26am	Discussion
8:34am–8:35am	Discussion	8:26am–8:30am	Race And Outcomes In Arthroplasty Surgery <i>Jesus M. Villa, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i>
8:35am–8:39am	Influence Of Neck Cut On Subsidence Of Hydroxyapatite Coated Stem <i>Yevgeniy Korshunov, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>	8:30am–8:32am	Discussion
8:39am–8:40am	Discussion	8:32am–8:36am	Resource Consumption And Outcomes In Total Knee Arthroplasty (TKA) <i>Carlos J. Lavernia, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>
8:40am–8:44am	Multiple Lower Extremity Arthroplasties: Quality Of Life <i>David A. Iacobelli, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i> *Presented by Jesus M. Villa, MD	8:36am–8:38am	Discussion
8:44am–8:45am	Discussion	8:38am–8:42am	Higher Morbidity And Mortality After Femoral Neck Fracture In Patients With Chronic Liver Failure <i>Antonia F. Chen, MD, MBA, The Rothman Institute, Philadelphia, PA</i>
8:45am–8:49am	Big Heads And Trunnions: Tribocorrosion Turbocharged <i>Jesus M. Villa, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i>	8:42am–8:44am	Discussion
8:49am–8:50am	Discussion	8:44am–8:48am	Effects Of Fracture Union With Direct Reduction Of Peritrochanteric Fractures <i>Lawrence K. O'Malley, MD, Greenville Health System, Greenville, SC</i>

### Rapid Fire Session 8B — Total Knee Reconstruction (Station B, Plaza Ballroom 1)

Moderator: James J. Purtill, MD

8:20am–8:24am	Does Medicare 3 Day Rule Increase Length Of Stay? <i>Victor H. Hernandez, MD, MS, The Rothman Institute, Egg Harbor Township, NJ</i>
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### Rapid Fire Session 8C — Hip & Spine (Station C, Ritz-Carlton Ballroom Foyer)

Moderator: John D. Kelly IV, MD

8:20am–8:24am	Femoral Acetabular Impingement In Patients Undergoing Total Hip Arthroplasty
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## Friday, October 24, 2014

*(Presenters and times are subject to change.)*

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

<p><i>Kyle E. Fleck, MD, University of Florida-Jacksonville, Jacksonville, FL</i></p>	<b>Rapid Fire Session 8D — Knee</b> <i>(Station D, Ritz-Carlton Ballroom Foyer)</i>		
<p>8:24am–8:25am</p> <p>8:25am–8:29am</p> <p>8:29am–8:30am</p> <p>8:30am–8:34am</p> <p>8:34am–8:35am</p> <p>8:35am–8:39am</p> <p>8:39am–8:40am</p> <p>8:40am–8:44am</p> <p>8:44am–8:45am</p> <p>8:45am–8:49am</p> <p>8:49am–8:50am</p>	<p>Discussion</p> <p>Labral Base Hematoma: A Tension-Sided Injury Pattern <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i></p> <p>Discussion</p> <p>Gait And Femoral Acetabular Impingement <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i></p> <p>Discussion</p> <p>Intra-Articular Hip Pathology Can Be Treated With Surgical Hip Dislocation <i>John A. Abraham, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i></p> <p>Discussion</p> <p>How Does State Income And The Number Of Uninsured Patients Relate To Hospital Charges For Spine Care? <i>Kushagra Verma, MD, MS, Thomas Jefferson University, Philadelphia, PA</i></p> <p>Discussion</p> <p>Restoring Sagittal Balance Improves Clinical Outcomes For Non-Ambulatory Cerebral Palsy Patients With Spinal Deformity <i>Kushagra Verma, MD, MS, Alfred I. duPont Hospital For Children Wilmington, DE</i></p> <p>Discussion</p>	<p>8:20am–8:24am</p> <p>8:24am–8:26am</p> <p>8:26am–8:30am</p> <p>8:30am–8:32am</p> <p>8:32am–8:36am</p> <p>8:36am–8:38am</p> <p>8:38am–8:42am</p> <p>8:42am–8:44am</p> <p>8:44am–8:48am</p> <p>8:48am–8:50am</p>	<p>The Incidence Of Repeat ACL Injury And Contralateral ACL Injury In NFL Players In 2013 Season <i>Daniel Woods, MD, The Rothman Institute, Philadelphia, PA</i></p> <p>Discussion</p> <p>Medial Meniscus Root Repair: Are We Healing and How Do We Tell? <i>Fotios Tjoumakaris, MD, The Rothman Institute, Egg Harbor Township, NJ</i></p> <p>Discussion</p> <p>Effect Of Anatomical Patella On Anterior Knee Pain, Crepitus And Satisfaction A Prospective Matched-Pair Analysis <i>Amar S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i> <i>*Presented by Morteza Metta, MD</i></p> <p>Discussion</p> <p>Medial Opening Wedge High Tibial Osteotomy, A Retrospective Review Of Patient Outcomes Over 10 Years <i>Fotios Tjoumakaris, MD, The Rothman Institute, Egg Harbor Township, NJ</i></p> <p>Discussion</p> <p>Painful Orthopaedic Hardware May Be Associated With Subclinical Infection <i>Hemil H. Maniar, MD, Geisinger Health System, Danville, PA</i></p> <p>Discussion</p>

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Ritz-Carlton Ballroom Salon I, unless otherwise specified

### Rapid Fire Session 8E — Mixed Topics (Station E, Ritz-Carlton Ballroom Foyer)

Moderator: Henry A. Backe Jr., MD

8:20am–8:24am	Radiographic Stage Does Not Correlate With Symptom Severity In Thumb Basilar Joint Arthritis <i>C. Edward Hoffler II, MD, PhD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>
8:24am–8:26am	Discussion
8:26am–8:30am	Electro-Chemical Testing Results Of Conventional Hip Stems <i>Ahmad Faizan, PhD, Mahwah, NJ</i>
8:30am–8:32am	Discussion
8:32am–8:36am	Post-Operative Complications Following Hemiarthroplasty In Patients On Warfarin <i>Kristin McPhillips, MD, MPH, Geisinger Health System, Danville, PA</i>
8:36am–8:38am	Discussion
8:38am–8:42am	Lateral Unicompartmental Knee Arthroplasty Yields Successful Outcomes And Return-To-Sport <i>Stephanie Petterson, MPT, PhD, Orthopaedic Foundation, Stamford, CT</i>
8:42am–8:44am	Discussion
8:44am–8:48am	Teriparatide Treatment In Patients With Persistent Pain Following Joint Replacement <i>Seth A. Jerabek, MD, Hospital for Special Surgery, New York, NY</i> <i>*Presented by Michael B. Cross, MD</i>
8:48am–8:50am	Discussion
8:50am–9:10am	Break – Please visit Exhibitors

### Symposium 4 — What's New in Total Joints

Moderator: Mary I. O'Connor, MD

9:10am–9:23am	Infection <i>Javad Parvizi, MD, FRCS, The Rothman Institute, Philadelphia, PA</i>
9:23am–9:36am	THR and ALTR <i>Chitranjan S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>
9:36am–9:49am	Revision TKR <i>Carlos J. Lavernia, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>
9:49am–10:00am	Discussion
10:00am–10:20am	Break – Please visit Exhibitors

### General Session 9 — BOC, OREF, AOA, AAOS Reports & Presidential Guest Speaker

Moderator: David W. Romness, MD

10:20am–10:25am	BOC Report <i>John C. Richmond, MD, New England Baptist Hospital, Boston, MA</i>
10:25am–10:30am	OREF Report <i>E. Anthony Rankin, MD, Providence Hospital and Howard University, Washington, DC</i>
10:30am–10:35am	AOA Report: Own The Bone Talk <i>Brian J. Galinat, MD, MBA, Christiana Care Health System, Newark, DE</i>
10:35am–10:50am	AAOS Report <i>Frederick M. Azar, MD, President, American Academy of Orthopaedic Surgeons, Campbell Clinic, Memphis, TN</i>

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## Friday, October 24, 2014

*(Presenters and times are subject to change.)*

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10:50am–10:55am	Introduction of Presidential Guest Speaker <i>David W. Romness, MD, Commonwealth Orthopaedics, Arlington, VA</i>	12:52pm–12:54pm	Discussion
10:55am–11:30am	<b>Presidential Guest Speaker</b> Variety Is The Spice Of Life: Embracing Differences To Strengthen Your Practice <i>Mary I. O'Connor, MD, Mayo Clinic, Jacksonville, FL</i>	12:54pm–1:00pm	Direct Costs of Aspirin Versus Warfarin For Venous Thromboembolism Prophylaxis <i>Christina J. Gutowski, MD, MPH, Thomas Jefferson University Hospital, Philadelphia, PA</i>
11:30am–12:30pm	<b>EOA Luncheon — Industry Presentation by Pacira Pharmaceuticals, Inc. (Ritz-Carlton Ballroom Salon I)</b> <i>*Not for CME</i>	1:00pm–1:02pm 1:02pm–1:08pm	Discussion <b>Resident/Fellow Travel Grant Award</b> Head CT Scans With Low Energy Isolated Geriatric Femur Fractures <i>Hemil H. Maniar, MD, Geisinger Health System, Danville, PA</i>
12:30pm–12:36pm	The Standard One Gram Dose Of Vancomycin Is Not Adequate Prophylaxis For MRSA <i>Anthony Catanzano, BS, NYU Hospital for Joint Diseases, New York, NY</i> <i>*Presented by Lorraine Hutzler, BA</i>	1:08pm–1:10pm	Outcomes Of Reverse Shoulder Arthroplasty In An Active Athletic Population <i>Ryan W. Simovitch, MD, Palm Beach Orthopaedic Institute, Palm Beach Gardens, FL</i>
12:36pm–12:38pm	Discussion	1:10pm–1:16pm	Discussion
12:38pm–12:44pm	Morphometric Risk Factors For ACL Injury In Pediatric Patients <i>K. Aaron Shaw, DO, Children's Mercy Hospital, Kansas City, MO</i>	1:16pm–1:18pm 1:18pm–1:24pm	Consumerism in Healthcare <i>Richard C. Mather III, MD, Duke University Medical Center, Durham, NC</i>
12:44pm–12:46pm	Discussion	1:24pm–1:26pm	Discussion
12:46pm–12:52pm	Outcomes Following Cervical Disc Arthroplasty: A Retrospective Review <i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> <i>*Presented by Scott C. Wagner, MD</i>	1:26pm–1:30pm	Go To Stations
<b>Rapid Fire Session 11A — Hip (Station A, Plaza Ballroom I)</b>			
<b>Moderator:</b> <b>Mary I. O'Connor, MD</b>			
		1:30pm–1:34pm	The Effect Of Severity Of Disease On Cost Burden Of 30-Day Readmissions Following Total Joint Arthroplasty (TJA) <i>Daniel Kiridly, BS, NYU Hospital for Joint Diseases, New York, NY</i>

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Ritz-Carlton Ballroom Salon I, unless otherwise specified

1:34pm–1:35pm	Discussion	<b>Rapid Fire Session 11B — Knee</b> <i>(Station B, Plaza Ballroom 1)</i>	
1:35pm–1:39pm	Outpatient Total Hip Arthroplasty As A Method To Decrease Healthcare Cost <i>Zachary D. Post, MD, St. Vincent Hospital, Billings, MT</i>	1:30pm–1:34pm	The Alpha-Defensin Biomarker For PJI Responds To A Wide Spectrum Of Organisms <i>Carl Deirmengian, MD, The Rothman Institute, Philadelphia, PA</i>
1:39pm–1:40pm	Discussion	1:34pm–1:35pm	Discussion
1:40pm–1:44pm	Fixation Of A Non-Cemented, Hydroxyapatite Coated Acetabular Component <i>Morteza Meftah, MD, Hospital for Special Surgery, New York, NY</i>	1:35pm–1:39pm	Compliance With Intermittent Pneumatic Compression Devices In Orthopaedic <i>Kristin McPhillips, MD, MPH, Geisinger Health System, Danville, PA</i>
1:44pm–1:45pm	Discussion		
1:45pm–1:49pm	Evaluating 216 Adverse Tissue Responses In A Single Surgeon Series <i>Danyal Nawabi, MD, Hospital for Special Surgery, New York, NY</i> *Presented by Geoffrey H. Westrich, MD	1:39pm–1:40pm	Discussion
1:49pm–1:50pm	Discussion	1:40pm–1:44pm	The Cost-Utility Of Total Hip Arthroplasty: Could WOMAC Predict It? <i>David A. Iacobelli, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i> *Presented by Jesus M. Villa, MD
1:50pm–1:54pm	Short-Term Results Of Novel Constrained Total Hip Arthroplasty <i>Stephen H. Finley, MD, Greenville Health System, Greenville, SC</i>	1:44pm–1:45pm	Discussion
1:54pm–1:55pm	Discussion	1:45pm–1:49pm	Sleep Disturbance Following Total Knee And Total Hip Arthroplasty <i>Alvin Ong, MD, The Rothman Institute, Egg Harbor Township, NJ</i>
1:55pm–1:59pm	Long-Term Clinical Results Of A First Generation Highly Cross-Linked Polyethylene In Young And Active Patients <i>Chitranjan S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>	1:49pm–1:50pm	Discussion
1:59pm–2:00pm	Discussion	1:50pm–1:54pm	Total Joint Arthroplasty In Patients With Cardiac Implantable Electrophysiological Devices <i>Seyed Alireza Mirghasemi, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>

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1:54pm–1:55pm	Discussion	<i>John A. Abraham, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
1:55pm–1:59pm	Safe Cost Savings For TJA: Eliminate Postoperative Home Visiting Nurse Services <i>Andrew G. Park, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	1:49pm–1:50pm
		1:50pm–1:54pm
1:59pm–2:00pm	Discussion	Malignant Associated Giant Cell Lesions Of Bone <i>Samuel Kenan, North Shore, Long Island Medical Center, New Hyde Park, NY</i>
		1:54pm–1:55pm
1:30pm–1:34pm	Intercalary Tibial Allograft Reconstruction Following Segmental Presentation of Bone Tumors <i>Ryan Michels, MD, North Shore Long Island Jewish Medical Center, New Hyde Park, NY</i>	1:55pm–1:59pm
1:34pm–1:35pm	Discussion	Opportunistic Osteoporosis Screening: Gleaning Additional Information From Diagnostic Wrist CT Scans <i>Joseph J. Schreiber, MD, Hospital for Special Surgery, New York, NY</i>
1:35pm–1:39pm	Surgical Navigation Allows Less Invasive Methods Of Resection Of Pelvic Sarcoma <i>John A. Abraham, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>	1:59pm–2:00pm
1:39pm–1:40pm	Discussion	Discussion
1:40pm–1:44pm	A Systematic Review Of The Surgical Management Of Carpal Boss <i>Abdo Bachoura, MD, UPMC Hamot, Erie, PA</i> *Presented by Thomas D. Lee, MD	1:30pm–1:34pm
1:44pm–1:45pm	Discussion	Periprosthetic Shoulder Infection In The United States: Incidence And Economic Burden <i>Surena Namdari, MD, MSc, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i> *Presented by Eric M. Padegimas, MD
1:45pm–1:49pm	Cardiac Metastasis Of Extremity Soft Tissue Sarcoma: An Unusual Metastatic Pattern	1:34pm–1:35pm
		1:35pm–1:39pm
		Two Year Survival And Outcomes Of Trabecular Metal Glenoid Components In Total Shoulder Arthroplasty <i>Scott T. Watson, MD, Steadman Hawkins Clinic of the Carolinas/Greenville Health System, Greenville, SC</i>

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Ritz-Carlton Ballroom Salon I, unless otherwise specified

1:39pm–1:40pm	Discussion	1:36pm–1:40pm	Cleft Foot Deformity, Management And Long Term Follow-Up <i>John E. Handelsman, MD, FRCS, Rhode Island Hospital, Brown University, Providence, RI/Cohen Children's Medical Center, North Shore/Long Island Jewish Medical Center, New Hyde Park, NY</i>
1:40pm–1:44pm	Arthroscopic Anchorless, Transosseous vs Anchored Rotator Cuff Repair-Case Control Analysis <i>Lucas B. Romine, MD, Johns Hopkins Hospital, Baltimore, MD</i>		
1:44pm–1:45pm	Discussion	1:40pm–1:42pm	Discussion
1:45pm–1:49pm	Complex Intra-Articular Distal Radius Fractures Treated With Cross-Pin Fixation And A Non-Bridging External Fixator (CPX System) <i>R. Tyler Huish, DO, North Shore Surgi-Center, Smithtown, NY</i>	1:42pm–1:46pm	Screw Fixation Of Lateral Condyle Fractures: Results Of Treatment <i>Eric D. Shirley, MD, Nemours Children's Clinic, Jacksonville, FL</i>
1:49pm–1:50pm	Discussion	1:46pm–1:48pm	Discussion
1:50pm–1:54pm	Basal Joint Arthroplasty Decreases Carpal Tunnel Pressure <i>Kevin Lutsky, MD, The Rothman Institute, Philadelphia, PA</i> *Presented by Nayoung Kim, BS	1:48pm–1:52pm	Effect Of Femoral Rotation On Entry Point For Trochanteric Nails <i>Hemil H. Maniar, MD, Geisinger Health System, Danville, PA</i>
1:54pm–1:55pm	Discussion	1:52pm–1:54pm	Discussion
1:55pm–1:59pm	Online Resources For Shoulder Instability: What Are Patients Reading? <i>Grant H. Garcia, MD, Hospital for Special Surgery, New York, NY</i>	1:54pm–1:58pm	Wait Time And Patient Satisfaction In The Orthopedic Clinic <i>Tyler M. Kreitz, MD, Thomas Jefferson University, Philadelphia, PA</i>
1:59pm–2:00pm	Discussion	1:58pm–2:00pm	Discussion
		2:00pm–2:04pm	Go To General Session Room

### Rapid Fire Session 11E — Pediatrics (Station E, Ritz-Carlton Ballroom Foyer)

Moderator: Daniel W. Green, MD

1:30pm–1:34pm	Nerve Allograft For Surgical Repair Of Obstetric Brachial Plexus Palsy <i>Evan Siegall, MD, Scottish Rite Children's Hospital/The Hand Upper Extremity Center of Georgia, Atlanta, GA</i>
1:34pm–1:36pm	Discussion

\* Institution by abstract presenter's name is the location where the research took place.

### General Session 12 — Foot/ Ankle Arthroplasty Case Presentations

Moderator: Sameh A. Labib, MD

2:04pm–3:00pm	Case Presentations <i>Matthew M. Roberts, MD, Hospital for Special Surgery, New York, NY</i> <i>Brian S. Winters, MD, The Rothman Institute, Philadelphia, PA</i>
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*Samuel B. Adams Jr., MD, Duke  
University Medical Center; Durham,  
NC*

3:00pm–4:00pm      **Scientific Poster Session** (Poster  
Presenters Available) (*Ritz-Carlton  
Ballroom Foyer*)

4:00pm–5:00pm      **Multimedia Education Session**  
(*Ambassador Room*)

\* Institution by abstract presenter's name is the location where the research took place.

## Saturday, October 25, 2014

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 46-55.

Ritz-Carlton Ballroom Salon I, unless otherwise specified

6:00am–7:00am	<b>Scientific Poster Session</b> (Poster Presenters Available) ( <i>Ritz-Carlton Ballroom Foyer</i> )	<i>Eric M. Padegimas, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
		Discussion
	<b>General Session 13 — Mixed Topics</b>	
<b>Moderators:</b> <b>Henry A. Backe Jr., MD</b> <b>E. Anthony Rankin, MD</b>		
7:00am–7:06am	Patients' Perception Of Care Correlates With Quality Of Hospital Care: A Survey Of 4605 Hospitals <i>Spencer Stein, BA, NYU Hospital for Joint Diseases, New York, NY</i>	<i>Michael Pensak, MD, University of Connecticut Health Center, Farmington, CT</i>
7:06am–7:08am	Discussion	Discussion
7:08am–7:14am	Patient-Reported Allergies Affect Outcomes After Lower Extremity Arthroplasty <i>Jason L. Blevins, MD, Hospital for Special Surgery, New York, NY</i>	<i>Alexander S. McLawhorn, MD, MBA, Hospital for Special Surgery, New York, NY</i>
7:14am–7:16am	Discussion	Discussion
7:16am–7:22am	Lidocaine Chondrotoxicity In A Porcine Fracture Model <i>Grigory E. Gershkovich, MD, Einstein Medical Center, Philadelphia, PA</i>	Discussion
7:22am–7:24am	Discussion	
7:24am–7:30am	CRP And ESR As Indicators For Resolution Of Periprosthetic Infection <i>Christopher P. Lindsay, BS, University of North Carolina School of Medicine, Chapel Hill, NC</i>	<i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>
7:30am–7:32am	Discussion	Labral Reconstruction <i>John D. Kelly IV, MD, University of Pennsylvania, Philadelphia, PA</i>
7:32am–7:38am	<b>Resident/Fellow Travel Grant Award</b> What Factors Affect Medicare Reimbursement In Total Joint Arthroplasty?	The Role of PAO and Surgical Dislocation in 2014 <i>Javad Parvizi, MD, FRCS, The Rothman Institute, Philadelphia, PA</i>
		Rationale and Technique for Capsular Preservation in Hip Arthroscopy

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	<i>Richard C. Mather III, MD, Duke University Medical Center; Durham, NC</i>	9:49am–9:53am	A Comparison Of Anatomic Versus Tubular Plating For Fibula Fractures <i>Justin Kane, MD, Thomas Jefferson University Hospital, Philadelphia, PA</i>
8:20am–8:27am	Discussion	9:53am–9:54am	Discussion
8:27am–8:42am	Second Business Meeting	9:54am–9:58am	Total Ankle Arthroplasty Versus Arthrodesis: An Arc Of Motion Analysis <i>Justin Kane, MD, Thomas Jefferson University Hospital, Philadelphia, PA</i>
8:42am–9:07am	Break — Please visit Exhibitors		
<b>Symposium 6 — What's New in Spine Surgery</b>			
<b>Moderator:</b> Scott D. Boden, MD		9:58am–9:59am	Discussion
9:07am–9:25am	What's New in Spine Surgery <i>James T. Guille, MD, Brandywine Institute of Orthopaedics, Pottstown, PA</i>	9:59am–10:03am	Anterolateral Tibial Trapezoidal Osteotomy For Accessing Osteochondral Lesions Of The Talus In Autologous Osteochondral Transplantation: Functional And T2 MRI Analysis <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i> *Presented by Arianna Giannakos, MD
9:25am–9:35am	Discussion		
9:35am–9:39am	Go To Stations		
<b>Rapid Fire Session 14A — Foot (Station A, Plaza Ballroom 1)</b>			
<b>Moderator:</b> Sameh A. Labib, MD		10:03am–10:04am	Discussion
9:39am–9:43am	Autologous Osteochondral Transplantation For Osteochondral Lesions Of The Talus: Functional And T2 MRI Outcomes At Mid-To Long-Term Follow-Up <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i> *Presented by Charles P. Hannon, BS	10:04am–10:08am	Posterior Tibial Tendoscopy: Functional Outcomes And Comparison To Magnetic Resonance Imaging <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i>
9:43am–9:44am	Discussion	10:08am–10:09am	Discussion
9:44am–9:48am	Clinical And MRI Outcomes Of Femoral Donor Sites In Patient Post Osteochondral Autologous Transfer For Osteochondral Lesions Of The Talus <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i>		
9:48am–9:49am	Discussion		
<b>Rapid Fire Session 14B — Trauma (Station B, Plaza Ballroom 1)</b>			
<b>Moderator:</b> David S. Wellman, MD		9:39am–9:43am	Semi-Extended Midvastus Tibial Nailing (The SeMid Technique) <i>Thomas H. Sanders, MD, INOVA Fairfax Hospital, Falls Church, VA</i> *Presented by Lolita Ramsay, RN, PhD

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9:43am–9:44am	Discussion	<b>Rapid Fire Session 14C — Spine</b> <i>(Station C, Ritz-Carlton Ballroom Foyer)</i>	
9:44am–9:48am	Plate Versus Screw Fixation of Radial Neck Fractures: A Biomechanical Study <i>Christina J. Gutowski, MD, MPH, Thomas Jefferson University Hospital, Philadelphia, PA</i>	9:39am–9:43am	Can Orthopaedic Surgeons Be Trained To Accurately Gauge Tapping Insertional Torque? <i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> <i>*Presented by Peter Formby, MD</i>
9:48am–9:49am	Discussion	9:43am–9:44am	Discussion
9:49am–9:53am	Higher Mortality And Length Of Stay After Hip Fracture In Chronic Renal Failure Patients <i>Antonia F. Chen, MD, MBA, The Rothman Institute, Philadelphia, PA</i>	9:44am–9:48am	Functional Outcomes Reporting In An Annual Meeting Over Three Years <i>Kristin McPhillips, MD, MPH, Geisinger Health System, Danville, PA</i>
9:53am–9:54am	Discussion	9:48am–9:49am	Discussion
9:54am–9:58am	Orthopaedic Trauma In The Amish Community: Epidemiology And Hospital Charges <i>Louis C. Grandizio, DO, Geisinger Health System, Danville, PA</i>	9:49am–9:53am	Sonication For Detection Of Infection In ‘Aseptic’ Nonunion <i>Hemil H. Maniar, MD, Geisinger Health System, Danville, PA</i>
9:58am–9:59am	Discussion	9:53am–9:54am	Discussion
9:59am–10:03am	Unstable Metacarpal Fractures Treated with Intramedullary Nail Fixation <i>Ather Mirza, MD, North Shore Surgi-Center, Smithtown, NY</i> <i>*Presented by Justin B. Mirza, DO</i>	9:54am–9:58am	Sacral Screw Strain In A Long Posterior Spinal Fusion Construct With Sacral Alar-Iliac (S2AI) Versus Iliac Fixation <i>Daniel G. Kang, MD, Walter Reed National Military Medical Center, Bethesda, MD</i> <i>*Presented by Scott C. Wagner, MD</i>
10:03am–10:04am	Discussion	9:58am–9:59am	Discussion
10:04am–10:08am	Decreasing Incidence and Changing Treatment of Distal Radius Fractures Among Elderly Adults <i>Benjamin D. Streufert, BS, Duke University Medical Center, Durham, NC</i>	9:59am–10:03am	Operative Treatment Of New Onset Radiculopathy And Myelopathy Secondary To Combat Injury <i>Gregory S. Van Blarcum, MD, Walter Reed National Military Medical Center, Bethesda, MD</i>
10:08am–10:09am	Discussion	10:03am–10:04am	Discussion

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10:04am–10:08am	A Normative Baseline For The SRS-22 From Over 1000 Healthy Adolescents In South East Asia: Which Demographic Factors Affect Outcome? <i>Kushagra Verma, MD MS, Alfred I. duPont Hospital For Children, Wilmington, DE</i>	9:58am–9:59am	<i>Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i> Discussion
10:08am–10:09am	Discussion		Short Term Complications After Revision Hip Arthroplasty With A Modular Dual Mobility (MDM) Prosthesis <i>Geoffrey H. Westrich, MD, Hospital for Special Surgery, New York, NY</i>
9:39am–9:43am	Analyzing CMS Radiographic Criteria For THA: Significant Outliers <i>Yevgeniy Korshunov, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>	10:03am–10:04am	Discussion
9:43am–9:44am	Discussion	10:04am–10:08am	Hypotension Following Total Joint Arthroplasty Is Common And Inconsequential <i>T. David Tarity, MD, Thomas Jefferson University Hospital, Philadelphia, PA</i> <i>*Presented by Ronald Huang, MD</i>
9:44am–9:48am	Appropriate Use Criteria And Local Carrier Determinations: Are We Hurting Our TJA Patients? <i>Carlos J. Lavernia, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>	10:08am–10:09am	Discussion
9:48am–9:49am	Discussion	9:39am–9:43am	Reduction Loss After Distal Radius Fracture Fixation With Various Volar Plates <i>Michael M. Vosbikian, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
9:49am–9:53am	Resident Education And Physician Assistants In Joint Replacement Surgery: Costs And Outcomes <i>Jesus M. Villa, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery Research Foundation, South Miami, FL</i>	9:43am–9:45am	Discussion
9:53am–9:54am	Discussion	9:45am–9:49am	Restoring Isometry in Lateral Ulnar Collateral Ligament Reconstruction <i>Jonathan W. Shearin, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>
9:54am–9:58am	Sex And Quality Of Life In Patients Undergoing THA <i>Jesus M. Villa, MD, The Center For Advanced Orthopedics at Larkin</i>	9:49am–9:51am	Discussion

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9:51am–9:55am	Locking Shaft Screws Not Necessary in Volar Plate Fixation <i>Kevin Lutsky, MD, The Rothman Institute, Philadelphia, PA</i> *Presented by C. Edward Hoffler II, MD, PhD	10:38am–10:40am 10:40am –10:46am	Discussion The Team Physician And The Athletic Trainer: Do We Agree? <i>Fotios Tjoumakaris, MD, The Rothman Institute, Egg Harbor Township, NJ</i>
9:55am–9:57am	Discussion	10:46am–10:48am	Discussion
9:57am–10:01am	Fingertip Amputation Treatment: A Survey Study <i>Andrew Miller, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i> *Presented by Eric M. Padegimas, MD	10:48am–10:54am	Native Anterior Cruciate Ligament Length Quantification Via Lateral Radiographic Landmark <i>LCDR Patrick W. Joyner, MD, MS, Naval Medical Center Portsmouth/ Bone &amp; Joint - Sports Medicine Institute, Portsmouth, VA</i>
10:01am–10:03am	Discussion	10:54am–10:56am	Discussion
10:03am–10:07am	Radiation Exposure To The Eye With Mini C-Arm Use During Hand Surgery <i>C. Edward Hoffler II, MD, PhD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>	10:56am–11:02am	Comparison Of Stability And Slope Neutralization Between CW And OW HTO In The ACL Deficient Knee <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>
10:07am–10:09am	Discussion	11:02am–11:04am	Discussion
10:09am–10:24am	Refreshment Break	11:04am –11:10am	<b>Resident/Fellow Award</b> Prospective, Randomized Study: Superior Early Outcomes Following THA Using Direct Anterior Approach <i>Ryan Massimilla, BS, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>

### General Session 15 — Mixed Topics

**Moderators:** Amar S. Ranawat, MD  
David S. Wellman, MD

10:24am –10:30am	Severity Of Hand OA — A Predictor Of Major Joint Involvement And Surgical Intervention <i>Chitranjan S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>	11:10am–11:12am 11:12am –11:18am	Discussion <b>EOA/OREF Resident/Fellow Travel Grant Award</b> When Is It Safe For Patients To Drive After Right Total Hip Arthroplasty? <i>Victor H. Hernandez, MD, MS, The Rothman Institute, Egg Harbor Township, NJ</i>
10:30am–10:32am	Discussion		
10:32am –10:38am	Periprosthetic Joint Infection: Could Bearing Surface Play A Role? <i>Langan S. Smith, BS, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i> *Presented by Camilo Restrepo, MD	11:18am–11:20am 11:20am–11:40am	Discussion Refreshment Break

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### Symposium 7 — What's New in Shoulder and Elbow Surgery

**Moderator:** Gregory S. DiFelice, MD

11:40am–11:50am	Treatments For Massive Rotator Cuff Tears <i>Fotios Tjoumakaris, MD, The Rothman Institute, Egg Harbor Township, NJ</i>	12:34pm–12:38pm	Pilon Plate For Fixation Of Comminuted Posterior Wall Acetabular Fractures <i>Adam K. Lee, MD, Geisinger Health System, Danville, PA</i>
11:50am–12:00pm	Advance In Treatments Of Elbow Injuries In Throwing Athletes <i>Joshua S. Dines, MD, Hospital for Special Surgery, New York, NY</i>	12:38pm–12:39pm	Discussion
12:00pm–12:10pm	Subscapularis Tears <i>Christopher Adams, MD, The Medical Group of South Florida, Jupiter, FL</i>	12:39pm–12:43pm	Provisional Plate Fixation In The Setting Of Open Tibia Fractures <i>Meryl R. Ludwig, MD, Inova Fairfax Medical Campus, Falls Church, VA</i> *Presented by Lolita Ramsay, RN, PhD
12:10pm–12:20pm	Discussion	12:43pm–12:44pm	Discussion
12:20pm–12:24pm	Go To Stations	12:44pm–12:48pm	Ipsilateral Ankle Fractures With Tibial Shaft Fractures Are Frequently Missed <i>Hemil H. Maniar, MD, Geisinger Health System, Danville, PA</i>

### Rapid Fire Session 16A — Trauma (Station A, Plaza Ballroom 1)

**Moderator:** David S. Wellman, MD

12:24pm–12:28pm	Computer-Assisted Orthopaedic Surgery (CAOS) In The Treatment Of Intertrochanteric (IT) Fractures <i>Carlos J. Lavernia, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>	12:48pm–12:49pm	Patients With Abnormal Infection Parameters Need To Be Investigated Prior To Revision Arthroplasty <i>Priscilla K. Cavanaugh, MS, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
12:28pm–12:29pm	Discussion	12:49pm–12:53pm	Discussion
12:29pm–12:33pm	Epidemiology Of Multiligamentous Knee Injuries And Associated Injuries: 10 Year Review At A Level 1 Trauma Center <i>Mark Elliott, MD, University of Florida College of Medicine-Jacksonville, Jacksonville, FL</i>	12:53pm–12:54pm	Discussion
12:33pm–12:34pm	Discussion		

### Rapid Fire Session 16B — Total Hip Reconstruction (Station B, Plaza Ballroom 1)

**Moderator:** Amar S. Ranawat, MD

12:24pm–12:28pm	Risk Factors For Periprosthetic Infection In Young Patients After THA <i>Taylor R. McClellan, BS, Duke University Medical Center, Durham, NC</i> *Presented by Michael P. Bolognesi, MD
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12:28pm–12:29pm	Discussion	<b>Rapid Fire Session 16C — Knee (Station C, Ritz-Carlton Ballroom Foyer)</b>	
12:29pm–12:33pm	Delaying Reimplantation Following Resection Arthroplasty Does Not Improve Outcomes: A Report From Two High Volume Orthopaedic Centers <i>Anthony Tokarski, BS, The Rothman Institute, Philadelphia, PA</i>	12:24pm–12:28pm	Systemic Manifestation Of Periprosthetic Infection Is Associated With Increased In-Hospital Mortality <i>Gregory K. Deirmengian, MD, The Rothman Institute, Philadelphia, PA</i>
12:33pm–12:34pm	Discussion	12:28pm–12:29pm	Discussion
12:34pm–12:38pm	Survivorship And Complications Of Revision Total Hip Arthroplasty With A Mid-Modular Femoral Stem <i>Jason Hochfelder, MD, NYU Hospital for Joint Diseases, New York, NY</i> *Presented by Aldo M. Riesgo, MD	12:29pm–12:33pm	Pre-Operative Templating Of Anterior Cruciate Ligament Reconstruction Using Lateral X-Ray <i>LCDR Patrick W. Joyner, MD, MS, Naval Medical Center Portsmouth/ Bone &amp; Joint - Sports Medicine Institute, Portsmouth, VA</i>
12:38pm–12:39pm	Discussion	12:33pm–12:34pm	Discussion
12:39pm–12:43pm	Intraoperative Femur Fracture During Primary Total Hip Arthroplasty And Hemiarthroplasty <i>David S. Geller, MD, Montefiore Medical Center, Bronx, NY</i> *Presented by Robert Brochin, BS	12:34pm–12:38pm	Tibial Rotation And Patellar Tilt Following Closing And Opening High Tibial Osteotomy <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>
12:43pm–12:44pm	Discussion	12:38pm–12:39pm	Discussion
12:44pm–12:48pm	What Is The Optimum Acetabular Component Position And Size In Direct Anterior Approach Total Hip Arthroplasty? — Influence Of Stability Assessment And Impingement <i>Parthiv A. Rathod, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i> *Presented by Jose A. Rodriguez, MD	12:39pm–12:43pm	Patient Perceived Outcomes And Physical Performance In TKA <i>Carlos J. Lavavera, MD, The Center for Advanced Orthopedics at Larkin Hospital, South Miami, FL</i>
12:48pm–12:49pm	Discussion	12:43pm–12:44pm	Discussion
12:49pm–12:53pm	Failure Of A Modular Neck Hip Stem: A Retrieval Study <i>Joseph Assini, MD, Hospital for Special Surgery, New York, NY</i>	12:44pm–12:48pm	Cost-Effective Prophylaxis Against Venous Thromboembolism After Total Joint Arthroplasty: Warfarin Versus Aspirin <i>Reza Mostafavi Tabatabaei, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
12:53pm–12:54pm	Discussion	12:48pm–12:49pm	Discussion

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12:49pm–12:53pm	Comparison Of Revision Rates Of Non-Modular Constrained Versus Posterior Stabilized Total Knee Arthroplasty <i>Mohamed E. Moussa, MD, Hospital for Special Surgery, New York, NY</i>	12:43pm–12:44pm	<i>Santy-Hôpital Privé Jean Mermoz, Lyon, France</i> Discussion
12:53pm–12:54pm	Discussion	12:44pm–12:48pm	The Prevalence Of Rotator Cuff Tears In Operative Proximal Humerus Fractures <i>Joseph A. Abboud, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>
		12:48pm–12:49pm	Discussion
		12:49pm–12:53pm	A Survey Of Expert Opinion Regarding Rotator Cuff Repair <i>Daniel C. Acevedo, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i> *Presented by Joseph A. Abboud, MD
		12:53pm–12:54pm	Discussion
<b>Rapid Fire Session 16D — Shoulder (Station D, Ritz-Carlton Ballroom Foyer)</b>			
<b>Moderator:</b> Kevin D. Plancher, MD			
12:24pm–12:28pm	Diagnositc Accuracy Of Non-Contrast MRI For Detecting Glenohumeral Cartilage Lesions <i>Corinne VanBeek, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>		
12:28pm–12:29pm	Discussion		
12:29pm–12:33pm	Arthroscopic Rotator Cuff Repair: The Characterization Of Preoperative And Postoperative Sleep Disturbance <i>Luke Austin, MD, The Rothman Institute, Egg Harbor Township, NJ</i>		
12:33pm–12:34pm	Discussion		
12:34pm–12:38pm	Timing Of Debridement And Infection Rates In Open Fractures Of The Hand: A Systematic Review <i>Joseph Dwyer, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i> *Presented by Constantinos Ketonis, MD, PhD		
12:38pm–12:39pm	Discussion		
12:39pm–12:43pm	Subscapularis Fatty Infiltration And Clinical Evaluation After Tenotomy In Total Shoulder Arthroplasty <i>Michael T. Freehill, MD, Unité Epaule, Centre Orthopédique</i>	12:24pm–12:28pm	Smart Collagen-Specific Anchors For Tendon-Targeted Delivery Of Therapeutic Cells <i>Mark Wang, MD, PhD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>
		12:28pm–12:30pm	Discussion
		12:30pm–12:34pm	Platelet-Rich Plasma Increases TGF-Beta Expression Following Autologous Osteochondral Transplantation In An In Vivo Rabbit Model <i>Ethan J. Fraser, MD, Hospital for Special Surgery, New York, NY</i> *Presented by Lorraine A. Boakye, BA
		12:34pm–12:36pm	Discussion

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12:36pm–12:40pm	Variance Of Matrix Metalloproteinases (MMP) And Tissue Inhibitor Of Metalloproteinases (TIMP) Concentrations In Activated, Concentrated Platelets From Healthy Male Donors <i>Justin M. Hire, MD, Dwight D. Eisenhower Army Medical Center, Fort Gordon, GA</i>	1:04pm–1:06pm 1:06pm–1:12pm	Discussion <b>Founders' Award</b> Fluoroscopic Radiation Exposure: Are We Protecting Ourselves Adequately? <i>C. Edward Hoffer II, MD, PhD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i>
12:40pm–12:42pm	Discussion	1:12pm–1:14pm	Discussion
12:42pm–12:46pm	Elimination Of Overlap In Small And Ring Metacarpal Measurements <i>Michael Rivlin, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i> *Presented by Nayoung Kim, BS	1:14pm–1:20pm	<b>Resident/Fellow Travel Grant Award</b> Conservative Management Of Elbow Dislocations With An Overhead Motion Protocol <i>Joseph J. Schreiber, MD, Hospital for Special Surgery, New York, NY</i>
12:46pm–12:48pm	Discussion	1:20pm–1:22pm	Discussion
12:48pm–12:52pm	Interobserver Reliability In The Measurement Of Hand Compartment Pressures <i>Justin C. Wong, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA</i> *Presented by Michael M. Vosbikian, MD	1:22pm–1:28pm	<b>Resident/Fellow Travel Grant Award</b> Targeting Skeletal Metastases Using HPMA Copolymer Nanoparticle Delivery And Retention <i>Alexander B. Christ, MD, Hospital for Special Surgery/Memorial Sloan Kettering Cancer Center, New York, NY</i>
12:52pm–12:54pm	Discussion		
12:54pm–12:58pm	Go To General Session Room	1:28pm–1:30pm 1:30pm–1:36pm	Discussion Red Cell Distribution Width: An Unacknowledged Predictor Of Mortality Following Revision Arthroplasty <i>Pouya Alijanipour, MD, The Rothman Institute, Thomas Jefferson University, Philadelphia, PA</i>

### General Session 17 — Mixed Topics

Moderator: Adam J. Rana, MD

12:58pm–1:04pm	Elevated Hemoglobin A1C Levels Correlate With Blood Glucose Elevation In Diabetic Patients Following Local Corticosteroid Injection In The Hand: A Prospective Study <i>Pedro K. Beredjiklian, MD, The Rothman Institute, Philadelphia, PA</i> *Presented by Nayoung Kim, BS	1:36pm–1:38pm 1:38pm–1:44pm	Discussion Medicare Audits: Are We Hurting Our TKA Patients? <i>David A. Iacobelli, MD, The Center For Advanced Orthopedics at Larkin Hospital and Arthritis Surgery</i>
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*Research Foundation, South Miami,  
FL*

*\*Presented by Jesus M. Villa, MD*

1:44pm–1:46pm	Discussion
1:46pm–1:52pm	Modern Tapers Are More Flexible: A Mechanical Analysis Of THA Trunnion Designs <i>David A. Porter, MD, NSLIJ-Lenox Hill Hospital, New York, NY</i>
1:52pm–1:54pm	Discussion
1:54pm–2:00pm	Surgical Case Order In Total Joint Arthroplasty Has No Effect On Infection Risk <i>Antonia F. Chen, MD, MBA, The Rothman Institute, Philadelphia, PA</i>
2:00pm–2:02pm	Discussion
2:10pm–3:00pm	<b>Scientific Poster Session</b> (Poster Presenters Available) ( <i>Ritz-Carlton Ballroom Foyer</i> )
3:00pm–4:00pm	<b>Multimedia Education Session</b> ( <i>Ambassador Room</i> )

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## 2014 Scientific Program Abstracts — Thursday

(An asterisk (\*) by an author's name indicates the presenter.)

**Thursday, October 23, 2014**

**General Session 1 — Sports Medicine**

*(Ritz-Carlton Ballroom Salon 1)*

**Moderators:** **Mark J. Lemos, MD**  
**Craig S. Roberts, MD, MBA**

7:05am–7:11am

### **Microfracture Versus Osteochondral Autologous Transplantation For High-Grade Osteochondral Lesions Of The Talus: A Prospective Comparative Analysis**

Sameh A. Labib, MD

Raj H. Shani, MD

Brian Dierckman, MD

Garrison P. Wier, BS

**Purpose:** To prospectively compare outcomes of microfracture and osteochondral autologous transplantation (OAT) for treatment of high-grade osteochondral lesions of the talus (OLT).

**Methods:** During a period from 2000-2009, a prospective investigation was undertaken for all patients identified with high grade, unstable OLT lesions treated with either microfracture or OAT. High grade lesion were defined as talar cartilage lesion that extended to bone. Any cystic lesion deeper than 5 mm or any lesion refractory to previous microfracture were treated with OAT. All other high-grade lesions were treated with microfracture. Patient outcomes were measured using the American Orthopedic Foot and Ankle Society Ankle-Hindfoot Scale (AHS), Visual Analog Scale (VAS) for Pain and Function, and patient reported satisfaction rating.

**Results:** Seventeen patients with OLT were treated with OAT and 31 patients were treated with microfracture. All patients had a minimum of 24 months follow up (OAT - mean followup 42 months (range 24-124 months), Microfracture - mean follow up 39 months (range 24-88 months). There

were no significant differences between the two groups with regards to sex, age, BMI, pre-operative AHS score, pain and function score, lesion size or chronicity of symptoms. Despite having significantly more prior surgeries (76.5% vs 19.4%, p <0.0001). Patients in the OAT group had significantly higher post-operative AHS scores (88.9 vs 79.4, p=0.002) and significantly lower post-operative VAS scores (p=0.0423).

**Conclusions:** Our results demonstrate that treatment of high-grade OLT with OAT leads to improved functional outcomes when compared to microfracture, despite the OAT group predominately involving patients having failed previous microfracture.

**Notes:**

7:13am–7:19am

### **On-Field Performance Of NFL Players Following Return From Concussion**

Neil Kumar, MD

Matthew Chin, MD

Craig O'Neill, MD

Andre Jakoi, MD

Loni Tabb, PhD

Michael Wolf, MD

**Introduction:** Concussion management in the National Football League (NFL) has undergone significant change recently, but there is little data examining their effects on player performance upon return to play. This study examined changes in on-field performance after concussion and the influence of epidemiological factors on performance and return to play.

**Methods:** NFL players active during the 2008 to 2012 seasons were considered. Weekly injury reports identified concussed players. All players played in at least 4 games prior to and after the game of injury within the season. Players who had missed games secondary to another injury or had sustained a second concussion within the same season were excluded. NFL profiles described player characteristics and games missed. Pro Football Focus (PFF) performance scores determined player ratings. Two-sided t-tests and both univariate and multivariate logistic regression models were used.

**Results:** 131 concussions in 124 players qualified for this study. 55% of players missed no games. Pre-injury performance was similar to post-injury performance in players without games missed and in players who missed at least 1 game. Age, BMI, experience, and previous concussion did not correlate with changes in post-injury performance scores. Older, more experienced players and players with late-season concussions were more likely to return to play without missing games. Odds of missing no games increased by 20% for each additional career year and by 35% for each additional game played within the season before injury.

**Discussion/Conclusion:** No difference in player performance following concussion was found whether return to play was immediate or delayed. Return without missing games may be influenced by player age, experience, and timing of injury within a season. NFL players exposed to repeated, high-impact contact football are able to achieve pre-injury levels of on-field performance following concussion once determined safe for return to play.

**Notes:**

7:21am–7:27am

**EOA/OREF Resident/Fellow Travel Grant Award**

**Suture Anchor Behavior In The Setting Of Rotator Cuff Footprint Decortication**

Adam E. Hyatt, MD

Kyle Lavery, MD

Christopher Mino, BS

Aman Dhawan, MD

**Background:** Suture anchor fixation continues to play an important role in rotator cuff repair. Mechanical failure at the bone-anchor interface can result in suture anchor loosening, migration, and pullout. Tears of the rotator cuff are highly prevalent in older patients, a population that has pervasive osteopenia and osteoporosis. Poor bone quality in this population may increase the likelihood of pull out, and as such fixation may depend even more heavily on an intact cortex. Some authors advocate removing cortical bone to obtain bleeding to optimize healing potential. To our knowledge there have been no previous studies that identify the consequence, if any, of violating the cortical shelf when preparing the humerus for suture anchor repair.

**Methods:** Demographic information and bone mineral density was obtained for twenty fresh frozen human humeri. After appropriate preparation, suture anchors were placed in a predetermined location in a decorticated and non-decorticated setting. Two decorticated and one control had to be eliminated due to fracture and implantation compromise. Decortication depth was analyzed using digital image analysis. Anchors were tested under physiologic cycling followed by a load to failure. The number of cycles, failure mode, stiffness and final pullout strength was recorded. A Welsh t test was used to compare the biomechanical properties of the decorticated and non-decorticated groups. Further statistical analysis was used to identify any correlations between age, sex, and bone mineral density.

**Results:** The mean of final pullout load of the non-decorticated was  $244.03570 \pm 89.05671$  (n=20), while the mean of the decorticated humeri was  $62.83496 \pm 38.04056$  (n=18). This resulted in an ultimate failure load statistically significantly higher in the decorticated group. Overall, positive correlations were found between gender and load to failure.

**Conclusion:** In this human cadaver model, decortication of the rotator cuff footprint significantly decreases the pullout strength of the suture anchor, which may lead to failure of the repair. In addition to other patient related factors, gender may play a role in bone-anchor biomechanics and should be considered during repair.

**Discussion:** Our understanding of the biomechanics and optimal healing environment for suture anchor fixation in arthroscopic rotator cuff repair continues to evolve. This study provides a greater understanding of the effect of violating the cortex and according to our results caution should be taken when preparing the rotator cuff footprint.

**Notes:**

7:29am–7:35am

## Safety Of The Trans-Pec (East) Portal: An Anatomic Study

Albert S. Dunn, DO

Stephanie C. Petterson, MPT, PhD

Kevin D. Plancher, MD

**Introduction:** Unique to the all-arthroscopic Latarjet procedure is the required trans-pectoralis major (East) portal created medial to the level of the coracoid. There is great concern when making portals medial to the coracoid for fear of damaging vital structures (e.g. brachial plexus). The purpose was to assess the proximity of neurovascular structures in a layered approach during East portal placement and to establish a safe-zone for portal placement medial to the coracoid for arthroscopic-Latarjet-type procedures.

**Methods:** Five, fresh frozen cadaveric torsos (10 shoulders) were mounted in a modified beach chair position. Four portals (standard posterior and three anterior: Central, West, East) were utilized as described by Boileau. A 20-gauge spinal needle was inserted along the path of the East portal to the lateral tip of the coracoid, superficial to the conjoined tendon and pectoralis minor and a second directed toward the medial base of the coracoid penetrating pectoralis minor. Distances

to surrounding neurovascular structures were performed with digital-calipers in superficial and deep planes. Anatomic variations were analyzed, assessing side-to-side differences using a paired-samples t-test.

**Results:** No structures were damaged. A safe zone for East portal origin was identified 45–50mm distal and 30–35mm medial to the coracoid, a minimum distance 10mm to the lateral pectoral nerve. In the superficial plane, the cephalic vein was  $4.63 \pm 1.91$  mm and the lateral pectoral nerve was  $9.36 \pm 2.60$  mm from the needle. In the deep plane, the axillary nerve was  $24.87 \pm 7.39$  mm, lateral cord of brachial plexus  $25.49 \pm 8.07$  mm, axillary artery  $34.13 \pm 6.05$  mm and the musculocutaneous nerve  $42.22 \pm 9.20$  mm from the needle. No significant differences were found between right and left arms (all p-values > 0.09).

**Discussion and Conclusion:** The medial trans-pectoralis major portal is safe for the arthroscopic-Latarjet procedure. Identification of a safe zone for East portal placement medial to the tip of the coracoid allows for a successful procedure without compromise to any vital neurovascular structures.

**Notes:**

7:37am–7:43am

## Resident/Fellow Travel Grant Award

### Accessory Medial Portal For ACL Reconstruction: Safe Zone To Avoid Complications

Jeffrey Alwine, DO

Kevin D. Plancher, MD

Stephanie C. Petterson, MPT, PhD

The infrapatellar branch of the saphenous nerve (IBSN) is located in a region that makes it susceptible to injury during open and arthroscopic surgical cases especially with use of an Accessory medial portal (AMP) during anterior cruciate ligament (ACL) reconstruction. The goal of this study

was to identify a safe zone for the use of an AMP in ACL reconstruction and to avoid complications associated with the IBSN. We hypothesized with increased knee flexion angle, there will be less risk to the IBSN when creating an AMP. 18 cadaveric, fresh-frozen, match paired knees were used for dissection to identify all branches of the IBSN. The 30° arthroscope was used to make 3 medial portals; Central medial (CMP), Intermediate medial portal (IMP) and AMP were marked with 18 gauge spinal needles at three flexion angles (60°, 90°, 110°). Safe zones were meticulously defined by reference points made by the IMP, AMP and medial border of the patellar tendon. It was noted if a branch of the IBSN pierced these zones or if a needle pierced the nerve and if any commonly Two branches, superior and inferior, of the IBSN were found in all specimens as previously described. The AMP at 60° was the closest portal to the IBSN (5.63 mm ±5.00). The AMP was significantly further from the superior IBSN 110° compared to 60° (p=0.012). The superior IBSN was pierced most frequently at the AMP at 60° (60% of specimens) and not pierced at 90° and 110°. The amount the zones were pierced was significant between 60° and 110° (p=0.002). Therefore a safe zone at 110° of flexion can be described proximal to 11.34 mm distal to the inferior pole of the patella and 25.23 mm medial to the patellar tendon. The IBSN is at the greatest risk for injury when creating an AMP at 60° of knee flexion and flexion to 110° greatly improves the safety of the AMP during ACL reconstruction. We caution use of an AMP at lower flexion angles because of the risk of nerve injury.

**Notes:**

**Thursday, October 23, 2014**

**Rapid Fire Session 2A — Sports Medicine (Station A,  
Plaza Ballroom 1)**

**Moderator: Anil S. Ranawat, MD**

9:45am–9:49am

## Pediatric Shoulder Dislocation Resulting In Rotator Cuff Tear And Osteonecrosis

Matthew A. Tao, MD

Grant E. Garrigues, MD

Alison P. Toth, MD

**Introduction:** Case presentation of a 16 year-old male who sustained a traumatic rotator cuff tear after posterior shoulder dislocation of his dominant arm, which remained unreduced for 2 days. Following open reduction and rotator cuff repair, he presented to our institution 1 year later with a recurrent massive tear and osteonecrosis of the humeral head. He had significant pain, a documented axillary neuropathy and poor overall function.

**Methods:** Following diagnostic arthroscopy, core decompression was performed under fluoroscopic guidance. Autologous iliac crest bone graft was used to fill the void, and a cortico-cancellous plug of iliac crest allograft was placed into the cortical defect. Rotator cuff revision was then performed with a porcine extracellular matrix scaffold. Although a preoperative aspirate was negative, 2 intraoperative cultures were positive for coagulase negative staphylococcus. Infectious Disease was consulted, and the patient received 6 weeks of IV Nafcillin. He subsequently had overgrowth of the bone plug causing mechanical symptoms and ultimately a small recurrent tear. He underwent bony debridement and revision rotator cuff repair 8 months from our initial surgery.

**Results:** He will be 2 years out at the time of presentation and has done incredibly well. He had an extended course of physical therapy and has continued to work independently on motion and strengthening. He is completely pain-free. Axillary neuropathy has resolved, and his strength in all planes has improved dramatically.

**Discussion and Conclusion:** This represents a unique and challenging case that initially devastated an otherwise healthy teenager. It brings to light the dangers of prolonged dislocation as well as an innovative surgical solution. It also high-

lights the broader utility of such xenografts as this is underappreciated as a viable option for massive rotator cuff tears.

*\*The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).*

**Notes:**

9:51am–9:55am

## Antegrade Versus Retrograde Bone Marrow Stimulation Techniques As A First Line Treatment Of Symptomatic Osteochondral Lesions Of The Talus (OLT)

Sameh A. Labib, MD

Michael D. Smith, MD

Garrison P. Wier, BS

**Background:** Treatment of osteochondral lesions of the talus (OLT) remains controversial. The purpose of this study was to prospectively compare outcomes of marrow stimulation using microfracture techniques and retrograde drilling for treatment of symptomatic osteochondral lesions of the talus.

**Methods:** During a ten-year period, a prospective investigation was undertaken for all patients identified with Talus OLT treated with either antegrade marrow stimulation /microfracture or retrograde drilling. Patient outcomes were measured with use of the American Orthopedic Foot and Ankle Society Ankle-Hindfoot Scale (AHS), Linkert Scale for Pain and Function, and overall satisfaction rating.

**Results:** From 2000 to 2010, 63 patients with OLT met the inclusion criteria. 45 patients underwent antegrade marrow stimulation/ Microfracture and 18 retrograde drilling. Duration of symptoms averaged 37 months. Preoperative AHS averaged  $61 \pm 12$  (17-87) in the antegrade cohort and  $64 \pm 40$  (8-84) in the retrograde cohort. Postoperative AHS averaged  $79 \pm 17$  (14-100) in the antegrade cohort and  $85 \pm 57$  (57-100) in the retrograde cohort. There was no significant difference in the change in between the preoperative and postoperative AHS between the two cohorts  $p=0.69$ . Linkert Scale for pain

preoperatively averaged  $7 \pm 2$  for both cohorts and postoperatively averaged  $3 \pm 3$  ( $p=0.80$ ). Linkert Scale for function preoperatively averaged  $5 \pm 2$  for both cohorts and postoperatively averaged  $8 \pm 2$  for both cohorts ( $p=0.94$ ). 31/44 (70.5%) of patients in the antegrade cohort were satisfied with their surgery compared to 14/18 (77.8%) of patients in the retrograde cohort ( $p=0.56$ ) Average follow-up for the antegrade cohort was 39.0 months (12-118 months). Average follow-up for the retrograde cohort was 43.6 months (6-105 months). Failure of treatment was defined as a patient undergoing subsequent surgery including osteochondral autograft transplantation (OAT) procedure or repeat marrow stimulation. 1/18 (5.5%) patients in the retrograde cohort underwent subsequent OATs and 10/45 (22.2%) in the antegrade underwent subsequent surgery. Of the 11 lesions that failed marrow stimulation procedure, 2 were larger than 150mm<sup>2</sup>.

**Conclusions:** No significant difference in outcome was seen in patients treated with antegrade marrow stimulation when compared to retrograde marrow stimulation, however retrograde marrow stimulation had less failures and required significantly less redo surgery

**Notes:**

9:57am–10:01am

## Surgical Treatment Of Symptomatic SLAP Tears In The Middle-Aged Patient

John A. Erickson, MD

Kyle Lavery, MD

James T. Monica, MD

Aman Dhawan, MD

Charles Gatt, MD

**Introduction:** Successful arthroscopic repair of symptomatic superior labral tears in young athletes has been well documented by a number of authors. As arthroscopic shoulder procedures become increasingly more common, the practice of SLAP repair in older patients has become controversial, with concerns for residual postoperative pain, stiffness, and higher rates of revision surgery.

**Methods:** The MEDLINE database was systematically searched using key terms to find articles related to SLAP tears. Nineteen studies were considered relevant, meeting the following criteria: the study contained a minimum of one group of patients who had undergone arthroscopic repair of a Type II or IV SLAP lesion with minimum two year follow-up, the paper was an original article and not a review itself, objective and/or functional scoring systems were used to evaluate post-operative outcomes, and there was a mean patient age of 40 years of at least one treatment arm of the paper or one subgroup analysis.

**Results:** Review of the available literature revealed mixed results. While many authors report equivalent outcomes of SLAP repair in patients over forty with those under forty, others demonstrate significantly higher failure rates in the older cohort. When concomitant rotator cuff tears are present, the evidence favors debridement or biceps tenotomy over SLAP repair.

**Conclusion:** Analysis of the literature reveals mixed evidence concerning the treatment of symptomatic SLAP tears in the active, middle-aged population. While many authors suggest excellent results can be obtained with SLAP repair in this cohort, several show age as a risk factor for surgical failure. The majority of available evidence supports labral debridement or biceps tenotomy over SLAP repair when concomitant rotator cuff pathology is present.

**Notes:**

10:03am–10:07am

## Analysis Of Anchor Placement For Bankart Repair: Trans-Subscapularis Versus Inferior Rotator Interval Portal

Ehsan Jazini, MD

\*Brian Shiu, MD

R. Frank Henn III

Seyed A. Hasan

**Introduction:** Failure of an arthroscopic Bankart repair is multifactorial. Suture anchor penetration through the far cor-

tex may compromise the initial biomechanical characteristics of anchor stability, which may in turn compromise initial repair integrity. We sought to test the hypothesis that placing the suture anchors through a transsubscapularis (TS) portal versus a low anterior inferior rotator interval portal (AI), will lead to a decreased rate of suture anchor perforation and increased biomechanical stability of the anchors in a cadaveric shoulder model.

**Methods:** 20 fresh-frozen bilateral human shoulder cadaveric specimens (10 matched pairs) were randomized to either an AI or TS portal for placement of suture anchors at the 3 o'clock and 5:30 position. After soft tissue dissection that following outcome measures were recorded: 1) distance from the portal to the cephalic, 2) the presence and length of suture anchor penetration through the inferior glenoid rim 3) the ultimate failure strength of the suture anchors.

**Results:** The mean portal to cephalic vein distance in AI versus TS group was 29.9 mm versus 11.2 mm respectively ( $p < 0.05$ ). The rate of suture anchor perforation at the 5:30 position through the AI was 60 percent versus 10 percent through the TS group ( $p < 0.05$ ). Mean suture anchor perforation at the 5:30 position through the AI was 4.4 mm versus 0.6 mm through the TS group ( $p < 0.05$ ). At the 3:00 position mean suture anchor perforation was 0 mm versus 0.6mm in the AI and TS groups respectively ( $p=0.36$ ). The mean pullout strength at the 5:30 suture anchor in the AI group was 112.6 N versus 132.8 N in the TS group ( $p= 0.18$ ). The mean pullout strength at the 3:00 suture anchor in the AI group was 124.9 N versus 124.1 N in the SI group ( $p= 0.85$ ).

**Discussion and Conclusion:** Although the cephalic vein is closer when utilizing the TS portal, it is still a safe distance away from it. There was a lower rate of anchor perforation in the TS portal group for the most inferior anchor (5:30 position), but not at the 3 o'clock position. We did not find a significant difference in the biomechanical rigidity of suture anchors between the two groups. The TS portal allows for improved positioning of the inferior-most anchor.

**Notes:**

10:09am–10:13am

## Platelet-Rich Plasma Can Successfully Treat Elbow Ulnar Collateral Ligament Insufficiency In High-Level Throwers

Phillip N. Williams, MD

Joshua S. Dines, MD

Neal ElAttrache, MD

Stan Conte, PT, DPT, ATC

Todd S. Tomczyk, ATC

Daryl Osbahr, MD

David M. Dines, MD

James P. Bradley, MD

Christopher S. Ahmad, MD

**Purpose:** The purpose of this study was to evaluate the effect of platelet rich plasma injections for partial ulnar collateral tears in high-level throwing athletes.

**Methods:** This was a retrospective review of 44 baseball players (6 professional, 14 college, and 24 high school) treated with platelet rich plasma injections for partial thickness ulnar collateral ligament tears. All tears were diagnosed by physical exam and confirmed by magnetic resonance imaging. Sixteen patients had one injection; six had two injections; and twenty-two had three injections. Post-injection, patients were started on an interval throwing program when they were asymptomatic. Final follow-up was conducted by physical examination and results were classified according to a modified version of the Conway Scale.

**Results:** The average age was 17.3 years (range: 16-28). All patients were available for follow-up at an average of 11 months after injection. Fifteen had an excellent outcome (34%); 17 good; 2 fair; and 10 poor outcomes. Four of the six (67%) professional players returned to play professionally after the injection. Twenty-two patients had proximally-based partial thickness tears; 7 had distally-based partial tears; and 15 were classified as ligament sprains. The average time to return to throwing post-injection was 5 weeks, and the average time to return to competition was 12 weeks (range: 5-24 weeks). There were no complications related to the injections.

**Conclusions:** The use of PRP to treat UCL insufficiency in this report provided much better results than those previously published on the conservative treatment of these injuries. PRP injections may be particularly beneficial in young athletes who have acute damage to an isolated part of the ligament, and in those athletes who are unwilling or unable to undergo

the extended rehabilitation required after surgical reconstruction of the ligament.

### Notes:

Thursday, October 23, 2014

Rapid Fire Session 2B — Total Knee (*Station B, Plaza Ballroom 1*)

Moderator: Amar S. Ranawat, MD

9:45am–9:49am

## Total Knee Arthroplasty In Patients With Hardware In Situ: How These Patients Do In Short-Term?

Camilo Restrepo, MD

Jonathan Beri, BS

Jeffery Oliver, BS

Raj G. Patel, BS

William V. Arnold, MD, PhD

Mohammad R. Rasouli, MD

Javad Parvizi, MD, FRCS

**Introduction:** Post-traumatic knee osteoarthritis necessitating total knee arthroplasty (TKA) is inevitable in some patients with history of knee surgery or injury. There is lack of information about outcome of TKA in these patients. The present study aims to evaluate short-term complication and survival of knee prosthesis in patients with previous knee surgery undergoing TKA.

**Methods:** Preoperative and postoperative radiographs of patients who had undergone TKA from 2007 to 2012 were reviewed to identify those patients who had any type of hardware in situ before TKA. These patients were included in the study and those with follow up of less than 6 months were excluded. These patients were matched in a 1:2 ratio for age, gender, and surgeon with patients who underwent TKA in the same year. Rate of complication and survival of the prosthesis was compared between the two groups.

**Results:** A total of 55 cases with hardware in situ and 110 cases without hardware who underwent TKA were included. The incidence of complications was higher, albeit not statistically significantly, in the post-traumatic group compared to control. The incidence of arthrofibrosis was 7.8% in the hardware group versus 1.8% in the controls, manipulation under anesthesia for stiffness (9.1% versus 7.3%), surgical site infection/periprosthetic joint infection (10.9% versus 4.5%), revision for any reason (4.6% versus 3.6%), presence of pain around the knee (4.6% versus 3.6%), mechanical complication of the implant (5.5% versus none), wound complications (1.8% versus 0.9%). Survival analysis failed to show any significant difference between two groups in term of survival free of revision and complications.

**Discussion and Conclusion:** It appears that presence of hardware around the knee and the underlying diagnosis of post-traumatic arthritis predisposes these patients to higher incidence of all time complications following TKA. We believe the small sample size may have been responsible for the difference in these complications not reaching statistical significance.

**Notes:**

by a single surgeon from September 2012 through October 2013. In this cohort, patients who received TXA were compared to patients who did not receive TXA. Patients that did not receive TXA (n=100) had a TKA using a tourniquet inflated to 250 mm Hg prior to incision and deflated prior to closure. In addition, these patients had a drain. Patients in the TXA group (n=69), underwent a TKA without a tourniquet and no drain was used. Patients treated with TXA received 3g of TXA diluted in 45cc of NaCl applied topically to exposed tissue surfaces and was left in contact with the surfaces for 5 minutes prior to irrigation and closure. Patients with a past history of bleeding disorder, thromboembolic disorders, allergy to TXA, cardiac stents, renal or liver diseases were not given TXA. Transfusions were administered based on institutional guidelines including Hgb < 7, Hgb < 10 with cardiac history or symptomatic acute blood loss anemia.

**Results:** The mean calculated blood loss in was 580ml (SD: ± 500; Range 30 to 2770ml) in the control group and 340ml (SD: ± 238; Range 11 to 1951ml) in the TXA group. Seventeen patients (17%) in the control group and 2 patients (2.9%) in the TXA group received transfusions post-operatively. 2 patients in each group were diagnosed with a pulmonary embolus requiring treatment.

**Conclusions:** We found TXA to significantly decrease post-operative blood loss and transfusion rate. Our study is under-powered to detect a statistically significant difference in complication rates. However, we found no difference in the rate of symptomatic DVT/PE.

*\*The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).*

**Notes:**

9:50am–9:54am

## Pragmatic Approach To Decreasing Blood Loss In Total Knee Arthroplasty

David J. Mayman, MD

\*Kaitlin M. Carroll, BS

Joseph Maratt, MD

Seth A. Jerabek, MD

**Introduction:** Tranexamic acid (TXA) has demonstrated benefit in general surgery with reduction in post-operative blood loss. However, there is limited literature supporting the use of TXA in orthopaedics.

**Methods:** We retrospectively reviewed 169 patients that underwent a unilateral primary total knee arthroplasty (TKA)

9:55am–9:59am

## Previous Periprosthetic Joint Infection Predicts Infection After New Primary Arthroplasty

Jorge Manrique, MD  
 Benjamin Zmistowski, MD  
 Anthony T. Tokarski, BS  
 Camilo Restrepo, MD  
 Hany S. Bedair, MD  
 Nitin Goyal, MD  
 Gregory K. Deirmengian, MD

**Introduction:** Periprosthetic joint infection (PJI) is a dreaded complication with high morbidity and mortality. It is well-known that patients treated for PJI have a high-risk of repeat infection in that joint. However, after effective management of PJI, patients often present with end-stage arthritis deserving total joint arthroplasty (TJA) in a distant joint. Unknown to the community is the risk of subsequent PJI in the distant joint. Therefore, this study attempts to identify this risk.

**Methods:** The institutional PJI database was utilized to identify patients that were treated for PJI from April 2000 to July 2012. This was then cross-referenced with the institutional arthroplasty database to identify those patients that underwent primary TJA after management of PJI. The incidence of subsequent PJI in the new joint was then determined and the relationship between the infecting organisms was analyzed.

**Results:** Thirty-one patients underwent primary TJA at a mean of 1,110 days (range: 113-4,770) after management of PJI in a distant joint. Four of these patients (12.9%; 4/31) went on to develop PJI in the new joint at a mean of 400 days (range: 24-1,093) after TJA. Two of these patients (6.4%; 2/31) were infected with the same pathogen in both joints (24 and 68 days post-arthroplasty).

**Conclusion:** A history of PJI in a distant joint increases the risk of infection in a new prosthetic joint. While patient factors likely play a role in this increased risk, the persistence of a sub-clinical infection does appear to complicate a new arthroplasty. Patients in this scenario must be counseled of their increased risk.

### Notes:

10:00am–10:04am

## Reasons For Revision Of Single Radius And Multi-Radius Total Knee Designs

Danielle Campbell, MS  
 \*Eric L. Smith, MD  
 Kirby Hitt, MD  
 Fabio R. Orozco, MD  
 Kristin Robinson, MS

**Introduction:** The incidence of revision total knee arthroplasty (TKA) continues to increase each year, with the primary reasons for revision being infection, instability, loosening, and polyethylene failure. The objective of this study was to review reasons for revision evaluated against different implant design philosophies.

**Methods:** One hundred and seventy-seven revision TKA patients enrolled in a prospective, post-market, multicenter study were evaluated preoperatively. A subset of 79 cases from the total population were further extrapolated into two groups based on previous implant manufacturer design; single-radius (SR) and multi-radius (MR). Patient demographics, outcomes and previous implant information were collected and analyzed.

**Results:** In the total study population, the primary reason for revision was tibial component failure. Within the subset of patients, the SR group was revised for infection (23.7%) and the MR group was revised for global instability (31.7%). Further differences were noted in anterior-posterior (AP) stability, with a larger number of patients in the MR group having >10mm of AP stability at 0°, 30°, and 90° as well as with mediolateral (ML) stability at 90°. There were no differences in patient demographics, initial diagnosis, comorbidities, or patient reported outcomes.

**Discussion and Conclusion:** As the number of TKA procedures increases every year, the incidence for revision will also increase. Studies have shown that aseptic failure, infection, and instability remain the top reasons for revision. Revisions for infection could be attributed to improper wound healing, poorly vascularized tissue, and/or a compromised metabolic state of the patient, all of which are not attributed to the design of the implant. The higher incidence of instability in the MR group was also accompanied by component failures and malalignment, suggesting instability is a multifactorial classification for revision.

### Notes:

10:05am–10:09am

## Postoperative Fever After Total Joint Arthroplasty: Use Of A Simple Medical Workup To Avoid Delayed Discharge

Patrick W. Kane, MD  
Zachary D. Post, MD  
Fabio R. Orozco, MD  
Alvin C. Ong, MD

**Introduction:** Postoperative fevers are a common occurrence following total joint arthroplasty (TJA). With more emphasis on accelerated recovery and shorter length of stay (LOS), postoperative fever has implication for discharge planning and cost. The aims of our study were to determine which patients were at risk of developing postop fever and to investigate the usefulness of a simple, relatively inexpensive, fever workup.

**Methods:** Under IRB approval we retrospectively reviewed all TJA patients between June 2010 and June 2011. 745 patients were identified. Of these, 137 patients were 55 or younger (Group A), 353 were 56-69 (Group B), and 258 were 70 or older (Group C). There were 455 females and 290 males. The surgical technique, anesthesia, and postoperative management of all patients was identical. Fever workup was performed in all patients with temperature >100.4. Workup included surgical site examination, chest x-ray, urinalysis, blood culture, and venous duplex. Patients were allowed discharge if the workup was negative. Incidence, findings on workup, and LOS were analyzed.

**Results:** 251 patients developed a postoperative fever for an incidence of 34%. Group B had a significantly higher incidence of postop fever ( $p=0.01652$ ). Accounting for all patients, males were more likely to develop fever ( $p=0.02591$ ). There was no association between postop fever and complications. There was no correlation between fever and findings on the medical workup. LOS was not increased by the occurrence of fever in any group.

**Discussion and Conclusion:** We found an increased incidence of postoperative fever in the middle age range for joint patients and in males. Postoperative fever was not associated with infection or any other postoperative complication. The use of our simple workup likely prevented increased length of stay secondary to postoperative fever after TJA.

**Notes:**

10:10am–10:14am

## Technological Advances: The Learning Curve Effect

David A. Iacobelli, MD  
\*Jesus M. Villa, MD  
Carlos J. Lavernia, MD  
Mark D. Rossi, PhD, PT

**Introduction:** We describe the “learning curve” of a novice surgeon in terms of the time required to perform total knee replacements (TKRs) in models using the electromagnetic (EM) navigation system and the conventional jig-based mechanical method.

**Methods:** Forty-eight TKR simulations were performed (24 using each method) on bone models. The mean time to perform the surgery in the EM group was significantly longer ( $p$  less than 0.001) compared to the time of the mechanical group. A fifth year orthopedic resident performed all simulated procedures. A graphical model (time vs. trial number) of the learning curve was prepared. For the statistical analyses t-test, ANOVA and coefficient of variation were used.

**Results:** We observed three distinct trends within the resultant curve of the EM group ( $p=0.006$ ). The initial eleven trials showed a decelerating trend due to decreasing surgical times on various successive trials (slope=-0.0016); the middle ones had an almost flat curve due to similar times (slope=-0.0001); the remaining seven had a variable curve (slope=-0.0004). On average, significantly more time was spent performing the initial eleven trials than performing the middle or the final ones ( $p=0.008$  and 0.046, respectively).

**Discussion and Conclusion:** To a novice surgeon, it takes up to 11 trials to “learn” the EM system and to perform it consistently in less time. Novice surgeons should thoroughly familiarize with new techniques and practice with models or cadavers before performing operations on patients.

**Notes:**

Thursday, October 24, 2014

**Rapid Fire Session 2C — Total Hip (Station C,  
Ritz-Carlton Ballroom Foyer)**

**Moderator:** Javad Parvizi, MD, FRCS

9:45am–9:49am

## **Cost-Analysis Of The Use Of Tranexamic Acid To Prevent Major Bleeding Complications In Hip And Knee Arthroplasty Surgery**

James Slover, MD, MS  
Joseph A. Bosco III, MD

**Introduction:** Arthroplasty procedures are common, and projected to grow rapidly over the next 25 years. As a result, efforts to reduce the costs associated with these procedures are paramount in order to preserve access and adequate funding for these procedures. Blood transfusion is a relatively common occurrence after total knee arthroplasty but is associated with a number of potentially negative outcomes and can add significant cost to the overall episode of care.

**Methods:** We constructed a Markov decision model to evaluate the impact of any effect of tranexamic acid use on blood transfusion rates on the cost of hip and knee arthroplasty procedures. The impact of any secondary effect on revisions on cost was also assessed with the model. The cost of tranexamic acid treatment and blood transfusion was taken from charge data at our institution.

**Results:** The larger the impact of tranexamic acid on transfusion or revision rates, the more likely its use is to be cost saving. If the baseline transfusion rate is less than 25%, then the routine use of tranexamic acid to reduce blood transfusion will not be cost saving, unless it reduces the revision rate.

**Conclusions:** Even a modest reduction in revision rates will make tranexamic acid very likely to be cost saving. The cost saving will come from a reduction in transfusion rates, provided the baseline rate is above threshold levels for the reduction found.

**Notes:**

9:51am–9:55am

## **MIS Posteriorlateral Total Hip Arthroplasty: Do We Need 6 Weeks Of Hip Precautions?**

Brett Frykberg, MD  
Friedrich Boettner, MD, PC  
Tom Schmidt-Braekling, MD  
Erol Akalin  
Wenzel Waldstein, MD  
Pablo Benavente, MD, PhD

**Background:** Postoperative hip dislocations have been reported in 0.5% to 15% of patients after posterolateral total hip arthroplasty (THA). Hip precautions are currently recommended for 6 weeks postoperatively to reduce early dislocation and facilitate healing of the posterior soft tissue repair.

**Methods:** To determine the effect of reduced 4 week precaution protocol on the dislocation rate we retrospectively studied a consecutive single-surgeon series of patients undergoing primary THA between September 2008 and December 2012 performed by the senior author (n=815 hips). All patients had a standard THA using a posterior approach with posterior soft tissue repair and 28-36mm heads. We included 698 patients with 797 hips in the study.

**Results:** There were eight dislocations in 797 hips in the first 12 months with 4 weeks of hip precautions (1.00%). Ten patients (10 hips) lost to follow-up, consequently the follow up rate is 98.7%. The average age at the time of dislocation was 58.8 years. (range 35-83 years). The average time to dislocate was 7.5 weeks after surgery (range 1.0 to 16.9 weeks), two dislocations (25%) took place in the first 4 weeks. three of the eight patients (38%) had a traumatic dislocation.

**Conclusions:** Reducing standard posterolateral hip precautions from 6 to 4 weeks after surgery does not increase the risk for postoperative dislocation.

**Notes:**

9:57am–10:01am

## The Reliability of Modern Alumina Bearings in Total Hip Arthroplasty

Gwo-Chin Lee, MD

**Introduction:** Ceramic components clinical fractures in total hip arthroplasty (THA) are rare but nonetheless serious complication. As a result of continued improvements in ceramic material quality, manufacturing methods, and implant design made over the last 30 years the incidence of such failures has drastically. In this report we will examine the frequency of these ceramic component clinical failures in THA. In order to get a complete picture we contacted the largest supplier of these components, and they agreed to share their most recent data.

**Materials:** In the year 2000, the largest supplier of alumina ceramic bearings for orthopaedic applications, began a rigorous program of collecting clinical fracture data for all of its ceramic components. The clinical fracture data for the period of January 2000 to June 2013 are reported here, with a review of the material properties, historical component fracture trends, and relative risk of fracture associated with alumina THA bearings.

**Results:** The data reported is divided into two separate groups. The first one is the incidence of clinical fracture of *forte* material. This is the original material developed in the 1970's and optimized over the years. The overall clinical fracture rate of these alumina components is 0.021 percent, or 21 in 100,000 during the January 2000 to June 2013 time period. The second group is composed of components manufactured from their Alumina Matrix Composite, *delta*. The overall clinical fracture rate for these components is 0.0001% or 1 in 100,000. Almost 80% of these alumina bearing failures occurred within 36 months following surgery. Increasing femoral head diameter was associated with a substantially reduced risk of fracture.

**Discussion:** Alumina bearings used in modern THA implants are safe and reliable, with a very low risk of failure. Improvements in the materials, developments in the manufacturing, the introduction of the Alumina Matrix Composite and the trend to utilize larger diameter ball heads are likely to drastically reduce the concerns that have been in the mind of surgeons using ceramics in THA.

**Notes:**

10:03am–10:07am

## Sexual Activity In Patients Undergoing Primary Total Hip Arthroplasty

Carlos J. Lavernia, MD

Jesus M. Villa, MD

David A. Iacobelli, MD

**Introduction:** Difficulty having sex is not usually used as a prime indication for THA. In addition, traditional hip scoring systems ignore that facet of life. Our purpose was to study the prevalence of sexual limitations in patients who underwent primary THA and the patient's rate of response to the topic.

**Methods:** A pre-intervention survey including the question on sexual activity was conducted before surgery on 358 consecutive patients undergoing THA due to primary/secondary osteoarthritis. Mean age was 66 years (58% females). Patient characteristics evaluated included age, gender, race, ethnicity, educational level, marital status, and religion. Pearson Chi-Square and Fisher's Exact Tests were used for statistical analyses.

**Results:** 294 patients (82%) answered. Among them, 234 (80%) were sexually active including 197 (84%) who reported sexual limitations. 28% of patients aged more than 70 years avoided to answer while only 7% of those aged less than 50 years did. Compared to males, a higher proportion of females did not answer the question (8% vs. 25%, respectively). 25% of Hispanics did not answer while only 7% of non-Hispanics did. Patients who only completed elementary education did not answer as frequently (47%) as those patients with high school (19%), college (9%), or graduate education (12%). Compared to patients who widowed (43%), a lower proportion of single, married, and divorced/separated patients avoided the question (18%, 11%, and 16%, respectively).

**Discussion and Conclusion:** A large percent of the patients undergoing THA are sexually active. Hip osteoarthritis significantly limits sexual activity. Surgeons should incorporate questions on the topic and counsel patients prior to surgery. A large percent of patients over 70 years old were not responsive to our inquiry. In addition females, Hispanics, and those with lower education were less likely to respond.

**Notes:**

10:09am–10:13am

## Direct Anterior THA Requires Fewer Acetabular Screws Than Posterior THA

Eric L. Smith, MD  
 Nicholas D. Colacchio, MD  
 Mark Cleary, MD, MPH  
 Daniel Reid, MD, MPH  
 David Trofa, MD

**Introduction:** There is no universal consensus concerning the most effective surgical techniques or the implants to be used during total hip arthroplasty (THA). Considerable research is dedicated to this area, with a focus on identifying methods for improving patient outcomes. The purpose of this study is to evaluate the need for supplemental acetabular cup screw fixation during direct anterior approach THA compared to posterior approach THA.

**Methods:** A retrospective review of all THA's performed by a single fellowship trained total joint surgeon at a tertiary academic medical center between January 2010 and January 2013 identified 136 primary THA's (124 patients). The following variables were analyzed: age, BMI, ASA score, operative side, surgical approach, operative time, estimated blood loss (EBL), blood transfusion, implant design, number of acetabular screws used, offset (high, standard, or coxa vara), cup anteversion, and cup abduction.

**Results:** There were 31 anterior approach and 105 posterior approach primary THA's performed. All patients received the same THA implant system. The average supplemental screw fixation required for the anterior approach was significantly less than that for the posterior group (1.0 vs. 1.9). Patients who underwent an anterior approach had a significantly lower mean BMI than patients who underwent a posterior approach (26.2 kg/m<sup>2</sup> vs. 30.6 kg/m<sup>2</sup>). There were no significant differences in age, gender, operative time, cup abduction, cup anteversion, EBL, or blood transfusions between the two cohorts.

**Discussion and Conclusion:** The number of supplemental acetabular screws needed in THA performed by direct anterior approach was significantly less than when a posterior surgical approach was used. Aside from BMI, there were no significant demographic or surgical differences identified between the groups. Surgeons should consider these factors when deciding which THA approach may be best for an individual patient.

**Notes:**

Thursday, October 23, 2014

Rapid Fire Session 2D — Spine (*Station D, Ritz-Carlton Ballroom Foyer*)

Moderator: Bradford L. Currier, MD

9:45am–9:49am

## Biomechanical Stability Of The Stalif-C Stand-Alone Spacer In Multi-Level And Hybrid Cervical Fusion Constructs

Daniel G. Kang, MD  
 \*Peter Formby, MD  
 LTC Ronald A. Lehman Jr., MD  
 CPT Adam J. Belevino, MD  
 LCDR Robert W. Tracey, MD  
 CPT John P. Cody, MD  
 LT Scott C. Wagner, MD  
 Rachel E. Gaume, BS

**Introduction:** Anterior plate constructs for cervical discectomy and fusion have been linked to post-operative dysphagia, increased operative times, and wider surgical exposures. Several "low profile" integrated stand-alone spacers (SAS) have been developed. While these spacers have demonstrated successful clinical outcomes and similar biomechanical stability to anterior plate constructs in single-level fusions, their biomechanical stability in multi-level constructs has not yet been established.

**Methods:** Twelve human cadaveric cervical spines (C2-T2) were non-destructively tested with a six-degree-of-freedom simulator under axial rotation (AR), flexion-extension (FE) and lateral bending (LB) loading. After intact analysis, each specimen underwent sequential instrumentation and testing: A) C5-6 spacer/plate with C6-7 SAS, B) C5-7 SAS, C) C5-7 spacer/plate. Range of motion (ROM) data was obtained and analyzed with paired t-tests and Bonferroni correction.

**Results:** The 2-level plate construct significantly reduced flexion-extension ROM compared to the 2-level SAS ( $5.6 \pm 3.4$  degrees versus  $11.6 \pm 4.6$  degrees, respectively; p less than 0.05). There was a significantly increased segmental ROM in the 2-level SAS construct compared to the 2-level hybrid construct in flexion-extension as well ( $11.6 \pm 4.6$  degrees versus  $7.2 \pm 2.4$  degrees, respectively, p less than 0.05). There was no significant difference in lateral bending and axial rotation

(p greater than 0.05) between the three different 2-level constructs.

**Conclusion:** Our study found that hybrid and 2-level SAS constructs are comparable to conventional anterior plate constructs in lateral bending and axial rotation, but there was an increase in flexion-extension motion allowed with constructs that incorporated a SAS. Stand-alone cervical spacers with integrated screws for hybrid and 2-level SAS constructs are reasonable alternatives to two level plate fixation; however, clinical trials are necessary to determine if the increased ROM in flexion-extension noted in the SAS constructs translates to clinical outcome.

**Notes:**

9:51am–9:55am

## Finite Element Modeling Accurately Predicts Biomechanics Of Human Lumbosacral Spine

LT Scott C. Wagner, MD

Divya V. Ambati, MS

Edward K. Wright Jr., PhD

LTC Ronald A. Lehman Jr., MD

Daniel G. Kang, MD

Gregory S. Van Blarcum, MD

Anton E. Dmitriev, PhD

**Introduction:** Practical limitations of cadaveric and animal spine studies such as specimen variability, time, and cost require developing a finite-element model (FEM). This study developed and validated an FEM of a complete lumbosacral spine (L1-sacrum) to predict spinal responses in various biomechanical investigations.

**Methods:** Experimentally-determined kinematic responses of the lumbar spine served as the validation tools. Constraints and bending moments replicating the experimental protocols were applied to the model to recreate flexion, extension, lateral bending, and axial rotation; with range of motion and intradiscal pressure values obtained at each loading step.

Material properties reported in the literature were initially incorporated and were later calibrated with the experimental results to provide agreement between the model and experimental responses. In addition to the level-specific comparison of range of motion and intradiscal pressure values with those of previous studies at a given moment, this study evaluated the non-linear response of the model over the entire experimental curve.

**Results:** The moment-rotation curves obtained at each increment paralleled published and in-house experimental curves, proving this finite element model's ability to reproduce non-linear spine behavior.

**Conclusion:** The non-linear 3D FEM presented in this study incorporates the most accurate geometry and material properties to mimic normal spine behavior. The method of calibration provides a means to improve the model performance and establish confidence in the FE prediction accuracy. This technique can be used as a basis for various future FEM studies. This validated FEM is an invaluable tool in computational spine research for predicting potential clinical scenarios, and will continue to be utilized for research simulation purposes.

**Notes:**

9:57am–10:01am

## An 8 Year Trend Analysis Of The Off-Label Use Of BMP In Pediatric Deformity Spine Surgery

Paul D. Kiely, MCh, FRCS (Tr & Orth)

Matthew E. Cunningham, MD, PhD

**Introduction:** The literature regarding the use of BMP in pediatric spine surgery is sparse. Recent studies have reported significant increases in the use of BMP in children during spinal fusion surgery, and determined that BMP use had increased to > 9.0%. This retrospective case series evaluated the proportional trends over time of bone morphogenic protein (BMP) use in pediatric spine arthrodesis at a single institution.

**Materials and Methods:** The electronic medical records and office notes of 1082 children who were  $\leq$  18 years at the time of spinal fusion surgery between July 2006 and July 2013 were retrospectively reviewed for reports of BMP use.

**Results:** One thousand and eighty two children underwent spine fusion during the 8 year study period. Seventy per cent (70%) of the 1082 children had adolescent idiopathic scoliosis (AIS), 15.9% had neuromuscular scoliosis (NMS), 9.6% had syndromic scoliosis (SS), 2.4% had spondylolysis and 2.1% had other diagnoses. BMP was used in 17 of the 1082 (1.6%) cases, and recombinant BMP-2 was the type of BMP used in each case. Of the 1082 cases, BMP was used in 0.1% (1/757) of AIS children, 2.9% (5/172) of NMS children, 1.9% (2/105) of SS children and 34.6% (9/26) of Spondylolysis children. BMP was used in 1.27% of total pediatric spine fusion cases in 2006, 0.81% in 2007, 0.00% in 2008, 0.72% in 2009, 1.31% in 2010, 4.38% in 2011, 1.12% in 2012, and 3.17% in 2013. Of the 17 children who received BMP during their fusion surgery, the male to female ratio was 11 boys to 6 girls. The mean age was 15 years (range 11-18 years). Ten children had BMP given during their primary procedure (average: 8.7 mg), while the remaining 7 children, had BMP used during a revision procedure (average: 11.3 mg) ( $p=0.23$ ). The mean follow up period was 31 months (range: 25 months-90 months). All 17 children who received BMP fused successfully. Three (17.6%) children developed complications - 2 wound infections and a radiculitis, all of which required reoperation.

**Conclusion:** In contrast to recent publications, this study demonstrates that off-label use of BMP in pediatric spine surgery is neither routine nor the “standard of care” in our institution.

*\*The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).*

#### Notes:

10:03am–10:07am

## Does Antibiotic-Loaded Bone Graft Used In Scoliosis Surgery Lead To Superbugs?

Sujal Patel, MD  
Sina Pourtaheri, MD  
Suken A. Shah, MD  
Freeman Miller, MD

**Introduction:** Antibiotic-loaded bone graft has decreased surgical site infections (SSIs) in pediatric scoliosis surgery; however, are decreased infection rates obtained at the expense of creating antibiotic resistance in the community? We reviewed cultured pathogens from SSI cases with and without antibiotic-loaded allograft and determined if there were antibiotic resistant pathogens seen in the antibiotic-loaded group.

**Methods:** 851 consecutive pediatric scoliosis surgeries from 2006-2010 with antibiotics in bone graft (ABX) were compared to 620 cases from 1998-2004 without antibiotics in bone graft (Non-ABX). In 2006, we initiated a protocol of placing antibiotics in bone graft. All patients received intra-operative IV antibiotics. Control cohorts included non-infected cases in the antibiotic-loaded group (Control-ABX) and non-infected cases without antibiotics in bone graft group (Control-Non-ABX). Analysis completed using chi-squared statistic, Fisher's exact, and single sample t-tests.

**Results:** 24 ABX cases were compared to 30 Non-ABX cases. The infection rate was significantly less in the ABX cohort (2.8% vs. 4.8%). Patient demographics were similar in AIS (57% in Control-ABX vs. 54% in Control-Non-ABX) and cerebral palsy (25% in Control-ABX vs. 27% in Control-Non-ABX). The proportion of gram positive and negative infections was similar between the infected groups [gram positive: 58% (ABX) vs. 54% (Non-ABX); gram negative: 42% (ABX) vs. 46% (Non-ABX)]. MRSA infections were greater in the ABX group. 38% of the *S. aureus* infections in the ABX cohort were MRSA; however, none of *S. aureus* infections in Non-ABX were MRSA.

**Discussion and Conclusion:** Antibiotic-loaded bone graft was effective prophylaxis for infection in scoliosis surgery. However, increased occurrence of MRSA was seen with antibiotic-loaded bone graft. The rise of MRSA infections could be attributable to the antibiotics used; or, it could be a result of the rise of MRSA in the community, since the ear-

lier cases predate our protocol for placing antibiotics in the bone graft.

**Notes:**

10:09am–10:13am

## Pedicle Screw Re-Insertion Using Previous Pilot Hole And Trajectory Does Not Reduce Fixation Strength

Daniel G. Kang, MD

\* LT Scott C. Wagner, MD

LTC Ronald A. Lehman Jr., MD

CPT Adam J. Belevino, MD

Rachel E. Gaume, BS

**Introduction:** When assessing for a pedicle wall violation, often no violation is found and the same screw is re-inserted along the original trajectory. Previous studies have reported significantly decreased insertional torque (IT) during this reinsertion, but fixation strength has never been evaluated biomechanically.

**Methods:** 31 thoracic and 9 lumbar human cadaveric vertebrae were evaluated. Each level was instrumented with 5.5mm (thoracic) and 6.5mm (lumbar) titanium multi-axial pedicle screws. A paired comparison was performed for each level, randomized between control and screw reinsertion test group. Screw IT was measured and peak IT reported in inch-pounds (in-lb). Screws were tensile loaded to failure “in line” with the screw axis and pullout strength (POS) measured in Newtons (N).

**Results:** No significant difference was detected for thoracic pedicle screw POS between re-inserted (RI) and control screws ( $732 \pm 307$  N v  $742 \pm 320$  N; p=0.78). We found no significant difference in IT between the initial test screw (INI) ( $7.28 \pm 3.51$  in-lb) and control ( $7.69 \pm 4.45$  in-lb) (p=0.33). However, IT for RI screws ( $5.14 \pm 4.18$  in-lb) was significantly decreased compared to INI (29%, p=0.00) and control screws (33%, p=0.00). There were similar findings for lumbar pedicle screws, with no significant difference for pedicle screw POS

between RI and control screws ( $943 \pm 344$  N v  $803 \pm 422$  N; p=0.09), as well as a significant IT decrease between RI and control screws ( $6.38 \pm 4.61$  in-lb v  $9.56 \pm 3.84$  in-lb; p=0.04). Test group screws in both the thoracic and lumbar spine had significant, strong correlations between initial screw IT and POS ( $r=0.79$ , p=0.00;  $r=0.93$ , p=0.00). There was a moderate correlation between re-insertion IT and POS in the thoracic spine ( $r=0.56$ , p=0.00), but no significant correlation for the lumbar spine ( $r=0.218$ ; p=0.57).

**Conclusion:** Despite a significant reduction in pedicle screw Insertional Torque with screw re-insertion, there was no significant difference in pedicle screw pullout strength, which is most clinically significant for immediate stability. Therefore, when the surgeon must remove a pedicle screw for tract inspection, re-insertion along the same trajectory may be performed without significantly compromising screw fixation strength.

**Notes:**

Thursday, October 23, 2014

Rapid Fire Session 2E — Health Policy

(Station E, Ritz-Carlton Ballroom Foyer)

**Moderator:** Richard C. Mather III, MD

9:45am–9:49am

## The Role Of Marketing And Public Relations

Daniel Goldberg, NA

The lecture or seminar I had in mind was less clinical than most of the presentations and more focused on how the physicians can attract more patients to their practices, the role of public relations in their practice and best practices for business development. I have spoken on this topic several times in the past including the Becker's Orthopedic and Spine Conference in 2012, 2013 and again in 2014, as well as the ISASS annual meeting in 2013. I have also been published in

several medical publications in regard to these topics. With the changing insurance environment and looming implementation of the Affordable Care Act, physicians are more wary than ever about declining reimbursements and attracting the right patients. This lecture would illustrate how to effectively engage potential patients and track ROI.

**Notes:**

9:52am–9:56am

## The Prevalence Of Obesity, Hypertension And Diabetes In Student Athletes Age 10-17

Eric C. Stiefel, MD  
William Reogle, PhD

**Introduction:** Over the past 30 years there has been a dramatic increase in the prevalence of childhood obesity in the United States. Further evidence supports an increasing prevalence obesity associated diseases, such as diabetes and hypertension. These alarming trends should be viewed as a significant health concern with potentially widespread public health implications in the near future. The preparticipation sports physical examination (PPE) provides orthopaedic physicians with an opportunity to identify patients at risk for obesity and obesity associated disease whom may otherwise have limited exposure or access to medical care, and further serve in a role of a community health advocate by using this encounter as an entry point into the health care system for patients underserved patients at risk for these chronic diseases. The purpose of this study was (1) to identify the prevalence of obesity among a population of high school athletes , (2) identify patient factors associated with an increased or decreased prevalence of overweight and obesity, and (3) to identify the prevalence of obesity associated cardiometabolic risk factors, hypertension and diabetes.

**Methods:** 21,013 Physical examination forms obtained between August 2009 and August 2013 from student athletes presenting for sports preparticipation physical examination were reviewed to evaluate the prevalence of obesity, elevated blood pressure (using age and sex normative anthropometric reference data) and pmH of diabetes.

**Results:** Among the population studied, the prevalence of overweight and obesity was 19.9% and 23.4 % respectively. 66.5% of individuals had normal BP on initial screening, 12.2% were pre-hypertensive and 21.4% of patients BP qualified as hypertensive, anthropometric normative values. A higher prevalence of Obesity and HTN was seen among minority populations, and participants in specific sports such as football and baseball. Participants in sports of basketball, cross country, soccer and individuals participating in multiple sports demonstrated lower prevalence of obesity and HTN.

**Discussion:** The prevalence of obesity and obesity associated diseases appear to be significant even among in student athlete populations. Our data is comparable to established benchmarks for non-athlete populations. Participation in “running sports” and multi-sport athletes demonstrated the lowest prevalence of disease. These data may encourage policy makers to financially support athletic programs based on their lower prevalence of obesity and associated disease, and implementation of certain sports programs as part of physical education curriculum aimed at obesity prevention. Further this study highlights the role of the orthopaedic surgeon as a community health advocate and the potential general health benefits of diversifying an athlete’s sports participation through multi-sport enrolment.

**Notes:**

10:00am–10:04am

## What Drives Inpatient Charges For Total Joint Arthroplasty?

Benjamin Zmistowski, MD

\*Eric M. Padegimas, MD

Kushagra Verma, MD, MS

Julie L. Shaner, MD

Michael J. Howley, PA-C, PhD

James J. Purtill, MD

**Introduction:** Price variability for total joint arthroplasty (TJA) has received substantial attention in the lay press recently, coinciding with the release of individual provider charges and reimbursement. Concurrently, new programs are incentivizing patients to select low-cost, high-quality providers. This study aims to quantify provider charge variation and identify the variables associated with increased charges.

**Methods:** The dataset of Inpatient Charge Data for Fiscal Year 2011 provided by the Centers for Medicare and Medicaid Services (CMS) was the source of 2,750 provider charges, reimbursement, location, and volume for discharges for providers with at least 10 claims for uncomplicated TJA. Providers were grouped into related regional areas using the Dartmouth Atlas. We constructed a multivariate regression model of regional charge variability using variables from the Dartmouth Atlas, the United States Census, the CMS, and the WWAMI Rural Health Research Center.

**Results:** 427,207 TJA were accounted for in this dataset with weighted average charges of \$50,105 (\$5,304-\$223,373). When including all variables, the regression model accounted for 44.5% of the variation in charges between providers. Quality measures alone accounted for 2.3% of variation. The addition of demand and supply measures to quality provided a model that accounted for only 7% of variation. Patient characteristics (driven by unemployment) and competitive factors (driven by neighboring provider charges and regional total Medicare reimbursements) were the largest contributors to charge variation, accounting for 13.2% and 17.6% of variation, respectively.

**Discussion and Conclusion:** Significant variation exists between different providers for inpatient charges associated with TJA. A comprehensive model accounting for many healthcare and economic factors was only able to account for 44.5% of this variation. Furthermore, increased charges were not associated with increased quality of care. As hospital

charges are now relevant, billing practices must be reexamined with an emphasis on standard economic principles and quality of care.

**Notes:**

10:07am–10:11am

## Transforming Resident Education — A New Horizon for Orthopaedic Skills Training

Matthew A. Tao, MD

Erika L. Templeton, MD

Benjamin A. Alman, MD

William T. Hardaker Jr., MD

**Introduction:** The training in orthopaedic surgery is steeped in history, pride and tradition; however, recent changes in the healthcare landscape have called the nature of this training into question. Residency programs nationwide have adapted, but the core structure remains relatively intact. A recent change in ACGME and ABOS guidelines regulated an increase to 6 months of orthopaedic education during the PGY-1 year. Our institution has been particularly enthusiastic about the new framework and what can be done to advance surgical skills earlier in residency.

**Methods:** We overhauled the first year to include an experience predicated on active engagement and repetitive, hands-on training. Based on literature suggesting the superiority of longitudinal training, we added a 3-month skills course overlaid onto rotations in pediatrics and community orthopaedics. Through individualized teaching by PGY-3 residents and faculty, repetition and regular feedback, the goal was to have interns master basic skills early so they can focus on higher level tasks in the future.

**Results:** Although still in its infancy, this course has been well received thus far. Residents have embraced the role of educator and have directed the curriculum. Interns have sub-

jectively improved in task performance and objectively documented increased confidence. This is still in evolution as we are adding pre/post-test metrics and self-directed components.

**Discussion and Conclusion:** Despite the high quality of orthopaedic training, there remains room for improvement. We are currently in discussion to create a standardized skills curriculum to be implemented in residency programs nationwide. By jumpstarting basic skills earlier and more deliberately, our hope is to accelerate the technical learning curve for all those in training.

**Notes:**

as its poor incorporation at the cartilage interface. Biological adjuncts, including platelet-rich plasma (PRP) and hyaluronic acid (HA) have been described as having the potential to improve the results of cartilage repair treatment strategies. The purpose of this study was to assess the effect of PRP and HA individually, as well as combined, on the histological results of AOT in a rabbit model.

**Methods:** Bilateral osteochondral defects (2.7 mm in diameter, 5 mm in depth) were created on the lateral femoral condyles of 36 New Zealand White rabbits. These defects were substituted with osteochondral grafts harvested from the contralateral femoral condyle and following wound closure and after randomization, the knees were treated with either the biological adjunct (PRP group, n = 12; HA group, n = 12; PRP + HA group, n = 12) or saline solution (control) with each rabbit serving as its own control. The rabbits were euthanized at three, six, or twelve weeks postoperatively. The osteochondral graft sections were stained using hematoxylin and eosin, alcian blue, and type II collagen immunohistochemistry and assessed using the modified International Cartilage Repair Society (ICRS) scoring system. As the results were not normally distributed, the variables were evaluated using the Wilcoxon signed-rank test.

**Results:** The mean modified ICRS histological score for the PRP treated group was significantly higher than its control ( $18.2 \pm 2.7$  versus  $13.5 \pm 3.3$ ;  $p = 0.002$ ). The mean modified ICRS histological score for the HA treated group showed no statistically significant difference compared to its control ( $15.9 \pm 2.9$  versus  $14.5 \pm 3.6$ ;  $p = 0.142$ ). The mean modified ICRS histological score for the PRP + HA treated group was significantly higher than its control ( $17.9 \pm 2.6$  versus  $14.0 \pm 3.3$ ;  $p = 0.006$ ). There was no statistically significant difference between the mean modified ICRS scores of the PRP and the PRP + HA treated grafts ( $p = 0.445$ ). Assessing graft integration specifically, the mean score of the PRP and PRP + HA treated groups was significantly higher than that of their controls (PRP,  $p = 0.004$ ; PRP + HA,  $p = 0.011$ ), however there was no statistically significant difference in the integration scores between the PRP and PRP + HA groups ( $p = 0.328$ ). No adverse events occurred as a result of the surgical procedure, or PRP and HA administration.

**Conclusion:** PRP improved the integration of the osteochondral graft at the cartilage interface and improved the modified ICRS histological score in an in vivo animal model. HA did not significantly affect the histological results of AOT either on its own, or as an addition to PRP.

**Notes:**

**Thursday, October 24, 2014**

**General Session 4 — Basic Science & Total Hip**

(Ritz-Carlton Ballroom Salon 1)

**Moderators:** Geoffrey H. Westrich, MD  
Scott D. Boden, MD

12:50pm–12:56pm

## The Effect Of Platelet Rich Plasma And Hyaluronic Acid On Autologous Osteochondral Transplantation: An In Vivo Rabbit Model

Niall A. Smyth, MD

Keir A. Ross, BS

Amgad M. Haleem, MD

Charles P. Hannon, BS

Christopher D. Murawski, BS

Ethan J. Fraser, MD

John G. Kennedy, MD, FRCS (Orth)

**Purpose:** Autologous osteochondral transplantation (AOT) is a surgical treatment strategy that has been used to treat osteochondral lesions (OCL). However, known concerns of the technique is the histological degradation the graft undergoes following harvesting and implantation trauma, as well

12:58pm–1:04pm

### Resident/Fellow Award

## Statins Adversely Affect Long Bones Of Corticosteroid Treated Rabbits

Christopher J. Williamson, MD

Ross Budacki, MD

Joseph Ehrenreich

John A. Handal, MD

Solomon P. Samuel, D. Eng

**Introduction:** Corticosteroids and statins are popular drugs taken by millions of Americans for various disease conditions. Many of these patients take both these drugs at the same time. There are limited literature reports on the adverse musculoskeletal drug interactions when these two drugs are taken together. This study evaluated the effect of two different statins (lovastatin and simvastatin) on the biomechanical properties of corticosteroid treated rabbit long bones.

**Methods:** 35 New Zealand White rabbits were used. The animals were assigned to four groups. Ten rabbits were used as controls; the other 25 rabbits received a once weekly 2-3 mg/kg intramuscular corticosteroid injection of methylprednisolone acetate injectable suspension. 16 of these 25 rabbits also received a daily oral dose of Lovastatin or simvastatin. At the end of 10 weeks, their long bones were harvested and tested in a 3-point bending mode. From the load-deformation curve and anatomic measurements of the bone, failure strength and modulus were calculated.

**Results:** When compared to simvastatin, the corticosteroid treated rabbits did not seem to tolerate lovastatin well. Four rabbits in the lovastatin plus corticosteroid group died before the 10-week study period was complete. The results also showed that both statins lowered the overall biomechanical properties of corticosteroid treated rabbit long bones. When compared to corticosteroid only group, the femur flexural strength of rabbits in statin plus corticosteroid group decreased as much as 18% and the strength of tibia decreased as much as 35%.

**Discussion:** Clinical studies always blame corticosteroids as a main reason for bone fractures. However, the current results as well as our previous data on atorvastatin calcium shows that a combination of corticosteroid and statin actually accelerates corticosteroid induced bone loss. Future clinical studies need

evaluate whether the probability of bone fracture is higher in patients taking these drugs together.

### Notes:

1:06pm–1:12pm

### Resident/Fellow Travel Grant Award

## Decreased T2 Relaxation In Articular Cartilage Following Modelled Therapeutic Irradiation At Long-Term Follow-Up

Ian Hutchinson, MD

John Olson, MS

L. Andrew Koman, MD

Thomas L. Smith, PhD

Kenneth T. Wheeler, PhD

Michael T. Munley, PhD

Jeffrey Willey, PhD

**Introduction:** Premature joint failure and decreased mobility are major sources of morbidity among childhood cancer survivors; the relative risk of premature joint replacement is 54 compared to unaffected siblings. Recent in vitro and ex vivo studies have demonstrated biomechanical and compositional degradation of articular cartilage matrix after irradiation. Our goal was to develop a translational platform to characterize late radiation effects in the knee joint articular cartilage in a rat model using total body irradiation (TBI) doses applicable to childhood cancer treatment.

**Methods:** Fourteen week old male Fisher 344 X Brown Norway rats ( $n = 3/\text{group}$ ) were exposed to a single 1, 3, or 7 Gy total body dose of 18 MV X-rays plus a small component of particulate radiation using a clinical linear accelerator (LINAC). One year after TBI (35 human years), the right hindlimb from each rat underwent multi-modality scanning

( $\mu$ MRI,  $\mu$ CT & nanoCT) and histological assessment. T2 maps were generated using a multi-slice/multi-echo (MSME) pulse sequence using a 7T scanner. Statistical analysis was performed with ANOVA.

**Results:** T2 relaxation from the weight-bearing tibial cartilage was significantly lower than unirradiated control. On nanoCT, osteophytes extending from the subchondral bone were seen in all groups; discrete intra-substance calcified lesions in the articular cartilage were only seen in articular cartilage of irradiated knees. Micro CT revealed architectural degradation of the trabecular bone of the proximal tibiae in the 7Gy group. Histological analysis revealed increased cartilage degradation in the irradiated rats.

**Discussion:** A novel investigational paradigm to study late effects of radiation therapy on joint health was created. Degenerative joint disease leads to increased T2 relaxation times; decreased T2 relaxation times were previously demonstrated in growth plate cartilage with increased calcification. Collectively, these findings suggest that joint degeneration following irradiation may result from a radiation-specific pathologic process in the articular cartilage.

**Notes:**

regarding the epidemiology, demographics, and risk factors for PJI after TKA in younger and/or privately insured patients.

**Methods:** The PearlDiver patient records database was used to gather patient demographic data on 83,617 privately insured patients – the vast majority of whom were under 65 years of age – that underwent primary TKA between 2007-2011. 1,635 (2.0%) of these patients went on to acquire a diagnosis of periprosthetic joint infection. The incidence of PJI was stratified by age, gender, and region of the United States. The database was searched for documentation of 35 common medical comorbidities utilizing CPT and ICD-9 codes among this population.

**Results:** The prevalence of PJI ranged from 0.89% at 3 months to 1.95% at 5 years. There was a significant difference between rates of PJI by age, with the highest rate (3.54%) occurring in the 35-39 year old age group and the lowest (1.84%) in the 60-64 year old group. Rates varied by region from 2.15% in the South to 1.74% in the Midwest. Males had an increased risk for infection relative to females (Odds Ratio = 1.38). Of 35 studied comorbidities, 23 demonstrated increased risk for PJI, including (in order of decreasing odds ratio) renal disease, dementia, metastasis, CHF, drug abuse, and lymphoma. The rate of infection did not appear to change over time in this population.

**Discussion and Conclusion:** The factors that demonstrate increased risk for PJI in this younger population seem to be congruent with those observed in studies of the Medicare population. Males had a higher risk of infection after TKA than females, and younger patients seemed to be at a higher risk of periprosthetic infection. The etiology for this trend is not clear.

**Notes:**

1:14pm–1:20pm

## Risk Factors For Periprosthetic Infection Following TKA In Young Patients

Taylor R. McClellan, BS

\*Michael P. Bolognesi, MD

R. Andrew Henderson, MD, MSc

Jonathon A. Godin, MD, MBA

**Introduction:** Recent large database studies have described the patient-related risk factors for periprosthetic joint infection (PJI) in Medicare patients undergoing total knee arthroplasty (TKA). Despite this research, much remains to be discovered

1:22pm–1:28pm

## Intraoperative Proximal Femoral Fracture In Primary Cementless Total Hip Arthroplasty

Ali Sina Shahi, MD

Danielle Y. Ponzio, MD

James J. Purtill, MD

**Introduction:** Intraoperative proximal femoral calcar fracture is a complication of primary cementless THA with reported rates of 1.5-27.8%.

**Methods:** A retrospective review of 2423 consecutive primary cementless THA cases of a single surgeon over 13 years identified 95 hips with a proximal femoral fracture in the medial calcar noted upon insertion of the stem and managed with cerclage cables above the lesser trochanter. Multivariate analysis compared fracture rates between two implants utilized, Manufacturer A and Manufacturer B, and evaluated potential risk factors for fracture using a randomized control group of 718 primary cementless THA cases without fracture matched to the fracture cohort by date of surgery (DOS). A group of 160 patients was matched to the fracture cohort by gender, age, BMI, DOS, and preoperative scores to compare Harris Hip Score (HHS).

**Results:** The incidence of proximal femoral calcar fracture was 3.9% (95/2423), 3.5% (36/1019) using Manufacturer A/4.2% using Manufacturer B (59/1404). Both implants demonstrated increased fracture incidence over time. Multivariate analysis revealed increased odds of fracture with decreasing stem size. Fracture was more common amongst females. Females, on average, had a smaller stem size (Manufacturer A  $2.4 \pm 0.9$ /Manufacturer B  $3.7 \pm 2.1$ ) than males (Manufacturer A  $3.4 \pm 0.9$ /Manufacturer B  $5.9 \pm 2.0$ ). No difference was found in clinical outcomes with a mean HHS improvement of 19.6 points and postoperative score of 58.2 points in the fracture cohort. No femoral revisions were required in the fracture cohort.

**Discussion:** In the largest single surgeon consecutive series reported, the incidence of proximal femoral calcar fracture upon impaction of a cementless wedge tapered femoral stem was relatively constant during primary THA despite different manufacturers. However, fracture incidence increased over time and with use of smaller femoral stems. If recognized, intraoperative fracture can be reliably addressed with cerclage

techniques to achieve satisfactory implant stability with no compromise to clinical outcome.

**Notes:**

1:30am–1:36pm

## Resident/Fellow Travel Grant Award

### Preoperative Anemia Increases Postoperative Complications And Mortality Following Total Joint Arthroplasty

Jessica Viola, BS

Camilo Restrepo, MD

Mitchell G. Maltenfort, PhD

Miguel M. Gomez, MD

Javad Parvizi, MD, FRCS

**Background:** There is some evidence that preoperative anemia might increase the incidence of complications such as infection and increase the length of hospital stay. This single institution, large cohort, case-controlled study examines the possible association between preoperative anemia and adverse outcome following total joint arthroplasty (TJA).

**Methods:** We retrospectively collected data from our prospective institutional database on 13,563 patients who underwent primary and revision TJA between January 2000 and June 2013. We then identified those patients with preoperative anemia (defined as Hb < 12 g/dL in women and Hb < 13 g/dL in men). A total of 2,576 patients had anemia pre-

operatively, and 10,987 patients had hemoglobin within the normal range. Multivariate analysis was used to determine the effect of preoperative anemia on the incidence of medical complications, infection, length of hospitalization and mortality.

**Results:** Anemic patients had a higher rate of complications compared to non-anemic patients (OR 2.11). Cardiovascular complications occurred in 26.5% of anemic patients, compared to 11.8% in non-anemic. Genitourinary complications occurred in 3.9% in the anemic group versus 0.9% in the non-anemic cohort. We identified increased infection rates in the anemic group 4.5% versus 1.12% in non-anemic patients. The length of hospital stay was found to be significantly higher in the anemic patients compared to non-anemic patients. Patients with a higher Charlson comorbidity score presented with a higher rate of complications. Although there was an increased incidence of mortality among anemic patients (0.2% versus 0.08%), the difference was not statistically significant.

**Discussion/Conclusion:** Our large cohort, single institution study confirms that patients with preoperative anemia are likely to exhibit higher incidence of complications and higher mortality following TJA. These patients may need to be optimized prior to surgery in an effort to reduce these complications.

#### Notes:

Thursday, October 23, 2014

Rapid Fire Session 5A — Hip  
(Station A, Plaza Ballroom 1)

Moderator: Douglas E. Padgett, MD

1:42pm–1:46pm

## Risk Factors Of Iliopsoas Tendonitis Following Total Hip Arthroplasty

Victor H. Hernandez, MD, MS

Ronald Huang, MD

Fabio R. Orozco, MD

Zachary D. Post, MD

Claudio Diaz, MD

Alvin C. Ong, MD

**Introduction:** Many things can cause pain after Total Hip Arthroplasty (THA) including septic or aseptic loosening, mechanical failure, referred pain, fractures, heterotopic ossification and iliopsoas tendonitis (IT). The purpose of this study was to determine if there is a relationship between the presence of IT after THA and the ratio between the head and cup of the hip implant.

**Methods:** This is a retrospective study done in our institution, 4,872 consecutive cases of primary and revision THA were reviewed between January 2007 and December 2010, from this population 78 patients (1.6%) reported groin pain at postoperative visits and underwent ultrasound of the affected groin, from those with groin pain 51 (1.0%) patients were diagnosed with iliopsoas bursitis, tendinosis, or tendinitis; their medical records were reviewed for demographic and intraoperative variables that included: surgical approach, head size, cup size, and bearing surface.

**Results:** We found a significant difference in the incidence of IT in females. In addition, there was significant difference with respect to revision surgery, but no differences were found with respect to the Charlson Comorbidity index, the surgical approach performed, the head size or the cup size. The head:cup ratio was 1.7 +/- 0.1 in the control group and 1.6 +/- 0.1 in the IT group with a significant difference of a p=0.048.

**Conclusion** This is the first study to report the head:cup ratio as a potential etiology for IT and may help provide surgical considerations for its prevention.

**Notes:**

36mm conventional head, and a 28mm conventional head were tested under two dislocation modes: (A) Posterior dislocation with internal hip rotation; (B) posterior dislocation with combined hip flexion and adduction. Wear performance of 36mm ceramic ACH implants and 36mm conventional ceramic heads articulating against UHMWPE liners was compared with a 12-station AMTI hip simulator. Two types of acetabular liners were tested: compression molded conventional PE, and highly cross-linked Vite-PE liners. To assess the femoroacetabular contact area, a FEA was completed with a 36 mm conventional head and a 36mm ACH implant. The femoral heads were modeled as rigid and articulated against UHMWPE acetabular liner modeled as plastically deformable. Loading cases corresponding walking, chair sit and deep-knee bend were analyzed.

**Results:** The dislocation analysis did not show any differences between the 36 mm ACH implant and the conventional 36 mm head. Both showed increased jump distance compared to the 28 mm conventional head. There was no difference between wear rate of the ceramic ACH implants and the conventional ceramic heads articulating against either UHMWPE liner materials (current results based on 2 million cycles). For example, average wear rate of conventional PE liners articulating against, the conventional ceramic heads and the ceramic ACH implants, was  $21.4 \pm 4.1$  mg/MC and  $20.8 \pm 4.2$  mg/MC, respectively. The FEA analysis also did not show any difference in articular contact area for the ACH and conventional heads articulating against UHMWPE liners.

**Conclusion:** This study showed that, as intended, an anatomically contoured large diameter femoral head designed to provide soft-tissue relief, maintains the stability of conventional implant of the same size, and does not alter the wear performance, and the load bearing articular contact area.

**Notes:**

## A Next Generation Anatomically Contoured Ceramic Femoral Head

Andrew A. Freiberg, MD

\*Kartik Mangudi Varadarajan, PhD

Michael P. Duffy, MS

Thomas Zumbrunn, MS

Harry E. Rubash, MD

Henrik Malchau, MD, PhD

Orhun K. Muratoglu, PhD

**Introduction:** Large diameter femoral heads have been successfully used to prevent dislocation after Total Hip Arthroplasty (THA). However, recent studies show that the distal region of contemporary femoral heads can impinge on native soft-tissues, particularly the iliopsoas, leading to activity limiting anterior hip pain. To address this we developed an Anatomically Contoured large diameter femoral Head (ACH) that maintains the hemispherical profile of a contemporary large diameter head above the equator, while contouring the distal profile below the equator for soft-tissue relief. The soft tissue friendly design of the ACH implant was optimized to maintain the dislocation benefits, and to not alter the wear performance, and load bearing femoroacetabular contact area of conventional large heads. This was verified via dislocation analysis, hip simulator wear testing, and finite element analysis (FEA).

**Methods:** Implant stability was evaluated by simulating dynamic hip dislocation in MSC Adams. A 36mm ACH, a

1:52pm–1:56pm

## Subsidence Of Tapered Wedge Femoral Stems Is Not Clinically Benign

Jonathan Robinson, MD

Suresh Patil, MD

Parthiv A. Rathod, MD

Rupesh Tarwala, MD

Jose A. Rodriguez, MD

**Introduction:** Subsidence of cementless femoral stems in total hip arthroplasty (THA) has been associated with poor initial fixation and subsequent risk of aseptic loosening. There is limited literature on how subsidence of tapered wedge femoral stems impacts the patient clinically. The aim of our study was to assess whether subsidence of these stems is associated with a decline in clinical function.

**Methods:** A review of a prospectively collected database of THAs performed by a single surgeon at one institution using two cementless, proximally porous coated, tapered wedge stem designs from January 2006 to June 2010 was performed. Patients with greater than 1.5mm of migration on 6 week post-operative radiographs were identified and placed into the subsidence group. Preoperative and postoperative pain and Harris hip scores were recorded and analyzed to identify if the clinical recovery pattern between the subsidence and non-subsidence group differed. Protected weight bearing was recommended to all patients in the subsidence group.

**Results:** 10 hips out of 264 THAs, had subsidence greater than 1.5 mm. There were 6 males and 3 females with a mean age of 62.1 years and mean follow-up of 29 months. Subsidence occurred at 6 weeks in all patients. Mean Harris hip score and pain scores were significantly lower at 6 weeks in the subsidence group (Mean 67.6) when compared to the no subsidence group (Mean 82.2). Patients had similar scores by the 1 year postoperative visits. One patient in subsidence group underwent revision for failure of osteointegration at 1.5 years and 1 patient underwent strut-grafting procedure for persistent thigh pain.

**Conclusion:** Subsidence of tapered wedge stems occurs at the 6 week mark and may be associated with a transient decline in clinical function. Early modification in the rehabilitation regimen may help improve clinical outcome scores in these patients.

**Notes:**

1:57pm–2:01pm

## The Economic Burden Of Home Visiting Nurse Services Following Total Joint Arthroplasty

Suneel Bhat, MD

\*Andrew G. Park, MD

Danielle Y. Ponzio, MD

James J. Purtill, MD

**Introduction:** Although purported to provide value in the management of total joint arthroplasty (TJA) patients, home visiting nursing services HVNS in themselves represent a substantial cost burden. In our experience, HVNS may be safely eliminated in most cases of TJA postoperative care – here we aim to describe the economic burden that HVNS imposes.

**Methods:** On January 1st, 2013 a policy change was instituted by a single surgeon at our institution where all patients were encouraged home discharge with no recommendation for HVNS. We performed a retrospective review of consecutive TJA patients 6 months prior to and after this policy change for associated HVNS costs. A unique stochastic decision tree model was developed based on derived probabilities and costs and analyzed by Monte Carlo simulation. Model outcomes were analyzed with standard comparative statistics.

**Results:** Our model demonstrated an average per patient cost savings of \$1177 (95%CI\$1129to\$1225) for THA and \$1647 (95%CI\$1586to\$1708) for TKA when HVNS are not recommended. With an approximate annual projected rate of THA of 300,000 and of TKA of 700,000, cost savings across the US of eliminating HVNS for THA was \$353,159,509, and for TKA was \$1,153,122,128.

**Discussion:** HVNS utilized in postoperative care in TJA is a significant economic burden annually in the US. Postoperative management not routinely recommending HVNS would result over \$1.5 billion annual incremental savings in TJA. This represents a significant reduction in economic burden on the health system, and dramatically increases the value of joint replacement.

**Notes:**

2:02pm–2:06pm

## Revision THA Outcomes Using Cemented, Modular Proximal Femoral Replacement Stems

Michael B. Cross, MD

Akos Zahar, MD

B. Bohn, MD

Kaitlin M. Carroll, BS

Thorsten Gehrke, MD

Daniel Kendoff, MD, PhD

**Introduction:** When managing periprosthetic joint infections (PJI), a large resection of the proximal femur bone may be required. The outcomes and early dislocation rates of cemented, modular proximal femoral replacements used for one and two stage revision total hip arthroplasty (THA) are unknown.

**Methods:** Sixty-one patients at an average age of 71 years (37-86 years) underwent septic hip revision between 01/2011 and 06/2013. Fifty-three patients underwent a one-stage septic revision, and 8 patients were revised using a two-stage revision. A cemented modular proximal femoral replacement stem was inserted in each case. In all cases antibiotic therapy was administered by local antibiotics in pMMA bone cement and intravenously. The duration of the intravenous antibiotic therapy was  $17 \pm 8.6$  days. Outcomes of the study were recurrence of the infection (including early recurrences less than 6 months), early revision of the implants for any reason and early postoperative dislocation rates.

**Results:** There were 41 patients available for follow-up with a mean follow up time of  $13.5 \pm 10$  months. One patient had a recurrent infection and one patient died 5 days after surgery due to unknown reason, and both these patients were considered as failures. All together 39 of 41 patients (95.1%) could be successfully treated by the described method. However, postoperative dislocation occurred in 7/41 (17%) cases, and three of these patients required an open reduction. Further, ten required minor revisions, but no patient required a revision due to aseptic loosening or implants failure.

**Conclusion:** In summary, the use of modular, cemented proximal femoral replacements for massive bone loss encountered during septic THA are acceptable with low early recurrence rates of infection. Based on the difficulty of this patient population, patients should be counseled that this procedure has high dislocation rates and carries a high likeli-

hood of requiring minor re-operations in the early postoperative period.

*\*The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).*

### Notes:

2:07pm–2:11pm

## Dislocation Rate After Revision THA Using A Dual-Mobility Cup

Taylor R. McClellan, BS

\*Samuel Wellman, MD

Roberto Calderon, MD

Michael P. Bolognesi, MD

David E. Attarian, MD

Paul F. Lachiewicz, MD

**Introduction:** Patients undergoing a revision THA have increased risk for postoperative dislocation, as high as 20% in some series. Studies have shown that the incidence of instability can be reduced when a larger head component is implanted. Dual-mobility cup systems use this principle by combining the advantage of a large head along with a “head within a head” articulation to increase the range of motion before impingement. A modular dual mobility (MDM) device is used at this institution in revision THA patients who are determined to be at increased risk for dislocation. A few studies have shown that dual-mobility cups probably have lower rates of dislocation, but more studies are needed to clarify if they are clinically effective and safe.

**Methods:** Four surgeons performed 82 revision total hip replacements (79 patients) through the posterior or direct-lateral approach (72 and 10 respectively) utilizing the MDM cup. The reasons for initial revision as well as early complications were retrospectively reviewed. 58 hips had a minimum 3-month follow up (range 3-28 months, mean 12.2 months).

**Results:** The main reason for revision to the MDM cup was instability (18, 31.0%), followed by adverse metal-on-metal reaction (13, 22.4%), infection (11, 19.0%), and aseptic loosening (9, 15.5%). There were no hip dislocations in the course

of follow up in this series. 6 hips (10.3%) developed peri-prosthetic joint infection requiring reoperation. Other post-op complications included: 2 (3.4%) DVTs, 2 (3.4%) traumatic fractures, 1 cup settling (1.7%), and 1 (1.2%) peri-operative mortality.

**Discussion and Conclusion:** The use of the MDM cup resulted in a 0% rate of dislocation in the short term, even in those patients with a history of multiple dislocations. However, this does not confirm future stability, so further follow up is needed. The rate of infection was high, but did not directly correlate with previous infection and was likely secondary to patient complexity and co-morbidities.

**Notes:**

lar spinopelvic fixation construct.

**Methods:** Eight cadaveric spines were instrumented with multi-axial pedicle screws (6.5 x 40mm) bilaterally at L5 and S1. Four specimens were further instrumented with iliac screws (8.5 x 80mm) placed with a starting point at the posterior superior iliac spine and the remaining four specimens were instrumented with SAI screws (8.5 x 80mm) placed with a starting point 1 mm inferolateral to the S1 foramen. All the screws were connected with 6.35 mm titanium rods. Subfailure testing was performed after preconditioning by loading at 1°/sec to a torque of 10Nm in four directions – left bending, right bending, extension, and flexion. Following subfailure testing, specimens underwent a monotonic load to failure under flexion at a rate of 1°/sec.

**Results:** There were no statistically significant differences for torsional stiffness in extension, flexion, left bending or right bending between SAI and iliac screw constructs. There were no statistically significant differences in SAI vs. iliac screws for failure torque angle of displacement at failure, yield torque, and yield displacement angles.

**Discussion and Conclusion:** The iliac and SAI screw demonstrated no statistical differences in this biomechanical comparison. These results support the use of the SAI technique as an alternative to the iliac screw for spino-pelvic fixation.

**Notes:**

Thursday, October 24, 2014

Rapid Fire Session 5B — Spine (*Station B, Plaza Ballroom 1*)

Moderator: Scott D. Boden, MD

1:42pm–1:46pm

## Biomechanical Comparison Of Sacro-Pelvic Fixation

Camden B. Burns, MD

Karan Dua, BA

Nicholas A. Trasolini, BSE

David E. Komatsu, PhD

James Barsi, MD

**Introduction:** Spinopelvic fixation is commonly used in the correction of pelvic obliquity, high-grade spondylolisthesis, and long spinal fusions. With the development of pedicle screw fixation, the iliac screw has been used as an anchor point to the pelvis. The associated morbidity with this fixation has led to the development of the sacral-alar-iliac (SAI) screw. Many studies have examined the biomechanical properties of iliac and SAI screws; however, a direct comparison has not been performed. The purpose of this study is to compare the biomechanical properties of the iliac and SAI screw in a simi-

1:49pm–1:53pm

## Cervical Posterior Foraminotomy's Effect On Segmental Range Of Motion In The Setting Of Total Disc Arthroplasty

Daniel G. Kang, MD

\*Peter Formby, MD

LTC Ronald A. Lehman Jr., MD

CPT Adam J. Bevevino, MD

LT Scott C. Wagner, MD

Rachel E. Gaume, BS

**Introduction:** Posterior foraminotomy offers the ability to decompress cervical nerves roots while avoiding the need to

extend a previous fusion or revise an arthroplasty to a fusion. However, the safety of a foraminotomy in the setting of total disc replacement (TDR) is unknown. With this in mind, the goal of this study was to investigate the effect on cervical segmental stability resulting from posterior foraminotomy following TDR.

**Methods:** Segmental non-destructive range of motion (ROM) was analyzed in nine human cadaveric cervical spine specimens. Following intact testing, each specimen was sequentially tested according to the following four experimental groups: Group 1=C56 TDR, Group 2=C56 TDR with unilateral C56 foraminotomy, Group 3=C56 TDR with bilateral C56 foraminotomy, and Group 4=C56 TDR with C56 and C45 bilateral foraminotomy.

**Results:** No significant difference in ROM was found between the intact, TDR, and foraminotomy specimens at C4-5 or C6-7. There was a step-wise increase in C5-6 axial rotation from the intact state (8 degrees) to Group 4 (12 degrees), although the difference did not reach statistical significance. At C5-6, the degree of lateral bending remained relatively constant, 8 degrees in the intact state to 8.8 degrees in Group 4, and was not statistically different in any of the tested groups. Flexion and extension at C5-6 was significantly higher in the foraminotomy specimens, Groups 2 (18.1 degrees), 3 (18.6 degrees), and 4 (18.2 degrees), compared to the intact state, 11.2 degrees. However, no ROM difference was found within foraminotomy Groups (2-4) or between the foraminotomy groups and the TDR group (Group 1), 15.3 degrees.

**Conclusion:** Our results indicate that cervical stability is not significantly decreased by the presence, number, or level of posterior foraminotomies in the setting of TDR. The addition of foraminotomies to specimens with a pre-existing TDR resulted in small and insignificant increases in segmental ROM. Therefore, posterior foraminotomy(s) may be considered a safe and viable option in the setting of recurrent or adjacent level radiculopathy following cervical disc replacement.

#### Notes:

1:57pm–2:01pm

## Finite Element Modeling Of Stability In Transforaminal Lumbar Interbody Fusion

LT Scott C. Wagner, MD

Divya V. Ambati, MS

Edward K. Wright Jr., PhD

LTC Ronald A. Lehman Jr., MD

Daniel G. Kang, MD

Gregory S. Van Blarcum, MD

Anton E. Dmitriev, PhD

**Introduction:** Transforaminal lumbar interbody fusion (TLIF) is popular for the surgical treatment of degenerative lumbar disease. The optimal construct for segmental stability remains unknown. The purpose of this study was to compare the stability of fusion constructs using standard (C) and crescent-shaped (CC) polyetheretherketone (PEEK) TLIF cages with unilateral (UPS) or bilateral (BPS) posterior instrumentation. Five TLIF fusion constructs were compared using finite element (FE) analysis.

**Methods:** A previously validated L3-L5 FE model was modified to simulate decompression and fusion at L4-5. This model was used to analyze the biomechanics of various unilateral and bilateral TLIF constructs. The inferior surface of the L5 vertebra remained immobilized throughout load simulation, and a bending moment of 10 Nm was applied on the L3 vertebra to recreate flexion, extension, lateral bending and axial rotation. Various biomechanical parameters were evaluated for intact and implanted models in all loading planes.

**Results:** All reconstructions displayed decreased motion at L4-5. Bilateral posterior fixation conferred greater stability when compared to unilateral fixation in left lateral bending. Over 50% of intact motion remained in left lateral bending with unilateral posterior fixation compared to less than 10% when bilateral pedicle screw fixation was used. Posterior implant stresses for unilateral fixation were six times greater in flexion and up to four times greater in left lateral bending compared to bilateral fixation. No effects on segmental stability or posterior implant stresses were found. An obliquely-placed, single standard cage generated the lowest cage-end-plate stress.

**Discussion and Conclusion:** TLIF augmentation with bilateral posterior fixation increases fusion construct stability.

The shape or number of interbody implants does not appear to impact segmental stability with bilateral pedicle screws. Increased posterior instrumentation stresses were observed in all loading modes with unilateral pedicle screw/rod fixation, which may theoretically accelerate implant loosening or increase the risk for construct failure.

**Notes:**

2:04pm–2:08pm

## Operative Treatment of Combat-Related Spine Trauma During the Conflicts In Iraq And Afghanistan

LT Scott C. Wagner, MD  
 Gregory S. Van Blarcum, MD  
 Daniel G. Kang, MD  
 LTC Ronald A. Lehman Jr., MD

**Introduction:** The rate of combat-related spinal injury sustained in Iraq and Afghanistan is reportedly the highest in history; however, a shortcoming of registry data collection has been limited clinical information and follow-up details after surgical intervention. Therefore, we set out to describe the operative treatment of combat-related spine trauma over a ten-year period at three high-volume military treatment facilities.

**Methods:** Retrospective analysis of surgical databases at three military institutions was performed; patients undergoing spine surgery designated in as engaged in Operations Enduring and/or Iraqi Freedom between 01JUL2003 and 01JUL2013 were evaluated. Inclusion criteria included trauma sustained in

direct relation to combat operations requiring operative treatment after evacuation.

**Results:** 302 patients with combat-related (OIF/OEF) spine trauma requiring operative intervention were identified. 105 casualties required definitive surgical management after return to the United States. The mean age of these casualties was 29.8 years. 74.3% of these casualties were enlisted US Army servicemembers. 49.5% and 48.6% of injuries occurred in Afghanistan and Iraq, respectively. The most common mechanism of injury was mounted improvised explosive device (IED, 42.9%). The lumbar spine was the most commonly involved region (59%), followed by thoracic (43.8%), cervical (33.3%) and sacral (17.1%). 1.5 spinal regions were injured per patient, and two patients sustained injuries to all four spinal regions. Spinal cord injuries were present in 29.5% of all patients. The mortality rate for all patients after evacuation to the United States was 1.9%.

**Discussion and Conclusion:** The current conflicts in Iraq and Afghanistan have seen the highest incidence of combat-related spine trauma in recorded history. These injuries involve multiple spinal levels per patient and have a high rate of associated spinal cord injury. This retrospective evaluation is the largest study evaluating the demographic information, resource utilization and longer-term follow up data for patients sustaining operative war-related spine trauma.

**Notes:**

**Thursday, October 24, 2014**

**Rapid Fire Session 5C — Total Knee Reconstruction**  
*(Station C, Ritz-Carlton Ballroom Foyer)*

**Moderator:** James Slover, MD, MS

1:42pm–1:46pm

## Patient-Specific Total Knees Demonstrate a Higher Manipulation Compared to “Off-The-Shelf”

Amar S. Ranawat, MD  
Peter White, BA

**Objective:** Patient-specific or “custom” total knee replacements have been designed to fit the arthritic knee in primary total knee arthroplasty (TKA) better than “off-the-shelf” implants. Using computer technology, patient-specific cutting-blocks and custom-made implants are created to more accurately fit the contour of the knee and reproduce the anatomic J-curve with the hope of providing a better functional outcome.

**Purpose:** This retrospective, matched-pair study evaluates manipulation under anesthesia (MUA) rates in cemented patient-specific cruciate-retaining (PSCR) TKA compared to that in both cemented posterior-stabilized (PS) and non-cemented cruciate-retaining rotating-platform (NC CR RP) TKA.

**Materials and Methods:** From 2010 through November of 2012, 21 PSCR TKAs were performed in 19 patients. Using medical records from our patient database, these patients were matched for age, side, deformity, diagnosis, Charnley Class, and preoperative range of motion (ROM) with 42 PS TKA performed during the same time period by the same surgeon using the same post-operative protocols. Additionally, 11 NC CR RP TKA were performed and evaluated based on the same criteria. Pre- and postoperative radiographs were performed using criteria as described by The Knee Society.

**Results:** Preoperatively the PSCR TKA cohort had a larger average ROM compared to the PS TKA cohort ( $P$ -value= 0.006). Postoperatively, however, the PSCR TKA cohort overall was found to have a significantly decreased average ROM compared to both the PS and NC CR RP TKA cohorts ( $2.0^\circ$ – $110.6^\circ$   $P$ -value= 0.0002 and  $2.4^\circ$ – $117.3^\circ$   $P$ -value= 0.0003, respectively). 6 of the 21 (28.6%) PSCR TKAs performed

underwent MUA to improve postoperative ROM. One manipulation was unsuccessful and the patient is scheduled for revision for arthrobrosis. No patients in either the matched PS group or the CR RP group underwent postoperative MUA. Clinical and radiographic analysis including pre-operative ROM, deformity, side, Charnley Class, posterior tibial slope angle, epicondylar axis and posterior condylar offsets provided no insight into the reason for this higher MUA rate in the PSCR knees.

**Conclusion:** MUA rates in the patient-specific TKA group were significantly higher than that in both “off-the-shelf” cohorts. No correlations were found to clearly indicate the cause of the higher MUA rate among the PSCR knees. Early manipulation is recommended for stiffness with these custom devices.

### Notes:

1:47pm–1:51pm

## Radiation Exposure Associated With Preoperative CT For Robotic-Assisted Knee Arthroplasty

Danielle Y. Ponzio, MD  
Jess H. Lonner, MD

**Introduction:** The radiation dose associated with preoperative computed topography (CT) for robotic-assisted knee arthroplasty has not been reported yet is critical information for the patient and surgeon to understand.

**Methods:** Preoperative CT scans of the involved knee, ipsilateral hip and ankle were retrospectively reviewed for 211 adult patients (236 knees) who underwent robotic-assisted knee

arthroplasty. The dose report was queried for each patient to obtain the dose-length product (DLP, mGy cm) for the hip, knee, ankle, and the total DLP for the study. The effective dose (ED, mSv) of radiation was calculated from the DLP using tissue weighting conversion factors specific to each body region. To appreciate the alternate sources and volume of radiation exposure for the average arthroplasty patient in the cohort, the total number of CT scans and radiographs performed within the hospital system were recorded for each patient, and an estimated cumulative ED of radiation attributed to CT examinations was calculated.

**Results:** The mean DLP associated with preoperative CT for robotic-assisted knee arthroplasty was  $1545 \pm 722.9$  mGy cm. The mean ED was  $4.8 \pm 3.0$  mSv. Twenty-five (11.8%) patients underwent bilateral preoperative CT scans at an average interval of 3.8 months (range 0-14 months) with a mean DLP of  $3077.9 \pm 1285.8$  mGy cm and mean ED of  $9.2 \pm 5.1$  mSv. All patients underwent multiple radiographs, with a mean of  $15.4 \pm 10.2$  radiographs (range 12-98) per patient within the hospital system. One or more additional CT scans (range 0-12) were obtained in 53 patients (25.1%), which amounted to an estimated cumulative ED per patient ranging from 6 to 103 mSv.

**Discussion and Conclusion:** Compared to conventional knee arthroplasty and the use of alternate navigation systems, the requirement of a preoperative CT is a disadvantage of robotic-assisted knee arthroplasty, associated with cost and radiation exposure.

#### Notes:

1:52pm–1:56pm

## Patellar Thickness And Range Of Motion (ROM) In Primary Total Knee Arthroplasty (TKA)

Carlos J. Lavernia, MD

Jesus M. Villa, MD

David A. Iacobelli, MD

**Introduction:** Maintenance or reduction of the pre-arthroplasty patellar thickness has been deemed to be important for the proper ROM after TKA. Overstuffing can result in a reduction in postoperative knee flexion or pain. Making the patella too thin can result in a fracture. Our objective was to study the effects of the change in patellar thickness on post-operative range of motion and patient oriented outcomes after TKA.

**Methods:** 200 consecutive patients undergoing primary TKA were studied. Patellar thickness was measured intraoperatively before and after patellar resection. Each patient was assessed preoperatively and at minimum 2 year's mark for passive and active ROM. Difference in Knee Active Flexion (KAF), Knee Passive Flexion (KPF), Knee Active Extension (KAE), and Knee Passive Extension (KPE) were assessed using ANOVA. A Pearson Product moment ( $r$ ) was also calculated to assess the relationship between levels of preoperative patellar thickness with the ROM. Independent t-tests were used to assess for differences in the KAF and KPF.

**Results:** There was no significant difference between groups based on preoperative patellar thickness for each of the ROM assessments. Results were similar at follow-up (mean: 2.53 years) for all postoperative patellar thickness. Patellar thickness was poorly correlated to ROM preoperatively ( $r$  range, 0.001-0.11; p-value range, 0.22-0.41) and postoperatively ( $r$  range, 0.07-0.09; p-value range, 0.47-0.69). Postoperative KAF and KPF along with postoperative patellar thickness did not differ amongst those individuals who had less than  $110^\circ$  or more than  $110^\circ$  of KPF before the procedure.

**Discussion and Conclusion** Maintaining a patellar resection between  $\pm 3.5$  mm of its initial patellar thickness provides satisfactory results and does not affect postoperative range of motion or outcome after primary TKA.

#### Notes:

1:57pm–2:01pm

## Utility Of Synovial White Cell Count And Neutrophil Differential During Reimplantation Surgery

Corey Clyde, BS  
Benjamin Zmistowski, MD  
Carl Deirmengian, MD  
Javad Parvizi, MD, FRCS

**Introduction:** Two-stage exchange arthroplasty remains the preferred method of surgical treatment for chronic periprosthetic joint infection (PJI) in North America. One of the major challenges with this surgical treatment is the determination of optimal timing of reimplantation surgery. Joint aspiration to determine the synovial white blood cell (WBC) count and neutrophil percentage (PMN%) prior to reimplantation is widely performed, yet the implications are rarely understood. Therefore, this study investigates the diagnostic yield of synovial fluid WBC count and differential and the calculated thresholds for persistent infection.

**Methods:** The institutional PJI database was utilized to identify 82 patients undergoing two-stage exchange arthroplasty who had joint aspiration prior to reimplantation between February 2005 and November 2012. Persistent infection was defined as positive aspirate culture, positive intraoperative cultures, or persistent symptoms of PJI—including subsequent PJI related surgery. Receiver operating characteristic (ROC) curve was used to calculate thresholds maximizing sensitivity and specificity.

**Results:** Twenty cases (24.4%; 20/82) were classified as having persistent PJI. Compared to aseptic patients, these patients had elevated pmN% (67% versus 45%) with no difference in synovial WBC count (1,231 versus 1,750 cells/ $\mu$ L). ROC analysis provided an area under the curve of 0.56 and 0.68 for synovial WBC count and pmN%, respectively. This provided a pmN% threshold of 57% with a sensitivity and specificity of 70% and 60%, respectively. The risk of persistent PJI increased with increasing pmN% (OR=1.03) with a risk of persistent PJI of 45% (5/11) in patients with pmN% greater than 90%.

**Discussion:** Synovial fluid analysis prior to reimplantation as part of two-stage exchange has unclear utility. While, there is no apparent association between WBC count and the status of persistent PJI, elevated pmN% does imply risk in reimplantation. With little other guidance regarding the timing of reim-

plantation, fluid cell count differential may be an important marker.

### Notes:

2:02pm–2:06pm

## Predictors of Discharge to Inpatient Rehabilitation After Total Knee Arthroplasty

Zachary D. Post, MD  
\*Victor H. Hernandez, MD, MS  
Fabio R. Orozco, MD  
Alvin C. Ong, MD

**Introduction:** Projected increases in total knee arthroplasty (TKA) have spurred innovation focused on decreasing complications and cost associated with the procedure. Included in this is a push for decreased length of stay (LOS) and discharge to home. In spite of improvements, many patients continue to require inpatient rehabilitation (IR) at a premium cost to the health care system. The purpose of this study was to evaluate factors associated with patient disposition and predictors of IR after TKA.

**Methods:** After IRB approval, a series of 800 consecutive patients undergoing TKA between January 2011 and December 2011 were retrospectively evaluated. Of these, 743 had unilateral, primary TKA and were included in our analysis. Several potential disposition predictors including family support, health status, home situation, surgical variables and demographics were evaluated. Binary logistic regression was used for statistical analysis.

**Results:** 340 patients (46.5 %) required discharge to IR. Significant predictors of IR were age (OR=1.072), female gender (OR=0.5), Medicare as primary insurance (OR=0.36), length of stay (OR=2.7), and lack of assistance at home (OR=0.38). No surgical or other demographic factors, including blood loss, length of surgery or BMI, were associated with IR. Medical conditions based upon Charlson comorbidity index and ASA score also did not predict IR discharge.

**Conclusion:** Like many institutions, we found our rate of IR after TKA to be recalcitrantly high. Our evaluation showed that non-modifiable factors such as age and gender were associated with an increased risk of IR. Interestingly, medical factors did not seem to influence the disposition of these patients. The only modifiable factor associated with IR was a lack of support at home. Future programs directed at decreasing costs through increased home discharge should focus on improving patient support at home after TKA.

**Notes:**

after surgery. The purpose of this study was to evaluate factors associated with patient disposition and predictors of early discharge (LOS < 2 days) to home after TKA.

**Methods:** A Series of 800 consecutive TKA that underwent surgery between January 2011 and December 2011 in one institution were include in the study. From this population, 743 were unilateral consecutive primaries TKA which met the inclusion criteria. 57 were excluded from the study because they were bilateral knees. Several potential predictors were used for the study that included social, medical and surgical variables. Binary logistic regression was used for statistical analysis.

**Results:** 366 patients (50.2 %) met criteria for successful completion of FT protocol. Factors associated with successful of completion were age < 65 y/o OR 1.15 95 % CI (1.03 - 1.3), ASA score OR 29 95% CI (1.7 – 498). Factors associated with failure to complete FT protocol and discharge directly to home included Charlson Comorbid Score OR 0.4 CI (0.17 – 0.97), BMI OR 0.62 CI (0.44 – 0.87) and Medicare insurance. Social factors such as patient living alone, 2 stories homes, the availability of help at home, did not have any influences in the results of FT.

**Conclusion:** Young Healthy patients (lower ASA and Charlson Comorbiity Score), are more likely to successfully complete a FT protocol and can be safely discharged to home. Patient social factors did not appear to have an influence in the successful completion of FT protocol.

**Notes:**

2:07pm–2:11pm

## Predictors Of Early Discharge After Total Knee Replacement

Victor H. Hernandez, MD, MS  
 Zachary D. Post, MD  
 Fabio R. Orozco, MD  
 Alvin C. Ong, MD

**Introduction:** Advances in total knee arthroplasty (TKA) have increased the number of patients able to go home after surgery. However, despite Fast track (FT) protocols, it is often difficult to predict which patients can safely go directly home

**Thursday, October 23, 2014**

**Rapid Fire Session 5D — Knee**  
(Station D, Ritz-Carlton Ballroom Foyer)

**Moderator:** Gregory S. DiFelice, MD

1:42pm–1:46pm

## **Outcomes Of ACL Reconstruction Using Closed Versus Variable Loop Button Fixation**

Brent T. Wise, MD

Sameh A. Labib, MD

Rebecca Bedard, MA, ATC, OTC

Garrison P. Wier, BS

Jessica Martschinske, MA, ATC, OTC

Melissa Rosen, MS, ATC, OTC

**Background:** Graft fixation methods and incorporation are essential for the stability of ACL reconstructions. Suspensory fixation with “button” devices has gained popularity, with both fixed loop and variable loop varieties available. This study examines these two different methods of fixation in order to determine their impact on graft laxity as well as patient reported outcome scores.

**Method:** Patients with ACL reconstructions using either a fixed loop button technique or variable loop button technique performed by the primary investigator between January 2009 and April 2012 were identified. Data was collected including Lysholm, Tegner, and SF-12 scores, and KT-1000 testing was performed and compared to the uninjured knee.

**Results:** 33 patients in the variable loop group and 11 patients in the closed loop group completed the KT-1000 testing. The average KT value for the variable loop group was 0.69mm, while the average for the closed loop was 1.0mm resulting in a mean difference of 0.31mm (95% CI -.93-1.53). This difference was not statistically significant. There was a greater percentage of patients with KT values >3.0 mm in the closed loop group (18% vs 6%). Amongst patients that completed the subjective outcomes scores, there was not a statistically significant difference in the post op Lysholm, Tegner, SF-12 physical or mental component scores between the two groups.

**Conclusion:** The study finds that there is no difference in objectively measured ACL graft laxity as measured by KT-1000 between grafts fixed with variable loop versus closed

loop button techniques. There does appear to be a greater percentage of grafts that are objectively considered to be lax in the closed loop group. There is not a difference in functional outcome with either design.

**Notes:**

1:48pm–1:52pm

## **Avoiding Complications And Technical Variability During ACL Reconstructions**

Natasha Trentacosta, MD

Allison Liefeld Fillar, MD

Cynthia P. Liefeld, PhD

Michael D. Hossack, MD

I. Martin Levy, MD

**Introduction:** Surgical reconstruction of the anterior cruciate ligament (ACL) can be complicated by incorrect tunnel placement, graft tunnel mismatch, cortical breaches and inadequate fixation due to screw divergence. Our goal was to determine if the use of an image intensifier during arthroscopically assisted transtibial ACL reconstruction (IIAA-TACLR) significantly decreased the occurrence of screw divergence and cortical breaches. Further, we wanted to see if IIAA-TACLR allowed for precise tunnel placement. Finally, we wanted to determine if the use of IIAA-TACLR permitted reliable recession of the proximal bone plug and accurate screw placement, thereby eliminating graft-tunnel mismatch and screw divergence.

**Methods:** 110 consecutive patients (in 112 reconstructed knees) underwent identical IIAA-TACLR using a bone-patellar tendon-bone autograft performed by one surgeon. Intra- and post-operative radiographic images and operative reports were evaluated for each patient, looking for evidence of cortical breeching and screw divergence. Precision of femoral tunnel placement was evaluated using a sector map modified

from Bernard et al. Graft recession distance and tibial angles were recorded.

**Results:** There were no femoral or tibial cortical breaches noted intra-operatively or on post-operative images. There were no instances of loss of fixation screw major thread engagement. There were no instances of graft-tunnel mismatch. The positions of the femoral tunnels were 100 percent precise, all falling into the desired sector of our location map (sector 1). Tibial  $\alpha$  angles and graft recession distances varied widely.

**Discussion and Conclusion:** The use of the C-arm with image intensifier enabled precise tunnel placement and eliminated cortical breech, graft tunnel mismatch and screw divergence during ACL reconstruction by allowing incremental adjustment of the tibial tunnel and knee flexion angle. A C-arm with image intensifier can be used, with any ACL reconstruction that incorporates tunnels in the technique, to avoid complications and enhance precision.

**Notes:**

1:54pm–158pm

## Quadriceps Tendon Repair Outcomes In A Worker's Compensation Cohort

Elliot S. Mendelsohn, MD

Matthew R. Salminen, BS

Russell Flato, BA

Ryan A. Watson, BA

Ben Root

Steven B. Cohen, MD

**Introduction:** A workers' compensation (WC) claim has been identified as a risk factor for poor outcomes after some procedures but results are unknown after quadriceps tendon

repair. We sought to determine the functional outcomes in WC patients who have undergone quadriceps tendon repair for acute ruptures compared to a non-workers' compensation (non-WC) cohort.

**Methods:** 18 WC patients (mean age 55, 83% male) and 27 non-WC patients (mean age 55, 85% male) were identified that underwent quadriceps tendon repair from January, 2005 - January, 2012. Data was collected including complications, occupation, time to return to work, and disability status. Functional outcomes were assessed with the International Knee Documentation Committee (IKDC) and the Lysholm Knee Scoring (Lysholm) questionnaires and compared using a Wilcoxon test.

**Results:** The average length of follow-up was 3.7 years (range, 2.1-9.9 years). There were no difference in major complications: 2 in WC (11%), 3 in non-WC (11%). The mean postoperative IKDC score in the WC cohort was 56 (range, 17-99) versus 66 (range, 24-98) in the non-WC group. The mean postoperative Lysholm score in the WC cohort was 70 (range, 21-99) versus 79 (range, 35-100) in the non-WC group. There was greater permanent disability and the average time to return to work was significantly longer in the WC group versus non-WC groups: 205 days (range, 93-335) versus 150 days (range, 47-275), respectively.

**Discussion and Conclusion:** WC patients who underwent quadriceps tendon repair took longer to return to work and there was a trend towards inferior IKDC and Lysholm scores compared to non-WC patients. No previous study has analyzed results of quadriceps tendon repairs in this study group. Similar to other WC surgical treatments, surgeons should be aware of poor functional results and longer time to return to work after quadriceps tendon repair.

**Notes:**

2:00pm–2:04pm

## Biomechanical Tensile Strength Analysis Of Current Techniques For MPFL Reconstruction

LCDR Patrick W. Joyner, MD, MS

Travis Roth, MS IV

C. Luke Wilcox, DO

Jeremy Bruce, MD

Scott Winnier, PhD

Aaron K. Mates, MD

Charles A. Roth, MD

**Introduction:** Current surgical techniques for medial patellofemoral ligament reconstruction (MPFL) may employ suspensory cortical fixation and a human gracilis allograft. We examine the biomechanical strength of suspensory cortical fixation and human gracilis allograft as it compares to the strength of the native MPFL.

**Methods:** Five different MPFL reconstruction techniques were analyzed using six matched pair human cadavers. Methods of fixation examined: suspensory cortical fixation in patella and femur (DTR), suspensory cortical fixation patella interference screw femur (TRP/ISF), interference screw patella suspensory cortical fixation femur (ISP/TRF), interference screw patella and femur (DIS), two suture anchors patella suspensory cortical fixation femur (SAP/TRF). The vector force was anatomic, directed laterally over the lateral femoral condyle while the knee was flexed 25°. Each method was examined six times; each reconstruction utilizing a new human gracilis allograft. The widths of all patellae were measured; consequently, the force necessary for 50% (subluxation) and 100% patellar displacement (dislocation) could be quantified. The peak force to fixation failure was examined for all methods. A native MPFL strength of 208N was used as a control. Failure was either 100% patellar displacement or fixation failure.

**Results:** Three forms of reconstruction required force >208N for 100% patellar displacement and fixation failure; DTR, TRP/ISF, and ISP/TRF. All methods of reconstruction required <208N for 50% subluxation. All methods of MPFL reconstruction demonstrated significantly different strengths for 50% and 100% displacement of the patella as well as peak force to failure ( $F = 8.4$ ,  $F_{crit} = 2.3$  (results of ANOVA)). No reconstruction method failed as a result of the human gracilis allograft.

**Conclusion:** Three methods of reconstruction were stronger than the native MPFL; ISP/TRF being the strongest. Additionally, human gracilis allograft can withstand forces far greater than the native MPFL; therefore, suggesting human gracilis allograft as an acceptable tissue alternative for MPFL reconstruction.

**Notes:**

2:06pm–2:10pm

## A Biomechanical Comparison Of Calcium Phosphate And Fibular Allograft In Split Depression Tibial Plateau Fractures

Maxwell K. Langfitt, MD

\*Stuart M. Saunders, MD

Gregory Daut, MD

Philip Brown, MS

Jason J. Halvorson, MD

Anna N. Miller, MD

Joel Stitzel, PhD

Eben A. Carroll, MD

**Introduction:** The treatment of split depression tibial plateau fractures involves elevation of the depressed articular fragment with bone grafting of the resultant metaphyseal bone defect. Biomechanical studies have touted calcium phosphate cement as superior to autogenous cancellous bone graft. However its use is associated with higher costs. Clinical series have demonstrated allograft fibula yields outcomes similar to other bone grafting options. The purpose of this study was to evaluate fibular allograft as an alternative to calcium phosphate for metaphyseal bone defect management in split depression tibial plateau fractures in a biomechanical model.

**Methods:** 6 matched pairs of fresh frozen cadaveric tibiae were systematically fractured to create a split depression fracture of the lateral plateau. During repair each tibia of a matched pair was randomly assigned to either calcium phosphate or fibular allograft for the metaphyseal bone defect. All specimens were repaired with a periaricular plate. The tibiae were then mechanically evaluated using a hydraulic test frame

under force-controlled cyclic fatigue loading to imitate rehabilitative walking. All specimens were loaded to failure.

**Results:** When individual fatigue cycle intervals were analyzed there was no significant difference in the stiffness or displacement of the articular surface of tibiae repaired with fibular allograft versus calcium phosphate over equivalent loading cycles. When analyzing the fatigue data as a whole calcium phosphate cement had a 120.55 N increase in stiffness over fibular allograft and displayed 0.12 mm less displacement. There were no significant differences between the two during failure testing.

**Conclusions:** Fibular allograft produced an articular reconstruction of similar stiffness to that of calcium phosphate. From a clinical standpoint, the magnitude of articular subsidence in the two groups was equal. Given the lower cost associated with fibular allograft, it may be a viable alternative for management of metaphyseal bone defects in split depression tibial plateau fractures.

#### Notes:

patients treated with decompression via endoscopic visualization.

**Methods:** To further our understanding of relevant anatomy, we dissected 26 cadaver arms. We paid special attention to fascial membranes as potential sites of constriction, as well as the position of nerves, vessels, and aberrant anatomy of interest. These findings facilitated our understanding of the extent of release in 81 patients (93 cases) with cubital tunnel syndrome, utilizing endoscopic simple decompression. Outcome measures included (1) DASH score (2) Gabel and Amadio score and (3) Grip and pinch strength.

**Results:** We noted a fascial band proximal to the medial epicondyle in 12 of 26 cadaver specimens. We observed a high degree of variability in the anatomy of the flexor pronator aponeurosis distal to the medial epicondyle. Where present ( $n=10$ ), medial antebrachial cutaneous nerve branches crossed the ulnar nerve at an average distance of 2.9 cm, (range: 1.0 - 4.5). Aberrant structures were noted in 8 of the 26 specimens, including the anconeus epitrochlearis muscle in two specimens, the basilic vein crossing the ulnar nerve in four specimens, and the epimysium of triceps in two specimens. The average preoperative DASH score was 48.7 ( $n=34$ ), postoperative was 24.6 ( $n=56$ ). The Gabel and Amadio outcome scores were 24 excellent, 40 good, 25 fair and 4 poor ( $n=93$ ). Average follow-up was 8.2 months (range: 0.13 - 34.8 months).

**Conclusion:** Cadaveric dissections shed light on vulnerable anatomy during release, including branches of the MACN, UN, brachial artery, facial bands, and the basilic vein. The high degree of anatomical variability in this study highlights the advantage of endoscopic visualization in allowing surgeons to minimize operative trauma. This technique is simple and minimally invasive.

#### Notes:

Thursday, October 23, 2014

Rapid Fire Session 5E — Upper Extremity (*Station E, Ritz-Carlton Ballroom Foyer*)

Moderator: N. George Kasparyan, MD, PhD

1:42pm–1:46pm

## An Anatomical Study As A Basis For Endoscopic Cubital Tunnel Release And The Associated Clinical Outcomes

Justin B. Mirza, DO  
Ather Mirza, MD  
Shawn Adhya, BS

**Introduction:** This is an anatomical study in fresh-frozen cadavers of the ulnar nerve, as related to endoscopic release of the cubital tunnel. We also present a retrospective review of

1:47pm–1:51pm

## Rate Of Utilization Of Physician-Owned Specialty Hospitals Versus University Facilities For Arthroscopic Shoulder Surgeries - Does Ownership Effect Utilization?

Eric M. Black, MD

John Reynolds, BA

Mitchell G. Maltenfort, PhD

Gerald R. Williams, MD

Joseph A. Abboud, MD

Mark D. Lazarus, MD

**Background:** The emergence of physician-owned specialty hospitals in orthopaedic surgery has spawned intense debate. The purpose of this study is to examine the practice patterns and surgical indications of physicians practicing at these facilities utilizing common shoulder procedures.

**Methods:** We retrospectively analyzed all patients undergoing arthroscopic rotator cuff, Bankart, or SLAP repairs during an 18-month period by five surgeons in our practice at one of five facilities (two of which were physician-owned, where three of the five surgeons were shareholders). Information on patient demographics, insurance status, duration of symptoms, time taken to indicate a patient for surgery, and time to schedule surgery was studied with univariate and multivariate analyses to determine the influence of 1) facility type and 2) physician shareholder status. Additionally, measures of “conservative” treatment prior to surgical intervention were analyzed.

**Results:** 501 patients underwent one of the three index procedures during the study period. There were no significant differences in baseline demographics (age, gender, or insurance status) within facility type of physician shareholder status groups. Median duration of symptoms prior to surgery was significantly shorter in workman's compensation patients (47% less,  $p<0.0001$ ) and men (31% less,  $p<0.001$ ), but was not influenced by shareholder status nor facility ownership ( $p>0.05$ ). In the multivariate analysis, time between patient presentation and consent for surgery was not influenced by hospital type ( $p=0.39$ ) or physician shareholder status ( $p=0.50$ ). Time from consent to surgical procedure was significantly faster in physician-owned facilities by 13% ( $p=0.03$ ), and slower with physician investors by 35% ( $p<0.0001$ ). Weeks of nonoperative therapy prior to SLAP or rotator cuff repair and number of dislocations prior to Bankart repair were

not influenced by physician shareholder status nor facility type.

**Conclusions:** Neither shareholder status nor facility ownership characteristics influence a surgeon's speed to indicate a patient for surgery or the initiation of non-operative treatment prior to surgery. Once indicated for surgery, patients undergo surgery faster at physician-owned facilities and with non-shareholder physicians.

### Notes:

1:52pm–1:56pm

## Distal Radius Fracture Fixation Using The T-Pin Device

Jason C. Saillant, MD

\*John S. Taras, MD

Peter Goljan, MD

Lucy McCabe, BS

**Introduction:** To investigate the outcomes of extraarticular and simple intraarticular distal radius fractures treated with the T-Pin, a threaded, cannulated device.

**Methods:** This is a retrospective study of distal radius fractures treated with the T-Pin distal radius fracture fixation device. A minimum of 1 year postoperative follow-up was required for inclusion in the study. The outcome data collected included wrist range of motion, grip strength, and lateral pinch strength. Radiographs obtained at each visit were analyzed to determine volar tilt and radial height. At the final follow-up visit, all patients completed the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire.

**Results:** Twenty-four patients were included in this study. At an average of 2 years after surgery (range, 1 to 6 years), flexion was 89%, extension 96%, supination 99%, and pronation 100% of contralateral wrist motion. Grip strength was 93% (range, 40% to 137%) and lateral pinch strength was 99% (range, 48% to 130%) of the contralateral upper extremity. Preoperative AO fracture classification disclosed 6 type A2, 12 A3, 4 C1, and 2 C2 fractures. One patient lost radial

height of 6 mm from initial postoperative- to final follow-up radiographs. The average final DASH score was 4.4 (range, 0 to 35). Hardware was removed electively in 1 case and as the result of tenderness with wrist range of motion in 1 case. After hardware removal, neither patient expressed further complaints. No other complications or secondary surgeries occurred.

**Conclusions:** The T-Pin offers stable, reliable fracture fixation for the treatment of extraarticular distal radius fractures. The low profile of the device and its minimally invasive approach diminishes postoperative soft tissue complications. The stability of the fixation allows patients to begin active range of motion early in their postoperative course.

**Notes:**

1:57pm–2:01pm

## Single Incision Distal Biceps Repair With Hemi-Krackow Suture Technique: Surgical Technique And Early Outcomes

Brandon Donnelly, MD  
\*Justin Stull, BA  
Peter Goljan, MD  
Nimit A. Patel, MD  
Randall W. Culp, MD

**Introduction:** We present the early outcomes of a series of distal biceps repairs using a single anterior incision and two suture anchors with tensioning of the tendon bone interface using a hemi-Krackow locking stitch.

**Methods:** A retrospective chart review was performed of patients who underwent primary distal biceps repair using a single anterior incision with two suture anchors utilizing a hemi-Krackow stitch. With this repair, one strand from each anchor was passed up and down the edge of the tendon in a running locking technique. The other suture limbs were then passed through the central aspect of the distal tendon and advanced to tension the repair and finally tied on top of the tendon to its respective hemi-Krackow limb, allowing the

tendon to insert directly onto bone. Patients with revision surgery or use of allograft were excluded. Measured outcomes included elbow range of motion and grip strength compared to the contralateral arm. All patients completed a Quick Disabilities of the Arm Shoulder and Hand (QuickDASH) questionnaire. Secondary outcomes including patient satisfaction, pain level, and reported complications.

**Results:** Fourteen patients with an average age of 51.3 (range: 27.8 to 66.4) were included in the study. The dominant arm was injured in 9 cases. At an average of 16.4 months (range: 6.8 to 34.3), all patients had elbow range of motion of 0 to >130°, and grip strength was 101.5% of the uninjured arm (range: 70.6 to 121.4%). Average QuickDASH score was 6.5 (range: 0 to 36.5). Patients rated their pain as 0.3 on a scale of 0 to 10 (range: 0 to 2.5) and one patient reported infrequent and self-limited tingling in the distribution lateral antebrachial cutaneous nerve. No patient required further surgery on their arm. All patients were satisfied with the overall surgical result. One patient was not satisfied with his arm's cosmetic appearance.

**Conclusions:** Single incision biceps repair with suture anchor fixation and hemi-Krackow stitch provided satisfactory functional outcomes at early follow-up. There were no revision surgeries and only one case of transient nerve complaints.

**Notes:**

2:02pm–2:06pm

## Incidence Of Ulnar Nerve Instability In Patients Considered For In Situ Ulnar Nerve Decompression

Jonas L. Matzon, MD  
\*C. Edward Hoffler II, MD, PhD  
Kevin Lutsky, MD  
Nayoung Kim, BS  
Pedro K. Beredjiklian, MD

**Introduction:** The incidence of ulnar nerve instability in patients considered for in situ ulnar nerve decompression is

unknown and pre-operative risk factors for ulnar nerve instability necessitating transposition have yet to be identified. We hypothesized that a relatively high percentage of patients considered for in situ ulnar nerve decompression will require transposition secondary to ulnar nerve instability.

**Methods:** We retrospectively identified all patients undergoing surgical treatment of cubital tunnel syndrome by in situ ulnar nerve decompression and ulnar nerve transposition over a five-year period. Patients requiring ulnar transposition due to revision surgery, elbow arthritis, or elbow contracture were excluded. Patient demographics such as age, weight, height, and body mass index (BMI) were collected. Patients with pre-operative radiographs had measurements of ulnar groove and medial epicondyle morphology. Patients who underwent ulnar nerve transposition were noted if they were diagnosed with instability pre-operatively, intra-operatively following decompression, or post-operatively. Unpaired t-tests were used to find statistical differences between patients undergoing decompression and patients requiring transposition.

**Results:** Of the 363 patients who were considered for in situ ulnar nerve decompression, 76 patients required ulnar nerve transposition secondary to ulnar nerve instability. Twenty-nine patients were diagnosed with instability pre-operatively, while 44 patients were identified with instability intra-operatively following in situ decompression. Three patients were diagnosed with instability post-operatively and underwent delayed transposition. Patients who required transposition due to instability were significantly younger, taller, and had a lower BMI than patients without instability. For those patients with pre-operative radiographs, height and width of the ulnar groove and slope of the inferior aspect of the medial epicondyle did not correlate with the need for transposition.

**Discussion/Conclusion:** In situ ulnar nerve decompression is an acceptable treatment for cubital tunnel syndrome, but a relatively high percentage of patients will require transposition secondary to ulnar nerve instability. While patient age, height, and BMI correlate with the need for ulnar nerve transposition, further research is necessary to determine which patients are at greatest risk for ulnar nerve instability following decompression.

#### Notes:

2:07pm–2:11pm

## Distal Radius Volar Plate Implant Prominence And Flexor Tendon Rupture: Safety Profile Of A Locking, Variable Axis Plate

Joel C. Klena, MD

\*John Deegan, DO

Andrew Lehman

**Introduction:** The use of volar plating in distal radius fracture fixation is becoming increasingly common. Recent investigations have focused on complications associated with volar plating of distal radius fractures. Flexor tendon rupture is one such complication. While plate location beyond the distal radius watershed line has been theorized to present a higher risk of flexor tendon rupture, minimal data exists quantifying the risks associated with specific volar plate implants and plate prominence. We sought to determine the flexor tendon rupture rate for a volar, locking, variable axis, distal radius plate and compare it to established values reported for similar implants.

**Objectives:** The primary objective of this study was to report the adverse effects associated with a volar, locking, variable axis distal radius plate utilized in 112 consecutive distal radius fractures. The safety profile for the implant is presented along with safety profiles generated for two similar implants previously reported in the literature.

**Methods:** We reviewed 112 consecutive cases of distal radius fractures treated surgically through a volar approach utilizing a volar, locking, variable axis distal radius (VADR) plate at a minimum follow-up of 6 months. Pre-operative images were utilized to classify all fractures by AO fracture grade. Post-surgery lateral images were used to classify plate prominence into one of three groups utilizing the method previously described by Soong.

**Results:** No tendon ruptures were reported at an average follow-up of nearly 4 years. 23 of 112 wrists (20.5%) had grade-0 implant prominence, 65 (58.0%) had grade-1 implant prominence and 23 wrists (20.5%) had grade-2 implant prominence. 37 fractures (33.0%) were classified as AO Type A fractures, 4 (3.6%) as Type B fractures, and 71 (63.4%) as Type C fractures.

**Conclusions:** The Synthes VADR plate has an excellent safety profile with respect to post-operative complications of flexor tendon ruptures. Even with the majority of cases involving severe intra-articular fractures, plate placement in a position of reduced prominence (Grade 0 or 1) was achieved in 78.5% of cases.

**Notes:**

## 2014 Scientific Program Abstracts — Friday

(An asterisk (\*) by an author's name indicates the presenter.)

**Friday, October 24, 2014**

**General Session 7 — Foot & Ankle and Spine (Ritz-Carlton Ballroom Salon 1)**

**Moderators:** Matthew M. Roberts, MD  
Samuel B. Adams Jr., MD

7:00am–7:06am

### Level Of Evidence And Methodical Quality Of Ankle Cartilage Repair Studies

Ethan J. Fraser, MD  
\*John M. Pinski, MS  
Lorraine A. Boakye, BA  
Keir A. Ross, BS  
Charles P. Hannon, BS  
Yan Ma, PhD  
John G. Kennedy, MD, FRCS (Orth)

**Background:** There are many surgical techniques that attempt to repair osteochondral lesions of the ankle. It is not known whether the studies analyzing the outcomes of these surgical options have strong methodological quality.

**Methods:** A literature search was performed using PUBMed, Medline, EMBASE, and the Cochrane Databases identifying studies whose primary intention was to examine the outcome of osteochondral lesions of the ankle treated with bone marrow stimulation techniques, tissue transplantation (BFOA), osteochondral allograft transplantation (OAT), autologous osteochondral transplantation (AOT), particulated juvenile cartilage (PJC), matrix-associated chondrocyte implantation (MACI) or autologous chondrocyte implantation (ACI). A further search of the references of all included papers was performed to ensure that all eligible studies were included in this systematic review. Two independent investigators scored each paper from 0 to 100 based on ten criteria from the modified Coleman methodology score. The papers were also assigned a level of evidence using the criteria established the American version of the Journal of Bone and Joint Surgery. We collected

data on the type of study, the year of publication, the number of surgical procedures, the mean follow-up, the pre-operative and post-operative AOFAS Score, other measures used to assess outcome, and country of publication.

**Results:** Ninety-five papers reporting the results of 2,703 patients who underwent 2,745 surgical procedures for osteochondral lesions of the ankle were included for analysis. A total of thirty eight outcome measurement scores were used to assess outcome. The mean Coleman score for all scored papers was a 51.5 out of 100 and five areas were identified as methodologically weak: study size, the type of study, description of postoperative rehabilitation, procedure for assessing outcome, and description of the selection process. The papers were separated by surgical technique yielding a mean Coleman score of 56.5 out of 100 for OATS procedures, 50.9 out of 100 for ACI procedures, 54.7 out of 100 for bone microfracture, and 51.9 out of 100 for autologous transplantation. There was no statistical difference found between the Coleman scores of papers each individual surgical technique ( $p=0.2638$ ). Of the ninety-five studies scored, forty studies were identified as prospective and fifty-five studies were classified as retrospective. The mean prospective Coleman score was 54.3 out of 100 and the mean retrospective Coleman score was 51.3 out of 100. There was a significant difference in the reported post-operative AOFAS score between each surgical technique ( $p=0.0328$ ). A weak correlation was found between the AOFAS outcome score and Coleman Methodology Score weighted by patient number ( $r=0.2420$ ,  $p=0.0433$ ). Papers with different levels of evidence did not have significantly different Coleman scores ( $p=0.2526$ ). Publication year correlated positively with the Coleman methodology score ( $r=0.4735$ ,  $p<0.0001$ ).

**Conclusion:** Investigators should exercise caution when interpreting results from studies assessing the surgical treatment of osteochondral lesions of the ankle as many of these studies have a relatively low Coleman Methodology Score, which is indicative of poor methodological quality. It would be beneficial to create a uniform, validated clinical outcome score to assess post-operative success of surgical treatment of osteochondral lesions of the ankle. With more attention paid to study design and reporting of results, higher methodologi-

cal quality may be attained thus enabling practitioners to draw more meaningful conclusions from the data.

**Notes:**

7:08am–7:14am

## Comparative Study Of Assisted Ambulation And Perceived Exertion With The Wheeled Knee Walker And Axillary Crutches In Healthy Subject

Matthew A. Napierala, MD

\*Benjamin Kocher, PA-C

Donna M. Lopez, MSN

Kevin L. Kirk, DO

**Introduction:** Lower extremity injuries are common and their treatment often involves protected weight bearing with an assistive device. While axillary crutches (ACs) are some of the most frequently prescribed devices for protected ambulation, the Wheeled Knee Walker (WKW) has recently gained popularity as an option for patients requiring an assistive device. The purpose of this study is to compare ACs and the WKW in healthy volunteers for both clinical and subjective outcomes using the 6 Minute Walk Test (6MWT), Self-Selected Walking Velocity (SSWV) and OMNI Rating of Perceived Exertion (OMNI-RPE). Our hypothesis is that the WKW will provide improved assisted ambulation on the 6MWT and SSWV, have lower perceived exertion, and provide higher patient satisfaction when compared to ACs.

**Methods:** We performed a prospective, randomized cross-over study utilizing 24 healthy volunteers. Each participant performed a 6MWT utilizing each assistive device in a cross-over manner. Pre-activity and post-activity heart rates were recorded. The SSWV was calculated and the subject's rating of perceived exertion was recorded using the OMNI-RPE. Each participant's preference for assistive device was identified using a subjective questionnaire. The outcomes for each group were compared using paired t-tests.

**Results:** The WKW showed a significant increase in distance traveled for the 6MWT compared to ACs. The WKW also

showed a significant increase in SSWV and significantly lower perceived exertion the Omni-RPE compared to ACs. Evaluation of the pre-activity and post-activity heart rates demonstrated significantly lower post-activity heart rates for participants utilizing the WKW when compared to ACs. Overall, 87.5% of participants preferred the WKW to ACs.

**Discussion and Conclusion:** The WKW provides improved assisted ambulation on the 6MWT and SSWV, as well as lower perceived exertion and post-activity heart rate, and is the preferred device for assisted ambulation in healthy patients compared to ACs.

**Notes:**

7:16am–7:22am

## Peroneal Tendon Abnormalities On Routine Magnetic Resonance Imaging Of The Ankle

Joseph T. O'Neil, MD

David I. Pedowitz, MD, MS

Adam C. Zoga, MD

Patrick W. Kane, MD

Steven M. Raikin, MD

**Introduction:** Abnormalities of the peroneal tendons can frequently be identified on routine MRI of the foot/ankle. Previous studies in the orthopaedic literature have discussed the prevalence of abnormal MRI findings in asymptomatic patients, most notably with regards to the spine and shoulder. The purpose of this study is to determine the prevalence of abnormal findings of the peroneal tendons on MRI in asymptomatic individuals.

**Methods:** Foot and ankle MRIs performed at our institution during the month of July 2012 were considered for inclusion in our study. Studies were excluded if performed on patients with documented inversion injuries, ankle sprains, or lateral ankle trauma. A total of 158 (of 305) MRIs were eligible for inclusion in this study. A single attending musculoskeletal radiologist reviewed each MRI. Pathologies of the peroneal tendons included tendinosis, tenosynovitis, acute tears, chronic tears, and tendon splits.

**Results:** The median age of the MRIs included in this study was 47.27 years with 100 females and 58 males. The most commonly occurring primary pathology was Achilles tendinosis (41), followed by plantar fasciitis (20) and posterior tibial tendon dysfunction (20). With regards to the peroneal tendons, 64 of the 158 (40.5%) MRIs demonstrated some pathology.

**Discussion and Conclusion:** The results of this study demonstrate that a sizeable percentage of individuals (40.5%) will have peroneal tendon pathology on MRI of the foot and ankle, when performed for reasons other than instability or lateral ankle trauma. This study can have important clinical implications for when patients present with concerning MRI findings that do not correlate clinically. Physicians providing musculoskeletal care can counsel and reassure patients who present with peroneal pathology on MRI but an absence of clinical findings.

**Notes:**

7:24am–7:30am

## Open Calcaneus Fractures And Associated Injuries

Jacob R. Worsham, MD  
Mark R. Elliott, MD  
Corey Rosenbaum, MD  
Christopher H. Perkins, MD  
Anthony M. Harris, MD

**Introduction:** To describe the associated injuries, demographic distribution, and management of patients sustaining open calcaneus fractures.

**Methods:** A retrospective case series was performed of open calcaneal fractures at a single level-1 trauma center. Sixty-six patients with open calcaneus fractures were identified from an orthopaedic trauma registry. All patients were managed with surgical irrigation and debridement with or without internal fixation.

**Results:** The most common mechanisms were motor vehicle crashes (56%) and falls greater than six feet (23%). Five patients (8%) had a posterior tibial artery transection. Fifty-five patients (78%) had a Gustillo type II or type III open medial injury. Eight patients (12%) had a femoral shaft fracture, fourteen patients (21%) had ipsilateral ankle fractures, sixteen patients (24%) had a metatarsal fracture, and eleven patients (17%) had associated midfoot fractures. In the associated midfoot fracture group 12 patients (18%) had a talus fracture and 5 patients (7%) had a cuboid fracture. Nine patients (14%) had an associated spine fracture with 66% being lumbar fractures. Fifteen patients (23%) had associated upper extremity fractures. Thirteen patients (20%) had a significant associated pulmonary injury. Ten patients (15%) had an associated closed head injury and six patients (9%) had an abdominal injury. Fifteen patients (22%) were treated with percutaneous wire fixation and seven patients (10%) with open reduction internal fixation. Forty-four (66%) were treated non-operatively. Overall all seven patients (11%) with Gustillo type III open calcaneal fracture eventually underwent a below the knee amputation.

**Discussion and Conclusion:** Open calcaneus fractures are severe injuries with potential for significant morbidity to the patient, given the high rate of concomitant injuries. Type III open injuries have a significant risk of needing subsequent amputation. Management of these injuries should include intravenous antibiotics, tetanus prophylaxis and urgent debridement and irrigation.

**Notes:**

7:32am–7:38am

## Factors Contributing To Hospital Stay And Charges In Ankle Arthroplasty

Jason L. Codding, MD  
Daniel E. Davis, MD  
Mitchell G. Maltenfort, PhD  
David I. Pedowitz, MD, MS

**Introduction:** Total ankle arthroplasty (TAA) has become a more common treatment for end-stage ankle osteoarthritis.

With rising healthcare costs and declining reimbursements, identifying variables increasing length of stay (LOS) and total inpatient charges (TIC) of TAA is necessary to evaluate these trends.

**Methods:** The National Inpatient Sample (NIS) Database was reviewed (1993-2010), identifying LOS and TIC for TAA. Using a multivariate analysis, comorbidities, demographics, payment, and hospital location and type were evaluated to determine effects on LOS and TIC. Comorbidities included diabetes mellitus and obesity. Demographics included gender, age and race. Payment included Medicare, Medicaid, private, self-pay, and no charge. Location included Northeast, Midwest, South and West. Hospital type included urban (academic or private), rural, small, medium or large, as defined by the NIS database.

**Results:** Overall, median LOS has decreased from 1993 to 2010 (5 to 2 days) while median TIC has increased (\$21,382.53 to \$62,028.00). Obesity or age had no significant difference on LOS or TIC. Diabetics and females had a significantly increased LOS, while white patients had decreased LOS and decreased TIC of 9.1%. Compared to Medicare, private insurers had a decreased LOS, while payment was not associated with a significantly different TIC. Compared to the Northeast, the Midwest and South had decreased TIC of 16.55% and 5.89%, respectively, while the West had an increased TIC of 14.81%. Regionally, there was no significant difference in LOS. Medium hospitals showed higher TIC of 6.51%, while large hospitals were associated with increased LOS and increased TIC of 25.18%. Rural hospitals demonstrated decreased TIC of 21.74% while urban private hospitals showed both decreased LOS and decreased TIC of 13.40%.

**Discussion and Conclusion:** Despite decreased LOS in TAA, hospital charges have increased considerably from 1993-2010. Particular variables are patient-specific, regional, cultural and systemic. Identification of these factors provides important information to all involved in the healthcare system.

#### Notes:

7:40am–7:46am

#### EOA/OREF Resident/Fellow Travel Grant Award

### Implant Cost Reduction Initiative In Spine Surgery

Jonathan Oren, MD  
Lorraine Hutzler, BA  
Tracey Hunter, BS  
Thomas J. Errico, MD  
Joseph D. Zuckerman, MD  
Joseph A. Bosco III, MD

**Introduction:** Demand for spinal surgery and its cost have risen over the past decade. In 2007 the aggregate hospital bill for surgical care of lumbar spinal stenosis was reported to be \$1.65 billion. One key driver of rising costs is spinal implants. In 2011 our institution implemented a cost-containment program for our spinal implants. This program was designed to decrease the prices of individual spinal implants and to decrease the inter-physician variation in implant costs.

**Methods:** Between February 2012 and January 2013, our spine surgeons performed 1121 spinal procedures using implants across 5 vendors. Using market analysis and implant cost data from the previous year, we established price points for each individual type of spinal implant, regardless of vendor. In order to continue to be approved for use, vendors were required to meet these price points. For each case, the cost of individual implants was recorded per the newly negotiated price points as well as the historical price point from the previous year. We expressed the cost reduction as a percentage decrease from the historical implant price points from the previous contract. To capture the degree of physician alignment, we examined the variance of implant cost during single level Anterior Cervical Discectomy and Fusion (ACDF) using standard deviation. Studying ACDFs served to limit the confounding variable of case complexity as seen among lumbar and thoracic procedures.

**Results:** During the first year of this initiative, the institution was able to reduce implant spending by \$2,347,521. Our quarterly reduction in spending when compared with historical spending rates was as follows: Q1 12.34%, Q2 21.96%, Q3 25.76%, and Q4 24.91%. The average savings of implant costs was 21.14%. The standard deviation of implant cost per ACDF among surgeons decreased from \$1123 to \$499.

**Conclusions:** Our initiative represents a successful cost-containment program. Despite the high complexity of spinal surgery and the initial reluctance among vendors to reduce prices, with strong hospital and physician alignment, these obstacles were overcome with significant savings to the medical center. There were no direct financial incentives to surgeons for participating in the program. Their participation was achieved by increasing physician awareness of the issue.

**Notes:**

Radiographic evaluation included standing anteroposterior (AP) and lateral pelvic radiographs, and sitting lateral pelvic radiograph, measuring functional pelvic obliquity and sagittal standing and sitting pelvic tilt. Post-operative functional anteversion and abduction angles were assessed by EBRA software.

**Results:** There was no dislocation at minimum 2-year follow-up. All cups were within the safe zone. 25% (17 patients) had fixed LS deformity. In all of the flexible pelvises, there was a posterior tilt from standing to sitting with increase in functional anteversion. The change in tilt from standing to sitting was significant in the flexible pelvis group as compared to the fixed pelvis group ( $26.8^\circ \pm 9.5^\circ$  versus  $5.9^\circ \pm 3.5^\circ$ ,  $p=0.0001$ )

**Discussion:** There is a significant change in pelvic tilt from standing to sitting, especially in patients with flexible spine, where the functional anteversion increases with sitting. The patients with fixed pelvis have significantly less anterior sagittal tilt in standing (less anteversion) with less posterior sagittal tilt in sitting. Care should be taken to adjust cup positioning in fixed spinal deformities or loss of posterior pelvic tilt while sitting.

**Notes:**

**Friday, October 24, 2014**

**Rapid Fire Session 8A — Total Hip Reconstruction**  
(Station A, Plaza Ballroom I)

**Moderator:** Douglas E. Padgett, MD

8:20am–8:24am

## Effect Of Fixed Spinal Deformity On Functional Pelvic Orientation From Standing To Sitting

Morteza Meftah, MD  
Chitranjan S. Ranawat, MD  
Amar S. Ranawat, MD

**Introduction:** Accurate and reproducible cup positioning is one the most important technical factors that affect the outcomes of total hip arthroplasty (THA). Although Lewinnek's safe zone is the most accepted range for anteversion and abduction angle, the effect of pelvic tilt, obliquity and effect of lumbosacral spine is not yet established. The aim of this study was to assess the change in pre-operative saggital pelvic tilt from standing to sitting, and analyze the effect of change in saggital pelvic tilt on acetabular anteversion and abduction angles.

**Material and Methods:** Between July 2011 and October 2011, 68 consecutive unilateral THAs were implanted in 68 patients with a mean age of  $71 \pm 6$  years old. All cases were performed by a single surgeon via the posterolateral approach.

8:25am–8:29am

## Dynamic Hip Spacers Reduce Operative Time During Reimplantation

Anthony Tokarski, BS  
Gregory K. Deirmengian, MD  
Javad Parvizi, MD, FRCS  
Carl Deirmengian, MD

**Introduction:** During two-stage exchange arthroplasty either a dynamic or static antibiotic impregnated spacer may be used. Although prior literature suggests that the use of dynamic knee spacers result in improved functional outcomes, substantiation of the additional cost of dynamic hip spacers is not as well-established. The purpose of our study was to investigate whether the use of dynamic spacers reduces operative time during reimplantation,

**Methods:** Using our institutional database, we identified all patients who underwent 2-stage exchange arthroplasty for treatment of PJI between 2006 to 2012. Detailed data was collected on all of these patients, including the operative time during reimplantation. Cox regression analysis was used determine independent risk factors for increased operative time.

**Results:** We identified 223 patients who underwent reimplantation of either the knee (154 patients) or the hip (69 patients). The mean operative time during reimplantation was 122 minutes for 20 patients with a dynamic hip spacer compared to 158 minutes for 49 patients with a static hip spacer. For 73 patients with a static knee spacer the mean reimplantation time was 131 minutes compared to 131 minutes for 81 patients with a dynamic knee spacer. The use of dynamic hip spacers was independently associated with decreased operative time. Other independent factors leading to an increase in operative time during reimplantation were increase in degree of bone loss and increase BMI.

**Discussion and Conclusions:** This study demonstrates that the use of dynamic spacers in the hip is associated with a decrease in operative time during reimplantation. It is possible that better maintenance of the effective joint space and soft tissue tensioning that can be achieved with the use of dynamic hip spacers results in ease of revision compared to static spacers. Given the expense associated with operative time, this factor should be considered in substantiating the cost of dynamic hip spacers.

#### Notes:

8:30am–8:34am

## Radiographic Patterns Of Osteointegration In Cementless Tapered Wedge Stems

Jonathan Robinson, MD  
Parthiv A. Rathod, MD  
John W. Stirton, MD  
H. John Cooper, MD  
Jose A. Rodriguez, MD

**Introduction:** A sequential radiographic analysis tracking the patterns of osteointegration and bony remodeling in proximally coated tapered wedge stems has yet to be fully described. The aim was to study the evolution of radiographic patterns of osteointegration and determine if there is correlation with pre-operative bony morphology and initial stem fit.

**Methods:** Retrospective radiographic review of consecutive primary total hip replacements performed by one surgeon using a single stem design. Procedures were done between January 2006 and December 2008. Patients included in the study required an anterior-posterior radiograph pre-operatively and anterior-posterior + lateral radiographs at 6 weeks post-operatively and at their most recent visit. Radiographs were analyzed by two of the authors. Radiographic analysis included documentation of radio-lucent Lines (RLL), endosteal spot welds, and changes in cortical thickness at each gruen zone. Incidence of pedestal formation, calcar remodeling and subsidence were also recorded.

**Results:** 104 hips (94 patients) met the inclusion criteria for radiographic review with a mean follow-up of 5.5 years (Range 3.4-7.4 years). No RLL were seen over the proximal porous coated portion of the stem. Distal RLL's were seen in 27% (zone 4) and 31%(zone 11) of stems. Cancellization of the calcar bone was seen in all patients on their final radiographs. Highest incidence of spot welds were at zones 2 and 9(54% and 57% respectively). Significant positive correlations were seen distal canal fill (DCF) and bony remodeling in zone 3( $p$  0.016) and 5( $p$  0.013).

**Conclusion:** Cortical hypertrophy around the midstem, lack of RLL around the proximal stem and cancellization of calcar bone are all radiographic patterns which were linked with osteointegration of proximally coated tapered wedge stems. While there was no significant correlation with preoperative bony morphology or initial stem fit proximally, there was

a positive correlation with DCF and cortical hypertrophy of zones 3 and 5.

**Notes:**

8:35am–8:39am

## Influence Of Neck Cut On Subsidence Of Hydroxyapatite Coated Stem

Yevgeniy Korshunov, MD

Jonathan Robinson, MD

Roger A. Sanguino

Mital S. Patel, MBBS, MS

Jose A. Rodriguez, MD

**Introduction:** Hydroxyapatite coated stems have been used for almost thirty years with reliably good results. Subsidence of a stem is a rare but sometimes serious complication. The aim of this study was to report the incidence of subsidence and correlate stem subsidence with pre-operative bony morphology, initial stem fit, and femoral neck cut length.

**Materials and Methods:** Retrospective review of consecutive case series done between May 2010 and December 2012 by single surgeon at a single institution. For the purposes of this study we looked at one particular stem design. 83 patients had primary total hip replacement with the stem during that time period. Patients included into the study had complete radiographic follow-up (defined as pre-operative, immediate post-operative, 6 week post-operative and 1 year follow-up radiographs). 70 patients met the criteria for radiographic analysis. Patients with stem migration greater than or equal to 1.5 mm were placed in the subsidence group. The remaining patients were placed into the control group. We used statistical analysis to identify differences between the two groups and to correlate stem migration with preoperative bony morphology, initial stem fit, and femoral neck cut length.

**Results:** Four patients had stem migration greater than or equal to 1.5 mm. All cases were identified on the 6 week post-operative radiograph. There was a significant difference found in femoral neck cut length and distal canal fill between the subsidence and control groups. There were no significant cor-

relations between subsidence and preoperative bony morphology or initial stem fit.

**Conclusion:** Stems that subsided had a neck cuts at the lesser trochanter. Preservation of calcar bone may play a role in initial stem stability and fixation. If preoperative templating calls for a low neck cut, the use of a collared stem may be beneficial.

**Notes:**

8:40am–8:44am

## Multiple Lower Extremity Arthroplasties: Quality Of Life

David A. Iacobelli, MD

\*Jesus M. Villa, MD

Carlos J. Lavernia, MD

**Introduction:** Scarce and outdated literature exists on quality of life (QoL) in patients with both knees and hips replaced. In this very unusual cohort of patients who had primary knee/hip multiple joint replacements (MJRs) we wanted to describe: (1) how much QoL improvement they obtain after each procedure, (2) how high and when their best QoL state is reached, and (3) how their QoL compares with the normal age-matched population.

**Methods:** Eleven patients (44 joints) had their QoL determined making use of the QWB-7. Preoperative QWB-7 obtained before the first replacement served as baseline. Mean QWB-7 obtained over time was recorded and compared with the one of the corresponding normal age-matched population. Mean follow-up was 12 years (range, 7-19 years).

**Results:** Compared to the baseline, QWB-7 scores improved postoperatively at the latest follow-up (mean difference: 0.100, 95% confidence-interval [CI]: 0.034-0.167). After the fourth joint had been replaced, the best mean QWB-7 (0.638, CI: 0.554-0.721) was attained at an average of 5 years (range, 8 months-13 years). The best mean QWB-7 obtained over time compared favorably with the one of the normal age-matched population (0.661 vs. 0.616, respectively). Patient's

mean QWB-7 fluctuated over time and it was at an inferior level compared to normal subjects (0.616) by the latest follow-up (0.577, CI: 0.488-0.667).

**Discussion and Conclusion:** Our data suggests that patients who undergo MJRs attain significant improvement in QoL, with the majority of patients, achieving a higher QoL when compared with preoperative levels. Postoperative improvement varied over time but, for most patients, it was clear and sustained. The quality of life of patients with multiple diseased joints is quite affected. Arthroplasty surgery returns a lot of the function even in these severely impaired patients.

**Notes:**

8:45am–8:49am

## Big Heads And Trunnions: Tribocorrosion Turbocharged

Jesus M. Villa, MD  
Carlos J. Lavernia, MD  
David A. Iacobelli, MD

**Introduction:** The use of large heads has increased 10 fold since the introduction of highly cross-linked bearing surfaces. Cobalt-chromium (Co-Cr) has approximately twice the modulus of elasticity of titanium (Ti) alloys. Most stems used in the USA today are made out of Ti alloys and over 90% of the heads implanted are Co-Cr. Our objective was to assess the consequences of using large heads on the resulting stresses and strains in the trunnion.

**Methods:** A 3D model was constructed of a standard 12/14 trunnion using Simulia's ABAQUS. Various head sizes were modeled. The model had 130.6k nodes and 93.2k elements. To better capture the surface stress, first order membrane elements were overlaid on tetrahedron elements. A pressure load of 2.1 MPa was applied to simulate a 2.6 body-weight force at the hip.

**Results:** Trunnions had a significant increase in stresses and strains as the heads increased from 28mm to 40mm. For a 28mm diameter ball the maximum principal stress was 20.3

MPa, for a 32mm ball it was 36.0 MPa, and for a 40mm ball it was 43.8 MPa. Our data shows a two-fold increase in trunnion stresses across the ball diameters studied.

**Discussion and Conclusion:** Our model suggests that increase in head size significantly augments the stresses and strains at the trunnion-head junction. This increase in motion and stresses at the trunnion head junction can significantly contribute to tribocorrosion and metal ion release. This effect can be magnified if an additional interface exists, such as in a double modular trunnion.

**Notes:**

Friday, October 24, 2014

Rapid Fire Session 8B — Total Knee Reconstruction  
(Station B, Plaza Ballroom 1)

Moderator: James J. Purtill, MD

8:20am–8:24am

## Does Medicare 3 Day Rule Increase Length Of Stay?

Victor H. Hernandez, MD, MS  
Alvin C. Ong, MD  
Zachary D. Post, MD  
Fabio R. Orozco, MD

**Introduction:** Medicare will only cover transfer to a skilled nursing facility if it follows a hospital inpatient stay of at least 3 days. The 3-day stay rule was instituted several years ago to prevent improper and excessive utilization of the skilled nursing benefits under Medicare. The purpose of this study was to evaluate whether or not Medicare 3 day rule increase length of stay after total joint arthroplasty.

**Methods:** From a consecutive cohort of 800 TKA done during 2011 we analyzed patients who were discharged to in-patient rehab after surgery. Medicare recipients were matched directly with those who were privately insured. We matched each patient according to age, BMI, and ASA score.

**Results:** A total of 322 patients were discharged directly to inpatient rehab facility after surgery. There were 209 Medicare patients and 113 Private patients. The LOS was 2.3 days for privately insured patients and 3.02 for Medicare recipients. No difference was found between the two groups with regards to age, BMI, and ASA score.

**Conclusion:** We found Medicare 3 days rule increased the length of stay of patients that needed inpatient rehabilitation when compared to patients who were privately insured. In the current medical economic climate, we recommend that this outdated rule be revised in order to decrease unnecessary cost and expenditure.

**Notes:**

8:26am–8:30am

## Race And Outcomes In Arthroplasty Surgery

Jesus M. Villa, MD  
Carlos J. Lavernia, MD  
David A. Iacobelli, MD

**Introduction:** We wanted to study a large case-series of THA/TKA and to determine the relationships of race with outcomes as well as the root causes of disparities if any.

**Methods:** A consecutive series of 2,435 cases (primaries/revisions) performed in a single hospital by a single surgeon was studied. Revisions due to infections were excluded. Data on race was available for 2,288 cases which were finally included. African-Americans (AA) (n=131) and Whites (n=2,157) were compared on demographics, preoperative diagnoses, Charlson, ASA; length of stay (LOS); transfusion rates; discharge disposition (home vs. facility); preoperative and postoperative pain intensity as measured by a visual analogue scale (VAS, 0-10), QWB-7, SF-36, WOMAC, Hip Harris and Postel-D'Aubigne scores, HSS Knee score as well as Knee Society Knee and Function Scores. T-tests, Chi-Square, and MANCOVA (to adjust for age, ethnicity, and diagnosis) were used.

**Results:** Overall and compared to Whites, African-Americans were significantly younger (70 vs. 64 years, respectively and for all comparisons), had fewer Hispanics (75% vs. 32%), underwent more transfusions (28% vs. 42%), and had more revisions (12% vs. 20%). In the primary group, the preoperative diagnoses between the two groups were significantly different. In addition and preoperatively, pain intensity (7.9 vs. 8.2), QWB-7 total (0.532 vs. 0.527), SF-36 pain (36 vs. 33), and WOMAC-total (52 vs. 57) were significantly different. Postoperatively, pain intensity (0.58 vs. 1.44), QWB-7 total (0.607 vs. 0.578), SF-36 pain (69 vs. 64), and WOMAC-total (5 vs. 9) were also significantly different (MANCOVA).

**Discussion and Conclusion:** African Americans underwent surgery early in life with more pain and functional impairment when compared to Whites. They had more revisions and worse preoperative and postoperative outcomes even on primary surgeries. Race seems to be strongly associated with outcomes. Particular attention should be given to the preoperative diagnoses and pain management on these patients.

**Notes:**

8:32am–8:36am

## Resource Consumption And Outcomes In Total Knee Arthroplasty (TKA)

Carlos J. Lavernia, MD  
David A. Iacobelli, MD  
Jesus M. Villa, MD  
Lawrence Brooks, PhD

**Introduction:** Patient's psychosocial and functional outcomes are associated with the financial aspects of TKA in our studied sample.

**Methods:** We retrospectively studied 131 consecutive unilateral TKA patients (mean age 71.8 years; 72.5% women). We extracted financial information from the hospital's accounting software that included charges, direct costs, and indirect costs. Each patient was administered the QWB-7, SF-36, and WOMAC. Functional measures included the Hospital for Special Surgery scale (HSS) and the Knee Society Function Score

(KSFS). Data was collected pre-operatively and at 3, 6, 12, and 24 month follow-up. Pearson-product moment correlations were used to evaluate the relationship between variables. T-tests were used to assess the effects of gender and ethnicity.

**Results:** A significant inverse relationship was found between cost and functional data at all-time points. This finding was strongest at three month follow-up ( $p < 0.001$ ). At three months, the HSS and KSFS were significantly correlated with: charges (HSS,  $r = -0.41$ ; KSFS,  $r = -0.46$ ), direct costs (HSS,  $r = -0.47$ ; KSFS,  $r = -0.46$ ), and indirect costs (HSS,  $r = -0.36$ ; KSFS,  $r = -0.44$ ). The QWB-7 score at the 2-year follow-up was significantly inversely correlated with: charges ( $r = -0.42$ ), direct costs ( $r = -0.40$ ), and indirect costs ( $r = -0.39$ ).

**Discussion and Conclusion:** Worse outcomes are significantly associated with higher charges, direct costs, and indirect costs for TKA.

**Notes:**

8:38am–8:42am

## Higher Morbidity And Mortality After Femoral Neck Fracture In Patients With Chronic Liver Failure

Antonia F. Chen, MD, MBA

Zachary D. Post, MD

Mitchell G. Maltenfort, PhD

Fabio R. Orozco, MD

Alvin C. Ong, MD

**Introduction:** Patients with chronic liver failure (CLF) are living longer and consequently, are more likely to develop osteoporosis secondary to altered bone metabolism. The purpose of this study was to evaluate if liver failure is associated with a higher risk of complication after hip fracture surgery.

**Methods:** Patients with closed femoral neck fracture were identified from the Nationwide Inpatient Sample (NIS) database. Patients with CLF were identified within this group using the Elixhauser comorbidity set from 2002-11. This resulted in a total of 128,700 closed hip fracture patients, of which 1539 had liver failure. Operative fixation consisted of

hemiarthroplasty (partial hip), internal fixation, or total hip arthroplasty (THA). Patients managed with more than one intervention were excluded. Gender, age, in-hospital mortality, length of stay (LOS), and postoperative complications were evaluated. Statistical analysis was performed using multivariate logistic regression.

**Results:** Patients with CLF sustained femoral neck fractures at younger ages (67.9 years $\pm$ 12.8) compared to patients without liver failure (78.3 years $\pm$ 12.9,  $p < 0.001$ ). CLF patients with femoral neck fractures were more likely to be male (47.8%) compared to non-chronic liver failure patients (29.8%,  $p < 0.001$ ). Both patient populations were more likely to receive a hemiarthroplasty as surgical fixation, followed by internal fixation and THA. Patients with CLF had higher mortality than those without liver failure ( $p < 0.001$ , OR 2.12, 95% CI 1.56-2.90), greater risk of transfusion ( $p < 0.001$ , OR 1.60, 95% CI 1.41-1.83) and wound complications ( $p = 0.01$ , OR 1.64, 95% CI 1.11-2.41). The median length of stay for CLF patients was 6 days, which was significantly longer than non-CLF patients who had a median stay of 5 days ( $p < 0.001$ ).

**Discussion and Conclusion:** Patients with chronic liver failure sustain femoral neck fractures at a younger age, and have higher associated morbidity and mortality. Extra precaution should be taken when managing this patient population especially with regards to blood and wound management.

**Notes:**

8:44am–8:48am

## Effects Of Fracture Union With Direct Reduction Of Peritrochanteric Fractures

Lawrence K. O'Malley, MD

Stephanie L. Tanner, MS

J. Scott Broderick, MD

Thomas M. Schaller, MD

**Introduction:** Anatomic reduction of peritrochanteric hip fractures allows preservation of anatomic kinematic relationships retaining leg length and appropriate hip offset. Multiple

articles have described clamp-assisted reduction for difficult subtrochanteric and femoral shaft fractures, however little has been written describing direct reduction of intertrochanteric fractures. The aim of this study is to evaluate union rates and reduction quality of peritrochanteric (intertrochanteric and subtrochanteric) hip fractures reduced using open, biologically friendly direct reduction techniques and fixed with cephalomedullary fixation or side plate hip screw.

**Methods:** We retrospectively reviewed peritrochanteric hip fractures (OTA 31A1-A3) between 2006 and 2013 in which some form of direct reduction was used prior to and/or during fixation. Direct reduction was used when positioning and traction alone were unsatisfactory in correcting alignment and displacement. All patients who had a low-energy fall, were at least 50 years old, and treated by one of two orthopaedic trauma surgeons were included. The outcomes measured included: instruments used for direct reduction, intraoperative/postoperative alignment, and radiographic union rates.

**Results:** Overall, forty-one patients were included, with an average age of seventy-four years old. All patients had anatomic or near anatomic reduction (within 5 degrees of anatomic) assessed with intraoperative fluoroscopy. The instruments used for direct reduction included clamps, pushers, cobbs, bone-hooks, K-wires and unicortical plates. The overall primary union rate was 93%, with three patients developing a nonunion requiring revision surgery. All patients with primarily united fractures maintained their anatomic reduction at final follow-up.

**Discussion and Conclusion:** With the use of biologically friendly direct reduction techniques, near anatomic reductions can be obtained in low-energy peritrochanteric fractures with minimal complications. This data supports the use of direct reduction for peritrochanteric hip fractures when indirect reduction techniques alone are insufficient.

**Notes:**

**Friday, October 24, 2014**

**Rapid Fire Session 8C — Hip & Spine**  
(Station C, Ritz-Carlton Ballroom Foyer)

**Moderator:** John D. Kelly IV, MD

8:20am–8:24am

## Femoral Acetabular Impingement In Patients Undergoing Total Hip Arthroplasty

Kyle E. Fleck, MD

Kris Wheeler, MD

Edmund Z. Brinkis, MD

**Introduction:** Increasing evidence has emerged that supports femoroacetabular impingement as a major cause of osteoarthritis of the hip in young adults. A review of the literature reveals no studies looking at the prevalence of FAI in patients that have undergone total hip arthroplasty. Our hypothesis is that there will be a high prevalence of patients with previously undiagnosed femoroacetabular impingement undergoing total hip arthroplasty.

**Methods:** We evaluated the prevalence of FAI in patients that underwent primary total hip arthroplasty at our institution beginning January 1, 2010, thru December 31, 2012, by inspecting the patient's preoperative radiographs for signs of pincer or cam impingement. Pincer impingement was diagnosed by evidence of acetabular retroversion or by evidence of global acetabular over coverage. Cam impingement was diagnosed with an alpha angle greater than 50.5° on the AP Pelvis or lateral hip radiograph.

**Results:** The study consisted of 116 right hips and 124 left hips to evaluate for cam and pincer impingement. The mean alpha angle on the right was 71.4° (range: 32.6-103°) and 71.2° (range: 24.5-118°) on the left. An alpha angle greater than 50.5° was found on 91.3% right hips and 85.4% left hips. Evidence of pincer impingement was found in 89% of the patients with at least one positive sign and 45% of patients had at least four positive signs. Coxa Profunda was the most common sign of pincer impingement with 63% and 64% of the right and left hips being positive, respectively. 98% of the patients had at least one positive radiographic finding of either cam or pincer impingement.

**Conclusions:** A large number of patients undergoing total hip arthroplasty at our institution had previously undiagnosed

femoroacetabular impingement giving further evidence that this process is a major cause of hip arthritis.

**Notes:**

8:25am–8:29am

## Labral Base Hematoma: A Tension-Sided Injury Pattern

Anil S. Ranawat, MD

Jaron Sullivan, MD

Oliver Sax, BA

**Background:** This study identifies an intra-articular finding known as labral base hematoma, a unique tension-sided intra-articular injury associated with hip instability. Our hypothesis is that labral base hematoma is a more significant injury than a hypertrophic labral tear associated with radiographic and computerized tomography findings of instability. The objective is to investigate the etiological factors of basal labral hematoma and corresponding bone morphology of the hip.

**Methods:** This was a prospective case study over a two year period. Labral base hematoma is defined as an articular-sided bloody fluid located within a hypertrophic labrum. Patients who displayed labral base hematoma were selected. Collected data included patient demographics, procedures, functional score outcomes, and intra-operative pictures. Additional data included pre-operative findings of patient exam, intra-articular radiography and computerized tomography (CT), and range of motion.

**Results:** The senior author performed 141 hip arthroscopies in this study period where 11 (7.8%) patients had a hypertrophic labrum with labral base hematoma and 7 (5.0%) patients had intra-operative findings consistent with a labral base hematoma. Labral base hematoma patients had radiographic and CT findings consistent with mild instability. The mean radiographic measurements angles were: alpha,  $47.82 \pm 5.74$ ; coronal center edge,  $25.36 \pm 6.73$ ; sagittal center edge,  $23.6 \pm 8.87$ . The mean CT measurements were: acetabular version (1 o'clock),  $2.29 \pm 7.3$ ; acetabular version (2 o'clock),  $10.67 \pm 6.57$ ; acetabular version (3 o'clock),  $14.91 \pm 7.19$ ; femoral

version,  $13.5 \pm 11.12$ . The mean internal rotation at  $90^\circ$  is  $13.93 \pm 4.97$ . Comparison of the two cohorts revealed no statistically significant difference.

**Conclusion:** This is the first description of a labral base hematoma, which we feel is a tension-sided labral base injury. This is different than a compression-sided labral tear, seen with impingement. Additionally, labral base hematoma may also be consistent with an intra-articular finding of hip instability.

**Notes:**

8:30am–8:34am

## Gait And Femoral Acetabular Impingement

Anil S. Ranawat, MD

Rachael Taylor, MPAS

James Satalich, BS

Oliver Sax, BA

**Background:** Femoral acetabular impingement (FAI) is a condition defined by abnormal development of bone at the head-neck junction of the femur (CAM lesion) and/or deep acetabulum (pincer lesion). Patients with FAI generally have decreased range of motion and pain, particularly in flexion and internal rotation, due to a mechanical block created by these lesions. The objective of the present study is to investigate the relationship between FAI and baseline foot progression angle, as well as evaluate changes in pain with changes in foot progression angle.

**Methods:** In a clinical prospective study starting 2/11/14, patients who presented with hip pain were selected. Patients were instructed to walk with an internal ( $-15^\circ$ ) and external rotation ( $+15^\circ$ ) gait from their normal baseline progression. Pain associated with each gait was recorded and x-ray measurements of FAI were collected. This data was analyzed to determine relationships between FAI, gait, and pain with changes in foot progression angles.

**Results:** 19 patients presented to the clinic with hip pain. 13 (68%) patients walked with a neutral foot progression, 4

(21%) walked with an out-toe gait, and 1 (5.3%) walked with an in-toe gait. X-ray measurements indicated a high incidence of FAI in those who walk with neutral and out toe progression at baseline, and also with increased pain with internal rotation.

**Conclusion:** People with FAI are more likely to walk with a neutral to out-toe progression, and have increased pain with internal rotation. This can be used in the clinical setting as a diagnostic tool. The present analysis will help clarify biomechanical associations between gait and hip pain.

**Notes:**

8:35am–8:39am

## Intra-Articular Hip Pathology Can Be Treated With Surgical Hip Dislocation

John A. Abraham, MD  
Brandon J. Shallop, MD  
Javad Parvizi, MD, FRCS

As in other joints, PVNS and synovial chondromatosis of the hip requires total synovectomy for treatment. Although challenging, total synovectomy can be performed in the hip via a surgical dislocation. No recent studies have studied hip dislocation and synovectomy as a surgical treatment option for PVNS or synovial chondromatosis of the hip. The purpose of this study is to evaluate the outcomes of patients treated with surgical dislocation and total synovectomy of the hip specifically for PVNS or synovial chondromatosis.

**Methods:** We retrospectively reviewed an institutional database to identify patients who underwent hip dislocation and synovectomy as treatment for PVNS or synovial chondromatosis of the hip. Selected patient records were queried and analyzed for recurrence rate, function, complications, and conversion rate to total hip post hip dislocation and synovectomy. All patients were followed for a minimum of 2 years with follow up MRI and clinical examination.

**Results:** 8 patients were identified with either PVNS or synovial chondromatosis of the hip. All patients underwent surgical dislocation and total synovectomy. Of the 8 patients, none

suffered a recurrence of disease in the follow up period. One patient progressed to total hip replacement. None developed avascular necrosis. Complications included one screw removal for prominence. All patients were ambulatory and complained of minimal pain at last follow up.

**Conclusion and Discussion:** Intra-articular neoplastic pathology of the hip is rare and extremely difficult to control. We studied the outcomes of 8 patients who underwent surgical dislocation and total synovectomy for intra-articular hip pathology. We found that although one patient progressed to total hip arthroplasty, none suffered a recurrence or major complication. All had reasonable functional outcomes with respect to ambulation and pain. Surgical dislocation is therefore a reasonable procedure for treatment of these neoplastic synovial conditions of the hip.

**Notes:**

8:40am–8:44am

## How Does State Income And The Number Of Uninsured Patients Relate To Hospital Charges For Spine Care?

Kushagra Verma, MD, MS  
Eric M. Padegimas, MD  
Alexander Vaccaro, MD, PhD  
Todd J. Albert, MD  
Alan S. Hilibrand, MD  
Kristen E. Radcliff, MD

**Introduction:** Charge and reimbursement data from the Centers for Medicare Services demonstrated significant variation in the hospital charge and charge to reimbursement ratio (CRR) of spine care across the country. The purpose of this study is to determine if the state-to-state variation is correlated with state income and the percent of uninsured patients using data from the United States Census Bureau.

**Methods:** Four “diagnosis related groups” were analyzed: 460 (Thoracic/lumbar fusion), 473 (Cervical spine fusion), 491 (Nonfusion back/neck), 552 (Medical back). For each

group, the correlation between medicare charge, reimbursement, and CRR to state income were analyzed. In addition, the correlation between charge, reimbursement, and CRR to % uninsured was investigated. Associations were determined with a Pearson's correlation.

**Results:** Thoracic/lumbar fusion: Charge correlated with % uninsured ( $0.519 < 0.0001$ ), while reimbursement with income ( $0.612 < 0.0001$ ). CRR was inversely correlated with income ( $-0.311 / 0.043$ ) and associated with % uninsured ( $0.623 < 0.001$ ).

Cervical fusion: Charge correlated with the % uninsured ( $0.288 / 0.040$ ). Reimbursement correlated with income ( $0.675 < 0.0001$ ), and was inversely related to % uninsured ( $-0.264 / 0.080$ ). CRR was associated with % uninsured ( $0.623 / 0.001$ ).

Nonfusion Surgery: Charge correlated with the % uninsured ( $0.415 / 0.002$ ), while reimbursement correlated with income ( $0.675 < 0.0001$ ). CRR was associated with % uninsured ( $0.524 < 0.0001$ ).

Medical Back: Charge correlated with the % uninsured ( $0.377 / 0.006$ ). Reimbursement correlated with income ( $0.605 < 0.0001$ ) and inversely with % insured ( $-0.299 / 0.05$ ). CRR was associated with % uninsured ( $0.530 < 0.0001$ ).

**Conclusions:** Overall, hospital charges and CRR for spine care increase with the number of uninsured patients within each state. These increased charges may reflect an effort to recoup financial losses from treating uninsured patients. Paradoxically, reimbursements tend to favor states with higher mean income.

#### Notes:

8:45am–8:49am

## Restoring Sagittal Balance Improves Clinical Outcomes For Non-Ambulatory Cerebral Palsy Patients With Spinal Deformity

Kushagra Verma, MD, MS

Suken A. Shah, MD

Firoz Miyanji, MD

Peter O. Newton, MD

Burt Yaszy, MD

Paul D. Sponseller, MD

**Introduction:** A positive sagittal balance ( $>5$  cm) has been associated with adverse outcomes in adult deformity patients but no such guidelines exist for primarily seated patients. This study evaluated the association between restored sagittal balance and clinical outcomes in cerebral palsy (CP).

**Methods:** From a multicenter database, we retrospectively reviewed prospectively collected data from patients with CP who underwent PSF to the pelvis. Demographic, clinical outcome, sitting tolerance, and seated radiographic data were studied. Using Pearson's correlation, we evaluated the relationship between multiple radiographic measurements and clinical outcomes using the CPCHILD Questionnaire – 6 domains, each scored 0 to 100 (best).

**Results:** 93 patients (age  $13.7 \pm 2.7$  yr) who underwent PSF (2008 – 2011) with 2-year follow-up were included. Mean radiographic parameters: major Cobb ( $29 \pm 16^\circ$ ), pelvic obliquity ( $8.1 \pm 6.8^\circ$ ), T2-T12 kyphosis ( $36 \pm 16^\circ$ ), T12-S1 lordosis ( $-53 \pm 17^\circ$ ), and sagittal vertical axis (SVA,  $-0.3 \pm 6.6$  cm).

Clinical outcomes: daily living ( $43 \pm 18$ ), transfers/mobility ( $43 \pm 18$ ), comfort/emotions ( $80 \pm 18$ ), social ( $55 \pm 29$ ), health ( $61 \pm 19$ ), overall function ( $70 \pm 22$ ), total score ( $56 \pm 15$ ), and sitting tolerance ( $294 \pm 166$  min). There was a linear correlation between SVA and transfers ( $r = 0.27$ ,  $p = 0.026$ ), social ( $0.24 / 0.38$ ), overall function ( $0.25 / 0.30$ ), and total score ( $0.30 / 0.015$ ). No correlation was found with other measurements. Given that SVA may vary with patient position, pelvic incidence (PI), sacral slope (SS), and T1 Pelvic Angle (T1PA – see figure) were measured on a subset of patients. Higher PI improved sitting ( $0.40 / 0.035$ ), while higher T1PA improved transferring ( $0.52 / 0.006$ ), overall function ( $0.51 / 0.006$ ), and total score ( $0.39 / 0.043$ ) with a trend towards better health ( $0.33 / 0.091$ ).

**Conclusion:** Restoration of sagittal balance to a neutral or slightly positive SVA and T1PA are associated with better transferring, function, social interaction, and total care-giver satisfaction in CP. Beyond a certain threshold, however, a positive SVA or T1PA is likely detrimental. T1PA can be evaluated intra-operatively in the prone position to improve the clinical outcomes of these children.

**Notes:**

**Friday, October 24, 2014**

**Rapid Fire Session 8D — Knee**  
(Station D, Ritz-Carlton Ballroom Foyer)

**Moderator:** Joshua S. Dines, MD

8:20am–8:24am

## The Incidence Of Repeat ACL Injury And Contralateral ACL Injury In NFL Players In 2013 Season

Daniel Woods, MD  
Peter Deluca, MD  
Christopher Dodson, MD  
Matthew R. Salminen, BS

**Background:** ACL injuries are common in the elite NFL athlete, and ACL reconstruction has been effectively utilized to allow athletes to continue to participate in NFL competition. Recent data by Andrews et al reports a 63% return to play rate after ACL reconstruction with more experienced, established and higher round draft picks returning at a much higher rate.<sup>1</sup> Repeat ACL rupture after reconstruction as well as the rate of contralateral ACL ligament injury has been defined in the general population by Bourke et al, who noted survival of the ACL graft to be 95%, 93%, 91% and 89% at 2,5,10 and 15 years and the survival of the contralateral ACL graft to be 97%, 93%, 90% and 87% at 2,5,10 and 15 years after primary ACL reconstruction.<sup>2</sup> This initial epidemiologic study sought to define the incidence of repeat and contralateral ACL tears in the NFL in 2013. Continuing to compile this data prospec-

tively will be the basis for defining the retear and contralateral ACL tear rates in the NFL population.

**Methods:** An internet search was utilized to identify NFL players who incurred an ACL injury in the 2013 season. All identified players were confirmed to have an ACL tear on the NFL injury report. A separate search was then undertaken to identify which tears represented a repeat ACL rupture after primary reconstruction and which players had previously suffered a contralateral ACL injury.

**Results:** 56 ACL ruptures were identified throughout the 2013 season from mini-camps, training camps, throughout the pre-season and regular season, and into the playoffs through 1/12/14. 2/56 (3.5%) of the ACL tears represented a repeat ACL injury while 3/56 (5.4%) represented a player who had incurred a contralateral ACL tear. In the remaining ACL injuries 51/56 (91%), a history of previous ACL injury was not obtainable and therefore deemed to be a primary ACL injury.

**Conclusion:** The incidence of ACL retears and contralateral ACL injuries in NFL players was calculated at nearly 9% of ACL tears in 2013. This percentage likely underestimates the actual incidence as each player's complete medical history was unavailable for close review. These findings illustrate that both repeat ACL injury after reconstruction and contralateral ACL injury are significant problems for the NFL athlete.

**Clinical Relevance/Future Directions:** Defining both the ACL retear rate and the contralateral ACL tear rate can provide significant information in counseling players undergoing ACL reconstruction as well as provide important information regarding player personnel decisions. This initial epidemiologic study provides the basis for future prospective studies to accurately define these values, and eventually identify specific risk factors for ACL retear and contralateral ACL tear.

**Notes:**

8:26am–8:30am

## Medial Meniscus Root Repair: Are We Healing and How Do We Tell?

Fotios Tjoumakaris, MD

Nicholas Lombardi, BS

Gregory T. Lichtman, MD

Bradford S. Tucker, MD

David Levi, MD

Amy Austin, MD

Matthew Pepe, MD

**Introduction:** Meniscus root tears are associated with loss of hoop stress, increased peak pressure, and reduction in contact area of the affected compartment of the knee. Reversal of this outcome is predicated on the successful restoration of the meniscus through biologic healing to the tibial attachment. The purpose of this investigation was to evaluate the biologic healing of meniscus root tears through high resolution MRI and correlate this appearance to clinical outcome.

**Methods:** Six patients were identified as having undergone a medial meniscus root repair using an identical pull-out surgical technique by a single surgeon. Outcomes were determined using Lysholm and WOMAC scores and quality of meniscus healing was assessed using a 3 Tesla MRI . MRI studies were reviewed by two fellowship trained musculoskeletal radiologists according to pre-defined criteria.

**Results:** There were 4 females and 2 males in the study group. The average follow-up time was 29 months (range 23-41). MRI demonstrated a new tear medial to the prior repair in 4/6 patients. 3 patients demonstrated recurrence of tear or lack of biologic healing of the root attachment. In patients with recurrent tears of the root, meniscal extrusion averaged 1.8mm. In patients with evidence of healing, extrusion averaged 1.57mm. The average WOMAC and Lysholm scores were 14.7 and 79.6 respectively. There was no correlation between healing and clinical outcome scores in this series.

**Conclusion:** 3 of 6 patients demonstrated recurrent tearing of the meniscus root. There was an increase in peripheral meniscus tears away from the repair in 4/6 patients, indicating excessive stress induced by the repair. Successful repair and healing was associated with decreased meniscus extrusion; however, this did not correlate with functional outcome scores, indicating that biologic healing is not a pre-requisite

for clinical healing. A similar finding has been shown in studies evaluating rotator cuff repair.

### Notes:

8:32am–8:36am

## Effect Of Anatomical Patella On Anterior Knee Pain, Crepitus And Satisfaction: A Prospective Matched-Pair Analysis

Amar S. Ranawat, MD

\*Morteza Meftah, MD

Chitranjan S. Ranawat, MD

**Introduction:** Anterior knee pain (AKP) is a recognized cause of patient's dissatisfaction after total knee arthroplasty. Potential implant/technique related contributors to AKP are patellofemoral maltracking, trochlear geometry, femoral mal-rotation, patellar tilt and overstuffed. The primary aim of this prospective, matched pair study was to assess the safety, efficacy and performance of an anatomic patella and its effect on AKP in a matched pair analysis.

**Material and Methods:** Between July 2012 and May 2013, 55 consecutive posterior stabilized cemented Attune TKAs (Depuy) were matched to the PFC Sigma group based on age, gender, and body mass index (BMI). All surgeries were performed via medial parapatellar approach with patellar resurfacing. Clinical and radiographic analysis was performed prospectively with minimum 6 month follow-up. Radiographic measurements included overall limb alignment, anterior offset, posterior offset, joint line, patellar thickness, patellar tilt and patellar displacement by two independent observers.

**Results:** The mean functional outcomes were similar in both groups. AKP incidence between Attune and PFC was statistically insignificant (3.6% and 3.8%). Radiographic analysis revealed no mal-alignment, or osteolysis. No complications such as infection, patellar fracture, subluxation or dislocations were observed.

**Discussion:** Attune knee design demonstrates excellent short-term safety and efficacy. At minimum 6-month follow-up,

anatomical patella with shows less AKP than single radius patella design. Longer follow-up is required to assess functional outcome of this design.

**Notes:**

8:38am–8:42am

## Medial Opening Wedge High Tibial Osteotomy, A Retrospective Review Of Patient Outcomes Over 10 Years

Fotios Tjoumakaris, MD  
Nicholas Lombardi, BS  
Bradford S. Tucker, MD  
Matthew Pepe, MD

**Introduction:** High tibial osteotomy (HTO) has become a well-established treatment for unicompartmental osteoarthritis of the knee. Over the last 30 years, various techniques have been used to treat this ailment. The purpose of this study is to retrospectively review the outcomes of patients who received medial open wedge HTO over the last ten years (2002-2012) using a modern, low profile fixation device. In addition, we sought to determine if obese patients had a less favorable outcome than their non-obese counterparts.

**Materials and Methods:** Ninety-three patients were prospectively identified from a surgical database as having undergone a HTO by one of two fellowship trained orthopedic surgeons from 2002-2012 utilizing a low profile fixation device. Minimum follow-up was one year for inclusion in the study. Outcomes were measured using Lysholm and WOMAC scores. Radiographs were evaluated to determine delayed union or non-union at the osteotomy site.

**Results:** 93 patients were identified from the database 62 (68%) were available for follow-up and are included in this analysis. Average follow-up time was 48 months (range 17 to 137). There were 43 males and 19 females. The average age was 45 years old. The average final Lysholm and WOMAC scores were 62.78 (range:13-95,StDev:24.95) and 18.55

(range:0-86,StDev:20.15) respectively. Obesity (BMI >30) had no effect on reported Lysholm ( $67.65 \pm 24.30$ ) or WOMAC ( $19.46 \pm 21.34$ ) scores. In this series, 2 patients (3.2%) developed an infection, 1 patient (1.6%) experienced delayed union and 3 patients (4.8%) required surgical lysis of adhesions. At follow-up 17 patients (27.4%) received viscosupplementation, 13 patients (21.0%) had undergone surgery to remove painful hardware and two patients (3.2%) required total knee replacement.

**Conclusion:** HTO delays the need for total knee replacement and is an effective procedure in both obese and non-obese patients alike. While many patients in this study continued to require treatment for their osteoarthritis, only a small few felt their pain severe enough to warrant further surgical intervention.

**Notes:**

8:44am–8:48am

## Painful Orthopaedic Hardware May Be Associated With Subclinical Infection

Hemil H. Maniar, MD  
Nathaniel C. H. Wingert, MD  
Kristin McPhillips, MD, MPH  
Michael A. Foltzer, MD  
Thomas Bowen, MD  
Daniel S. Horwitz, MD

**Introduction:** Sonication is a promising technology that has recently demonstrated subtle, clinically silent implant infections to be a cause of certain orthopaedic treatment failures. Subclinical infection is a possible cause of painful hardware after osteosynthesis, but has not previously been investigated using sonication.

**Methods:** A total of 72 consecutive patients underwent hardware removal for pain (52 patients) or for scheduled routine removal (20 patients). All were treated at a single medical center from September 2010 to May 2013. Sonication cultures were obtained for all explanted hardware during this time

period and a retrospective review of sonication results was conducted. Sonication results were considered positive for growth of greater than or equal to 20 CFU (colony forming units).

**Results:** Out of 52 patients undergoing hardware removal for pain, five had positive sonication result consistent with implant bacterial colonization (9.6%). Out of 20 patients undergoing scheduled routine removal, none showed positive sonication result (0%). Patients with positive sonication were treated with prophylactic oral antibiotics and none manifested clinical signs of infection postoperatively.

**Discussion and Conclusion:** A subset of patients with painful trauma hardware have subclinical implant infection. Implant sonication should be considered for patients with painful hardware, and especially for a patient undergoing removal with concurrent or staged joint arthroplasty.

#### Notes:

patient-reported symptom severity. We hypothesize that basilar thumb arthritis radiographic stage does not correlate with validated outcome measures of symptom severity.

**Methods:** We prospectively enrolled consecutive patients who presented to a hand surgery clinic with the diagnosis of unilateral thumb basilar joint osteoarthritis. The diagnosis was based on history, physical examination, and radiographic evaluation. All patients completed self-reported disability scores, including the QuickDASH, SF-12 mental, and SF-12 physical surveys. Patients with bilateral disease, concomitant diagnoses, or unwillingness to participate were excluded. A fellowship-trained hand surgeon assigned an Eaton-Littler radiographic osteoarthritis stage for each patient. Statistical analysis was utilized to determine the correlation between radiographic stage and objective outcome measures.

**Results:** Fifteen men and 47 women, with an average age 62.3 years (range 32-81), were enrolled in the study. Based on radiographic grade, there were 13% (n=8) stage I, 32% (n=20) stage 2, 45% (n=28) stage 3, and 10% (n=6) stage 4. Eaton-Littler stage did not correlate with QuickDASH ( $\rho = -0.013$ ), SF-12 mental ( $\rho = 0.019$ ) or SF-12 physical ( $\rho = 0.14$ ). The dominant hand was involved in 40% (25) of patients. Dominant hand involvement did not affect survey results ( $p > 0.600$ ). Interobserver reliability for radiographic stage was found to be good to excellent.

**Discussion and Conclusion:** The severity of radiographic disease in thumb basal joint arthritis does not correlate with degree of patient symptoms. While conventional wisdom has traditionally held a disconnect between a patient's subjective complaints and degree of radiographic severity, this is the first study to confirm this scientifically. Validated metrics that link radiographic and subjective components of thumb basal joint arthritis may improve surgical decision-making and monitoring of treatment response.

#### Notes:

**Friday, October 24, 2014**

**Rapid Fire Session 8E — Mixed Topics**  
(Station E, Ritz-Carlton Ballroom Foyer)

**Moderator:** Henry A. Backe Jr., MD

8:20am–8:24am

## Radiographic Stage Does Not Correlate With Symptom Severity In Thumb Basilar Joint Arthritis

C. Edward Hoffler II, MD, PhD  
Jonas L. Matzon, MD  
Kevin Lutsky, MD  
Nayoung Kim, BS  
Pedro K. Beredjiklian, MD

**Introduction:** Conventional wisdom has held that radiographic staging of basilar thumb arthritis does not predict

8:26am–8:30am

## Electro-Chemical Testing Results Of Conventional Hip Stems

Ahmad Faizan, PhD

Viswanathan Swaminathan, PhD

Jim Nevelos, PhD

Kevor TenHuisen, PhD

R. Michael Meneghini, MD

**Introduction:** Electro-chemical testing has been used to understand the corrosion potential of hip replacement systems [1]. This in vitro test was designed to evaluate the relative electro-chemical performance of three different commercially available hip femoral component tapers to understand the effect of taper material combination: Ti6Al4V/CoCrMo [Accolade II] vs. TMZF/CoCrMo [Accolade TMZF]) and design: V40 taper [Accolade II] vs. C taper [Secur-Fit] on the electro-chemical performance under physiologically relevant loading conditions.

**Methods:** Testing involved a short-term loading scheme where cyclic load magnitude was incremented in steps (from 100 N up to 3200 N, 3 min at each load at 3 Hz, R=0.1) followed by a long-term loading scheme where cyclic loading continued for 1 million cycles (3200 N at 3 Hz, R=0.1). After 1 million cycles loading, samples were allowed to recover for a period of time and the short-term loading scheme was repeated. All tests were performed in phosphate buffered saline solution at room temperature. Electrochemical measurements were taken periodically throughout the duration of the test.

**Results:** The results showed that the average current and current amplitude increased and the potential dropped with increasing load magnitude. For different groups, the onset load ranged from 960 to 1204 N, and the mean currents at maximum applied load ranged from 1.3 to 2.2  $\mu$ A. No statistically significant differences were observed between different taper designs or material combinations tested in this study.

**Discussion and Conclusion:** The results from this in vitro bench top testing showed that these differences in material combination and taper design did not influence the electro-chemical performance of the tapers. Further study will include exploration of the effects of taper surface finish, taper assembly conditions, more complex loading mechanisms, and more

aggressive solution conditions on the corrosion performance of different tapers.

**Notes:**

8:32am–8:36am

## Post-Operative Complications Following Hemiarthroplasty In Patients On Warfarin

Kristin McPhillips, MD, MPH

Hemil H. Maniar, MD

Jove Graham, PhD

Daniel S. Horwitz, MD

**Introduction:** There has been an increase in the number of patients taking warfarin, but no specific recommendations exist regarding the reversal of anticoagulation prior to hemiarthroplasty. The risk of bleeding is thought to be less if the INR is less than 1.5 at the time of surgery. We sought to examine the effect of INR at the time of surgery on the risk of post-operative hematoma or infection.

**Methods:** This study was a retrospective review of electronic health records from patients who underwent hemiarthroplasty for a femoral neck fractures at level 1 and level 2 trauma centers who were taking warfarin and had an INR more than 1.3 upon admission. INR at admission and at surgery, time from presentation to surgery, estimated blood loss, and the surgery length were recorded. The primary outcome was hematoma or deep infection (HDI) requiring reoperation within 60 days.

**Results:** 91 hips in 88 patients were included in the study. Mean INR at admission was 2.49 (range 1.34-8.20) and the mean time until surgery was 42 hours. Mean INR at the time of surgery was 1.52 (range 1.05-2.28). There were 7 HDI (5 confirmed infections and 2 noninfected hematomas) that required reoperation within 60 days of the procedure; 6 patients with HDI had INR more than 1.5 at the time of

surgery, 1 had an INR below 1.5. Two patients with thromboembolic complications having INR below 1.5 died. The mean estimated blood loss was 177 mL for patients with INR less than 1.5 and 237 mL for patients with INR more than 1.5 at time of surgery.

**Discussion and Conclusion:** Our data suggest that higher INR at the time of surgery may predispose to increased blood loss, hematoma and infection, but that a more aggressive reversal of anticoagulation may result in increased risk of thromboembolic disease.

**Notes:**

8:38am–8:42am

## Lateral Unicompartmental Knee Arthroplasty Yields Successful Outcomes And Return-To-Sport

Stephanie C. Petterson, MPT, PhD

Jeffrey Alwine, DO

Kevin D. Plancher, MD

**Introduction:** Isolated lateral compartment osteoarthritis is less common than isolated medial disease, accounting for ~10% of all osteoarthritic knees. Expanded indications have increased the use of lateral unicompartmental arthroplasty (UKA), however, some have suggested inferior results compared to its medial UKA counterpart. The purpose of this study was to determine long-term outcomes and the impact of sports participation on survivorship of lateral UKA.

**Methods:** From 2001 to 2013, 54 lateral UKA in 49 patients [15 men, 39 women; mean age 67 years (range 43-87); mean BMI 26.27 (range 18.1-40.4)] were performed by KDP. Preoperative and annual postoperative clinical evaluation included Lysholm, Tegner, and HSS scoring and complete radiographic evaluation. Sporting activities were categorized as moderate or vigorous based on ACSM guidelines. Paired samples t-tests were used to analyze continuous variables.

**Results:** At an average of 5.03 years (range 2-10), Lysholm significantly improved from 59.2 to 93.2 ( $p<0.001$ ), Tegner significantly improved from 3.1 to 4.8 ( $p<0.001$ ), and HSS significantly improved from 64.1 to 93.0 ( $p<0.001$ ). Postoperative mean ROM was 0-120° (only one patient had a flexion ROM <120°). Mechanical axis was 6° of valgus preoperatively and 1.4° of valgus postoperatively, a change of 4.6°. All patients returned to sporting activities; 61% (N=33) returned to vigorous sports activities including downhill skiing (N=10), tennis (N=10), basketball (N=1), and ice hockey (N=1). There was no evidence of component loosening, osteolysis, polyethylene wear, or full thickness arthritic progression. Failure, as defined by conversion to TKA, occurred in 3/55 patients (5.5%).

**Conclusion:** Lateral UKA yields excellent outcomes in active adults allowing return to desired high-level sporting activities. Return to demanding sporting activities did not adversely affect outcome. Low recurrence rate, <5% at an average of 5 years, demonstrates the success of this procedure for patients with isolated lateral compartment disease.

**Notes:**

8:44am–8:48am

## Teriparatide Treatment In Patients With Persistent Pain Following Joint Replacement

Seth A. Jerabek, MD

\*Michael B. Cross, MD

Kaitlin M. Carroll, BS

David J. Mayman, MD

**Introduction:** Tibial stem pain following a revision total knee arthroplasty (TKA) and thigh stem pain following a revision total hip arthroplasty (THA) can be a significant problem to manage. Teriparatide is a bone anabolic therapy for osteoporosis that has been shown to increase bone remodeling and increase bone mineral density (BMD). While studies have

shown that teriparatide may increase bone mineral density and decrease risk of fractures in osteoporotic individuals there are a limited number of studies on the effect of teriparatide in arthroplasty.

**Methods:** We report on a case series of patients who presented with persistent stem pain after revision TKA or THA who were treated post-operatively with teriparatide. Four patients at an average age of 71 years (58-81 years) had persistent stem pain between 2012 and 2013. Three patients presented with post-operative tibial stem pain status post revision TKA and 1 patient presented with post-operative thigh pain status post revision THA. Patients were treated conservatively and reported pain during activities of daily living. Patients were prescribed a daily dose of 20mcg injection of teriparatide for three months and 1 year if they were previously diagnosed with osteoporosis.

**Results:** There were four patients included in our case series with a mean follow-up time of 6 months (range 3-12 months). All patients were treated conservatively with teriparatide, calcium and vitamin D. All patients reported an improvement in pain and increase in activity. One patient discontinued teriparatide after 3 months and one patient had a history osteoporosis. All patients were successfully treated by teriparatide post-operatively.

**Conclusion:** Arthroplasty surgeons should consider teriparatide as an anabolic agent to treat persistent stem pain status post revision THA or TKA. This is the first report to show efficacy of a daily injection administration of teriparatide in patients with persistent pain following revision THA or TKA.

\* The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).

**Notes:**

**Friday, October 24, 2014**

**General Session 10 — Mixed Topics**  
*(Ritz-Carlton Ballroom Salon 1)*

**Moderators:** Matthew S. Austin, MD  
Geoffrey H. Westrich, MD

12:30pm–12:36pm

## The Standard One Gram Dose Of Vancomycin Is Not Adequate Prophylaxis For MRSA

Anthony Catanzano, BS

\*Lorraine Hutzler, BA

Michael Phillips, MD

Yanina Dubrovskaya, PharmD

Joseph A. Bosco III, MD

**Introduction:** The indications for vancomycin prophylaxis to prevent Methicillin-Resistant Staphylococcus aureus (MRSA) surgical site infections are increasing. The recommended dose of vancomycin has traditionally been one gram IV. However, the increasing prevalence of obesity in our population coupled with increasing resistance of MRSA to vancomycin has resulted in recent recommendations for weight-based dosing of vancomycin at 15mg/kg. We hypothesize that the standard one gram dose of vancomycin is inadequate to meet the recently recommended dosage of 15mg/kg.

**Methods:** Since 2009, all patients at our institution undergoing elective total joint and spine surgery are screened for staphylococcus aureus nasal colonization prior to surgery. We reviewed the data on adult patients who had a MRSA positive nasal screen and underwent surgery between January 2009 and January 2012. All patients were given 1 gram of vancomycin within an hour prior to surgical incision as prophylaxis. Using the revised dosing protocol of 15mg/kg of body weight for vancomycin, proper dosage was calculated for each patient. These values were then compared to the 1 gram dose given to the patients at time of surgery. Patients were assessed as either underdosed (a calculated weight-based dose >1 gram) or overdosed (a calculated weight-based dose <1 gram). Additionally, we used actual case times to and pharmacokinetic equations to determine the VAN levels at the end of the procedures.

**Results:** During the study period, 216 patients tested positive for MRSA. Out of these 216 patients, using the 15 mg/kg dosing recommendations, 69% were determined to be underdosed and 10% patients were determined to be overdosed. The predicted VAN level at the end of procedure was <15 mg/L in 60% of patients with 1g dose compared to 12% ( $p=0.0005$ ) with WB dose. Six patients developed post-operative MRSA SSIs. Of these 6 patients; 4 had strains of MRSA with VAN MIC's of >1.0mg/L. Based 1g dosing, 5/6 patients with MRSA positive SSIs had wound closure levels of <15 mg/L and all 6 were <20 mg/L.

**Discussion:** Sixty nine percent of the patients receiving peri-op vancomycin prophylaxis were underdosed, given their body weight. Additionally the calculated serum VAN levels at the wound closure were inadequate to provide MRSA prophylaxis in 60% of patients using the 1 gram VAN dose. Based in the MIC's of the individual strains of MRSA, 4/6 of our patients with MRSA SSI's had VAN levels which were inadequate. In settings, such as hospitals, where the risk for resistant bacteria, especially MRSA, is high, it is becoming increasingly important to accurately dose patients who require vancomycin. In order to avoid incorrect dosing of vancomycin health care providers must use weight-based dosing.

**Notes:**

12:38pm–12:44pm

## Morphometric Risk Factors For ACL Injury In Pediatric Patients

K. Aaron Shaw, DO  
 Brian S. Dunoski, MD  
 Neil J. Mardis, DO  
 Donna M. Pacieca, MD

**Introduction:** The purpose of this study was to perform a retrospective, comprehensive case-control analysis of identified morphometric factors thought to predispose patients to ACL injury. We hypothesized that increased medial tibial plateau slope and depth, and decreased intercondylar notch width index (NWI) would be associated with ACL injury when com-

pared to an age-matched control in a pediatric patient population.

**Methods:** We retrospectively reviewed knee magnetic resonance imaging (MRI) studies performed on skeletally immature patients between 1 January 2009 and 1 January 2013. All imaging reports indicating an acute intra-substance injury of the ACL were reviewed. Inclusionary criteria consisted of skeletally immature patients who sustained a non-contact ACL injury, without associated ligamentous injury or medical condition associated with ligamentous laxity. The MRI studies were analyzed by a fellowship-trained pediatric musculoskeletal radiologist, measuring numerous parameters, to include intercondylar notch width and volume, NWI, medial and lateral tibial plateau width, depth, and slope, and tibial eminence height and volume.

**Results:** One hundred and twenty-eight patients, including 74 males and 54 females with an average age of 15.27 years sustained an ACL disruption. Twenty-eight patients met all inclusionary criteria, 13 males and 15 female, average age of  $14.2 \pm 2.08$  years. When compared to the age-matched control ( $N=28$ , 14 male and 14 female,  $14.29 \pm 1.08$  years), NWI was found to be significantly smaller in the ACL injured group. However, no parameter was found to be predictive of ACL injury using a logistic regression. NWI and medial tibial plateau depth were the only parameters to approach statistical significance.

**Discussion and Conclusions:** No consensus exists with regard to potential intra-articular bony parameters and predisposition for ACL injury in a skeletally immature patient population. This study further highlights the need for a multi-focal approach to the skeletally immature patient with an ACL disruption.

**Notes:**

12:46pm–12:52pm

## Outcomes Following Cervical Disc Arthroplasty: A Retrospective Review

Daniel G. Kang, MD

\*LT Scott C. Wagner, MD

LTC Ronald A. Lehman Jr., MD

LCDR Robert W. Tracey, MD

CPT John P. Cody, MD

**Introduction:** Cervical radiculopathy is a common problem in society that causes significant disability. Cervical disc arthroplasty (CDA) is increasingly being used as an alternative to anterior discectomy and fusion (ACDF). We set out to further evaluate the outcomes of cervical disc arthroplasty.

**Methods:** We performed a retrospective review of 176 consecutive patients undergoing CDA at a single, military tertiary medical center from 2008 to 2012. All construct types (1-level CDA, 2-level CDA/ACDF hybrid, and multi-level CDA) were included for review.

**Results:** Of the 176 patients, 40 were female (22.7%) with an average age of  $41.6 \pm 8.1$  years. Surgical indication was radiculopathy in 141 patients (84.4%), myelopathy in 13 patients (7.8%), and both in 10 patients (6.0%). Average follow-up was  $8.5 \pm 7.6$  months. 111 patients (63.1%) underwent single-level CDR. CDR/ACDF hybrid constructs were used in 52 patients (29.5%) and 13 patients (7.4%) underwent a two-level CDR. The most frequently addressed levels were C6-7 (42.0%) and C5-6 (39.6%). At most recent follow up, average CDA range of motion was 7.46 degrees ( $\pm 3.6$  degrees). 94.5% of patients experienced complete resolution of their pre-operative symptoms and 93.6% of patients returned to full activity. 36 patients (21.8%) experienced persistent posterior neck pain. Other complications included one superficial infection, five recurrent laryngeal nerve injuries and 18 patients reporting persistent dysphagia.

**Conclusion:** This is the largest non-sponsored single center study of cervical disc arthroplasty. Our data demonstrates relief of pre-operative symptoms (94.5%) and return to full activity (93.6%) with an average follow-up of 8.5 months. There was a low complication rate without device or implant related complications. Arthroplasty continues to be a safe and reliable option in treating patients with cervical radiculopathy or myelopathy.

**Notes:**

12:54pm–1:00pm

## Direct Costs of Aspirin Versus Warfarin For Venous Thromboembolism Prophylaxis

Christina J. Gutowski, MD, MPH

Benjamin Zmistowski, MD

Jess H. Lonner, MD

Javad Parvizi, MD, FRCS

**Introduction:** Recent clinical evidence supports the utilization of aspirin as a safe and efficacious strategy to prevent venous thromboembolism (VTE) after total joint arthroplasty. This study aims to determine the financial implications of using aspirin instead of warfarin in terms of direct costs associated with the patient's episode of care.

**Methods:** The institutional arthroplasty database was utilized to analyze the preoperative, clinical, and financial data on 6,372 patients undergoing primary and revision total joint arthroplasty at our institution between January 2008 and March 2010. Mode of VTE prophylaxis (aspirin or warfarin) for each patient was recorded. Patients readmitted for postoperative complications related to VTE prophylaxis or infection were identified. Line-by-line charges were gathered for all patients in this cohort for their index arthroplasty admission, as well as any subsequent readmissions for related complications. Charges associated with the two groups were compared, and linear regression analysis was utilized to isolate the effect of anticoagulation on total charges.

**Results:** An episode of care associated with the aspirin cohort (n=1,213 patients) resulted in an average total cost of \$54,181, compared to \$63,718 for patients receiving warfarin (n=4,159). Twenty-five patients (2%) receiving aspirin experienced a post-operative complication related to VTE prophylaxis, resulting in 11 readmissions (0.9%), compared to 241 (5.8%) complications and 89 (2.1%) readmissions in warfarin patients. When adjusting for surgeon, day and year of surgery, Charlson index, joint, revision versus primary, BMI, and gender, aspirin was an independent predictor of decreased total charges and decreased cost of index hospitalization.

**Discussion and Conclusion:** This study supports the cost-savings that can be achieved by using aspirin rather than warfarin in primary and revision arthroplasty settings. The use of aspirin compared to warfarin results in 11.75% cost saving for each total joint arthroplasty.

**Notes:**

1:02pm–1:08pm

**Resident/Fellow Travel Grant Award****Head CT Scans With Low Energy Isolated Geriatric Femur Fractures**

Hemil H. Maniar, MD

David G. Fanelli, BS

Jeffrey L. Wild, MD

Michael Suk, MD, JD, MPH, FACS

Denise M. Torres, MD

Daniel S. Horwitz, MD

**Introduction:** The geriatric population (>65years) has increased, and in turn so has the percentage of geriatric trauma patients. Femur fractures are the most common fracture in this age group. Head CT (computerized tomography) scans are commonly used during the diagnostic workup for this age group. We hypothesized that for patients who suffer low energy falls, the need for obtaining a Head CT scan is fairly limited.

**Methods:** After IRB approval, we retrospectively reviewed all geriatric patients whom sustained a femur fracture from low energy falls and underwent a head CT scan during their initial evaluation between January 2004 and December 2011. Using the trauma database and electronic medical record, presenting symptoms and medical history were reviewed.

**Results:** During the study period, 1068 patients sustained femur fracture following low energy falls. Two hundred fourteen patients (20%) underwent a head CT scan as part of their evaluation. Of these patients, 84% suffered proximal femur fractures, 11% shaft fractures and 5% distal fractures. The majority of the patients were evaluated by the Emergency Department (ED) with only 18% (38/214) being evaluated by the trauma team. Average patient age was 83 years (range 65-99 years). 140 patients (65%) were on some form of antiplatelet or anticoagulation medication. Of the 214 patients who underwent head CT scan, 14 (7%) patients had acute findings (hemorrhage-12, tumor-1, infarct-1), and only one of the patients required neurosurgical intervention.

**Discussion and Conclusion:** The incidence of a traumatic injury that requires neurosurgical invention is extremely small in geriatric patients that sustain a low energy fall at 0.09% (1/1068). Head CT scans should have a limited role in the

work-up of this patient population and should be reserved for patients with a history and physical findings that support head trauma.

**Notes:**

1:10pm–1:16pm

**Outcomes Of Reverse Shoulder Arthroplasty In An Active Athletic Population**

Ryan W. Simovitch, MD

Frank F. Cook, MD

Berenice Gerard, BS, MHS

Jordon Brees, PA-C

Justin Kearse, MD

**Introduction:** Reverse shoulder arthroplasty is primarily indicated for treating a shoulder conditions in a limited activity low demand population. However, shoulder pathologies that require a reverse shoulder arthroplasty are often found in more athletic and higher demand individuals. This study evaluates the clinical and radiographic outcomes in an athletic higher demand population.

**Methods:** We evaluated 68 consecutive patients (mean age, 72) who underwent RTSA and indicated they were athletic and high demand prior to surgical intervention at a mean follow-up of 4.6 years. Of this cohort we identified 41 patients who indicated a return to sport and high demand use of their prosthetic shoulder after RTSA. Follow-up of these patients included visual analog scale, subjective shoulder value (SSV), range of motion, strength, Constant Score and ASES score. Postoperative radiographs were evaluated for evidence of scapular notching, humeral and glenoid component lucencies and component subsidence. Complications were recorded.

**Results:** VAS improved from 7.2 to 1.8. SSV improved from 32% to 84%. Active forward elevation improved from 42° to 139°. The Constant score improved from 37 to 84. The ASES score improved from 34 to 72. Radiographic evaluation demonstrated a notching rate of 6%. There were no cases of

glenoid or humeral component loosening. There was one post-operative dislocation and one acromion stress fracture postoperatively. One shoulder required a revision.

**Discussion and Conclusion:** RTSA can dramatically reduce pain and restore function in an active athletic population with mid-term follow-up. Sixty percent of patients that participated in sports were able to return to sport after RTSA. There was no evidence of humeral or glenoid component loosening or mechanical failure directly related to sporting activity. Future studies should examine if these results are durable with long term follow-up.

**Notes:**

1:18pm–1:24pm

## Consumerism in Healthcare

Richard C. Mather III, MD

Central to value-based healthcare is the shifting of financial risk to decision makers in the healthcare system. Much attention is focused on provider risk through mechanisms such as value-based purchasing, bundled payments, tiering and shared savings. However, the impact of increased cost sharing by patients receives less attention but promises to be a powerful force. Healthcare consumerism is the movement fueled by this increased cost sharing. In this abstract we will outline the early impact of healthcare consumerism and how it has and will affect musculoskeletal care. In particular, we will focus on the opportunities available to orthopaedic surgeons and how embracing this movement can be a positive disruptive force on orthopaedic practice.

**Notes:**

**Friday, October 24, 2014**

**Rapid Fire Session 11A — Hip**  
(Station A, Plaza Ballroom 1)

**Moderator:** Mary I. O'Connor, MD

1:30pm–1:34pm

## The Effect Of Severity Of Disease On Cost Burden Of 30-Day Readmissions Following Total Joint Arthroplasty (TJA)

Daniel Kiridly, BS  
Alexa J. Karkenny, BS  
Lorraine Hutzler, BA  
James Slover, MD, MS  
Richard Iorio, MD  
Joseph A. Bosco III, MD

**Introduction:** In order to control the unsustainable rise in healthcare costs the Federal Government is experimenting with the bundled payment model for total joint arthroplasty (TJA). In this risk sharing model, providers are given one payment, which covers the costs of the TJA, as well as any additional medical costs related to the procedure for up to 90 days. The amount and severity of comorbid conditions strongly influences readmission rates and costs of readmissions in TJA patients.

**Methods:** Using our administrative database, we identified all Medicare patients from 2008 to 2012 who were admitted for a primary or revision total hip arthroplasty (THA) or total knee arthroplasty (TKA) at our institution. We then identified all unplanned readmissions occurring within a 30 day window from the patient's discharge. For each readmission, we compiled all of the direct costs incurred by the institution – including implant costs, hospital room and board, medications, and medical supplies.

**Results:** Both the costs of readmission and the readmission rate tended to increase as severity of illness increased. The readmission burden also increased as severity of illness (SOI) increased, but increased most markedly in the extreme SOI patients.

**Conclusion:** Given the large financial burden of patients with a high SOI, providers should attempt to modify the long-term risk factors of some of their patients prior to TJA in order to change their SOI class and reduce financial risk. However,

given the difficulty of modifying long-term risk factors, some providers may opt to simply change their case mix to exclude patients with a high severity of illness.

**Notes:**

done in the outpatient setting was significantly lower, \$24,529 compared to \$35,480.

**Discussion and Conclusion:** Innovative methods to safely decrease cost are growing in popularity. Utilization of minimally invasive approaches, multi-modal pain management strategies and early mobilization have decreased length of stay at many institutions. While not all patients are candidates for outpatient THA, this study suggests that appropriately selected patients can undergo THA in an outpatient setting with no increase in complications, a much shorter length of stay, and at a substantial savings to the healthcare system.

**Notes:**

1:35pm–1:39pm

## Outpatient Total Hip Arthroplasty As A Method To Decrease Healthcare Cost

Zachary D. Post, MD

\*Fabio R. Orozco, MD

Michael C. Aynardi, MD

Alvin C. Ong, MD

Dean C. Sukin, MD

**Introduction:** Advancements in analgesia, rehabilitation, and standardization of postoperative protocols after total hip arthroplasty (THA) have led to shorter length of stay and early mobilization postoperatively. Additionally, impending financial constraints in the healthcare industry will demand higher quality at a fraction of the cost of current rates. The aim of this study is to compare outcomes and cost-effectiveness of traditional inpatient THA with the same procedure done at an outpatient surgery center.

**Methods:** From 2008-2011, 119 patients underwent THA at an outpatient surgery center owned by a parent inpatient hospital. All patients done at the surgery center were required to be discharged or transferred to the hospital by 23 hours post-op. Outpatients were then compared with 78 controls done at a parent inpatient hospital. Under IRB approval, a retrospective case-control was performed analyzing complications, length of stay, demographic data and overall cost.

**Results:** There was no difference with respect to complications between the two groups. Outpatients had a much shorter average length of stay, 24.4 hours versus 59.2 hours. A total of 4 outpatients required transfer. The outpatient group was younger, 58.97 years versus 68.33 years, and had a lower BMI, 28.1 versus 30.2. The average cost of THA for patients

1:40pm–1:44pm

## Fixation Of A Non-Cemented, Hydroxyapatite Coated Acetabular Component

Morteza Meftah, MD

Amar S. Ranawat, MD

Chitranjan S. Ranawat, MD

**Introduction:** Total hip arthroplasty (THR) with non-cemented cups remains one of the most successful procedures performed today. In this study, we look at the safety and efficacy of a modern hemispherical acetabular component based on radiographic and clinical analysis.

**Methods:** 211 consecutive patients between 2003 and 2007 who had a minimum 5 year (range, 5-9 years) radiographic follow up (108 were male, 103 were female) were analyzed. Average Hospital for Special Surgery (HSS) hip scores at latest follow up were recorded. Radiographic analysis included classification based on Delee and Charnley's zones and osseointegration was assessed based on SIHRCaB (Stress Induced Hypertrophic Reactive Cancellous Bone), trabeculae, and absence of radiolucency. EBRA software was used to assess cup placement.

**Results:** At 5-9 year clinical follow up, average HSS score was 34.8, with 4.02% undergoing revisions for any reason, such as dislocation (1.34%), loose stem (0.89%), stem fracture (0.89%), pain/bursitis (0.45%), and infection (0.45%). At 5-9 year radiographic follow up, there were no revisions performed due to mechanical failures or due to failure to osseointegrate. No association of bearing surfaces to survivorship was noted.

**Discussion and Conclusion:** The hemispherical, peripheral press-fit, acetabular component was examined in a large, consecutive series by a single surgeon with a minimum 5 year radiographic follow up. We have demonstrated excellent radiographic osseointegration at latest follow up with no mechanical failures, high survivorship, and excellent clinical outcome scores.

**Notes:**

1:45pm–1:49pm

## Evaluating 216 Adverse Tissue Responses In A Single Surgeon Series

Danyal Nawabi, MD

\*Geoffrey H. Westrich, MD

Allison Ruel, BA

Brett Lurie, MBBS

Matthew Koff, PhD

Huong T. Do, MA

Hollis G. Potter, MD

**Introduction:** Recent total hip arthroplasty (THA) stem designs have introduced modularity at the neck-stem junction. Corrosion at the modular junction is the cause of reported failure. This study evaluated the outcomes of all patients with a recently recalled modular neck-stem implanted by a single surgeon.

**Methods:** This is a prospective study of 216 THAs by a single surgeon in 195 patients (79 men and 116 women) with a mean age of 65.4 years (20-88 years). All hips had a titanium-alloy

stem, but 199 had a modular cobalt-chromium neck and 17 were monolithic. Patients presenting with new-onset pain were worked up for infection and investigated with metal-ion levels and magnetic resonance imaging (MRI). Cases suspected of having an adverse local tissue response (ALTR) based on MRI also received an ultrasound-guided biopsy. Intraoperative tissue samples were graded and retrieved implants were examined.

**Results:** At a mean follow-up of 19.3 months, 80 of 216 hips (37%) have been revised and 11 are awaiting revision. 73 of 80 hips were revised for ALTR, which only occurred in the modular neck design. All monolithic hips remain asymptomatic. Metal-ion tests in the ALTR cases showed mean cobalt levels of 8.6ng/ml and mean chromium levels of 1.8ng/ml. 58 of 166 MRI exams showed moderate-severe levels of synovial response. Ultrasound-guided biopsy had a false-negative rate of 48% for diagnosing ALTR. The mean aseptic lymphocytic vasculitis-associated lesion (ALVAL) score for the revised cases was 8.1. Corrosion was visible on all tapers at the neck-stem but not the head-neck junction.

**Conclusions:** Early failures of modern modular THA occur due to corrosion at the neck-stem junction, resulting in ALTR. Surveillance with metal-ion levels and MRI may be indicated for all patients regardless of symptoms as the early survivorship is poor and the ultimate failure rate may be catastrophically high.

**Notes:**

1:50pm–1:54pm

## Short-Term Results Of Novel Constrained Total Hip Arthroplasty

Stephen H. Finley, MD

Thomas Pace, MD

Rebecca G. Snider, BS

Stephanie L. Tanner, MS

**Background:** The persistently unstable total hip arthroplasty (THA) has continued to be problematic for the

orthopaedic surgeon with limited satisfactory options. Constrained acetabular components, to this date, have only been recommended as a salvage option for the persistently unstable THA, secondary to limited range of motion and less than satisfactory component failure rates. Our purpose was to show the short term results with a newer constrained implant that offers improved range of motion, and decreased failure rates secondary to component failure and instability.

**Methods:** This is a retrospective review of 117 patients with 129 consecutive primary constrained THAs performed by the senior author between November 2003 and August 2007. Patients were followed for a minimum of two years. We reviewed serial radiographs, postoperative complications, groin/thigh pain, and compared preoperative Harris Hip Scores (HHS) to those recorded postoperatively.

**Results:** With a mean follow-up of 3.4 years, there was a 0.7% dislocation rate, 0% component failure rate, and 2.3% failure when including revision for any reason. Six patients reported continued groin pain, and three had continued thigh pain. Radiographic review showed no evidence of osteolysis, polyethylene wear, or stem subsidence. Harris Hip Scores improved from a mean of 68.8(range 58-87) preoperatively to 98.9(range 65-100) at the final clinical assessment.

**Conclusions:** This novel constrained acetabular prosthesis remained 99.2% stable, with 0% component failure rate at an average of 3.4 years of follow-up suggesting this prosthesis may be a viable alternative for patients at risk for instability or those known to have recurrent instability. Furthermore, this implant demonstrates a greater arc of motion with a decreased rate of component failure compared to previously used constrained liners.

#### Notes:

1:55pm–1:59pm

## Long-Term Clinical Results Of A First Generation Highly Cross-Linked Polyethylene In Young And Active Patients

Chitranjan S. Ranawat, MD

Morteza Meftah, MD

Amar S. Ranawat, MD

**Background:** Highly cross-linked polyethylene (HCLPE) was introduced to improve wear related osteolysis in total hip arthroplasty (THA). There is limited data regarding wear rates and clinical performance of HCLPE in young and active patients. The purpose of this prospective study was to assess minimum 10-year wear rates and survivorship of non-cemented total hip arthroplasty using metal on HCLPE in patients in young and active patients.

**Materials and Methods:** Between January 2001 to December 2003, 52 hips consecutive THAs (43 patients; 26 males and 17 females) age of 55 years and younger with an average University of California Los Angeles activity (UCLA) score of 5 and above at the time of surgery were identified from our Institutional Review Board-approved prospective database. The mean age of patients was  $47.4 \pm 7.8$  years old (range 24 to 55 years) and the mean UCLA was  $7.3 \pm 1.5$  (range 5 – 10). Indication for surgery included osteoarthritis in all cases. All operations were performed by the senior surgeon via a posterolateral approach. All components were non-cemented femoral stem, Cobalt-Chromium (Co-Cr) femoral head, and solid acetabular shell with acetabular liner. At minimum 10-years follow-up (mean  $11.5 \pm 0.94$  years), wear rates (Roman software), clinical and radiographic data and survivorship were analyzed.

**Results:** The mean linear wear was  $0.019 \pm 0.018$  mm/year (range 0-0.082) There were no revisions for osteolysis or loosening, periprosthetic infection or dislocation in this cohort. Kaplan-Meier survivorship was 100% for all failures.

**Conclusion:** This study demonstrates that metal on HCLPE has an excellent survivorship rates at a minimum 10-year follow-up in young-active patients. Moreover, oxidation concern with Crossfire up to 10 year has not shown any clinical significance.

#### Notes:

**Friday, October 24, 2014**

**Rapid Fire Session 11B — Knee**  
(*Station B, Plaza Ballroom 1*)

**Moderator:** **Sabrina Strickland, MD**

1:30pm–1:34pm

## **The Alpha-Defensin Biomarker For PJI Responds To A Wide Spectrum Of Organisms**

Carl Deirmengian, MD

Alexander Cameron, BS

Kevin Schiller, BS

Michael Citrano, BS

Simmi Gulati, RM (ASM)

Patrick Kilmartin, BS, MS

Keith Kardos, PhD

**Introduction:** Alpha-Defensin has been identified as a highly accurate synovial fluid biomarker for periprosthetic joint infection (PJI), and has been previously demonstrated to match the MSIS definition for PJI. The purpose of this study is to describe the breadth of organisms that stimulate alpha-defensin during PJI, and secondarily, to identify any organism-specific influence on alpha-defensin levels.

**Methods:** A retrospective review of 1937 de-identified synovial fluid samples having both the Synovasure PJI test and culture identified 498 alpha-defensin-positive samples, and 1439 alpha-defensin-negative samples. Samples were received from 418 surgeons in 42 states. 239 of the alpha-defensin-positive synovial fluid samples (48%) had organism growth from the synovial fluid, whereas only 19 of the alpha-defensin-negative samples (1.3%) had organism growth. A total of 41 different species of bacteria and yeast were isolated and classified by cell type, species, Gram-type, and virulence. Mean alpha-defensin signal to cutoff (S/CO) levels were calculated for these various classifications of organisms, and the ANOVA test was utilized to identify any potential organism-specific influences on the synovial fluid alpha-defensin level.

**Results:** All organisms typically isolated in relationship to arthroplasty were found to result in a positive synovial fluid alpha-defensin level. The mean semi-quantitative alpha-defensin S/CO among 239 alpha-defensin positive, culture-positive samples was 4.68, compared to 0.30 among 1439 alpha-

defensin-negative samples. Gram-positive bacteria (87%), gram-negative bacteria (10 %), and yeast (3%) demonstrated no statistically significant differences in the mean associated synovial fluid alpha-defensin S/CO (4.7, 5.3, 3.8 respectively). Similarly, the virulence of the organism had no statistically significant influence on the mean alpha-defensin S/CO.

**Conclusions:** This study demonstrates that a wide variety of gram-positive bacteria, gram-negative bacteria, and yeast result in a positive synovial fluid alpha-defensin level, without any evidence of an organism-specific influence. The alpha-defensin test appears to provide diagnostic value for PJI, regardless of the infecting organism.

**Notes:**

1:35pm–1:39pm

## **Compliance With Intermittent Pneumatic Compression Devices In Orthopaedic**

Kristin McPhillips, MD, MPH

Hemil H. Maniar, MD

Jove Graham, PhD

Michael Suk, MD, JD, MPH, FACS

Daniel S. Horwitz, MD

**Introduction:** Hospitalized patients are at a high risk for venous thromboembolism. Mechanical prophylaxis, in the form of intermittent pneumatic compression devices (IPCs), is effective and IPCs are the standard of care for patients after orthopaedic surgery but they must be used in conjunction with chemoprophylaxis. IPCs may be uncomfortable or inconvenient for patients and the compliance with these devices in orthopaedic patients is unknown.

**Methods:** Over a 10 day period we observed compliance with IPC use in patients being treated by orthopaedic surgeons at a level 1 trauma center, including primary patients and consult patients. Patients were observed twice daily between 7am and 5pm with a minimum of six hours between observations.

Compliance was defined as wearing the devices with the machine “on” when in bed or in the chair.

**Results:** 660 observations were taken from 174 unique patients over the 10-day period. Of those observations, 480 patients were in bed, 180 were in the chair. The overall compliance rate was 32% (212 of 660). Compliance was 41% for patients in bed versus 9% for patients in chairs. Each patient was observed between 1 and 21 times (mean=3.8, median=3). The compliance rate for trauma patients significantly different than for non-trauma patients; in trauma patients, compliance was 41% (133 of 323, 95% CI=17%-32%), compared to 24% (79 of 335, 95% CI 33%-49%) for non-trauma patients.

**Discussion and Conclusion:** Compliance rate with IPCs in orthopaedic patients is poor. Compliance is worse when patients are in chairs than when they are in bed. Trauma patients were more likely to be compliant with IPCs than were non-trauma patients. All orthopaedic patients are at high risk for thromboembolic disease, and patients and nurses should be educated about the risk of DVT and PE and the proper use of IPCs.

#### Notes:

1:40pm–1:44pm

### The Cost-Utility Of Total Hip Arthroplasty: Could WOMAC Predict It?

David A. Iacobelli, MD

\*Jesus M. Villa, MD

Lawrence Brooks, PhD

Carlos J. Lavernia, MD

**Introduction:** To the best of our knowledge, no study in the US has previously evaluated the impact of hip joint-specific preoperative state in the cost-effectiveness of THA; our investigation might provide information as to whether early-stage or late-stage THA interventions could be more cost-effective.

**Methods:** We estimated the cost of Quality-Adjusted-Life-Years (QALY) gained according to preoperative disease sever-

ity. We studied 159 unilateral primary THA, mean follow-up: 4 years. A median split of preoperative WOMAC scores was done to set apart a low (better) and a high (worse) score group.

**Results:** In both groups, costs were similar and their mean quality of life improved postoperatively. Worse preoperative WOMAC scores were consistently associated with a less cost-effective intervention. Overall, the highest mean cost-effectiveness was achieved by patients with better WOMAC total scores (\$8,256.32 per QALY gained). As patients aged, the cost-effectiveness of THA decreased. Those patients 75 years of age or older and with worse WOMAC total scores had the least cost-effective interventions (\$25,937.33 per QALY gained).

**Discussion and Conclusion:** Our data suggests that primary THA performed in patients with less pain and disability (early in the timeline of end-stage joint disease) is more cost-effective than waiting to intervene until the latter stages of the disease have ensued. Despite being more cost-effective when performed earlier, primary THA remains a cost-effective intervention even in older patients or in those with greater severity of disease.

#### Notes:

1:45pm–1:49pm

### Sleep Disturbance Following Total Knee And Total Hip Arthroplasty

Alvin C. Ong, MD

Zachary D. Post, MD

Fabio R. Orozco, MD

Carl Deirmengian, MD

Benjamin Zmistowski, MD

Victoria Younger, BS, CCRP

Luke Austin, MD

**Introduction:** Postoperative sleep disturbance is a common complaint following total knee (TKA) and total hip arthro-

plasty (THA). Modern arthroplasty techniques and postoperative protocols have focused on rapid recovery of patient function and pain. However, little information exists on sleep recovery following TKA and THA arthroplasty. Since adequate sleep plays a role in postoperative healing and also in patient satisfaction, it is necessary to investigate and characterize sleep disturbances in patients undergoing THA and TKA.

**Methods:** With IRB approval, forty-two consecutive patients undergoing total knee (n=35) or total hip (n=7) arthroplasty were enrolled in this prospective study. Patients were surveyed preoperatively and postoperatively at intervals of 2, 4, 6, 12, and 24 weeks. Patient outcomes were scored using the Pittsburgh Sleep Quality index (PSQI), and the Visual Analog Score (VAS). A lower PSQI score indicated improved sleep. Results were evaluated using a student's t test.

**Results:** Sixty-one percent of patients reported pre-operative PSQI scores indicative of sleep disturbance (score >6 out of 21), with an average preoperative PSQI of 7. A statistically significant improvement in PSQI was achieved at 3 months (mean score 4.9, p 0.042) and continued to improve through 6 months. A PSQI score < 5, considered normal, was achieved by 65% (15/23) at 3 months, and 65% (15/23) at 6 months.

**Conclusions:** Sixty-one percent of patients undergoing TKA or THA have sleep disturbance preoperatively. Following surgery, pain improves quickly but sleep disturbance lags behind and significant improvements are not seen until 3 months following the procedure.

#### Notes:

1:50pm–1:54pm

## Total Joint Arthroplasty In Patients With Cardiac Implantable Electrophysiological Devices

Seyed Alireza Mirghasemi, MD  
Reza Mostafavi Tabatabaei, MD  
Mohammad R. Rasouli, MD  
Mitchell G. Maltenfort, PhD  
Alvin C. Ong, MD  
Javad Parvizi, MD, FRCS

**Introduction:** Number of patients with implantable cardiac electrophysiological devices (ICEDs) is increasing and orthopaedic surgeon will encounter more patients with ICEDs requiring total joint arthroplasty (TJA). However, there is paucity of literature about perioperative morbidity and mortality in these patients following TJA. The present study aims to evaluate risk of cardiac complications and mortality following TJA in patients with ICEDs using nationally representative data.

**Methods:** Using ICD-9 codes, we queried the Nationwide Inpatient Sample from 2002 to 2011 to identify cases have been coded for both history of pacemaker or defibrillator implantation and TJA. Prioperative complications were identified using the same coding system. Logistic regression was performed to analyze data.

**Results:** Over the study period, percent of cases with ICED increased. Mortality rate was higher in patients with pacemaker (0.32%) and defibrillator (0.28%) compared to controls (0.15%). Myocardial infarction was also observed more frequently in patients with pacemaker (0.34%) and defibrillator (0.65%) compared to the control group (0.30%). Cardiac complications occurred in 0.83% of controls compared to 0.64% and 0.95% in pacemaker and defibrillator groups respectively. Logistic regression adjusting for confounders including arrhythmias and comorbidities indicated that ICEDs are not associated with increased risk of in-hospital mortality and cardiac complications. The pacemaker and defibrillator groups were more likely to have atrial fibrillation and two times more likely to have other dysrhythmias. Atrial fibrillation and other dysrhythmias were associated with mortality (odds ratio (OR) of 2.53 and 11.56 respectively), cardiac complications (OR of 16.41 and 30.43

respectively) and myocardial infarction (OR of 2.05 and 3.91 respectively).

**Discussion and Conclusion:** Our findings indicated that patients with ICEDs are not at greater risk of in-hospital mortality and cardiac complications compared to controls following TJA which mainly seems to be related protective effects of these devices on postoperative arrhythmias.

#### Notes:

1:55pm–1:59pm

### Safe Cost Savings For TJA: Eliminate Postoperative Home Visiting Nurse Services

Andrew G. Park, MD  
 Danielle Y. Ponzio, MD  
 Suneel Bhat, MD, MPhil  
 James J. Purtill, MD

**Introduction:** Home visiting nurse services (HVNS) in the post-acute care period following primary TJA are supported to facilitate a shorter length of stay (LOS), increased rate of discharge to home, decreased postoperative complications, decreased readmission rates, and decreased cost compared to inpatient rehabilitation. No study has established the utility of HVNS compared to discharge to home without services.

**Methods:** Amongst a consecutive single surgeon series of 509 elective primary THA and TKA patients over a 1-year period, post-acute care was dictated by a protocol change as of January 1, 2013 such that HVNS were no longer routinely recommended. A retrospective analysis compared 6-month periods prior to (July-December 2012, n=230) and

after (January-June 2013, n=279) the change. Outcomes included discharge dispositions, LOS, discharge to home rate, complication rate, reoperation rate, readmission rate, patient satisfaction (Press Ganey), and number of office phone calls.

**Results:** Patient groups were comparable in age, gender, arthroplasty type, and Medicare usage. Following the protocol change, the discharge to home rate improved from 88.3% (203/230), 188 of which utilized HVNS, to 95% (265/279) with 10 using HVNS. Mean LOS decreased from  $2.5 \pm 1.4$  to  $2.1 \pm 1.1$  days. Complication rate was similar (3.91% pre- vs. 2.86% post-protocol), with the exception of an increased need for knee MUA (2.17% pre- vs. 0% post-protocol). A decreased number of weekly office phone calls were received ( $104 \pm 24$  pre- vs.  $92 \pm 8$  post-protocol). Patient satisfaction remained favorable. HVNS patients received  $8.3 \pm 4.5$  visits, consisting of  $4.4 \pm 1.5$  nurse visits and  $3.7 \pm 3.7$  PT visits.

**Discussion:** A single surgeon post-acute care protocol change dramatically diminished HVNS utilization following primary TJA which was associated with decreased LOS, increased discharge to home rate, decreased office phone calls, and decreased knee stiffness requiring MUA. Other complications, readmissions, and patient satisfaction showed no significant differences suggesting overall cost-savings with no loss of quality of care.

#### Notes:

**Friday, October 24, 2014**

**Rapid Fire Session 11C — Tumor**  
(Station C, Ritz-Carlton Ballroom Foyer)

**Moderator:** Valerae O. Lewis, MD

1:30pm–1:34pm

## **Intercalary Tibial Allograft Reconstruction Following Segmental Resection of Bone Tumors**

Ryan Michels, MD

Samuel Kenan, MD

Adam Levin, MD

**Introduction:** The optimal surgical reconstructive modality for segmental tibial defects following wide resection of malignant bone tumors has been debated in the literature. The current reconstructive options include vascularized fibular graft (VFG), Fresh frozen allograft, Extra corporal irradiated autograft, either option combined with VFG. The question remains whether a simple intercalary allograft to bridge the defect can obtain equivalent long-term results to VFG procedures.

**Materials and Methods:** From 1984 to 2012, 13 patients with malignant tibial bone tumors underwent segmental resection and reconstruction using fresh frozen allograft. There were 6 children (M-3, F- 2, Age range 6-13) with open physes and 7 adults (M-5, F-2, Age range 18-60). Tumors included Osteosarcoma in-3, Ewing's Sarcoma-4, Adamantinoma-3, and Myofibroblastic Sarcoma-3. Allograft fixation in Children was with locking plate in order to minimize growth plate damage. Muscle flap coverage over reconstruction was performed in all cases and consisted of gastrocnemius flap for proximal tibia defects and soleus muscle flap for distal tibia.

**Results:** All patients' radiographic and histological findings were retrospectively analyzed. Tumor free surgical margin was obtained in all cases. The proximal and distal osteotomy site went on to boney union in all patients. No infections occurred in the population. Complications included allograft stress fracture in two children treated successfully with autogenous iliac crest bone graft and improved fixation. A broken plate and allograft fracture in an adult patient was treated successfully by intramedullary fixation. One patient had local recurrence at 10 years follow up treated with below knee

amputation. Functional results based on the MSTS system in 12 patients were good or excellent. All cases progressed to full weight bearing in less than one year and regained full active knee motion. Leg length discrepancy was minimized in children in this series by preservation of growth plates.

**Discussion:** This case series demonstrates that segmental tibial defects can be successfully treated with cryopreserved allograft. VFG could be an ideal biological solution, however it is associated with increased donor site morbidity, increased surgical time associated with the complex microvascular procedure. The low risk of site infections in our series with allograft reconstruction is likely attributable to meticulous surgical technique and adequate soft tissue repair using muscle flap. The tibia's anatomical and mechanical axes are similar, thus decreasing shear and bending forces across the donor-host bone interfaces. In the femur the anatomic and mechanic axes are different. These differences in biomechanics necessitate the surgeon to consider different reconstructive options when treating these anatomic locations.

**Conclusion:** Segmental tibia surgical defects after wide resection of malignant bone tumors present a unique reconstructive challenge, which can be successfully treated with cryopreserved allograft. Our long-term clinical outcome demonstrated an excellent result in most patients.

### **Notes:**

1:35pm–1:39pm

## **Surgical Navigation Allows Less Invasive Methods Of Resection Of Pelvic Sarcoma**

John A. Abraham, MD

**Introduction:** Pelvic Sarcoma is a challenging problem. Although wide resection is necessary for adequate treatment, it is often technically extremely difficult to achieve the desired surgical margins. Traditional methods of hemipelvectomy

require extensive surgical exposure and difficult dissection often spanning twelve or more hours of surgical time. Surgical navigation has recently been investigated in orthopedic oncology and its role is currently being defined. The purpose of this study is to determine if surgical navigation can be used to modify the traditional methods of pelvic resection in order to achieve the necessary surgical margins with smaller incisions, less invasive surgical dissection, shorter surgical times, or alternate approaches.

**Methods:** A surgical database of patients undergoing pelvis resection for malignant pelvic tumors. The patients in which navigation and a nonstandard approach are used are identified. 5 patients are identified that fit the criteria. Incision length, surgical time, blood loss and margins are recorded

**Results:** All 5 patients underwent surgical navigation assisted pelvis resection. Surgical time ranges from 4 to 8 hours. Blood loss ranged from 400 to 3500cc. Surgical margins were negative in all cases. Two cases were type II hemipelvectomies in which all bone cuts were made from the outer table of the pelvis, minimizing the exposure of the inner table of the pelvis. In both these cases, the anterior limb of the traditional incision was not used, removing the “T” portion of the incision, which is the most common site of wound breakdown. One case was a type III hemipelvectomy, in which the entire resection was performed through a gluteal incision, rather than a traditional ilioinguinal incision. Two cases were sacral resections that were performed through an all-posterior approach, in spite of the tumor masses being anterior. In all cases, the incision length, surgical time, and blood loss were less than would be expected from traditional pelvic resection surgery, while maintaining negative surgical margins. Detailed case imaging and descriptions will be presented.

**Discussion:** Pelvic resections are challenging. Surgical navigation has recently been studied as a method to potentially improve the ease and safety of these difficult operations. We demonstrate that surgical navigation can indeed be used to modify the traditional approach to pelvic resection, enabling negative margin resections with less blood loss, smaller or modified incisions, and reduced surgical time. Although a small series, this pilot is the first to demonstrate improvements over standard surgical resection technique utilizing surgical navigation.

#### Notes:

1:40pm–1:44pm

## A Systematic Review Of The Surgical Management Of Carpal Boss

Abdo Bachoura, MD

\*Thomas D. Lee, MD

John D. Lubahn, MD

**Introduction:** The carpal boss is a benign bony protuberance that often develops over the dorsal aspect of the index and middle carpo-metacarpal (CMC) joints bases. There is no clear consensus on the most effective surgical technique, however: simple excision or excision followed by CMC arthrodesis. The existing literature on the surgical management of carpal boss was systematically reviewed to identify the optimal surgical treatment method.

**Methods:** Two authors independently reviewed articles retrieved from MEDLINE using the search query “carpal boss AND ganglion cyst OR carpal boss” and applied limitations to include English language articles. Reports with less than 5 patients were excluded. Secondary selection required the studies to report data with at least 6 months of clinical follow up. Variables of interest included basic demographics, post-operative symptom recurrence, reoperations and complications. Fisher’s exact test was used for statistical analysis.

**Results:** A total of 41 studies were identified. Following the application of inclusion and exclusion criteria, 8 studies remained: 1 level III, 7 level IV evidence. 206 patients were identified: 168 underwent simple excision, 38 underwent excision followed by arthrodesis. 86 females and 78 males were identified. 70/207 cases had a history of trauma, while 3/36 had an overlying ganglion cyst. Follow up ranged from 6months to 10 years. There were no significant differences in pain relief, reoperation rates, symptom recurrence or complication rates.

**Discussion:** Simple excision is a technically less demanding procedure and may result in outcomes similar to CMC arthrodesis. While persistent symptoms of pain are not uncommon following carpal boss excision, additional, more extensive debridement or CMC arthrodesis appears to result in satisfactory patient outcomes. The available literature on the surgical treatment of carpal boss is limited by a small number of studies with low levels of evidence. Higher quality studies would be useful in guiding treatment considerations.

#### Notes:

1:45pm–1:49pm

## Cardiac Metastasis Of Extremity Soft Tissue Sarcoma: An Unusual Metastatic Pattern

John A. Abraham, MD

**Introduction:** Soft tissue sarcomas are aggressive malignant neoplasms of the musculoskeletal system. The usual pattern of metastasis is to the lungs, although other patterns can be seen. We report the unusual occurrence of intra-cardiac metastases of soft tissue sarcoma in two patients.

**Methods:** Medical records of two patients with intra-cardiac metastases of soft tissue sarcoma are reviewed.

**Results:** Two patients with soft tissue sarcoma metastases to the myocardium are identified. One patient had a diagnosis of small round cell sarcoma, and the other had an undifferentiated pleiomorphic sarcoma. Both had other sites of metastatic disease. Both patients received chemotherapy. One patient underwent open heart excision of the intra-cardiac metastasis, the other elected palliative treatment. Both patients died of disease within 6 weeks of diagnosis of intra-cardiac metastasis. Imaging for patients will be presented.

**Conclusion:** Soft tissue sarcomas are rare malignant tumors of the musculoskeletal system, demonstrating an aggressive metastatic pattern. We report the unusual occurrence of an intra-cardiac metastasis in two patients. In spite of aggressive treatment, both patients died rapidly of disease, demonstrating the aggressive nature of this type of metastasis.

**Notes:**

1:50pm–1:54pm

## Malignant Associated Giant Cell Lesions Of Bone

Samuel Kenan, MD

Paul A. Anderson, MD

Michelle G. Carlson, MD

Andrew J. Weiland, MD

Malignant associate giant cell lesions are exceedingly rare and may exhibit insidious progress. The clinical radiographical and pathological finding may be indistinguishable from benign giant cell tumor. Early recognition is important to ensure appropriate treatment. Occasionally benign appearing osteoclast-like giant cells are present in diffuse and large number producing striking resemblance to giant cell tumor. Incorrect diagnosis of giant cell tumor could be made especially if tumor cells show subtle atypia. Limited biopsy may not provide enough representative tissue for correct diagnosis. Malignant transformation of giant cell tumor without antecedent history of radiation or multiple surgical procedures is exceedingly rare. Most osteosarcoma contains focal clusters of benign osteoclast-like giant cells morphologically indistinguishable from those seen in giant cell. The classification of malignant giant cell lesions includes:  
1. Primary malignant giant cell tumor (PMGCT) 2. Secondary malignant giant cell tumor (SMGCT) 3. Giant cell rich osteosarcoma (GCROS) 4. Anaplastic giant cell rich sarcoma. The distinction between all the groups and benign giant cell tumor is extremely important as the clinical treatment and prognostic outcome is different. All shows similar radiographic features, histologically all have osteoclast-like giant cells and anaplastic spindle stromal cells. The correct diagnosis is challenging. The combination of subtle criteria may help in making the correct diagnosis. Exemplified cases from each group will be presented with discussion of treatment and outcome.

**Notes:**

1:55pm–1:59pm

## Opportunistic Osteoporosis Screening: Gleaning Additional Information From Diagnostic Wrist CT Scans

Joseph J. Schreiber, MD

Paul A. Anderson, MD

Michelle G. Carlson, MD

Andrew J. Weiland, MD

**Introduction:** Hounsfield Unit (HU) values can be easily obtained from diagnostic CT scans to calculate regional bone density. We hypothesized that HU values of the distal radius could be used to assess local bone quality and would be predictive of distal radius fracture risk, thereby allowing identification of patients in need of further management.

**Methods:** Quantitative CT scans were performed and bone density measurements were made using regional cancellous bone HU values of the distal radius and ulna. 15 patients with a CT documented distal radius fracture (mean=36 years) were compared with 15 matched controls (mean=35 years) that had a CT scan obtained for other indications. CT scans obtained within one week of injury were used to minimize disuse osteopenic changes.

**Results:** The cohort of patients with a distal radius fracture had significantly lower regional bone density, as assessed with HU, at the distal radius (227 vs. 312) and ulnar head (211 vs. 320), as compared to non-fracture controls. A HU threshold of 268 in the distal radius had a sensitivity of 87% and specificity of 87%, and patients with  $HU \leq 268$  were at an increased risk for distal radius fracture (OR=6.5).

**Discussion:** Patients with a distal radius fracture had lower bone density, as assessed with HU, in the distal radius and ulna. - A threshold HU value of 268 in the distal radius was identified that is associated with 6.5 times increased risk for distal radius fracture. - HU measurements can be obtained from any diagnostic CT scan using modern software programs with minimal effort, at no additional cost or radiation to the patient. - We suggest that patients with HU values below 268 in the distal radius be considered for further metabolic bone disease work up, such as additional imaging, laboratory assessments, initiation of treatment, or appropriate referral.

### Notes:

Friday, October 24, 2014

Rapid Fire Session 11D — Upper Extremity  
(Station D, Ritz-Carlton Ballroom Foyer)

Moderator: Pedro K. Beredjiklian, MD

1:30pm–1:34pm

## Periprosthetic Shoulder Infection In The United States: Incidence And Economic Burden

Surena Namdari, MD, MSc

\*Eric M. Padegimas, MD

Mitchell G. Maltenfort, PhD

Matthew L. Ramsey, MD

Gerald R. Williams, MD

Javad Parvizi, MD, FRCS

**Background:** Periprosthetic joint infection (PJI) is a major cause of morbidity following shoulder arthroplasty. There is little known about infections following shoulder arthroplasty. The purpose of this study was to analyze the incidence, predisposing factors, and economic burden of PJI after shoulder arthroplasty in the United States.

**Methods:** Patients who underwent shoulder arthroplasty were identified using the ICD 9-CM codes 81.80, 81.81 and 81.88 in the National Inpatient Sampling (NIS) database from 2002 through 2011. Shoulder PJI was identified using arthrotomy for device removal (80.01) and prosthetic infection (996.66) codes. Multivariate logistic regression analysis was utilized to identify predisposing factors for shoulder PJI.

**Results:** The overall infection rate over the course of the ten years studied was 0.98% and did not vary significantly over this period of time. The factors most strongly associated with PJI were weight loss (OR 2.62;  $p = 0.00047$ ), drug abuse (OR 2.38;  $p = 0.0011$ ) and anemia from either blood loss (OR 2.43;  $p=0.00031$ ) or deficiency (OR 2.05;  $p < 0.0001$ ) and older age (OR 0.98/year;  $p < 0.0001$ ). Patients in urban private hospitals had greater risk of infection than patients in urban academic hospitals (OR 1.93;  $p < 0.0001$ ). Adjusted to 2011 dollars, the median total charges for a shoulder PJI patient increased from \$26,757 in 2002 to \$48,421 in 2011.

**Conclusions:** The incidence of PJI following shoulder arthroplasty did not change substantially over the decade of study

period. This study identified some modifiable risk factors and the economic burden that is associated with shoulder PJI. The rising number of shoulder arthroplasties performed will result in a greater absolute number of shoulder PJI cases in the future with an increasing economic burden on the health care.

**Notes:**

lary lateral views were reviewed for any evidence of loosening.

**Results:** Thirty-four patients' data were available with two year follow-up. Average age was 66.6 years. Average duration of follow-up was 31 months (Range 23-49). Four patients (11.8%) were revised to a reverse total shoulder arthroplasty, all for the indication of subscapularis failure and pain at an average of 9 months post operatively. There were no implants with radiographic evidence of loosening. VAS scores improved an average of 4.8 from pre-op to the final follow-up. Forward elevation and external rotation improved an average of 72° (0-130°) and 43° (0-80°) respectively from pre-op exam to final follow-up.

**Conclusion:** Trabecular metal glenoid component survival was 100% at 2 year follow-up in this cohort of patients. While long term follow-up is needed, these early results are promising.

**Notes:**

1:35pm–1:39pm

## Two Year Survival And Outcomes Of Trabecular Metal Glenoid Components In Total Shoulder Arthroplasty

Scott T. Watson, MD

Stefan Tolan, MD

Keith Lonergan, MD

**Introduction:** Glenoid component failure remains a substantial cause of Total Shoulder Arthroplasty (TSA) failure and surgical revisions. Trabecular metal backed glenoid components have become popular in recent years. This technology has well documented survival results in Hip and Knee arthroplasty, however to our knowledge there are no published reports of survival in TSA. The purpose of this study is to report the two year survival and clinical outcomes of patients who received a trabecular metal glenoid component in a primary anatomic total shoulder arthroplasty.

**Methods:** Radiographs and clinical records for all patients who underwent an anatomic TSA with a trabecular metal glenoid component were reviewed retrospectively. The primary outcome was survival of the implant defined as no revision surgery at least 23 months postoperatively. Secondary outcomes were: any evidence of loosening of the component on postoperative imaging, VAS scores at two year follow-up compared to pre-op, and improvement in forward elevation and external rotation range of motion. AP, oblique, and axil-

1:40pm–1:44pm

## Arthroscopic Anchorless, Transosseous vs Anchored Rotator Cuff Repair — Case Control Analysis

Lucas B. Romine, MD

Umasuthan Srikumaran, MD, MBA

Kelly G. Kilcoyne, MD

Edward McFarland, MD

Steve Petersen, MD, MSc

**Introduction:** Recent advancements in surgical instrumentation have permitted an all-arthroscopic, anchorless transosseous repair, which reproduces the “gold standard” of open transos-

seus repair. To date, there is no published literature comparing all-arthroscopic, anchorless, transosseous repair to standard arthroscopic anchored technique. Our goal is to assess clinical outcomes of arthroscopic anchorless, transosseous versus anchored rotator cuff repair.

**Methods:** We conducted a retrospective case-control study of arthroscopic rotator cuff repair performed by a single surgeon from 2011 to 2013. The control group included anchored repair (single and double row), while the case group included anchorless, transosseous repair. We excluded partial thickness tears, revision cuff repair, and isolated repairs of the subscapularis. Baseline demographic data included age, sex, and tear size. We collected visual analog (VAS) pain score, subjective shoulder score (SSV), range of motion, ASES score, and recorded complications.

**Results:** Baseline demographic data for age and sex did not differ between groups. Compared to the anchored group, the anchorless, transosseous group was found to have significantly larger tear size. At 12 month follow up, there was significant postoperative improvement in both groups with respect to SSV, VAS, and ASES scores compared to preoperative scores. There was no difference between the two groups with respect to SSV, VAS pain score, and ASES score.

**Discussion and Conclusion:** No significant differences in functional or patient reported outcomes were identified between arthroscopic standard anchored approaches and anchorless, transosseous techniques, despite significant bias in tear size against the anchorless, transosseous group.

#### Notes:

1:45pm–1:49pm

## Complex Intra-Articular Distal Radius Fractures Treated With Cross-Pin Fixation And A Non-Bridging External Fixator (CPX System)

R. Tyler Huish, DO  
Justin B. Mirza, DO  
Ather Mirza, MD  
Shawn Adhya, BS

**Introduction:** This study aims to assess the outcomes of complex, intra-articular distal radius fractures (AO type C) treated with closed reduction, cross pin multiplanar fixation, and a non-spanning external fixator. The use of this device was hypothesized to maintain anatomic reduction and allow for range of motion in AO type C distal radius fractures, as assessed via radiographic variables, functional outcomes, and DASH score.

**Methods:** Twenty-three patients with complex, intra-articular (AO type C) distal radius fractures (DRFs) were included in this study. All patients were treated with closed reduction and percutaneous fixation using K-wires attached to a non-spanning external fixator. Postoperatively, a removable orthosis was applied, mean 6 days (range 2-10) and formal wrist rehabilitation began, mean of 8 days (range 2-16). Standard radiographs were obtained pre-op, post-op, at 8-12 weeks and 10-14 months. Radiographic variables were measured at each time point from digitized radiographs using Digimizer software. Patients were also evaluated for grip strength, pinch strength, and active wrist range of motion (AROM). The PRWHE and DASH were used to determine subjective outcomes.

**Results:** At average follow-up of 17 months (range 12-36), grip and lateral pinch strength recovered 82.2% and 95.1% respectively, mean wrist AROM increased to a minimum of 82% of the non-injured side; mean DASH and PRWHE scores at last follow up were 10.8 and 9.1 respectively. There was no loss of reduction and no significant change in radiographic parameters following reduction, ( $P>0.33$ ) although parameters were slightly outside of accepted ranges in three patients. There were no pin track infections, non-unions, tendon injuries, or angular collapses. Two patients had an increase in ulnar variance. One patient developed complex regional pain syndrome which resolved and one patient had mild transient

superficial radial nerve sensitivity without functional compromise. All patients returned to their prior employment and/or activities.

**Conclusion:** Twenty-three patients with complex intra-articular DRFs were treated with closed reduction, cross pin fixation, and a non-spanning external fixator. Subsequently, patients demonstrated excellent radiographic, functional, and subjective outcomes (Final DASH of 10.8). Two patients experienced complications that resolved without functional compromise. This preliminary study suggests that the non-spanning external fixator may be indicated for complex intra-articular DRFs if closed reduction is possible.

**Notes:**

carpal tunnel immediately before and after BJA was measured using a commercially available pressure monitor device. In patients with concomitant CTS undergoing both BJA and carpal tunnel release (CTR), the pressure was measured after BJA but prior to release of the transverse carpal ligament.

**Results:** The pressure within the carpal tunnel decreased after BJA in all patients. The mean pressure prior to BJA was 20.5 mmHg and decreased significantly to 8.0 mmHg after BJA. Patients with concomitant CTS had a mean pre-BJA pressure of 26.8 mmHg, which decreased to significantly 6.8 mmHg after BJA.

**Discussion and Conclusion:** BJA decompresses the carpal tunnel and decreases the pressure within. In patients with concomitant CTS the BJA alone (without additional release of the transverse carpal ligament) decreases the carpal tunnel pressure. Further study is warranted to determine the need for discrete release of the transverse carpal ligament in patients with CTS who are undergoing BJA.

**Notes:**

1:50pm–1:54pm

## Basal Joint Arthroplasty Decreases Carpal Tunnel Pressure

Kevin Lutsky, MD  
\*Nayoung Kim, BS  
Asif Ilyas, MD  
Pedro K. Beredjiklian, MD

**Introduction:** There is a well-documented association between carpal tunnel syndrome (CTS) and thumb carpometacarpal (CMC) arthritis, and these conditions commonly coexist. We have observed that patients with who have previously undergone thumb basal joint arthroplasty (BJA) seem rarely to present subsequently with CTS. Our hypothesis is that BJA decreases the pressure within the carpal tunnel.

**Methods:** Nineteen patients (4 with co-existent CTS) undergoing BJA were enrolled in the study. The pressure within the

1:55pm–1:59pm

## Online Resources For Shoulder Instability: What Are Patients Reading?

Grant H. Garcia, MD  
Samuel A. Taylor, MD  
Chris J. Dy, MD, MSPH  
Alexander B. Christ, MD  
Ronak M. Patel, MD  
Joshua S. Dines, MD

**Introduction:** Evaluations of the medical literature suggest many online sites provide poor quality information. Our stud-

ies purpose was to investigate the value of online resources for shoulder instability.

**Methods:** This was a prospective investigational study in which we selected three search terms (“shoulder instability”, “loose shoulder” and “shoulder dislocation”), which were entered into three search engines (Google, Yahoo and Bing). We evaluated the first 25 results from each search. 3 reviewers independently gauged quality and accuracy of information using a set of pre-determined scoring criteria based on AAOS/ASES patient websites, in addition to noting if four potential surgery options were mentioned. Reviewers were blinded. The readability of websites was evaluated using the Fleisch-Kincaid score for reading grade level. Comparative statistics (independent t-tests and analyses of variance) were used to determine whether the search term, author type, and presence of commercial bias affected the quality, accuracy, and readability of the websites found.

**Results:** 82 unique websites were evaluated. Higher quality and accuracy was produced using the term “shoulder instability” compared to websites using the term “loose shoulder” (quality: p less than 0.001; accuracy: p equals 0.001). However, the reading level was significantly more advanced for “shoulder instability” websites (p less than 0.001) see table 1. Quality was significantly higher in websites with reading levels above 8th grade (p equals 0.001), occurring in 88% of websites. Only 23 sites (28.0%) mentioned surgical options for shoulder instability and of these, eight-mentioned thermal capsulorrhaphy as a primary treatment.

**Discussion and Conclusions:** Online information regarding shoulder instability is often inaccurate and/or at an unacceptably high reading level. The quality of information is highly dependent of the specific search term used. Clinicians need to be aware of information available online, and should help direct patients to proper sites and guide Internet search terms.

#### Notes:

Friday, October 24, 2014

Rapid Fire Session 11E — Pediatrics  
(Station E, Ritz-Carlton Ballroom Foyer)

Moderator: Daniel W. Green, MD

1:30pm–1:34pm

## Nerve Allograft For Surgical Repair Of Obstetric Brachial Plexus Palsy

Evan Siegall, MD  
Allan F. Peljovich, MD  
Joshua Ratner, MD

**Introduction:** Treatment of obstetric brachial plexus palsy (OBPP) has continued to evolve for the past several decades including several techniques for surgical exploration and repair of the brachial plexus. The use of allograft nerve grafts is a new technique not currently described in the literature. Benefits of this technique include bridging gaps too long for direct repair or use of a nerve tube, prevention of autograft donor site morbidity, ability to size-match the graft, decreased OR time, and ready supply of graft.

**Methods:** This paper presents a retrospective review of 9 patients whose brachial plexus palsies were surgically repaired with nerve allograft. Surgical repair was elected if there was no return of biceps function by 6 months of age. Inclusion criteria were a minimum of 8 months follow-up. Our data represents short-term follow-up, average 14 months, as a preliminary look to determine if there is early evidence of reinnervation of affected musculature. The primary outcome measure was return of 2/5 biceps by 1 year of follow-up.

**Results:** Within our cohort of 9 patients, 6 have had clear return of 2/5 biceps or better, and 3 have not. Of the patients with return of 2/5 biceps by one year, 3 have continued to progress to 3/5 strength with continued follow-up, and one achieved 3/5 strength and may yet achieve better biceps strength by one year.

**Conclusions:** Our data shows that OBPP lesions surgically repaired with nerve allograft can lead to reinnervation of affected musculature similarly to other techniques. Further follow-up is required to fully compare final outcomes of this technique versus others.

**Notes:**

two-toed or three-toed feet with excellent function after 7 years and 4.5 years, respectively. The older girl was reexamined at age 43. She is pain free, able to run, walk on her metatarsal heads and heels, and wears normal shoes. Patient stated that surgery transformed her life. Her brother, now 50, expressed equal satisfaction.

**Discussion and Conclusion:** Cleft foot is amenable to correction by uncomplicated surgery. In the younger children, simple cleft closure and straightening of curly toes produces good function and acceptable cosmesis. Cleft closure in older patients requires basal metatarsal osteotomies with reduction held by temporary transverse pin fixation. Deformed rigid toes are best ablated. Elaborate toe reconstruction should be avoided. The aim is to produce feet that are normal in width, function well and fit comfortably in regular shoes. Relatively simple surgical correction is described for disabling and cosmetically unacceptable cleft foot deformity. These techniques were effective in 8 feet in four patients followed from 4.5 to 30 years.

**Notes:**

1:36pm–1:40pm

## Cleft Foot Deformity, Management And Long Term Follow-Up

John E. Handelsman, MD, FRCS

David H. Godfried, MD

Folorunsho Edobor-Osula, MD, MPH

**Introduction:** Absence of central rays create a cleft or lobster claw foot. Residual toes are curled and ultimately rotate inwards and ankylose. These feet are unstable and shoe fitting is difficult. This study evaluates the long-term results of specific surgical techniques.

**Methods:** Eight feet were treated. Two siblings, a girl aged 3 and a boy aged 18 months were managed by excision of skin in the cleft and soft tissue suture apposition. Flexed toes were corrected by standard curly toe releases. Two older siblings, a girl aged 13 and a boy aged 20, required basal osteotomies of residual metatarsals and transverse Kirschner wire fixation to achieve and maintain correction. Ankylosed toes were amputated.

**Results:** Eight feet in four patients have been surgically corrected. The younger children have cosmetically acceptable

1:42pm–1:46pm

## Screw Fixation Of Lateral Condyle Fractures: Results Of Treatment

Eric D. Shirley, MD

John M. Mazur, MD

**Introduction:** Fixation of lateral condyle distal humeral fractures has traditionally been achieved with K-wires. Screw fixation provides the advantage of compression across the fracture site. The results of screw fixation and risk of iatrogenic physeal damage are not well defined. This study was

designed to evaluate the efficacy of screw fixation for lateral condyle fractures.

**Methods:** A retrospective study of patients treated with lateral condyle elbow fractures using screw fixation at a single institution was undertaken. Patients ages 12 years and under with isolated fractures were included. Clinical notes were examined for residual symptoms, alignment, range of motion, and complications. Radiographs were reviewed for healing and growth arrest.

**Results:** 95 patients treated over a 7-year period met inclusion criteria. Mean patient age was 5.8 years, range 2-12. 53 patients required open reduction, 42 patients underwent a closed reduction. Mean follow up was 148 days, range 34-802. The overall complication rate was 19%, with a 5% rate when lateral overgrowth was excluded as a complication. Initial fracture union was achieved in 99% of patients, as one patient required revision fixation with bone grafting. Hardware was symptomatic with prominence or loss of flexion in 4% of patients. There were no cases of growth arrest or alterations of the carrying angle. For patients with final follow-up > 12 months, the mean extension loss was 2° (range, 0-25°) and the mean loss of flexion was 8° (range, 0-25°).

**Discussion:** Screw fixation of lateral condyle fractures results in satisfactory union with minimal risk of growth plate complications at early follow-up. Small degrees of motion loss may occur, with flexion deficits larger than extension deficits.

**Conclusion:** This study demonstrates the safety of screw fixation of lateral condyle fractures in the short-term, which has not been well established in the literature.

#### Notes:

1:48pm–1:52pm

## Effect Of Femoral Rotation On Entry Point For Trochanteric Nails

Hemil H. Maniar, MD  
David G. Fanelli, BS

Thomas Bowen, MD  
Daniel S. Horwitz, MD

**Introduction:** Trochanteric entry nail has become the implant of choice to treat peritrochanteric femur fractures. A point on the greater trochanter just medial to its tip in the AP (antero-posterior) C-arm view and in line with the femoral shaft in the lateral C-arm view is the correct starting point for the trochanteric nail. However, there is no description of the rotational position of the femur during site selection and the influence of femoral rotation on finding the optimal starting position.

**Methods:** Four saw bone samples were selected and mounted in anatomical position. The optimal starting point was marked with a needle; two additional needles were inserted lateral to this at 3mm intervals in the same coronal plane. A distinct bony density, the junction of the proximal intertrochanteric line and the superior border of the neck was identified and marked as a reference point—6 mm medial and 12 mm anterior to the entry point. The anteversion of the femoral neck of each sample was measured on lateral image, based on which, the first anatomical AP image was taken. To mimic external and internal rotation, the C-arm was rotated in 10 degree increments in either direction.

**Results:** With increasing external rotation the coronal distance between the metallic point and all needles decreases. At 20 degrees of external rotation the metallic point appears to be coplanar with the medial downslope of the greater trochanter. Selecting a starting point at that rotation will lead the surgeon to believe that he/she is significantly more medial.

**Discussion and Conclusion:** It is essential to either correct the femoral rotation to anatomical position or position the C-arm in an appropriate plane taking into account the femoral rotation before selecting the entry point in trochanteric entry proximal femoral nail.

#### Notes:

1:54pm–1:58pm

## Wait Time And Patient Satisfaction In The Orthopedic Clinic

Tyler M. Kreitz, MD

Brian S. Winters, MD

David I. Pedowitz, MD, MS

**Purpose:** The purpose of this study was to examine the relationship between wait time and overall patient satisfaction and likelihood to recommend the practice in the orthopedic clinic.

**Methods:** This is a retrospective cross-sectional study using routinely collected wait times and satisfaction survey results for 3125 new patients in the orthopedic clinic from June 2011 through October 2013. Wait time was calculated from the time of scheduled appointment to time in the exam room. A general linear mixed statistical model was used to evaluate the effect of increasing wait time on overall satisfaction and likelihood to recommend the practice.

**Results:** The likelihood of an excellent (OR 0.86) and excellent or very good (OR 0.82) rating for overall satisfaction showed significant correlation per 15 minutes of additional wait time. The likelihood of a strongly agree (OR 0.9) and strongly agree or agree (OR 0.85) response to recommend the practice showed no significant correlation per 15 minutes of additional wait time.

**Conclusion:** Minimizing wait times in the outpatient orthopedic clinic may improve overall patient satisfaction but may not affect likelihood of those patients to recommend the practice to others. An increase in wait time of 15 minutes reduces the odds of a positive satisfaction result without affecting the likelihood to recommend the practice. This may suggest that although the patient may have been less satisfied with their individual experience, they did not believe this to be indicative of the overall practice. Our data shows a correlation between wait time and patient satisfaction.

**Notes:**

## 2014 Scientific Program Abstracts — Saturday

*(An asterisk (\*) by an author's name indicates the presenter.)*

**Saturday, October 25, 2014**

**General Session 13 — Mixed Topics (Ritz-Carlton  
Ballroom Salon 1)**

**Moderators:** **Henry A. Backe Jr, MD**  
**E. Anthony Rankin, MD**

7:00am–7:06am

### **Patients' Perception Of Care Correlates With Quality Of Hospital Care: A Survey Of 4605 Hospitals**

Spencer Stein, MD  
Michael Day, MD, MS  
Raj Karia, MPH  
Lorraine Hutzler, BA  
Joseph A. Bosco III, MD

**Introduction:** Increasing quality while reducing cost of medical care is the goal of health care reform in the United States. The Centers for Medicare and Medicaid Services (CMS) plan to continue the implantation of payment for performance initiatives to reach this goal. The patient's perception of the care they received is a key performance metric and is being used to determine payments to hospitals. It is unclear if there is a correlation between the technical quality of care received and patient satisfaction. In this report, we correlated patient perception of care measured by Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores with accepted quality of care indicators, many of which are pertinent to the field of orthopaedic surgery.

**Methods:** We used the Hospital Compare database (4605 hospitals) to examine complication rates and patient reported experience for hospitals across the nation in 2011. We used the following 8 Hospital-acquired Conditions (HACs) and 5 Patient Safety Indicators (PSIs) to measure quality of care:

#### **HACs**

- Foreign object retained post-operatively
- Air embolism
- Blood incompatibility
- Serious pressure ulcers
- Falls and trauma
- Vascular catheter-associated infection (VCAI)
- Catheter-associated urinary tract infection (CAUTI)
- Manifestations of poor glycemic control

#### **PSIs**

- Postoperative death from treatable complication
- Iatrogenic pneumothorax
- Postoperative venous thromboembolism (VTE)
- Postoperative wound dehiscence
- Accidental puncture or laceration.

We gauged patient experience using responses to the following 4 questions on the HCAHPS survey: overall hospital rating, willingness to recommend the hospital, doctor communication, and responsiveness of staff. Hospitals were divided into quartiles based on performance on each of the four HCAHPS questions. The 13 quality indicators (HACs and PSIs) were then calculated for each of the HCAHP quartiles, and a test for trend was applied across the quartiles to correlate patient experience with quality of care.

**Results:** Of the 4605 hospitals reporting HCAHPS data, 3273 (71.1%) reported rates of HACs and 2871 (62%) reported rates of PSIs. Hospitals with higher rates of pressure ulcers, VCAIs, manifestation of poor glycemic control, post-operative death due to treatable conditions, VTEs, and wound dehiscence were associated with significantly worse patient experience scores than those with lower complication rates ( $P<0.05$ ).

**Conclusion:** Favorable patient experience and low complication rates have been proposed as essential components of patient centered medical care. The majority of our correlations demonstrated an inverse relationship between patient

experience and complication rates. This negative correlation suggests that reducing these complications can lead to a better hospital experience. Our data on physician communication and the timely responsiveness of staff also supports previous conclusions that complication rates may be improved by optimizing patient interactions. The two global domains of patient experience did demonstrate some correlations between higher complication rates and better patient experience suggesting factors such as service recovery may be at play. Overall, our results suggest that patient experience is generally correlated with the quality of care provided.

**Notes:**

7:08am–7:14am

## Patient-Reported Allergies Affect Outcomes After Lower Extremity Arthroplasty

Jason L. Blevins, MD  
Benjamin T. Bjerke-Kroll, MD, MS  
Alexander S. McLawhorn, MD, MBA  
David M. Dare, MD  
Peter K. Sculco, MD  
Seth A. Jerabek, MD

**Introduction:** Factors other than surgical expertise and component positioning influence patient outcomes after arthroplasty. Perceptions of pain, depression and somatization have been shown to influence musculoskeletal disorders. Patient-reported allergies (PRA) are often discussed clinically, but have not been examined critically in the orthopaedic literature. We hypothesized that multiple PRA portend increased length of stay (LOS) and worse outcomes after lower extremity arthroplasty.

**Methods:** All patients undergoing primary unilateral total hip arthroplasty (THA) and total knee arthroplasty (TKA) from October to December 2010 at a single institution were retrospectively reviewed. Allergies, sensitivities, and intolerances were recorded from medical records, with basic demographic and LOS data. WOMAC and satisfaction scores were col-

lected at 2-years postoperatively. Logistic regression models were used to examine the association between PRA, LOS and 2-year outcomes.

**Results:** 541 primary THA and 607 primary TKA patients, with 1,102 PRA (mean, 0.96 allergies/patient), were included. 70% of allergies were drug-related, 14% food, and 16% environmental. Increasing number of PRA was associated with increased LOS for TKA, but not for THA. Each additional PRA increased the likelihood of staying in the hospital for more than 5 days by 16% following TKA. Increasing number of PRA was significantly associated with worse WOMAC pain, stiffness and functional scores, and worse overall improvement in quality of life (QoL) after TKA. PRA were also correlated with worse WOMAC pain and functional scores, decreased improvement in QoL, and decreased overall satisfaction after THA.

**Discussion and Conclusion:** Number of PRA is an independent risk factor for increased LOS after TKA and worse outcomes at 2-years after TKA and THA. Patients with multiple reported allergies should be identified preoperatively and counseled about the risks of suboptimal postoperative results. These findings may have implications for surgeon and hospital reimbursement, as value-based payment becomes linked to patient-reported satisfaction.

**Notes:**

7:16am–7:22am

## Lidocaine Chondrotoxicity In A Porcine Fracture Model

Grigory E. Gershkovich, MD  
James S. Raphael, MD  
Solomon P. Samuel, DEng

**Introduction:** Numerous studies have demonstrated the chondrotoxicity of lidocaine, but no study has examined its chondrotoxicity during acute trauma. This novel study examined

the chondrotoxicity of lidocaine during pre-existing trauma in a porcine cadaver model. We hypothesized that lidocaine would cause chondrotoxicity in the trauma setting.

**Methods:** Three porcine cadavers were utilized within 30 minutes of euthanasia. Fractures of the medial and lateral femoral condyles of bilateral stifle joints were created via a mini-open technique and a 1 cm osteotome. The right stifle joint received a lateral suprapatellar 20 ml injection of 2% lidocaine. The left joint received saline (control). After 30 minutes, 3 mm diameter cartilage biopsies from the fracture sites were obtained. A total of 23 samples were obtained from the control group and 29 were taken from the experimental group. Cartilage explants were incubated in a standard cell culture medium for 24 hours. AlamarBlue reagent was then added, and the optical density (OD) of the media was measured after 6 h at 570 nm to assess explant viability. The explant viability between the control and experimental group was compared using student t-test.

**Results:** The mini-open technique produced consistent fractures. We were able to verify the presence of anesthetic in the synovial space after 30 minutes. The combined OD data from the three animals demonstrated a statistically significant 34% reduction in viability within the lidocaine exposure group. Individually, the reduction in explant viability varied from anywhere between 22 -54%.

**Discussion and Conclusions:** The preliminary data supports our hypothesis, and physicians must remain vigilant when injecting lidocaine into injured joints. The study demonstrates that porcine cartilage explants are a quicker and suitable alternative than cell culture for studying local anesthetic toxicity. Finally, the local environment within injured synovial joints does not provide enough protection against lidocaine to prevent chondrotoxicity.

#### Notes:

7:24am–7:30am

## CRP And ESR As Indicators For Resolution Of Periprosthetic Infection

Christopher P. Lindsay, BS

Christopher W. Olcott, MD

Daniel J. Del Gaizo, MD

**Introduction:** Periprosthetic joint infection (PJI) is a difficult problem to treat, often necessitating a 2-stage procedure where all implants are removed, a temporary spacer placed, and several weeks of antibiotics administered. Only then, if the infection is eliminated, can re-implantation take place. Serum levels of C-Reactive Protein (CRP) and Erythrocyte Sedimentation Rate (ESR) have been established as important tests in the initial diagnosis of PJI. Many surgeons also use these tests to determine if infection is resolved between stages of a 2-stage procedure; however, a paucity of data exists regarding this practice. The purpose of this study was to determine the utility of serum CRP and ESR in evaluating eradication of infection between stages of a 2-stage revision/re-implantation for PJI.

**Methods:** A retrospective review of our institutional total joint databases was conducted. We identified and analyzed the response of CRP and ESR between the two stages of the 2-stage revisions, as well as after re-implantation. Eradication of infection was defined as clinically infection free at least 2 years post-operatively. Between 7/2004 and 7/2012, 25 consecutive 2-stage revisions for PJI were identified for analysis (16 knees, 9 hips).

**Results:** Out of the 25 cases, 4 experienced evidence of infection within the first 2 years from the second stage procedure. Sensitivity was 50% for elevated CRP, 75% for elevated ESR, and 100% when the tests were combined. The specificities were 76%, 81%, and 91% for those tests respectively. Most notably, the negative predictive value of persistent infection was 100% when neither test was elevated.

**Discussion and Conclusion:** Results of this study support the use of CRP and ESR as indicators of the resolution of PJI during 2-stage revision. Combining the two tests greatly affects the sensitivity and specificity. More research is needed with larger samples to further support these findings.

#### Notes:

7:32am–7:38am

### Resident/Fellow Travel Grant Award

#### What Factors Affect Medicare Reimbursement In Total Joint Arthroplasty?

Eric M. Padegimas, MD  
Benjamin Zmistowski, MD  
Kushagra Verma, MD, MS  
Julie L. Shaner MD  
Michael J. Howley, PA-C  
James J. Purtill, MD

**Introduction:** Medicare costs have been increasing since the inception of the program and they are projected to continue increasing exponentially. In order to increase transparency and contain costs, the Centers for Medicare and Medicaid Services (CMS) released charge and reimbursement data for 2011. Concurrently, the demand for total joint arthroplasty (TJA) is projected to increase significantly. Our purpose is to study reimbursement variability for TJA and what factors affect it. Enhanced understanding of Medicare billing may allow the orthopaedic community to better manage the economic changes coming.

**Methods:** In 2011, the CMS released a dataset of Medicare reimbursement, provider charges, location and volume of discharges for the top 100 most billed Diagnosis Related Groups (DRGs). These were grouped into patient referral areas using the Dartmouth Atlas. We created a multivariate regression model by referral area with population and healthcare variables identified from the Dartmouth Atlas, CMS, WWAMI Rural Health Research Center, and United States Census.

**Results:** 427,207 TJA with weighted average reimbursement of \$14,324.84 (\$9,103-\$38,686) were identified. Our regression model accounted for 52.5% of variability. Variables regarding hospital ownership accounted for 2.4% of variability, socioeconomic 10.9%, competitive institutions 14.5%, supply and demand 19.9%, and quality of care 4.8%. Quality metrics such as TJA provider volume and patient satisfaction were both significantly inversely correlated with reimbursement.

**Discussion and Conclusion:** Reimbursement for TJA is highly variable. Quality of care measures only account for 4.8% of variability and institutions with worse metrics have greater reimbursements. The current reimbursement system

does not encourage improved quality of care. If reimbursement is to be driven by quality metrics, evidence-based reimbursement (i.e. reward to high-volumes centers of clinical excellence) should be considered. Understanding how quality measures in TJA relate to Medicare billing may enhance quality of care and reward institutions that have better clinical outcomes.

### Notes:

7:40am–7:46am

### Resident/Fellow Award

#### Combination Therapy With DBM And PTH Cannot Heal A Critical Sized Murine Femoral Defect

Michael Pensak, MD  
Seung-Hyun Hong, PhD  
Alex G. Dukas, MD  
Jennifer M. Bayron, MD  
Brian A. Tinsley, MD, MA  
Ashish Jain, MS  
Amy Tang  
Aditya Makol, MD  
David W. Rowe, MD  
Jay R. Lieberman, MD

**Introduction:** Orthopaedic surgeons continue to search for cost-effective bone graft substitutes to enhance bone repair. Teriparatide (PTH 1-34) and demineralized bone matrix (DBM) have been used in patients to promote bone healing. We evaluated the efficacy of combination therapy with DBM and PTH in healing a critical sized femoral defect. We used novel lineage-specific reporter mice to evaluate the osteoprogenitor response to this treatment.

**Methods:** Critical sized femoral defects (2mm) were created in male lineage-specific transgenic mice expressing Col3.6GFPtopaz (pre-osteoblastic marker),

Col2.3GFPemerald (osteoblastic marker) and -SMA-Cherry (pericyte/myofibroblast marker). Three groups were evaluated: Group I, PTH 30 µg injection daily and empty defect, Group II, PTH 30 µg injection daily + DBM, and Group III, DBM + 30µL saline injection. There were 5 mice per transgene per treatment per time point. Animals were sacrificed at 7, 14, 28 and 56 days after surgery. Injections were administered for 28 days or until the point of sacrifice if the latter came first. Radiographs were taken at the time of sacrifice and evaluated using a 5-point scaled scoring system to evaluate healing by three independent reviewers. Frozen histologic sections were analyzed for osteoprogenitor response within the defect using computer-automated histomorphometric techniques.

**Results:** Radiographic analysis of the specimens showed a lack of healing across all treatment groups at all time points. The average healing score at 56 days was as follows: Group I, 1.57+/-0.68; Group II, 3.00+/-1.29; and Group III, 2.90+/-1.03. ANOVA and post hoc testing revealed that at 56 days healing was significantly better in Groups II and III compared to Group I. Only 1 of 120 (0.83%) defects across all 3 groups healed. A weighted Kappa value of 0.87 was achieved among the radiographic reviewers indicating high interobserver reliability. Histologic analysis revealed that across all treatment groups and time points the defects were largely absent of osteoprogenitor cells.

**Discussion and Conclusion:** Combination therapy with DBM and PTH failed to heal a critical sized femoral defect. Quantitation of frozen histologic sections revealed a limited osteoprogenitor response to this regimen. This combination should not be used to treat nonunions or fractures with bone defects in humans.

#### Notes:

7:48am–7:54am

#### Ranawat Award

### Cost Effectiveness Of Bariatric Surgery Prior To Primary Total Knee Arthroplasty

Alexander S. McLawhorn, MD, MBA

Daniel Southren, BA

Y. Claire Wang, MD, ScD

Robert G. Marx, MD, MSc, FRCSC

Emily R. Dodwell, MD, MPH, FRCSC

**Introduction:** Obesity is associated with adverse outcomes after total knee arthroplasty (TKA). Costs for TKA increase linearly with body mass index. Bariatric surgery is an effective treatment for morbid obesity, but its cost-effectiveness for weight loss prior to TKA is unknown. The purpose of this study was to determine the cost-effectiveness of bariatric surgery prior to TKA for patients failing medical management of obesity and knee osteoarthritis (OA).

**Methods:** A Markov model was constructed to compare the cost-utility of two treatment protocols for patients with morbid obesity and end-stage knee OA: (1) immediate TKA, and (2) bariatric surgery two years prior to TKA. The probability of transition between each state and its utility were derived from the literature. Costs were estimated using National Inpatient Survey data and adjusted to 2012 US dollars. Utilities were expressed in quality-adjusted life-years (QALYs). Costs and utilities were discounted at 3% per year. The principal outcome measure was the incremental cost-effectiveness ratio (ICER). One-way, two-way and probabilistic sensitivity analyses were performed, using a willingness-to-pay (WTP) threshold of \$100,000/QALY.

**Results:** Obese patients undergoing TKA had lower QALYs gained than patients receiving bariatric surgery prior to TKA. With \$1,136 additional costs over the model period for patients undergoing bariatric surgery prior to TKA, the ICER between these two procedures was approximately \$13,997/QALY. Results were stable across broad value ranges for independent variables. Probabilistic sensitivity analysis found a median ICER was \$14,038/QALY (95% CI, \$5,004-\$47,590/QALY).

**Discussion and Conclusion:** In morbidly obese patients, bariatric surgery prior to TKA yielded greater utility than TKA alone. The addition of bariatric surgery prior to TKA results in a cost well below the standard \$100,000/QALY WTP

threshold. Bariatric surgery prior to TKA is likely a cost-effective option for improving outcomes in morbidly obese patients with end-stage knee OA indicated for knee replacement.

**Notes:**

**Saturday, October 25, 2014**

**Rapid Fire Session 14A — Foot**

(Station A, Plaza Ballroom 1)

**Moderator:** Sameh A. Labib, MD

9:39am–9:43am

## **Autologous Osteochondral Transplantation For Osteochondral Lesions Of The Talus: Functional And T2 MRI Outcomes At Mid-To Long-Term Follow-Up**

Ethan J. Fraser, MD

\*Charles P. Hannon, BS

Sean Flynn, BS

Keir A. Ross, BS

Timothy W. Deyer, MD

Huong T. Do, MS

John G. Kennedy, MD, FRCS (Orth)

**Background:** For large or cystic lesions osteochondral lesions (OCL) of the talus, autologous osteochondral transplantation (AOT) can be utilized to restore native architecture of the articular surface. There are no studies in the literature comparing quantitative imaging and functional outcomes following AOT. The purpose of this study was to investigate functional, MRI, and T2 mapping outcomes to quantitatively assess repair tissue and the association with functional outcomes.

**Methods:** Eighty-seven ankles in 85 patients that underwent AOT were retrospectively reviewed. Functional outcomes were assessed pre and post-operatively using the Foot and Ankle Score (FAOS). The Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score was used

to assess osteochondral graft tissue in 73 patients. Quantitative T2 relaxation time values were recorded in a subset of 61 patients. T2 values were analyzed in both the superficial and deep halves of the articular cartilage. Regions of interest included tissue within the graft and adjacent, normal cartilage, which served as a control.

**Results:** The mean follow up was 47.2 months, with average patient age of 37 years. Mean FAOS improved significantly ( $p<0.05$ ).

**Conclusions:** This study demonstrated that AOT is an effective treatment for OCLs of the talus, with good mid-to long-term functional outcomes. While MOCART scoring indicated good structural integrity of the graft, quantitative T2 mapping suggests that graft tissue may not always mirror native hyaline cartilage, particularly in superficial regions. Further prospective, randomized controlled trials are required to compare AOT to other surgical procedures used for treating OCL of the talus.

**Notes:**

9:44am–9:48am

## **Clinical And MRI Outcomes Of Femoral Donor Sites In Patient Post Osteochondral Autologous Transfer For Osteochondral Lesions Of The Talus**

Ethan J. Fraser, MD

John G. Kennedy, MD, FRCS (Orth)

Keir A. Ross, BS

Ian Savage-Elliott, BA

Timothy W. Deyer, MD

**Background:** Autologous osteochondral transplantation (AOT) has demonstrated good clinical outcomes in the short-to-med term. The procedure is indicated for large or cystic osteochondral lesions (OCL) or after failed reparative treatment such as microfracture. However, there are concerns regarding donor graft harvest from an uninjured knee. The purpose of this study was to assess donor site morbidity

(DSM) in patients undergoing AOT for talar OCLs and to compare these findings with post-operative magnetic resonance imaging (MRI) of the donor knee.

**Methods:** Thirty-nine patients who underwent AOT of the talus from 2006 to 2012, with the donor graft being taken from the lateral trochlear ridge of the ipsilateral knee, were included in the study and retrospectively reviewed. Post-operative magnetic resonance imaging (MRI) of the donor knee was obtained for all patients. Any complaints of post-operative knee pain or stiffness were recorded. Patients with symptoms in the ipsilateral knee at two years post-operatively were further assessed using the Lysholm Score. Lysholm scores are currently being collected for the remainder of the cohort. A senior musculoskeletal radiologist also assessed the post-operative MRI of the donor knee in all cases and graded them using the MOCART scoring system. Percentage of cartilage infill at the donor site was also calculated via MRI.

**Results:** Patients were a mean age of 36.1 years and mean follow up period of was 41.8 months. The patients included in this study were a subset of a series of 87 AOT procedures (7% DSM). Knee MRI was obtained in this study cohort when post-operative knee symptoms persisted. The average time to post-op MRI was 11.9 months (range 3-48 months). Mean MOCART score was 60 out of 100 points. Of the 39 knees included, six (15%) had donor site symptoms of pain (4 patients), stiffness (1 patient) or persistent swelling (1 patient) noted on two year clinical follow up. The remainder of the cohort had knee symptoms that indicated MRI evaluation, however, symptoms resolved after a period of physical therapy. Mean MOCART for those patients with DSM at two years was 53.3 compared with 61.2 for the asymptomatic cohort. In the patients with symptoms persisting two years or more, Lysholm scores for two were rated as "fair", three were rated as "good" and one was "excellent" with an average score of 85.1 out of 100. Post-operative MRI showed variable infill of the defect surface between the groups with 75.5 % of the asymptomatic group having complete infill compared to 66.7 % in the DSM group. Subchondral bone exposure was not evident in any patients. Similarly, MRI showed no evidence of effusion or adhesion in any of the patients. MRI assessment also revealed 83.3 percent vs 84.5 percent had intact or partially intact subchondral lamina in the DSM and asymptomatic groups, respectively. Subchondral bone pathology such as edema, granulation tissue, cysts or sclerosis was evident in 50 percent of the symptomatic group compared with 54.5 percent in the asymptomatic group.

**Conclusions:** In this subset of patients with donor site morbidity, symptoms typically resolved before two year post-operatively. In patients with persistent symptoms, two patients had a "fair" knee score, but no "poor" results were reported. Percent infill of repair tissue and MOCART scores were lower for the symptomatic group overall, with lower scores in cartilage surface and subchondral ingrowth. Subscales of the MOCART score were higher in the asymptomatic group. Overall, the MRI findings of donor sites in AOT patients are worse when persistent knee pain is present two or more years post-operatively.

#### Notes:

9:49am–9:53am

## A Comparison Of Anatomic Versus Tubular Plating For Fibula Fractures

Justin Kane, MD  
Andrew Kay, BA  
Joseph N. Daniel, DO  
David I. Pedowitz, MD, MS  
Steven M. Raikin, MD  
James C. Krieg, MD

**Introduction:** Numerous implant designs exist for the treatment of fibula fractures. In-situ studies have failed to demonstrate a difference in strength between implants. Studies suggest that locking constructs may be beneficial in the setting of osteoporotic bone. However, a paucity of data exist assessing fixation of fibula fractures in healthy patients with non-osteoporotic bone. This study aims to assess whether there is a difference in quality of fracture reduction in the setting of SER-2 ankle fractures with either standard one-third tubular plating or anatomic plating.

**Methods:** A retrospective review of 201 patients treated for an SER-2 ankle fracture by four foot and ankle fellowship trained orthopaedic surgeons at a single tertiary care practice was undertaken. Office notes, operative reports, pre-operative imaging, and post-operative imaging were reviewed to collect patient demographics and assess the quality of reduction of the fibula. Quality of reduction was assessed established

radiographic parameters to determine whether an anatomic reduction was achieved.

**Results:** One-third tubular plating was used to treat 120 patients. 111 (92.5%) of these patients had an anatomic reduction of their fibula fracture. Anatomic plating was used to treat 81 patients. 74 (91.4%) of these patients had an anatomic reduction of their fibula fracture. No statistical significance existed between one-third tubular plates and anatomic plates in achieving anatomic reduction. Comparing the success rates of achieving an anatomic reduction for each plate design yielded no statistical significance.

**Discussion and Conclusion:** With the rising cost of health care, we must weigh the use of costlier implants and new innovations that may offer no significant benefit to patients while increasing the overall cost of treatment. Newer implant designs for distal fibular fractures may be beneficial in certain circumstances. However, in the treatment of SER-2 ankle fractures, no benefit was found comparing anatomic and one-third tubular plates in achieving anatomic reductions.

**Notes:**

9:54am–9:58am

## Total Ankle Arthroplasty Versus Arthrodesis: An Arc Of Motion Analysis

Justin Kane, MD  
Geoffrey Smith, BS  
Kristin Brown, BA  
Heather L. Saffel, BS, MS  
Steven M. Raikin, MD  
David I. Pedowitz, MD, MS

**Introduction:** Advancements in total ankle arthroplasty (TAA) have increased successful long term outcomes and, coupled with preservation of near normal joint kinematics; provide the theoretical benefit of protecting against progression of arthritis to adjacent joints. However, there are few reports offering comparison of midfoot range of motion with plantarflexion and dorsiflexion of the foot following TAA and

fusion. The purpose of our study was to assess changes in range of motion and functional outcomes following both treatment modalities.

**Methods:** Patients undergoing tibio-talar arthrodesis and TAA were enrolled as part of an ongoing prospective study. Overall arc of motion and midfoot arc of motion were assessed by anterioposterior, lateral, mortise, and flexion/extension radiographs. All patients completed Foot and Ankle Ability Measure (FAAM) ADL and Sports subscale forms and VAS pain scores.

**Results:** 35 patients who underwent TAA and 7 patients who underwent tibio-talar arthrodesis were available for follow-up. Average total arc of motion was 34.4 degrees (range 17.0–52.2) with average midfoot arc of 11.1 degrees (range 0.9–28.8) in the TAA cohort. Average total arc of motion was 22.9 degrees (range 6.9–32.4) with average midfoot arc of 21.6 degrees (range 8.3–41.4) motion in the arthrodesis cohort. Average VAS pain score was 3.8 (range 0–44) following TAA and 38.5 (range 0–87) following arthrodesis. Average FAAM ADL and Sports subscale scores were 84.8 (range 35.7–100.0) and 55.5 (range 15.6–100) and 66.3 (range 28.6–90.5) and 55.5 (range 15.6–100.0) for TAA and fusion, respectively.

**Discussion and Conclusion:** TAA offers superior results compared to fusion in regards to preserving normal arc of motion, pain relief, and post-operative function. The relative increase of midfoot arc compared to total arc seen in fusion patients may play a role in the inferior results compared to TAA and may predispose these patients to degenerative changes at adjacent joints to the fused tibiotalar joint.

**Notes:**

9:59am–10:03am

## **Anterolateral Tibial Trapezoidal Osteotomy For Accessing Osteochondral Lesions Of The Talus In Autologous Osteochondral Transplantation: Functional And T2 MRI Analysis**

Ethan J. Fraser, MD

\*Arianna Giannakos, BS

Charles P. Hannon, BS

Keir A. Ross, BS

Hunter Newman, HS

Timothy W. Deyer, MD

John. G. Kennedy, MD, FRCS (Orth)

**Background/Purpose:** Osteochondral lesions (OCL) of the talus are common injuries and have a poor propensity to heal. Outcomes of reparative procedures, including bone marrow stimulation, worsen with increased lesion size. Thus, replacement procedures such as autologous osteochondral transplantation (AOT) are often indicated for large, cystic lesions. The surgical approach to access the OCL depends on the location and size of the lesion. Although a medial malleolar osteotomy has been described as an approach for AOT of medial lesions, lateral lesions require a different approach. The purpose of this study is to report functional and MRI outcomes in a series of patients that underwent a novel approach for lateral OCL—the lateral tibial trapezoidal osteotomy.

**Methods:** Records of patients that underwent a lateral tibial trapezoidal osteotomy for AOT were retrospectively reviewed. Pre-and-postoperative FAOS scores and demographic data were recorded. Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) was used to assess morphologic state of tibial cartilage at the repair site of the osteotomy. Quantitative T2-mapping MRI was analyzed in 0.2mm<sup>2</sup> regions of interest in the superficial and deep cartilage layers of the repair site of the osteotomy and in adjacent normal cartilage to serve as control tissue.

**Results:** Seventeen patients at an average age of 36.9 years (range: 17-76) underwent a lateral tibial trapezoidal osteotomy with a mean follow-up of 54.7 months (range: 8-87). FAOS pain scores significantly improved from an average 39.22 (range: 14-66) out of 100 points preoperatively to 81.21 (range: 19-98) postoperatively ( $p=0.05$ ).

**Conclusion:** Although outcomes of surgical approaches to accessing medial lesions have been reported, there is a paucity

of data regarding access to lateral lesions. This study showed improved functional outcome scores after lateral tibial trapezoidal osteotomy. Quantitative T2 mapping relaxation values in both superficial and deep components of the repair tissue were similar, suggesting that the repair tissue at the site of osteotomy resembles normal, native cartilage.

### **Notes:**

10:04am–10:08am

## **Posterior Tibial Tendoscopy: Functional Outcomes And Comparison To Magnetic Resonance Imaging**

Ethan J. Fraser, MD

Arianna Giannakos, BS

Keir A. Ross, BS

Charles P. Hannon, BS

Gavin Duke, MD

Marcelo P. Prado, MD

John. G. Kennedy, MD, FRCS (Orth)

**Background:** Operative treatment of early tibialis posterior tendon (TPT) pathology historically required an open approach. Traditional open exposures have been a cause of concern as postoperative scarring may cause further stenosis and inflammation of the tendons. Comparison of tendoscopy and magnetic resonance imaging (MRI) for diagnosis and treatment of early TPT pathology has yet to be reported. The purpose of this study was to compare the diagnostic sensitivity of MRI and tendoscopy and to report quantitative functional outcomes of tibialis posterior tendoscopy.

**Methods:** Records and MRI of 12 patients that underwent tendoscopy of the TPT were retrospectively reviewed. Mean follow-up was. Preoperative MRI findings were available in ten patients and were compared to tendoscopic findings to assess the diagnostic agreement between each modality.. Functional outcomes were assessed using the Foot and Ankle Outcome Score (FAOS) and Short Form-12 (SF-12) General Health Questionnaire pre-and-postoperatively.

**Results:** Mean patient age was 51 years (range, 26 to 77). Mean duration of preoperative symptoms was 13.5 months (range, 2 to 30). Pathologies included tenosynovitis, tendinosis, tendonitis, stenosis, and partial thickness tear. Preoperative MRI findings were in agreement with tendoscopy findings in seven out of ten cases. Tendoscopy diagnosed and treated pathology that was missed on MRI in three of ten cases. Mean FAOS improved from a preoperative score of 56.25 to a postoperative score of 77. The mean SF-12 score improved from a preoperative score of 32.9 to a postoperative score of 50.25.

**Conclusions:** Although MRI is considered the preferred imaging technique for tendon pathology, tendoscopy may be a more sensitive diagnostic tool. Tendoscopy provides minimally invasive diagnosis of pathology at the time of surgery and can provide functional improvements in the short-term for early TPT pathology. Full extent of the benefits over traditional open surgery requires further study.

**Notes:**

cerns remain regarding iatrogenic injury to the patella-femoral joint. The SeMid technique merges the midvastus approach with the technical advantages of semi-extended tibial nailing.

**Methods:** IRB approved retrospective-prospective study. Inclusion criteria: (1) age 18-75; (2) tibial shaft fracture; and (3) treated by orthopedic trauma surgeon using the SeMid technique. At the one year follow up visit, patients were asked to complete SMFA and VAS surveys assessing knee pain. Range of motion and X-rays were also evaluated.

**Results:** Since 2011, 67 patients underwent the SeMid technique. Fourteen patients with 16 tibia shaft fractures (average age 43.5 years with 53.3 weeks of follow up) are analyzed. Average VAS pain rating was 1.40 ( $\pm 1.55$  SD; range 0-5). Six patients (43%) denied any knee pain. The SMFA resulted in low index scores and good functional outcomes: mean dysfunction score= 10.66 ( $\pm 7.04$  SD); mean bothersomeness score= 9.31 ( $\pm 6.39$  SD). Scores were particularly low for difficulty with mobility ( $18.65 \pm 14.51$  SD). Full range of motion (ROM) was achieved between 6 to 12 months post-operative, averaging -1.31 ( $\pm 2.77$  SD) to 137.5 ( $\pm 3.16$  SD). No significant iatrogenic damage to the patella-femoral cartilage was identified at arthrotomy closure. There were no infections or non-unions.

**Discussion and Conclusion:** Semi-extended tibial nailing using SeMid technique has shown promising early clinical results with respect to post-operative knee pain and function. At 1 year after surgery, patients reported minimal pain and low levels of dysfunction and bothersomeness. The SeMid technique allows the surgeon to benefit from the logistical and technical advantages of semi-extended tibial nailing without violating the patella-femoral cartilage, hopefully leading to less anterior knee pain and maintaining knee range of motion.

**Notes:**

Saturday, October 25, 2014

Rapid Fire Session 14B — Trauma  
(Station B, Plaza Ballroom 1)

Moderator: David S. Wellman, MD

9:39am–9:43am

## Semi-Extended Midvastus Tibial Nailing (The SeMid Technique)

Thomas H. Sanders, MD

\*Lolita Ramsay, RN, PhD

A. Stephen Malekzadeh, MD

Daniel Dziadosz, MD

Cary Schwartzbach, MD

**Introduction:** Anterior knee pain hinders recovery after intra-medullary nailing of the tibia. More orthopaedic surgeons are utilizing the semi-extended technique for tibial nailing. Con-

9:44am–9:48am

## Plate Versus Screw Fixation of Radial Neck Fractures: A Biomechanical Study

Christina J. Gutowski, MD, MPH

Asif Ilyas, MD

Kurosh Darvish, PhD

Christopher Jones, MD

**Hypothesis:** Fixation of non-committed radial neck fractures can be achieved with a plate and screw construct or with two obliquely-oriented screws. The hypothesis of this study was that the mechanical properties, specifically stiffness and load to failure, of these two fixation strategies are similar in a cadaver model.

**Methods:** Ten matched-pair cadaver arms were skeletonized and the radii were removed. X-ray and visual inspection were performed to ensure absence of preexisting trauma. DEXA scans were obtained to measure bone density. A transverse osteotomy was created at the neck of each radius, which was subsequently fixed: all right-sided radii were fixed with two oblique headless compression screws, and all left-sided radii were fixed with a plate and screws. The distal aspect of each radius was potted in polymethylmethacrylate bone cement. The radial head was loaded in cantilever bending in 4 different planes, 90 degrees apart and orthogonal to the radial shaft using an MTS machine. Stiffness and load to failure were recorded for each specimen.

**Results:** All ten radii were free of preexisting injury. The stiffness of both constructs was similar in all planes except for loading from medial to lateral (opposite of the plate) where the screw construct was 1.8 times stiffer. Ultimate failure occurred at 229N for the plate and 206N for the screws. Failure mode for the plate was plate bending while the screws failed by pullout and fracture.

**Discussion and Conclusion:** The two strategies provide similar strength and stiffness to transverse, non-committed fractures. While plate-and-screw constructs are more appropriate when there is bone loss or comminution, this study supports the utilization of two oblique screws in simple transverse neck fractures, especially since screw fixation requires less exposure and the hardware is buried and unobtrusive.

**Notes:**

9:49am–9:53am

## Higher Mortality And Length Of Stay After Hip Fracture In Chronic Renal Failure Patients

Antonia F. Chen, MD, MBA

Zachary D. Post, MD

Mitchell G. Maltenfort, PhD

Fabio R. Orozco, MD

Alvin C. Ong, MD

**Introduction:** Chronic renal failure (CRF) is associated with loss of bone mineral density and osteoporosis, which can lead to an increased risk of hip fracture. The purpose of this study was to evaluate if renal failure patients, with or without dialysis, are associated with a higher risk of complications after hip fracture.

**Methods:** The Nationwide Inpatient Sample (NIS) database was queried for patients with closed femoral neck fractures, as defined by ICD-9 code 820.08. Patients with CRF were identified in this group using the Elixhauser comorbidity set; because of changes in the CRF classification, we focused on the years 2007-2011 for consistency. This resulted in a total of 68,750 closed hip fracture patients, 7,906 of which were identified with CRF but not on dialysis and 1,148 patients with CRF who received dialysis in the hospital (CRFD). Age, gender, length of stay (LOS), in-hospital mortality, and all postoperative complications were evaluated. Statistical analysis was performed using multivariate logistic regression.

**Results:** Patients with CRF were more likely to develop sacral decubitus ulcers ( $p=0.001$ , OR 1.55, 95% CI 1.19-2.02) and require transfusion ( $p<0.001$ , OR 1.46, 95% CI 1.36-1.56) compared to those without CRF. CRFD patients had greater wound complications ( $p=0.02$ , OR 1.84, 95% CI 1.12-3.03), greater SSIs ( $p<0.001$ , OR 2.74, 95% CI 1.68-4.47), and more DVTs ( $p=0.03$ , OR 1.70, 95% CI 1.04-2.77) than those without CRF. In-hospital mortality was higher in CRF patients than those without CRF ( $p<0.001$ , OR 1.68, 95% CI 1.43-1.96) and higher still in CRFD patients ( $p<0.001$ , OR 5.10, 95% CI 3.83-6.80). Patients without CRF had shorter LOS while patients with CRFD had longer LOS regardless of surgical intervention.

**Discussion and Conclusion:** Hip fractures patients with CRF, especially those on dialysis, have higher morbidity, mortality, and LOS compared to patients without CRF. We recommend caution when managing this patient population as longer LOS

and increased complications are likely directly related to the increased mortality we found.

**Notes:**

9:54am–9:58am

## Orthopaedic Trauma In The Amish Community: Epidemiology And Hospital Charges

Louis C. Grandizio, DO

Michael Suk, MD, JD, MPH, FACS

Benjamin Wagner, BS

Jove Graham, PhD

Joel C. Klena, MD

**Introduction:** The Amish are an uninsured, conservative Christian religious group who live an agrarian lifestyle and are at risk for injuries from horse-drawn carriage accidents and farm related trauma. Little is known about the specific types of orthopaedic injuries they sustain and the hospital charges associated with their treatment. The purpose of this study is to define epidemiology of orthopaedic trauma in the Amish community and to analyze the hospital charges associated with their treatment.

**Methods:** 79 Amish patients who had been seen in our emergency department with a traumatic orthopaedic injury from 2006 through 2013 were identified. Data collection included demographics, injury complex and mechanism, Injury Severity Score (ISS), operative interventions and hospital charges. A retrospective cohort of 40 Old Order Anabaptist (Mennonite) patients with health insurance was included for comparison.

**Results:** For Amish patients, occupational injuries (52%) and buggy accidents (16%) accounted for the highest percentage of admissions. 87% sustained at least one fracture, most commonly of the hand and wrist (11%). Facial injuries were the most common associated injury (30%). 58% of Amish patients required operative intervention. Total hospital charges averaged \$58,031 per patient. Transportation related injuries had the highest hospital charges. 11% of patients had recom-

mendations for inpatient rehabilitation or skilled nursing facilities at time of discharge, yet all patients were discharged home. Amish and Mennonite groups were similar except for a higher percentage of males in the Mennonite group. Hospital charges did not differ based on insurance status.

**Discussion and Conclusion:** Amish patients are at risk for a variety of orthopaedic injuries related to agricultural accidents and their unique means of transportation. Hospital charges did not vary based on insurance status. Socio-religious beliefs must be taken into consideration when educating these patients regarding post-operative and post-injury care, as attendance at outpatient follow-up is low.

**Notes:**

9:59am–10:03am

## Unstable Metacarpal Fractures Treated with Intramedullary Nail Fixation

Ather Mirza, MD

\*Justin B. Mirza, DO

Shawn Adhya, BS

**Introduction:** Fractures of the metacarpals account for nearly 36% of all hand fractures. While many metacarpal fractures can be treated through nonsurgical means, unstable metacarpal fractures which are subject to malrotation, displacement, foreshortening and angulation require reduction and stable fixation. Flexible intramedullary nail (IMN) fixation of fractures has become the cornerstone of treatment of long bone fractures with the medullary cavity. It provides distinct advantages over other methods because it is minimally invasive with minimal soft tissue dissection, stability of fixation, and enhancing bone healing by preventing distraction of the fracture site. This is a particularly great option for patients presenting multiple metacarpal fractures. Our study evaluates outcomes in a case series of unstable metacarpal fractures treated with flexible intramedullary nail (IMN) fixation.

**Methods:** This study includes 55 cases of fractures healed by clinical and radiographic assessment at an average of 12.7 weeks. The outcomes were assessed via a radiological study

of longitudinal and angular collapse, and final functional outcome as measured by the Disabilities of the Arm, Shoulder and Hand (DASH), active wrist range of motion (AROM), and Grip and Pinch Strength tests.

**Results:** Pins were removed in all cases at an average of 13.9 weeks. Patients regained full finger range of motion at final follow-up and were capable of 72.4% of motion at two weeks post-operatively. Mean DASH score at final follow-up was 6.5. Complications included three cases of extensor tendon irritation that resolved without functional impairment and two cases of “backing out” that required reoperation to replace the pin. In one case, a bony exostosis formed on the affected metacarpal that led to tendon irritation and required operative excision.

**Conclusion:** We found that this technique allowed for stabilization of fractures, early range of motion with early resumption of usual activities, reduced immobilization, and minimal complications. A removable orthosis, instead of a cast, allowed for mobilization of the PIP joint.

#### Notes:

10:04am–10:08am

## Decreasing Incidence and Changing Treatment of Distal Radius Fractures Among Elderly Adults

Benjamin D. Streufert, BS

Jonathan A. Godin, MD, MBA

Robin N. Kamal, MD

Sendhilnathan Ramalingam, BS

R. Andrew Henderson, MD, MSc

Richard C. Mather III, MD

**Introduction:** Distal radius fracture (DRF) is the most common upper extremity fracture in the elderly population and a cause of significant morbidity. DRF has been linked to osteoporosis and to subsequent injury, including hip fracture. Several studies in the past two decades have described increases in absolute numbers and incidence of DRF across age groups, including the elderly, but neither recent trends of incidence

nor data on treatment in elderly adults in the US are available. It is not well known if recent emphasis on diagnosing and treating bone mineral density changes in elderly adults has impacted the incidence or treatment of DRF.

**Methods:** US Medicare enrollees who were diagnosed with distal radius fracture between 2005 and 2011 were identified by searching ICD-9 diagnosis codes in a comprehensive Medicare hospital claims dataset via the PearlDiver Database. Treatment of DRF was identified in a 5% Medicare Patient Sample using CPT codes for closed and open fixation. Rates of treatments were compared relative to each other for analysis. Additional procedures and diagnostic testing performed on patients before and after diagnosis of DRF were analyzed. Fractures were stratified according to patient demographics, and comorbidities within this population were examined.

**Results:** Incidence of DRF: Between 2005 and 2011, 571,384 patients diagnosed with DRF were identified in the Medicare population. Total numbers of DRF increased 6.70% from 83,512 in 2005 to 89,107 in 2011, but the incidence fell 7.17% from 19.65 to 18.24 per 10,000 person-years over the same period. The age group with the largest decrease in incidence was patients age 85 years and older, with a 22.93% decrease from 64.67 to 49.84 per 10,000 person-years. Incidence in females was higher than in males, and both groups had decreased incidence of DRF from 2005 to 2011. Incidence in the Northeastern US decreased 9.12% while increasing 4.33% in the Western US. In the year prior to DRF, a diagnosis of osteoporosis was present in 11.0% of patients, low vitamin D in 1.8%, and tobacco use in 4.7%. Dual-energy x-ray absorptiometry scan was performed in 6.73% in the year before DRF and 8.50% in the year after DRF. Treatment of DRF: In the 5% Medicare sample, 29,570 patients were treated with closed or open fixation for DRF from 2005 to 2011. Closed treatment represented 79.6% of the total treated, but the proportion treated with open fixation rose from 21.2% in 2007 to 29.4% in 2011. Trends in treatment of various fracture patterns were examined, as were regional and gender variation in treatment.

**Discussion and Conclusion:** Despite increases in absolute numbers of DRF from 2005 to 2011 in US elderly adults, the incidence of DRF has decreased over the same period. Treatment trends show increased open fixation in this population. While increasing emphasis on osteoporosis may be affecting trends in DRF in elderly adults, this decreasing incidence and changing surgical management deserve further investigation.

#### Notes:

**Saturday, October 25, 2014**

**Rapid Fire Session 14C — Spine**  
*(Station C, Ritz-Carlton Ballroom Foyer)*

**Moderator:** Scott D. Boden, MD

9:39am–9:43am

## **Can Orthopaedic Surgeons Be Trained To Accurately Gauge Tapping Insertional Torque?**

Daniel G. Kang, MD

\*Peter Formby, MD

LTC Ronald A. Lehman Jr., MD

CPT Adam J. Bevevino, MD

LT Scott C. Wagner, MD

LCDR Robert W. Tracey, MD

**Introduction:** Tapping insertional torque (IT) is a metric used to estimate pedicle screw size. Prior studies have shown that obtaining a tapping IT value of 2.5 in-lbs predicts optimal pedicle fill when selecting screw size intra-operatively. Aside from utilization of an intraoperative torque meter, there are currently no guides to assess tapping IT values. The purpose of this study was to determine if surgeons at all levels (intern to attending) could be trained to assess torque by “feel” to obviate the need for intra-operative gauges.

**Methods:** Ten surgeons at our institution at different levels of training (attending, senior resident, and junior resident) underwent a 30-repetition round of torque training with three separate tap sizes (4.5, 5.5, 6.5mm), followed by a round of testing. Each participant subsequently performed two additional rounds of testing spaced 1-week apart. Testing was performed utilizing polyurethane foam blocks at a density of 10 pounds/ft<sup>3</sup> (pcf), which most closely resembled cancellous bone based on our pilot test. Torque values were recorded utilizing a digital torque gauge meter. Data were then analyzed with an ANOVA test with a post hoc comparison of means for any significant differences.

**Results:** We found no significant difference ( $p$  greater than 0.05) between each training level and our “perfect” model. We also found that there was no significant difference between rounds of testing for all participants ( $p > 0.05$ ). Additionally, there was no significant difference between the standard deviations measured between rounds ( $p$  greater than 0.05).

We determined that junior level residents were not as accurate as either the senior level residents ( $p$  less than 0.05) or the attending surgeons ( $p$  less than 0.05), but there was no difference noted between junior residents and the “perfect” model ( $p$  greater than 0.05).

**Conclusion:** Our data suggest that surgeons at all levels of training can be taught to accurately gauge 2.5 in-lbs of tapping insertional torque, and that this skill does not regress with subsequent testing at 1-week intervals. Therefore, Resident and Staff surgeons can be easily trained to assess intraoperative IT which obviates the need for an IT screw driver in the operating room.

**Notes:**

9:44am–9:48am

## **Functional Outcomes Reporting In An Annual Meeting Over Three Years**

Kristin McPhillips, MD, MPH

Hemil H. Maniar, MD

Michael Suk, MD, JD, MPH, FACS

Daniel S. Horwitz, MD

**Introduction:** There is an increasing focus in orthopaedic trauma on measuring outcomes using validated functional outcomes instruments. Recent work published in the Journal of Orthopaedic Trauma showed a lack of validated outcome measures in papers over a five year period. This study examines the utilization rate, strength and validity of outcomes instruments used in papers accepted for presentation at the Orthopaedic Trauma Association (OTA) annual meeting from 2011 through 2013.

**Methods:** We reviewed the papers presented at the OTA annual meeting in 2011, 2012, and 2013. Papers that were not eligible to use functional outcomes measures (biomechanics, animal studies, and basic science) were excluded. Articles meeting the inclusion criteria were reviewed for the use of functional outcomes instruments. The total number of instruments used was recorded and each instrument was assigned to one of three categories (generic, validated, and nonvalidated)

based on the AO handbook of Musculoskeletal Outcomes Measures and Instruments. Additionally, valid functional outcome instruments were examined to determine whether the instrument was validated within the category of use.

**Results:** Of 266 abstracts submitted, 102(38%) of the articles reviewed met the inclusion criteria; of those 63 (61%) reported at least one functional outcome instrument. A total of 119 functional outcome instruments were reported; 46 (38%) were generic, 19 (16%) were nonvalidated, 54 (45%) were validated and 11 (9%) were validated within the category of interest.

**Discussion and Conclusion:** Submissions to the 2011, 2012, and 2013 OTA annual meeting had a 61% utilization rate of functional outcomes instruments; about half of the instruments used were either generic or nonvalidated and very few were validated within the category of use. Measuring outcomes using instruments that are supported by evidence is an important step in improving outcomes—future efforts should be directed toward validating anatomically appropriate outcome measures in orthopaedic trauma patients.

#### Notes:

9:49am–9:53am

### Sonication For Detection Of Infection In ‘Aseptic’ Nonunion

Hemil H. Maniar, MD  
Nathaniel C. H. Wingert, MD  
Kristin McPhillips, MD, MPH  
Michael A. Foltzer, MD  
Thomas Bowen, MD  
Daniel S. Horwitz, MD

**Introduction:** In recent years, sonication technology has identified subclinical infection as a cause of certain otherwise unexplained orthopaedic treatment failures. Clinically silent hardware infection is a possible cause for a subset of patients with ‘aseptic’ nonunion. Sonication has not previously been studied in this setting.

**Methods:** A total of 42 consecutive patients with aseptic nonunion after osteosynthesis were treated at a single medical center from September 2010 to May 2013. All patients were judged by the attending surgeon to manifest no clinical or laboratory signs of infection. During this time period, sonication cultures were performed for all explanted orthopaedic hardware. Sonication culture results were retrospectively reviewed in a consecutive series of patients undergoing hardware removal for a diagnosis of aseptic nonunion. Sonication results were considered positive for culture growth equal to or greater than 20 CFU (colony forming units) per plate.

**Results:** Among 42 patients consecutively treated for aseptic nonunion, all 42 demonstrated negative sonication culture results (100.0%). Twenty six patients demonstrated no growth (61.9%) and 16 patients demonstrated growth less than 20 CFU per plate (38.1). No patients demonstrated persistent deep infection post-operatively.

**Discussion and Conclusion:** In this series, sonication did not demonstrate any cases of subclinical implant associated infection among patients with clinically aseptic nonunion. Sonication does not appear to have a role in the evaluation or treatment of aseptic nonunion.

#### Notes:

9:54am–9:58am

### Sacral Screw Strain In A Long Posterior Spinal Fusion Construct With Sacral Alar-Iliac (S2AI) Versus Iliac Fixation

Daniel G. Kang, MD  
\*LT Scott C. Wagner, MD  
LTC Ronald A. Lehman Jr., MD  
LCDR Robert W. Tracey, MD  
Rachel E. Gaume, BS  
Khaled M. Kebaish, MD  
Lawrence G. Lenke, MD

**Introduction:** Long instrumented posterior fusion constructs to the lumbosacral spine have a significant rate of pseudoarthrosis and S1 screw failure. With the increasing popularity of

Sacral Alar-Iliac (S2AI) fixation with its purported advantages of 1) decreased implant profile and 2) obviating the need for a lateral offset connector, the biomechanical properties with respect to S1 screw strain remain unknown. We set out to compare the biomechanical effect of S2AI versus traditional iliac screw fixation on S1 screw strain.

**Methods:** Five fresh-frozen human cadaveric specimens were instrumented from L2-pelvis, maintaining all osteoligamentous structures, with bilateral titanium 6.0x40-mm pedicle screws and 5.5-mm cobalt-chromium rods. Bilateral S1 pedicles were instrumented with 8.0x50-mm screws that were centrally cored out and two uniaxial strain gauges inserted at 0 degrees and 90 degrees. S2AI and/or Iliac fixation with 8.0x80-mm titanium pedicle screws was performed to evaluate four different constructs: (1) Bilateral S1 Screws (control); (2) Bilateral S2AI; (3) Bilateral Iliac; (4) Hybrid (S2AI with contralateral Iliac). Bilateral S1 screw strain was measured (microstrain), and pure moment loads (12.0 Nm) were applied in axial rotation (AR), flexion-extension (FE) and lateral bending (LB). One way repeated measure ANOVA was used to analyze the S1 screw strain data.

**Results:** Compared to S1 screws alone, both S2AI and Iliac fixation significantly reduced sacral screw strain in FE by 58% and 67%, respectively (p less than 0.05), in AR by 35% and 41%, respectively (p less than 0.05), while no significant difference in LB for either construct (p greater than 0.05). Hybrid constructs demonstrated a significant reduction in only FE, with reduction in screw strain by 56% for S2AI and 59% for Iliac fixation, with no difference in AR and LB moments. When S2AI and Iliac fixation were compared, there was no significant difference in screw strain for all bending moments (p greater than 0.05). Similarly, hybrid constructs demonstrated no side-to-side significant difference between S2AI and Iliac fixation for all bending moments (p greater than 0.05).

**Conclusions:** Both S2AI and Iliac fixation provide significant reduction in S1 sacral screw strain compared to sacral fixation alone. Bilateral S2AI fixation is a viable and biomechanically comparable alternative to traditional Iliac fixation, and presents another option to achieve protection of the S1 sacral screws for long segment constructs to the pelvis.

#### Notes:

9:59am–10:03am

## Operative Treatment Of New Onset Radiculopathy And Myelopathy Secondary To Combat Injury

Gregory S. Van Blarcum, MD

LT Scott C. Wagner, MD

Daniel G. Kang, MD

LTC Ronald A. Lehman Jr., MD

**Introduction:** Several recent studies have examined the rates of combat-related spinal injury sustained in Operations Enduring (OEF) and Iraqi Freedom (OIF) using joint trauma registries. We set out to describe combat-related spine trauma over a 10-year period at three high-volume military treatment facilities, and thereby determine the frequency of new onset myelopathy and radiculopathy secondary to combat injuries.

**Methods:** We performed a retrospective analysis of a surgical database at three military institutions. Patients undergoing spine surgery following a combat-related injury in Operations Enduring and/or Iraqi Freedom between July 2003 and July 2013 were evaluated. Inclusion criteria consisted of: evidence of myelopathic or radicular symptoms requiring operative treatment following documented trauma.

**Results:** 105 patients with combat-related (OIF/OEF) spine trauma requiring operative intervention were identified. 15 patients had radiculopathy or myelopathy as their primary complaint after injury. The average age was 39 years, with 80% injured in Iraq and 20% in Afghanistan. The most common mechanism of injury was mounted improvised explosive device (IED, 33%). All patients were diagnosed with herniated nucleus pulposus (HNP). The cervical spine was most commonly involved (53%), followed by lumbar (40%), and one patient has a thoracic HNP. Average time from injury to index surgery was 21.9 months. C5-C6 was the most commonly treated level (75% of cervical), and L5-S1 was the second most common (83% of lumbar). 53% of patients had continued symptoms following surgery, and two had at least one revision surgery. Two patients were medically retired.

**Conclusion:** To our knowledge, this is the largest study evaluating the treatment of traumatic myelopathy or radiculopathy following combat-related trauma. Spinal symptoms are a significant source of disability in the military, even in patients sustaining combat-related injuries, and further studies are needed to elucidate the impact these disorders have on military readiness/preparedness.

**Notes:**

10:04am–10:08am

## A Normative Baseline For The SRS-22 From Over 1000 Healthy Adolescents In South East Asia: Which Demographic Factors Affect Outcome?

Kushagra Verma, MD, MS

Senthil T. Nathan, MD

Yuan Ren, PhD, MS

Baron Lonner, MD

Suken A. Shah, MD

**Introduction:** Previous studies have established a baseline for the SRS-22 in the US and described the impact of patient demographics. While the SRS-22 is used internationally, limited normative data is available. This study aims to: 1) establish a baseline for the SRS-22 in SE Asia and 2) evaluate the influence of patient demographics on the SRS-22.

**Methods:** This is a prospective observational study utilizing the SRS-22 in SE Asia. After approval from the local hospital and school board, 1200 adolescents (age 10-18) were asked to anonymously complete the SRS-22 in English. The following demographic factors were assessed: height, weight, age, gender, household income (range <\$30K to >\$200K) and household status (single/dual parent income). Participants with a prior spine history or active medical problems were excluded. Statistical analysis was done with a Pearson's correlation followed by an ANOVA.

**Results:** 1019 unaffected adolescents completed the SRS-22 (mean age  $14.4 \pm 1.6$ ). Demographics as follows: gender (42%F, 58%M), household status (640 single/379 dual), height ( $157 \pm 12$ cm), weight ( $46 \pm 11.2$  kg), BMI ( $18.5 \pm 3.6$ ). SRS-22 score for all patients and by gender: Mean ( $4.0 \pm 0.4$ , F $4.0 \pm 0.4$ , M $3.9 \pm 0.4$ ,  $p < 0.0001$ ), Activity ( $3.9 \pm 0.4$ , F $4.0 \pm 0.5$ , M $3.9 \pm 0.6$ ), Pain ( $4.3 \pm 0.6$ ; F $4.4 \pm 0.6$ , M $4.2 \pm 0.7$ ,  $p < 0.001$ ), Image ( $3.9 \pm 0.6$ , F $3.9 \pm 0.6$ , M $3.9 \pm 0.6$ ), and Mental ( $3.7 \pm 0.6$ , F $3.8 \pm 0.6$ , M $3.7 \pm 0.6$ ,  $p < 0.001$ ). Male gender was associated with worse pain (-0.15), mental health (-0.11), and overall SRS-22 score (-0.11). Age was correlated

with a worse image ( $r = -0.17$ ,  $p = <0.000$ ), while higher BMI was associated with less pain (0.07/0.02).

**Conclusion:** Younger age, female gender, and higher BMI correlated with a better SRS-22 score. Income and household status did not affect SRS-22. These findings are in contrast to data gathered in the United States. This study establishes the first normative baseline for the SRS-22 in SE Asia and analyzed the effect of demographics on the outcome score.

**Notes:**

Saturday, October 25, 2014

Rapid Fire Session 14D — Total Hip Reconstruction  
(Station D, Ritz-Carlton Ballroom Foyer)

Moderator: David W. Romness, MD

9:39am–9:43am

## Analyzing CMS Radiographic Criteria For THA: Significant Outliers

Yevgeniy Korshunov, MD

John W. Stirton, MD

Jonathan Robinson, MD

Parthiv A. Rathod, MD

H. John Cooper, MD

Jose A. Rodriuez, MD

**Introduction:** Total joint replacement is an elective surgical procedure with good outcomes, but is associated with significant expenses to the healthcare system. In an attempt to contain costs, Center for Medicare and Medicaid Services (CMS) proposed sets of objective clinical and radiographic criteria for total hip (THA) and knee arthroplasty (TKA). To be eligible for THA, a patient must meet 2 out of 5 radiographic criteria. In our study we evaluated patients who underwent primary THA and did not meet CMS radiographic criteria.

**Materials and Methods:** In this retrospective case series we reviewed preoperative radiographs for all patients who had undergone primary THA performed over a 2 year period by

a single surgeon. All radiographs were graded based on CMS criteria. We identified all cases that met less than 2 of 5 criteria, and analyzed them for the following data points: age, gender, diagnosis, length of follow-up, MRI, need for injection, arthroscopy, reoperation, pre- and post-operative Harris Hip Scores, and overall outcome.

**Results:** 249 cases were included in the study. There were 11 cases with fewer than 2 of 5 CMS radiographic criteria. Minimum follow-up was 1 year, with average follow-up 25 months. Of the 11 THAs 9 were performed for dysplasia, 1 for osteoarthritis, and 1 for avascular necrosis. Nine clinical outcomes were rated as excellent, one as good and one as poor.

**Conclusion:** The results of this study suggest that the current CMS preoperative radiographic criteria may exclude patients who would otherwise receive significant benefit from the procedure. The goal of optimizing utilization is not simply to decrease the number of procedures being performed, but to eliminate the unnecessary procedures. Orthopaedic surgeons need to play an active role in defining the appropriate use of criteria for various procedures including primary THA.

**Notes:**

ing surgery. Statistical analyses were conducted to examine the effect of premorbid pain and other patient characteristics on outcomes (WOMAC, SF-36, and QWB-7). A high pain ( $n = 248$ ) and low pain ( $n = 267$ ) group were determined by a median split of preintervention WOMAC pain scores. Stepwise regression analysis was used to determine whether presurgical WOMAC pain scores predicted follow-up WOMAC function scores when controlling for key demographic and clinical variables. A p-value of less than 0.001 was considered significant.

**Results:** After surgery, subjects with very high presurgical pain levels had significantly worse outcomes than those with lower pain levels as measured by QWB-7, SF-36 Bodily Pain, SF-36 Physical Functioning, WOMAC Pain, and WOMAC Stiffness scores. Stepwise regression analyses found that age at follow-up, time since procedure, and baseline WOMAC pain scores significantly predicted follow-up WOMAC function scores. The preintervention WOMAC pain score was the strongest predictor of outcome.

**Discussion and Conclusion:** Preintervention pain significantly influences patient-reported outcomes after TJA. Our data suggests that waiting until a patient experiences extreme levels of pain before operating will lead to worse outcomes.

**Notes:**

9:44am–9:48am

## Appropriate Use Criteria And Local Carrier Determinations: Are We Hurting Our TJA Patients?

Carlos J. Lavernia, MD  
Jesus M. Villa, MD  
David A. Iacobelli, MD

**Introduction:** Pain is an important indication for arthroplasty surgery. Insurance companies and in particular Medicare are refusing to pay for a procedure until the pain level is very severe. Our objective was to assess the effects of the presurgical pain level in arthroplasty patients on the outcomes of TJA.

**Methods:** A consecutive series of 640 TJA patients were interviewed prior to surgery and at minimum 2-years follow-

9:49am–9:53am

## Resident Education And Physician Assistants In Joint Replacement Surgery: Costs And Outcomes

Jesus M. Villa, MD  
Carlos J. Lavernia, MD

**Introduction:** Physician Assistants (PA-C) are assuming an increasingly important role in the practice of medicine. Previous reports in general surgery, trauma, and intensive care units have evaluated the possible effects of using PA-Cs on hospital costs or patient outcomes. However, little information is available on this regard in the arthroplasty setting. Therefore, our objective was to evaluate in a teaching institution the

effects that the use of a PA-C instead of orthopedic residents could have on hospital LOS, hospital costs, and postoperative patient perceived outcomes (PPOs).

**Methods:** During a period of one year, 248 consecutive patients underwent total hip/knee replacements by a single surgeon in a single institution; 200 patients were finally included for statistical analyses. Residents took care of patients (n=89) in the first half of the year while the PA-C did (n=111) on the second half. Patients were retrospectively studied. Outcomes studied included hospital length of stay, costs (fixed and variable), QWB-7, SF-36, and the WOMAC.

**Results:** Regarding LOS and hospital costs (for all procedures combined), the mean LOS was significantly shorter (5.1 vs. 7.0 days; p less than 0.001) and the mean total cost was significantly lower (\$13,901 +/- \$5,733 [SD] vs. \$15,470 +/- \$6,016 [SD]; p less than 0.05) in patients who received care from the PA-C versus those who received it from residents. Postoperatively, PPOs were not significantly different.

**Discussion and Conclusion:** Increasing the utilization of PA-Cs in orthopedic surgical practices may mitigate the growing costs of arthroplasty surgery and relieve working hour resident shortages without adversely affecting hospital resources or patient outcomes.

#### Notes:

9:54am–9:58am

## Sex And Quality Of Life In Patients Undergoing THA

Jesus M. Villa, MD  
Carlos J. Lavernia, MD  
David A. Iacobelli, MD

**Introduction:** Being active sexually has been associated with a high quality of life (QoL). Hip arthritis significantly affects the ability of patients to have sex. Our objectives were to study the relationships between limitations in sexual activity due to hip arthritis and QoL and to determine the postoperative effects of THA on both.

**Methods:** 159 consecutive patients who underwent unilateral primary THA due to osteoarthritis were studied. We divided them into two groups (with or without sexual limitations). Patient characteristics evaluated included age, gender, race, ethnicity, marital status, education level, and religion. Pre-operative and postoperative Pain intensity/frequency VAS, QWB-7, SF-36, WOMAC, Harris and Merle-D'Aubigné-Postel scores were compared between groups after adjustments. Mean age was 65 years (45% females). Chi-Square, t-tests, and MANCOVA were used.

**Results:** Hip arthritis caused a significant interference in the sexual life of 82% of patients in this series. 96% of females reported limitations while only 72% of males did. Preoperatively, patients with limitations had a mean pain intensity (VAS) of 8 while patients without limitations had 6. The same pattern was observed regarding the frequency of pain (8 vs. 6, respectively). The QWB-7 Total (0.522 vs. 0.569), SF-36 physical function (19 vs. 44), SF-36 social function (44 vs. 67), SF-36 physical component summary (27 vs. 35), WOMAC total (54 vs. 37), Harris (47 vs. 63) and Merle-D'Aubigné-Postel (11.1 vs. 13.5) scores were significantly different. Postoperatively, all significant differences disappeared with the exception of the SF-36 physical function scores (51 vs. 67).

**Discussion and Conclusion:** Our data suggests that the hip plays a key role in the sex lives of patients. Sexual activity seems to be a key component of the overall QoL among patients undergoing THA. Any limitation in sexual activity due to hip arthritis should be seriously considered as a prime indication for THA.

#### Notes:

9:59am–10:03am

## Short Term Complications After Revision Hip Arthroplasty With A Modular Dual Mobility (MDM) Prosthesis

Geoffrey H. Westrich, MD

Erik Schnaser, MD

Mathias P. G. Bostrom, MD

**Introduction:** Dual mobility constructs have been used in Europe for several years. Due to their large jump distance and perceived enhanced stability, there has been significant interest in using these devices in a revision setting. Providing the ability to stabilize the cup with screws, the modular dual mobility (MDM) cup offers the benefit of providing enhanced cup fixation with the perceived benefits of enhanced stability. These devices recently were approved in the United States and there is a paucity of information regarding their success in the revision setting.

**Objectives:** The main purpose of this study is to evaluate the short term complications associated with the modular dual mobility (MDM) prosthesis used for revision total hip arthroplasty at a single institution.

**Methods:** We conducted a retrospective review of all revision procedures done at our institution using the MDM device (Stryker Orthopaedics). Our hospital billing database was queried to identify all MDM devices implanted. From this list, all revision hip procedures were identified including liner and femoral head exchange, complete acetabular revision plus head exchange, liner exchange with complete femoral revision, and complete both component revisions. Difficult total hip procedures such as fusion take downs, excision of heterotopic ossification, and hip fracture conversions with existing hardware were also included. All inpatient and outpatient records were reviewed and complications related to the prostheses were identified. All surgeries were performed by surgeons who were fellowship trained in adult reconstruction.

**Results:** Our institution began using MDM prosthesis in 2011. We identified 134 MDM prostheses used between 2011-2013. 11 (8.2%) patients required further surgery after revision. The most common indication for further surgery was recurrent instability (n=5, 3.7%), infection (n=3, 2.2%), acetabular failure (n=2, 1.4%), and facial dehiscence (n=1, 0.07%). The average follow up was 7.7 months (range 0-30). The most common reason for revision was instability (n=56). Two (3.5%) of the 56 patients who had pre revision instabil-

ity had postoperative instability and required further surgery. 3 of the dislocations occurred in patients who had both the acetabular and femoral component revised, 1 occurred in a patient who had a heterotopic ossification excision, and 1 had an acetabular revision and head exchange only. 1 patient who dislocated post operatively had a sciatic nerve palsy.

**Conclusions:** The MDM prosthesis appears to have an acceptable short-term complication profile following revision total hip arthroplasty. When used in the setting of recurrent instability, the failure rate was observed to be very low (3.5%) compared to historical controls. These devices will need to be further monitored for long-term issues that may arise.

### Notes:

10:04am–10:08am

## Hypotension Following Total Joint Arthroplasty Is Common And Inconsequential

T. David Tarity, MD

\*Ronald Huang, MD

Michael M. Vosbikian, MD

Kirsten A. Ross, BS

Jeffrey Muenzer, BS

James J. Purtill, MD

**Introduction:** Hypotension is commonly encountered in the postoperative total joint arthroplasty (TJA) patient and may complicate recovery. The purpose of this study was to evaluate the incidence and risk factors of postoperative hypotension following TJA. Further we investigated the implications of hypotension on patient mobilization, the development of associated complications and discharge from hospitalization.

**Methods:** One hundred consecutive primary and revision TJA cases performed at a single institution between July 2012 and August 2012 were retrospectively reviewed. Demographics, comorbidities, antihypertensive medications, laboratory results, perioperative vital signs, and postoperative complica-

tions were recorded for each patient. Hypotension defined as a greater than 20 point drop in systolic blood pressure during postural changes or preoperative to the postoperative course or absolute systolic blood pressure less than 90 mmHg was recorded. Multivariate logistic regression analysis was utilized. Complication rates and length of stay were compared between patients with and without postoperative hypotension.

**Results:** Fifty-one patients met our definition of postoperative hypotension however, this dissipated over time; 37% post-operative day (POD) 1, 25% of patients on POD 2 and only 2% on POD 3. There were 53 females and 47 males with a mean age of 62.7 years at the time of surgery. Increased blood pressure at patients' pre-admission testing and lower postoperative systolic BP in the PACU were independent predictors of postoperative hypotension. Cardiac comorbidities and preoperative medications were not predictors of postoperative hypotension. Transfusion rate was higher in patients with postoperative hypotension. No significant difference in length of stay or delay in physical therapy was observed.

**Discussion and Conclusion:** Prolonged hypotension was infrequent and not associated with cardiac or significant postoperative complications. Patients with poorly controlled hypertension are most at risk. Proper identification and management of these "at risk" patients may decrease the rate of unnecessary postoperative blood transfusion administration.

#### Notes:

Saturday, October 25, 2014

Rapid Fire Session 14E — Hand  
(Station E, Ritz-Carlton Ballroom Foyer)

Moderator: David S. Zelouf, MD

9:39am–9:43am

### Reduction Loss After Distal Radius Fracture Fixation With Various Volar Plates

Michael M. Vosbikian, MD  
Constantinos Ketonis, MD, PhD  
James A. Costanzo, MD  
Joseph Dwyer, MD  
Genghis E. Niver, MD  
Dominic J. Mintalucci, MD  
Christopher Jones, MD  
Mark Wang, MD, PhD  
Mitchell G. Maltenfort, PhD  
Asif Ilyas, MD

**Introduction:** Distal radius fractures are common injuries and successful outcomes hinge upon achieving and maintaining fracture reduction. Today, a surgeon has multiple volar plate options when surgery is selected, but limited data exists as to their ability to maintain fracture reduction. The goal of this study was to review consecutive operatively treated distal radius fractures with various volar locking plates in order to determine their ability to maintain reduction.

**Methods:** A retrospective review of 127 patients who had undergone volar plate fixation(including plate from "Company A", plate from "Company B", plate from "Company C", Plate from "Company D", and plate from "Company E"), between 2009-2012, with post-operative radiographs available at both day 0 and a final radiograph taken at a minimum of 1 year.

**Results:** The three parameters that were found to significantly change from initial to final radiographs were radial height (decreased  $-1.01\text{mm} \pm 0.12$ ), ulnar variance (increased  $0.302\text{mm} \pm 0.07495$ ), and volar tilt (decreased  $-2.03^\circ \pm 0.20$ ). Among these, only volar tilt demonstrated significant differences between implant brands. Among the variable-angle locking plates, "Company C" had the greatest loss of volar tilt at an average of  $3.82^\circ$ , while the "Company E" plates had the least loss of volar tilt at  $0.84^\circ$ .

**Discussion/Conclusion:** Loss of some aspect of fracture reduction was routinely observed following volar plating. Loss of volar tilt showed significant variability when compared between implant manufacturers. “Company B” and “Company E” maintained volar tilt significantly better than the “Company A,” “Company C,” and “Company D” implants. Ulnar variance and radial height changed significantly over time but did not show a significant difference between the various implants. Radial inclination and articular step-off did not change significantly over time or between the various implants. Consider variability exists between volar plates in their ability to maintain fracture reduction, particularly volar tilt. Surgeons should consider these findings when selecting a volar plate.

**Notes:**

9:45am–9:49am

## Restoring Isometry in Lateral Ulnar Collateral Ligament Reconstruction

Jonathan W. Shearin, MD

Michael J. Alaia, MD

Steven J. Lee, MD

**Introduction:** Posterolateral rotatory instability (PLRI) of the elbow is an often-missed diagnosis when evaluating patients with elbow pain or instability. Reconstruction of the lateral ulnar collateral ligament (LUCL) typically restores stability and improves pain. Creating an isometric reconstruction would provide stability without limiting range of motion or putting excessive force on the tendon graft. However, restoration of isometry may be difficult, and there is no consensus regarding proper placement of bone tunnels to produce isometry. We hypothesize that by placing the humeral attachment of the LUCL at the center of rotation (COR) on the humerus will provide the most isometric reconstruction.

**Methods:** Thirteen cadavers from mid-humerus to the hand were analyzed. In all specimens the soft tissue and common extensor origin were removed leaving only the lateral ligamentous complex. The morphology of the ligament complex was assessed and anatomic measurements were taken. The

COR on the humerus was then found using radiographic parameters. 7 points on the humerus located at and around the COR and three points paralleling the supinator crest of the ulna were chosen and the distances from these points were then calculated using a digital caliper at 0,30,60,90, and 130 degrees of flexion. Differences in potential ligamentous lengths (“graft elongation”) were calculated and statistical analysis performed using a 3x7 repeated measures analysis of variance with Bonferroni corrections for pairwise comparisons.

**Results:** The mean age of the specimens was 65.8 +/- 11.2 yr. The average length of the lateral ligamentous insertion onto the ulna was 17.2 +/- 4.1 mm. There was no perfectly isometric point along the humerus or ulna. However, in 13/13 specimens, the COR was the most isometric point for the humeral reconstruction site with an average graft elongation of 1.14 mm. Differences in humeral tunnel position dramatically affected graft elongation at all 3 ulnar points ( $P<.0001$ ). The most an isometric point was that of the humeral location posterior to the center of rotation with a mean graft elongation of 5.1 +/- 0.07 mm. Mean difference in elongation between the least and most isometric point was 4.28 +/- 0.53mm ( $P<0.0001$ ). Overall the ulnar position had minimal effect on graft elongation ( $P = 0.05$ ), with mean differences between ulnar positions all less than 1mm regardless of statistical significance.

**Conclusion:** Although no perfectly isometric points were found, the humeral center of rotation consistently reproduced the most isometry when assessing graft elongation over range of motion. Differences in ulnar tunnel placement did not result in significant changes in graft elongation. This data will assist surgeons in proper tunnel placement in LUCL reconstruction. Humeral tunnels placed at the center of rotation will optimize graft isometry. Placement of ulnar tunnels are less critical and lack a single, optimal isometric point along the ulna, supporting the use of double or.

**Notes:**

9:51am–9:55am

## Locking Shaft Screws Not Necessary in Volar Plate Fixation

Kevin Lutsky, MD

\*C. Edward Hoffler II, MD, PhD

Jonas Matzon, MD

**Introduction:** Volar plate fixation is a common method of treatment for distal radius fractures. Many implants are designed such that there is the option to use locking screws in the shaft portion of the plate. One indication for the use of locking plates is poor bone quality, and there is a high incidence of low bone mineral density in patients who sustain distal radius fractures. The indications for the use of locking shaft screws is not well defined. Our hypothesis is that the routine use of locking screws in the shaft portion of volar plates is not required to maintain reduction or to prevent hardware failure.

**Methods:** A retrospective review was performed of all patients over age 50 over a 2 year period who underwent volar plate fixation using an implant with non-locking shaft screws for a distal radius fracture. Patients were permitted to perform early range of motion exercises. Radiographs were examined and measurements obtained to assess maintenance of reduction and incidence of hardware failure. Patients were excluded from analysis if locking shaft screws were utilized or if follow-up was inadequate.

**Results:** There were 47 patients who met the inclusion criteria. The average age was 62 years (range: 50-79 yo). There were 33 men and 14 women. The average length of followup was 24.4 weeks. The implant used incorporates 3.5 mm shaft screws in 39 patients, and 2.4 mm shaft screws 18 patients. All patients healed within acceptable radiographic parameters (mean volar tilt = 5.4°, mean radial inclination = 21.5°, mean radial height = 11.5°). There were no instances of hardware failure.

**Discussion and Conclusion:** Distal radius fractures frequently occur in patients with low bone mineral density. Non-locking, bicortically placed shaft screws provide adequate stability to allow for early range of motion without loss of reduction or hardware failure. The routine use of locking screws in the shaft portion of volar plates does not appear justified.

**Notes:**

9:57am–10:01am

## Fingertip Amputation Treatment: A Survey Study

Andrew Miller, MD

\*Eric M. Padegimas, MD

Michael Rivlin, MD

Jack Abboudi, MD

William Kirkpatrick, MD

Christopher Jones, MD

**Introduction:** Distal fingertip amputations are common injuries in both work and non-work related accidents. Treatment options range from simplistic, such as wound care, to more involved interventions including flaps and replantations, all with reported good overall outcomes. Treatment of long fingertip amputations vary according to surgeon demographic factors such as country of origin, years of experience, institution type and training background.

**Methods:** A 16 question survey was sent to the members of the American Association for Surgery of the Hand, as well as selected international hand societies. The survey was comprised of 6 demographic questions, 5 clinical scenarios with various level long fingertip amputations, and 5 treatment preference questions. Logistic regressions were used to estimate adjusted odds ratios for treatment choices controlling for all predictors.

**Results:** A total of 199 hand surgeons, 62% from the US and 38% international, responded to the survey. For each clinical scenario (Allen level 2, 3, 4, and volar oblique amputation) there was a wide variation of treatment preferences. Wound care was less likely performed by surgeons with greater than 30 years of experience or plastic surgery backgrounds. Replantation was more commonly performed internationally and by academic practice surgeons. Skeletal shortening with closure was more likely to be performed by hand with fewer than five years of experience compared to other demographics.

**Discussion/Conclusion:** For all levels and orientation of fingertip amputation queried, there is a wide range of treatment preferences among hand surgeons. Differences in treatment principles vary according to practice demographics and training background. However, clinical decision making is likely anecdotal in part given the limited amount of comparative

research. The survey highlights the need for a prospective randomized trial to determine the most effective treatments for distal fingertip amputations.

**Notes:**

10:03am–10:07am

## Radiation Exposure To The Eye With Mini C-Arm Use During Hand Surgery

C. Edward Hoffler II, MD, PhD

Mark Wang, MD, PhD

Frederick Liss, MD

Asif Ilyas, MD

Charles S. Leinberry, MD

Pedro K. Beredjiklian, MD

**Introduction:** Fluoroscopic radiation exposure is a potential occupational health risk to the Hand Surgeon, given operator proximity and the relative lack of eye shielding. At present, the amount of radiation exposure to the eye, associated with the routine use of mini C-arm fluoroscopy is unknown. The association of eye radiation exposure and the early development of cataracts have been previously reported. The purpose of this study is to test that eye radiation exposure, sustained during routine mini C-arm use, does not exceed that of previously reported critical radiation dosages to the eye.

**Methods:** Over a four month period, eye radiation exposure was measured in four Board-Certified Hand Surgeons utilizing mini C-arm fluoroscopy during routine surgical procedures. Eye dosimeters were secured to surgical loupes at the level of the orbit. Accumulated radiation dosage was analyzed and compared to control badges on a monthly basis, and background exposure was eliminated. For each procedure, mini C-arm radiation output was logged, including the dose rate, total accumulated dosage, and total exposure time.

**Results:** Average monthly eye dosimetry values included the following: dose rate was  $0.50 \pm 0.03$  mGy/sec, total accumulated dosage was  $32.16 \pm 7.88$  mGy, and total exposure time was  $75.72 \pm 16.36$  sec. Average monthly eye radiation exposure values were less than 30 mrem (previously reported maximum

eye dosage is 1,250 mrem per month). 46 procedures were performed over the collection period. The most commonly performed procedures included ORIF distal radius fractures (14), metacarpal and phalangeal surgery (9), and basilar thumb arthritis surgery (7). ORIF of the distal radius fracture was associated with higher average exposure time (93.57 sec) and average accumulated dosage (51.73 mGy).

**Discussion/Conclusion:** Our study suggests that eye radiation exposure, from routine mini C-arm fluoroscopy use, on an average monthly basis, does not approach previously reported critical eye radiation loads associated with cataracts.

**Notes:**

Saturday, October 25, 2014

### General Session 15 — Mixed Topics

(Ritz-Carlton Ballroom Salon 1)

**Moderators:** Amar S. Ranawat, MD  
David S. Wellman, MD

10:24am –10:30am

## Severity Of Hand OA — A Predictor Of Major Joint Involvement And Surgical Intervention

Chitranjan S. Ranawat, MD

Morteza Meftah, MD

Amar S. Ranawat, MD

**Introduction:** The presence of hand OA increases the risk for developing OA in other major joints<sup>1</sup>. Genetic predisposition has been implicated in its causation<sup>2</sup>. The association of hand OA with symptomatic and asymptomatic major joint(s) has not been previously studied. Therefore, the goal of this study was to correlate the severity of hand OA with other major joint(s) involvement and need for surgical intervention.

**Material and Methods:** 100 consecutive patients with mean age of 71.6 were recruited. All patients had a hand photo taken for visual documentation of the hand joints. Radiograph

of hand and all major symptomatic joint(s) were analyzed. Patient's family history of involvement was captured. The severity of hand involvement was determined using the Kellgren-Lawrence (KL) scale by an independent radiologist.

**Results:** Severe hand OA was present in 91% of the patients. Radiographic analysis showed the hip involved in 88% of the patients, of whom 85.2% (75) were symptomatic and 14.7% (13) were asymptomatic. 62.5% (55) of symptomatic hip patients required hip replacement. Knee involvement was present in 37% of the patients and all were symptomatic. 81.1% (30) of these required knee replacement. 33% (28) had bilateral and 6% (5) had 'two joint (hip& knee)' surgery. Spine involvement was present in 72% of the patients. Based on patients' history, foot-toe and shoulder was involved in 33% and 29%, respectively. 75% of the patients had 2 and 7% patients had 3 other major joints involved. 76% of the patients showed positive family history for arthritis.

**Discussion:** This is the first study associating the severity of hand involvement with other major joint involvement and risk of surgical intervention. Although the onset of hand and other joints OA and their progression were not tracked, this study emphasizes the need to investigate the genetic predisposition in causation of OA.

#### Notes:

10:32am –10:38am

## Periprosthetic Joint Infection: Could Bearing Surface Play A Role?

Langan S. Smith, BS

\*Camilo Restrepo, MD

Pouya Aljianipour, MD

Mitchell G. Maltenfort, PhD

Javad Parvizi, MD, FRCS

Arthur L. Malkani, MD

**Introduction:** Periprosthetic joint infection (PJI) is a devastating complication of total hip arthroplasty (THA). According to registry-based studies, some bearing couples are associ-

ated with an increased risk of PJI. The purpose of this study was to determine whether there was any difference in the incidence of PJI in two commonly used bearing couples (metal on polyethylene [MOP] versus ceramic on polyethylene [COP]).

**Materials and Methods** A retrospective multi-institutional query was performed to find all patients who received primary THA with MOP or COP bearing surfaces performed during 2005-2009 in two high-volume arthroplasty centers. Demographic factors, comorbidities, length of hospital stay, complications and other relevant information were extracted. PJI was defined based on MSIS criteria. Multivariate analysis was performed to determine whether bearing coupling was independently correlated with PJI.

**Results:** In our data, 25/2,921 (0.9%) patients with MOP and 11/2,643 (0.4%) patients with COP developed PJI. This difference was statistically significant. After the multivariate analysis, controlling for potential confounders (age, body mass index and length of hospital stay, Charlson comorbidity index), MOP bearing surface was found to be an independent factor correlating with higher incidence of PJI (odds ratio: 2.6, CI: 1.02-6.54).

**Discussion:** The finding of this study suggests that the bearing surface may have an influence on the incidence of PJI. Although, we had originally thought that ceramic bearing surface may be used in younger and healthier patients, the multivariate analyses, that controlled for all these variables, confirms that use of metal femoral head is an independent risk factor for development of PJI. The finding of this study is compelling and begs for future basic science mechanistic investigations.

#### Notes:

10:40am –10:46am

## The Team Physician And The Athletic Trainer: Do We Agree?

Fotios Tjoumakaris, MD  
Nicholas Lombardi, BS  
Luke Austin, MD  
Matthew Pepe, MD  
Kevin Freedman, MD  
Katherine Bagnato, ATC  
Bradford S. Tucker, MD

**Background:** It is standard practice in high school athletic departments for athletic trainers (ATs) to formulate a diagnosis and treatment plan for injured high school student athletes. In select instances, the athletes are then referred on for definitive medical management and treatment by a supervising team physician. The purpose of this investigation was to determine the rate of agreement between physician and AT with regard to student athlete injury and diagnosis.

**Methods:** Between 2010 to 2012, a prospective athletic injury database was maintained by a regional healthcare system athletic training staff. All athletes injured during this time were included in the database. All patients that were referred on for physician evaluation and treatment were identified, and this data was retrospectively analyzed. Specific diagnosis (both by trainer and physician), physician subspecialty, and diagnostic concordance were analyzed and determined by review of medical records and radiologic imaging. This study is a retrospective review of a prospective database with Level III evidence.

**Results:** 344 incidents met our inclusion criteria (both AT and physician evaluation). 305 (88.7%) of the AT and physician diagnoses were in agreement. Of the 39 diagnoses that were discordant, 3 (7.7%) required surgical management. 16 of the 39 misdiagnoses (41%) involved fractures and 9 (23.1%) involved sprains. ATs displayed the highest accuracy diagnosing dislocations and abrasions/lacerations (100%). Concussions were also diagnosed very accurately (98.5%).

**Conclusions:** When using a physician diagnosis as the accuracy barometer, ATs are highly skilled professionals who are well trained in the evaluation of acute athletic injuries, with a nearly 90% accuracy rate. This study identified areas where further education and communication may be necessary amongst providers, namely fractures, and joint sprains. With increased diagnostic agreement among medical professionals,

better care for student athletes can lead to quicker diagnoses, rehabilitation and recovery.

### Notes:

10:48am –10:54am

## Native Anterior Cruciate Ligament Length Quantification Via Lateral Radiographic Landmark

LCDR Patrick W. Joyner, MD, MS  
Travis Roth, MS IV  
C. Luke Wilcox, DO  
Jeremy Bruce, MD  
Ryan Hess, MD  
Christopher O'Grady, MD  
Charles A. Roth, MD

**Background:** Graft tunnel mismatch, a complication of anterior cruciate ligament reconstruction, is a condition in which the bone-patella-tendon-bone autograft or allograft is either too long or short, and can result in compromised fixation. We aim to find a radiographic landmark, on lateral knee X-ray, which will allow for a simple, easy, and reproducible method of quantifying native ACL length. Materials &

**Methods:** 130 patients (66 male & 64 female), underwent, as a standard part of their knee arthroscopy procedure, measurement of their native ACL. These native ACL's were measured percutaneously with a spinal needle. The lengths of the native ACL's were compared with one lateral knee X-ray landmark and a clinical landmark: Blumensaat's line and patellar ligament, respectively. The mean percent difference, absolute difference, and a correlation between Blumensaat's line and the native ACL length were calculated.

**Results:** In males, the average length of the ACL was 32.5mm, Blumensaat's line was 33.0mm, and the patellar ligament was 49.2mm. The absolute difference between Blumensaat's line and the native ACL was  $1.2\text{mm} \pm 1.3\text{mm}$ , the mean percent difference  $0.9\% \pm 2.9$ , and the correlation coefficient was 0.88. The correlation coefficient between the patellar ligament and the native ACL was 0.08. In females, the

average length of the ACL was 30.6mm, Blumensaat's line was 30.3mm, and the patellar ligament 44.2mm. The absolute difference between Blumensaat's line and native ACL was  $1.3\text{mm} \pm 1.3\text{mm}$ , the mean percent difference was  $0.4\% \pm 2.8$ , and the correlation coefficient was 0.84. The correlation coefficient between the patellar ligament and native ACL was 0.1.

**Conclusion:** As a general rule, regardless of age or sex, the length of Blumensaat's line is equivalent to length of the native ACL.

**Notes:**

10:56am–11:02am

## Comparison Of Stability And Slope Neutralization Between CW And OW HTO In The ACL Deficient Knee

Anil S. Ranawat, MD  
 Durham Weeks, MD  
 Saker Khamaisy, MD  
 Hendrik A. Zuiderbaan, MD

**Background:** The purpose of this study was to quantify changes in PTS and knee kinematics using two commonly used HTO techniques.

**Methods:** Anterior drawer (ATT at 90°), Lachman (ATT at 30°), and Pivot-shift tests were performed on intact hip-to-toe cadaveric specimens ( $n=16$ ) and translation of the lateral and medial compartments was measured using ACL specific navigation software. The ACL was then sectioned and stability testing repeated and compartment translation recorded. Half of the knees underwent closing wedge (LCW) HTO using a lateral titanium plate and screws ( $n=8$ ). The contralateral knees underwent an opening wedge (MOW) HTO using a medial titanium plate and screws ( $n=8$ ). The goal of both procedures was for an 8-10mm correction with maximal sagittal slope neutralization. Following this procedure, stability testing and translation measurements were once again performed. Correction was assessed using pre-operative and post-operative computed tomography (CT) scans. Coronal and sagittal

alignment changes as well as all kinematic data were recorded and analyzed.

**Results:** Sectioning the ACL resulted in a significant increase in anterior tibial translation (ATT) during Anterior drawer, Lachman, and Pivot shift testing. The mean Tibial Coronal alignment correction in the MOW group was  $7.2^\circ (\pm 0.95)$  compared to  $5.9^\circ (\pm 1.8)$  in the LCW group. Although the coronal correction was improved in the MOW, this difference did not reach significance. The mean tibial slope neutralization achieved with a LCW was  $7.1^\circ (\pm 1.8)$ , which was significantly higher than  $5.1^\circ (\pm 0.9)$  found using MOW.

**Conclusions:** Closing wedge HTO generates significantly greater PTS neutralization (avg  $7^\circ$ ) than opening wedge HTO. In the ACL deficient knee, this degree of slope correction using a closing technique confers a significant improvement in knee stability during ATT testing that approaches normal knee kinematics with the knee in 30° of flexion.

**Notes:**

11:04am –11:10am

## Resident/Fellow Award

### Prospective, Randomized Study: Superior Early Outcomes Following THA Using Direct Anterior Approach

Ryan Massimilla, BS  
 Mitchell G. Maltenfort, PhD  
 Javad Parvizi, MD, FRCS

**Introduction:** There are numerous studies that suggest THA performed through direct anterior approach has a better functional outcome than other surgical approaches. What is not known is the immediate to very early outcome of THA performed through the DA approach. This prospective, randomized study was designed to examine the very early outcome of THA performed through DA versus anterolateral approach.

**Methods:** 84 Patients with end-stage arthritis of the hip who were candidates for THA were randomized to receive their

surgery using DA (44 patients) or DL approach (40 patients). The type of anesthesia, prosthesis, postoperative rehabilitation, and all other protocols were exactly the same. The surgery was performed by the same surgeon in each patient. The functional outcome on day 1, day 2, week 6, week 12, six months, one year were measured using TUG, Gait Speed, Chair Test, LASA, Harris Hip score and LEFS. Hospital length of stay, blood transfusion, narcotic consumption and other parameters between the two cohorts were compared also.

**Results:** Patients receiving THA through DA had significantly higher functional scores in all domains during the early period following surgery. The difference in functional scores appeared to level out at six months. Patients undergoing THA using the DA approach were also able to drive earlier, return to work earlier, and appear to regain muscle functionality more quickly than patients receiving THA through the antero-lateral approach.

**Discussion:** It appears that the use of DA approach for THA does provide a better functional outcome during the early period of recovery, which includes return to functional independence such as driving, and returning to work.

**Notes:**

versial. Most studies recommend 6 weeks but recent advances in surgical approach, pain management and rapid recovery may have changed this time frame. The purpose of this study was to prospectively evaluate driving safety after THA through brake time reaction.

**Methods:** After IRB approval, 30 patients who were scheduled for, and underwent, right THA were prospectively evaluated between October 2013 and March 2014. Driving performance was evaluated using the Brake Reaction Test that measured brake time after a stimulus. All patients underwent a preoperative assessment to establish a baseline. Patients were then re-tested at 2, 4 and 6 weeks post operatively. Patients were allowed to drive when the post-operative reaction time was equal to or less than their pre-operative baseline. General linear repeated measurement was used for analysis.

**Results:** All 30 patients completed the pre-op and 2 week post-op tests. The mean pre-op reaction time was 0.607 sec. The mean 2-week reaction time was 0.566 sec. Of the 30 study patients, 26 (87 %) were able to reach their baseline time (or better) by 2 weeks. Three patients (10%) reached their baseline at the 4 week post-op test and only 1 (3%) did not return to base line until the 6 week mark. Evaluation of confounding variables revealed no differences with respect to age, gender, and the use of assistance devices in the group.

**Conclusion:** Most patients in this study were able to return to normal brake response times by 2 weeks after THA. This represents a substantial improvement from current recommendations. These findings have allowed us to encourage patients to re-evaluate their driving ability as soon as 2 weeks after THA.

**Notes:**

11:12am–11:18am

**EOA/OREF Resident/Fellow Travel Grant Award**

**When Is It Safe For Patients To Drive After Right Total Hip Arthroplasty?**

Victor H. Hernandez, MD, MS

Alvin C. Ong, MD

Fabio R. Orozco, MD

Anne Marie Madden

Zachary D. Post, MD

**Introduction:** Driving restrictions after total hip arthroplasty (THA) can be inconvenient and burdensome for patients.

When patients may safely be allowed to drive remains contro-

**Saturday, October 25, 2014**

**Rapid Fire Session 16A — Trauma**  
(*Station A, Plaza Ballroom 1*)

**Moderator:** David S. Wellman, MD

12:24pm–12:28pm

## **Computer-Assisted Orthopaedic Surgery (CAOS) In The Treatment Of Intertrochanteric (IT) Fractures**

Carlos J. Lavernia, MD  
David A. Iacobelli, MD  
Jesus M. Villa, MD

**Introduction:** Navigated IT fracture pinning resulted in a significant decrease in radiation exposure as compared to a control group in this simulated randomized controlled trial.

**Methods:** 25 hip models with soft tissue were used. Pin placement was randomized to a navigated system ( $n=13$ ) versus a standard fluoroscopic technique ( $n=12$ ). Total procedure time was collected, and radiation exposure was measured as the total number of seconds of radiation. Digital radiographs were performed on all models after the procedure, and were used to measure pin placement accuracy using the tip-apex distance (TAD); blinded re-test were performed in all cases to assess reproducibility. Mann-Whitney test and Spearman correlation were used for statistical analysis.

**Results:** Average time to pin placement was  $6.4+/-0.7$ (SE) minutes with the navigated technique and  $6.1+/-0.8$  minutes in the models in which the standard technique was used ( $p=0.94$ ). Radiographic measurements for both AP and lateral view were highly correlated (0.95 and 0.79, respectively;  $p$  less than 0.001). The mean TAD for the navigated group was  $2.1+/-0.2$  cm and  $2.3+/-0.2$  cm for the standard group ( $p=0.48$ ). The percentage of pin placements with a TAD of more than 2.5 cm was 29% in both groups. Radiation exposure was measured and found significantly different, in the navigated procedures it averaged  $6.14+/-0.67$  seconds while in the conventional group it was  $11.43+/-1.7$  seconds ( $p$  less than 0.008).

**Discussion and Conclusion:** Our data clearly demonstrated that the use of CAOS to pin an IT fracture does not add significant extra time to pin placement. Both techniques were comparable in terms of accuracy. We found that radiation

exposure when using the navigation system was reduced by almost 50%.

**Notes:**

12:29pm–12:33pm

## **Epidemiology Of Multiligamentous Knee Injuries And Associated Injuries: 10 Year Review At A Level 1 Trauma Center**

Mark R. Elliott, MD  
Corey Rosenbaum, DO  
Christopher H. Perkins, MD  
Anthony M. Harris, MD

**Introduction:** To characterize multiligamentous knee injury patterns and describe associated injuries.

**Methods:** Retrospective chart review of one hundred twenty four patients (129 knees) with multiligamentous knee injuries and/or dislocations from 2002-2012 presenting at a level 1 trauma center. Subgroup of 105 knees with appropriate magnetic resonance images available for ligamentous injury patterns.

**Results:** Vascular injury occurred in 12%, peroneal nerve injury in 12% with the most common (33%) injury pattern being combined disruption of the anterior cruciate ligament, posterior cruciate ligament and posterolateral corner. The average age of the patient was 36 years old and males sustained 77% of the injuries with motor vehicle crashes causing 39% of injuries. Forty seven percent of knees presented with gross dislocation and of those anterior dislocation was the most common. Open knee dislocation occurred in 5%. Twenty four percent of knees had associated ipsilateral tibial plateau fractures, 12% had associated ipsilateral femoral shaft fractures, and 15% had associated pelvic ring injuries. An intra-abdominal injury occurred in 18% of patients and a severe closed head injury in 21%.

**Conclusion:** The incidence of arterial injury and peroneal nerve injury was lower than previous reported in the literature. Posterolateral corner injuries were highly associated with

peroneal nerve injuries. One-fourth of knee dislocations were associated with ipsilateral tibial plateau fractures and just over half presented with a spontaneously reduced knee, which is comparable with the current literature. There is a high incidence of associated injuries with ipsilateral femur and pelvic injuries being the most common. Due to the high rate of spontaneous reductions, polytrauma patients should be closely evaluated for multiligamentous knee injuries.

**Notes:**

12:34pm–12:38pm

## Pilon Plate For Fixation Of Comminuted Posterior Wall Acetabular Fractures

Adam K. Lee, MD  
Kristin McPhillips, MD, MPH  
James C. Widmaier Jr., MD  
Daniel S. Horwitz, MD

**Purpose:** In fractures of the posterior wall of the acetabulum, restoration of the articular surface is necessary to optimize clinical outcomes. Fractures of the posterior wall with comminution are a subset of these injuries where fixation and maintenance of reduction are often difficult due to the presence of multiple small fragments. The concept of cortical substitution, using plates to recreate the contour of the posterior wall, can be applied to improve results. We present a series of comminuted posterior wall acetabular fractures treated with a novel use of a stainless steel pilon plate and hypothesize that the design of the plate will maintain reduction. The Food and Drug Administration has not approved labeling the device for the described purpose.

**Methods:** All patients eighteen years or older with comminuted posterior wall acetabular fractures treated by two orthopaedic trauma surgeons with the locking compression pilon plate from 2008-2013 were retrospectively reviewed. Patients with inadequate imaging follow-up were excluded. Patient demographics, injury mechanism, fracture characteristics, time to union, maintenance of fixation, reoperations, and other complications were recorded.

**Results:** Twenty (14 male, 6 female) patients met inclusion criteria. The average age at injury was 48 years (range, 18-80). Injuries were secondary to motor vehicle collisions (17), falls (2), and snowmobile accidents (1). Fourteen patients had posterior femoral head dislocations, and 13/14 were reduced within 12 hrs. Thirteen fractures were classified as OTA 62-A types, 4 were 62-B, and 2 were 62-C. Fourteen patients had associated marginal impaction. Patients were followed for an average of 10.1 months (range, 3-33) and achieved union by an average of 13 weeks (range, 7-27). Radiographic outcomes at final follow-up were graded according to Matta (3 excellent, 8 good, 5 fair, 4 poor). One patient (5%) had loss of fixation (fragment displacement of 6.8 mm) and was one of 3 reoperations (2 for post-traumatic arthritis and 1 for avascular necrosis). All revision procedures were total hip arthroplasties.

**Conclusion:** All fractures achieved union with failure rates similar to other techniques. Using locking compression pilon plates as a means of cortical substitution is a viable alternative for fixation of comminuted posterior wall acetabular fractures.

*\*The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 57).*

**Notes:**

12:39pm–12:43pm

## Provisional Plate Fixation In The Setting Of Open Tibia Fractures

Meryl R. Ludwig, MD  
\*Lolita Ramsay, RN, PhD  
Robert A. Hymes, MD  
Michael Pitta, MD  
Jeff E. Schulman, MD

**Introduction:** This study analyzed the risk of complications in open tibia shaft fractures treated with intramedullary nailing and provisional plate fixation. Our hypothesis was that using provisional plate fixation prior to nailing will not increase complications.

**Methods:** Approval was obtained by the hospital IRB. Records were included if patients were 18 or older; admitted to level I trauma center between January 1, 2005 to June 30, 2013; open tibia fracture; and operatively treated with intramedullary nailing, with or without provisional plating. Demographic data, mechanism, side of injury, Gustillo and AO/OTA classification, secondary procedures, and operative reports were reviewed.

**Results:** There were 143 patients with an open tibia fracture, 104 after exclusions (7 for age, 4 died, 1 acute amputation; 27 insufficient follow-up). Patients averaged 37 years old, 75% were male, and 67.3% were injured by motor vehicle collisions. Forty-four percent of injuries were Gustillo type 3 and mean follow-up was 10.4 months. Provisional plate use occurred in 32.4% of extremities (57.1% permanent, 42.9% removed). The complication rate was 27.8%, of which 16.7% had a superficial or deep infection (4.6% wound breakdown) and 11.1% had other complications. After controlling for Gustillo, provisional plate use had a 1.48 higher odds for infection (95% CI [.50, 4.34]), but did not significantly increase the odds for other types of complication (AOR = 1.15, 95% CI [.31, 4.32]). In 35 patients with provisional plating, removing the plate decreased ones odds for infection (AOR = .42, 95% CI [.07, 2.67]), and any complication (AOR = .56, 95% CI [.13, 2.43]), compared to retained provisional plates.

**Discussion and Conclusion:** Provisional plate stabilization used to maintain fracture alignment in open tibia fractures undergoing intramedullary nailing should be used with caution. Although the local wound complication rate is low, removal of the plate after nailing should be considered.

#### Notes:

12:44pm–12:48pm

## Ipsilateral Ankle Fractures With Tibial Shaft Fractures Are Frequently Missed

Hemil H. Maniar, MD

David G. Fanelli, BS

Raveesh Richard, MD

Kristin McPhillips, MD, MPH

Michael Suk, MD, JD, MPH, FACS

Daniel S. Horwitz, MD

**Introduction:** Due to the predominant visible injury of the tibial shaft, an associated fracture involving the distal articular surface may be missed. The purpose of the study was to delineate these articular injuries, and report the number of missed injuries.

**Methods:** All skeletally mature patients who sustained an AO/OTA-42 fracture with associated ipsilateral distal articular fracture, between 2004 and 2013, were included in the retrospective analysis. Mechanism of injury, operative notes, and imaging were analyzed for the study.

**Results:** A total of 369 patients were included in the study. 30/369 (8.1%) and 14/369 (3.7%) had a fracture of the posterior and medial malleolus respectively. 18/30 (60%) posterior malleoli were low energy and 12/30 (40%) were high energy injuries. In fractures with high energy mechanism the pattern of the tibial shaft fracture was not consistent. In 20/30 (66.6%) patients, the posterior malleolus was not seen clearly on initial injury films and was missed. In 11/20 (55%) a CT scan identified the fracture. In 9/30 (30%) patients the injury was completely missed preoperatively. In 2 patients the injury remained unrecognized and 1 required revision surgery. No patient with pre or intraoperatively diagnosed and stabilized posterior malleolus displaced during/after passage of the nail. 8/14 (57%) medial malleolus fractures were due to high energy and 6/14 (43%) were due to low energy mechanism. 13/14 medial malleolar fractures were clearly evident in preoperative X-rays and 1 was seen on CT Scan. None of the medial malleoli displaced when stabilized before passage of the tibial nail.

**Discussion and Conclusion:** A posterior malleolar fracture is commonly associated with a low energy tibial shaft fracture. A high index of suspicion is required to diagnose this injury. There are chances of displacement of the malleolar fracture

during nailing and hence fixation should be done prior to the nailing procedure.

**Notes:**

12:49pm–12:53pm

## **Patients With Abnormal Infection Parameters Need To Be Investigated Prior To Revision Arthroplasty**

Priscilla K. Cavanaugh, MS  
Benjamin Zmistowski, MD  
Anthony T. Tokarski, BS  
Camilo Restrepo, MD  
Javad Parvizi, MD, FRCS

**Introduction:** In the setting of painful joint arthroplasty, ruling out periprosthetic joint infection (PJI) is imprecise. A clear and uniform definition of PJI—relying upon culture, systemic inflammatory markers, and local signs of infection—has been provided by the Musculoskeletal Infection Society (MSIS). While providing a clear diagnosis when major criteria are fulfilled, the meaning of one or two minor criteria in an aseptic case is unclear. This study investigates (a) the incidence of positive minor criteria in the work-up of PJI, and (b) implications of positive results.

**Methods:** The cohort consisted of 620 revision knee and 638 revision hip arthroplasties performed between 2006-2011. Results of preoperative and intraoperative work-up of PJI were collected. The MSIS definition of PJI was used to classify cases as infected or aseptic. Subsequent readmissions for PJI were identified and used to assess importance of positive minor criteria.

**Results:** The MSIS definition classified 358 (28.5%) cases as infected. In the aseptic group, 648 patients had zero (72%), 207 had one (23%), and 45 had two (5%) positive minor criteria. In the PJI patients the presence of minor criteria was zero in 4 patients (1%), one in 22 patients (6%), two in 90 patients (25%), three in 97 patients (27%), and four in 147 patients (41%). The aseptic group had 14 (2% of aseptic cases) patients readmitted for infection, while the infected group had

47 (13%) readmitted for infection. Four patients in the aseptic cohort with two positive minor criteria (9.0%; 4/44) had subsequent infection compared to 11 aseptic patients with less than two positive minor criteria (1.3%; 11/856).

**Conclusion:** Elevated inflammatory markers, joint leukocytosis and neutrophilia, or an isolated positive culture in the setting of an otherwise aseptic appearing joint is not uncommon. However, when multiple tests are positive and more than two minor MSIS criteria are fulfilled, the risk of PJI is increased. Patients with two or more minor MSIS criteria should be worked up for PJI thoroughly.

**Notes:**

Saturday, October 25, 2014

Rapid Fire Session 16B — Total Hip Reconstruction  
(Station B, Plaza Ballroom 1)

Moderator: Amar S. Ranawat, MD

12:24pm–12:28pm

## **Risk Factors For Periprosthetic Infection In Young Patients After THA**

Taylor R. McClellan, BS  
\*Michael P. Bolognesi, MD  
R. Andrew Henderson, MD, MSc  
Jonathon A. Godin, MD, MBA

**Introduction:** The patient-related risk factors for periprosthetic joint infection (PJI) after total hip arthroplasty (THA) have recently been evaluated in several large Medicare database studies. However, much remains to be discovered regarding the epidemiology, demographics, and risk factors for PJI after THA in younger and/or privately insured patients.

**Methods:** A patient records database was used to gather patient demographic data on 45,202 privately-insured patients that underwent primary THA between 2007-2011. The vast majority of these patients were under 65 years of age. 750 (1.7%) of these patients went on to acquire a diagnosis of

periprosthetic joint infection. The database was searched for documentation of 35 common medical comorbidities utilizing CPT and ICD-9 codes among this population. The incidence of PJI was stratified by age, gender, and region of the United States. Relative risk and odds ratios for developing PJI were then calculated for all comorbid conditions.

**Results:** Cumulative incidence of PJI in this cohort ranged from 0.81% at 30 days to 1.66% at 5 years. There was a significant difference in the prevalence of PJI by age, with the highest rate occurring in the 30-34 year old population (2.85%) trending downward with increasing age until 65-69 years old (1.74%). There were no significant differences in PJI prevalence by sex or region of the country. Of the 35 comorbidities evaluated, 20 demonstrated an increased risk for PJI (odds ratio >1.0) including dementia, chronic pulmonary disease, alcohol and drug abuse, liver disease, anemia, and complicated diabetes.

**Discussion and Conclusion:** Interestingly, the risk of PJI seems to be higher in younger patients. This is likely multifactorial in nature. Further, the medical comorbidities which constitute risk factors for PJI in elderly and/or Medicare patients observed in other studies seem to be largely conserved in this younger population

#### Notes:

12:29pm–12:33pm

## Delaying Reimplantation Following Resection Arthroplasty Does Not Improve Outcomes: A Report From Two High Volume Orthopaedic Centers

Anthony Tokarski, BS  
 Mohammad R. Rasouli, MD  
 Matthew W. Tetreault, BA  
 Alex Uhr, BS  
 Craig J. Della Valle, MD  
 Javad Parvizi, MD, FRCS

**Introduction:** In North America, the preferred surgical treatment of chronic periprosthetic joint infection (PJI) is two-

stage exchange arthroplasty. Although reimplantation generally occurs 6-8 weeks after resection arthroplasty the optimal timing for reimplantation is unknown. This study aims to determine if the timing between the first and second stages of a two-stage exchange influenced the outcome of this procedure in terms of infection control.

**Methods:** We used data from two high volume centers to identify all PJI cases treated with two-stage exchange arthroplasty between 2002 and 2012. Reimplantation failure was defined as the need for further surgical intervention for the treatment of PJI. Multivariate logistic regression and Cox proportional hazard test were used to determine predictors of subsequent failure of the prosthesis due to infection.

**Results:** The final cohort consisted of 433 patients. Mean duration of follow up from time of reimplantation was  $2.4 \pm 1.9$  years (minimum of 90 days). 97 patients (22.4%) experienced subsequent failure. Logistic regression analysis indicated that PJI of knee (Odds Ratio (OR) = 2.08), spacer exchange (OR = 12.21), and polymicrobial PJI (OR = 9.48) but not time to reimplantation were some of the predictors of reimplantation failure. The Cox proportional hazards model showed that BMI (OR = 1.04), knee infection (OR = 1.95) and spacer exchange (2.56) were predictors of failure at any time. **Conclusions:** It is a commonly held belief that reimplantation for patients with “severe” infection should be delayed. Based on our findings, it appears that the timing between first and second stage does not influence the outcome of two-stage exchange arthroplasty. Although timing of reimplantation may need to be individualized, the best metric to guide surgeons regarding the optimal timing of reimplantation still remains unknown.

#### Notes:

12:34pm–12:38pm

## **Survivorship And Complications Of Revision Total Hip Arthroplasty With A Mid-Modular Femoral Stem**

Jason Hochfelder, MD

\*Aldo M. Riesgo, MD

Edward Adler, MD

Richard Iorio, MD

Christopher Nathasingh, BA

Nick Brownstone, BA

Lawrence M. Specht, MD

**Introduction:** The number of revision total hip arthroplasties (THA) performed each year continues to rise; however, there is no consensus on the optimal femoral implant. Diaphyseal fitting mid-modular femoral components with variable metaphyseal sizing options are the most utilized femoral stems for revision THA in the United States. Corrosion at the mid-modular interface leading to aseptic loosening and implant failure, as well as loosening leading to subsidence, have been reported. The purpose of this study is to evaluate the survivorship and complications of diaphyseal fitting mid-modular femoral components used in revision THA.

**Methods:** We reviewed all revision THA with a diaphyseal fitting mid-modular femoral component performed by 10 different surgeons at two high volume academic medical centers. The number of failures and the reason for failure were recorded. Failure was defined as aseptic loosening, mechanical failure, septic revision, periprosthetic fracture, or need for revision for any reason. Radiographs were reviewed for signs of boney ingrowth and signs of loosening.

**Results:** One hundred fifty-eight patients were identified who had a total of 161 revision THA with diaphyseal fitting mid-modular femoral components. The average follow-up was 3 years. At final follow-up, 5 (3%) patients required re-revision for failure of the femoral component; 4 for loosening of femoral component and 1 for fracture of the femoral component. There were a total of 24 (14.9%) revisions for any reason, with the most common reason being septic failure (10 of 24).

**Discussion and Conclusion:** To our knowledge this is the largest reported series of revision THA with diaphyseal fitting mid-modular femoral components. Our results show that these stems have a low rate of aseptic loosening, subsidence, and mechanical failure. While revision THA may be a challenging

procedure, these stems provide a safe and effective solution for many femoral problems.

**Notes:**

12:39pm–12:43pm

## **Intraoperative Femur Fracture During Primary Total Hip Arthroplasty And Hemiarthroplasty**

David S. Geller, MD

\*Robert Brochin, BS

Simon Greenbaum, BA

**Introduction:** Total hip arthroplasty and hemiarthroplasty are commonly performed orthopedic procedures with over 300,000 performed annually in the US. These numbers can be expected to increase with the aging population. Intraoperative femur fracture during femoral stem implant is a recognized event that may result in additional cost and complications for the patient. The purpose of this study is to evaluate the incidence of this event.

**Methods:** A retrospective observational review of x-ray images following all primary press fit total hip arthroplasties and hemiarthroplasties over a 3-year period (January 2010–December 2012) was performed at an academic medical center. Intraoperative fracture was considered when cerclage wire was noted. Statistical difference between genders and age cohorts (less than 65 vs. greater than or equal to 65 years) was performed using chi-square analysis.

**Results:** A total of 859 primary non-cemented total hip arthroplasties and hemiarthroplasties were performed in 859 unique patients over the study period. The study population consisted of 509 females and 350 males with an average age of 65.8 years and an age range of 15–102 years. Intraoperative fracture occurred in 49 cases (5.7%). The average age of patients with intraoperative fracture was 68.1 years with a range of 21–102 years. Intraoperative fracture occurred in 11.1% of patients greater than 91 years, but there was not a significant difference in fracture incidence between age cohorts. Fracture occurrence rates in females (33, 6.5%) and

males (16, 4.6%) did not significantly differ.

**Discussion and Conclusion:** An intraoperative fracture rate of 5.7% falls within previously reported ranges of fracture incidence in press fit hip arthroplasty. These findings suggest realized intraoperative fracture may occur in approximately 17,000 patients per year. Cost of revision, additional surgery, and limb length discrepancies may carry significant burden. Clinicians should be cognizant of this potential complication.

#### Notes:

12:44pm–12:48pm

## What Is The Optimum Acetabular Component Position And Size In Direct Anterior Approach Total Hip Arthroplasty? — Influence Of Stability Assessment And Impingement

Parthiv A. Rathod, MD

\*Jose A. Rodriguez, MD

Ajit J. Deshmukh, MD

Jonathan Robinson, MD

John W. Stirton, MD

**Introduction:** Our aim was to study the evolution of acetabular cup position in direct anterior approach with reference to stability and impingement as a part of a single surgeon's learning curve.

**Methods:** Clinical and radiographic records of first 300 consecutive DAA THAs performed by a single surgeon from April 2009 to April 2011 were reviewed at a single center. Radiographic analysis was done by two observers to determine acetabular inclination and anteversion on 6 week post-operative standing radiographs. Native femoral head size, measured on preoperative radiographs after adjusting for magnification, was used to calculate the native acetabular cup size. The study population was divided into three groups; Group A- 1st 100 DAA THA cases, Group B- 2nd 100 and Group C – 3rd 100 corresponding to the use of intraoperative anterior stability assessment ( Group B and C) and change in the cup size strategy (Group C). The incidence of instability and psoas

impingement (PI) –related groin pain at 2 year follow-up was determined for the three groups. Statistical analysis was done to see if there were differences in these clinical and radiographic outcome measures.

**Results:** Mean values for abduction were similar in all the groups. Mean anteversion was significantly lower in Group B [ $12.5^\circ (\pm 3.3^\circ)$ ] and C [ $13.6^\circ (\pm 2.3^\circ)$ ] as compared to group A [ $24.3^\circ (\pm 7.5^\circ)$ ]. The difference between the implanted cup size and calculated native cup size was significantly higher in Group A [5.2 ( $\pm 2.1$ ) mm] and group B [5.8 ( $\pm 2.60$ mm] as compared to group C [1.4 ( $\pm 1.4$ ) mm](Figure 1). There were 2 anterior dislocations in group A with none in the other groups. The incidence of PI-related groin pain was higher in group B (12%) as compared to group A (2%) and group C (2%). For PI related groin pain, an arthroscopic psoas release was performed in 3 patients and cup revision in 1 patient.

**Discussion:** For optimum anterior stability, the target cup anteversion is lower in the DAA. Increasing the cup size makes the use of large heads possible. However, the implanted cup size should be as close to the native cup size with DAA THA to avoid anterior overhang (psoas impingement) or posterior overhang (cup-neck impingement and anterior instability).

#### Notes:

12:49pm–12:53pm

## Failure Of A Modular Neck Hip Stem: A Retrieval Study

Joseph Assini, MD

Ivan De Martino, MD

Marcella Elpers, BS

Timothy Wright, PhD

Geoffrey H. Westrich, MD

**Introduction:** Femoral stems with dual-taper modularity were introduced to provide increased versatility to the surgeon in adjusting neck anteversion, length and offset in total hip arthroplasty. Despite the increasing popularity and use of

these femoral stems, concerns regarding corrosion at the neck-stem interface exist.

**Methods:** We analyzed 60 modular-neck stem implants. The stem bodies were made of titanium alloy and the modular necks were made of CoCr alloy. Patient demographic data were collected from medical records including patient age, BMI, length of implantation (LOI), reason for revision and modular neck characteristics (neck angle, length, version and offset). The retrieved implants were explanted mostly for adverse local tissue reaction (ALTR) after a mean LOI of 21.4 ±8.2 months. The neck angle was 127° in 42 cases and 132° in 18 cases. The neck length included 30 mm (38), 34 mm (50%), and 38 mm (12%). The average patient age at revision was 64.6 (±8.4) years. Each modular neck was assessed and graded for fretting and corrosion according to the Goldberg's criteria using a 1 to 4 scale (1 none, 4 severe). The taper interface of the modular stem was divided in 4 zones (anterior, posterior, medial and lateral) and the modular neck taper was divided in 2 regions (proximal and distal) and 4 zones (anterior, posterior, medial and lateral).

**Results:** Evidence of fretting and corrosion was assessed on all tapers at the neck-stem junctions but not at the head-neck junction. The mean fretting score was 1.7 for the neck and 1.2 for the stem. The mean corrosion score was 3.5 for the neck and 3.9 for the stem. The LOI showed a linear relation with higher scores. The proximal medial zone and the distal medial and lateral zones had more corrosion and fretting than all other regions of the modular neck. No relations were observed with neck angle and neck length.

**Discussion and Conclusions:** This implant is associated with high rate of failure secondary to fretting and corrosion at the femoral neck-taper junction. The higher corrosion scores on the medial and lateral side of the neck taper junction could be related to high stresses at that zones.

**Notes:**

Saturday, October 25, 2014

Rapid Fire Session 16C — Knee  
(Station C, Ritz-Carlton Ballroom Foyer)

Moderator: Marc J. Lemos, MD

12:24pm–12:28pm

## Systemic Manifestation Of Periprosthetic Infection Is Associated With Increased In-Hospital Mortality

Gregory K. Deirmengian, MD  
Anthony T. Tokarski, BS  
Javad Parvizi, MD, FRCS  
Alex Uhr, BS

**Introduction:** Although it is known that patients with systemic inflammatory response syndrome (SIRS) and septicemia can have increased in-hospital complications, few have investigated systemic illness in the presence of periprosthetic joint infection (PJI). The purpose of this study was to determine the incidence of SIRS in patients with acute PJI treated on an urgent basis and to report outcomes in these patients.

**Methods:** Using our institutional database, we identified all patients surgically treated for deep PJI on an urgent basis from 2002-2012. Electronic medical records were used to collect patient demographics, preoperative vital signs, blood culture results, in-hospital mortality, ICU admissions, and subsequent reoperation for deep infection. Patients were classified as having SIRS based on the criteria set by the American College of Chest Physicians.

**Results:** During the study period, 491 patients were treated for deep PJI on an urgent basis. Of those, 128 (26%) developed SIRS preoperatively. At least one concomitant blood culture was present in 30 (6%) of the patients with SIRS. In total, there were 7 in-hospital deaths for our cohort. Patients with SIRS and at least one positive blood culture were at a significantly higher risk of in-hospital mortality (10% vs 0.9%; p = 0.002). Systemic illness was not an independent risk factor for ICU admission or recurrence of PJI.

**Discussion and Conclusions:** Our study demonstrates that patients who develop SIRS preoperatively and present with concomitant positive blood cultures are at an increased risk of in-hospital mortality. We have also shown that there is a high incidence of preoperative SIRS in patients with acute PJI.

Given these findings, careful medical management should be undertaken in patients presenting with systemic illness in the presence of PJI.

**Notes:**

12:29pm–12:33pm

## Pre-Operative Templating Of Anterior Cruciate Ligament Reconstruction Using Lateral X-Ray

LCDR Patrick W. Joyner, MD, MS

Travis Roth, MS IV

C. Luke Wilcox, DO

Ryan Hess, MD

Jeremy Bruce, MD

Christopher O'Grady, MD

Charles A. Roth, MD

**Introduction:** Anterior cruciate ligament reconstruction (ACLR) with bone-patella-tendon-bone (BTB) autograft or allograft can be complicated by graft tunnel mismatch. We investigate the lateral knee X-ray as a template to help calculate tibial tunnel length pre-operatively. The similarity between Blumensaat's line and the reconstructed anterior cruciate ligament (ACL) length was a secondary outcome measure.

**Methods:** 20 consecutive ACLR were performed (13 male, 7 female); all were BTB autograft. Average patient age was  $27.8 \pm 11.8$  years. All ACLR were performed anatomically with independent drilling of the femoral and tibial tunnels. Lateral X-Rays were obtained prior to ACLR. The length of Blumensaat's line and the patellar ligament were recorded. The overall graft length was calculated from the patellar ligament length on lateral X-ray; subsequently, Blumensaat's line was used to calculate the tibial tunnel length. All pre-operative calculations; Blumensaat's line, patellar ligament, overall graft, and tibial tunnel lengths; were compared to their respective intra-operative measurements. The amount of graft protrusion or recession in the tibial tunnel was measured at the end of the case; effectively the length of graft tunnel mismatch.

**Results:** The average difference between the length of Blumensaat's line and the reconstructed ACL was  $1.4 \pm 1.2$  mm, pre-operative and intra-operative tibial tunnel was  $4.5 \pm 4.5$  mm, and the average graft tunnel mismatch was  $2.1 \pm 2.6$  mm. The mean percent difference between Blumensaat's line and reconstructed ACL was 0.72% and pre-operative and intra-operative tibial tunnel length was 6.43%. The correlation coefficient (greater than 0.8 is excellent, less than 0.2 is poor) for Blumensaat's line and the reconstructed ACL was 0.81.

**Conclusion:** This method of pre-operatively templating an ACLR and calculating the tibial tunnel length is effective in minimizing the risk of graft tunnel mismatch when using BTB auto and allografts. Additionally, we demonstrated that Blumensaat's line is essentially the same length as the reconstructed ACL.

**Notes:**

12:34pm–12:38pm

## Tibial Rotation And Patellar Tilt Following Closing And Opening High Tibial Osteotomy

Anil S. Ranawat, MD

Saker Khamaisy, MD

Hendrik A. Zuiderbaan, MD

Durham Weeks, MD

Benjamin Stone, BA

Andrew D. Pearl, MD

**Purpose:** This study was performed to evaluate tibial rotation and patellar axial tilt following closing and opening wedge slope-decreasing HTO.

**Methods:** Sixteen knees of fresh-frozen cadavers were used; 8 underwent lateral closing wedge slope-decreasing HTO (CWO) and 8 underwent medial opening wedge slope-decreasing HTO (OWO). The dimensions of the planned wedges in all cases were identical. All cadavers underwent pre- and postoperative computerized tomography (CT) which was converted into 3D computer models. A novel software

code was developed, based on iterative closest point (ICP) mathematical algorithm, to match the 3D models of the pre- and postoperative bone surfaces and calculate changes in tibial axial rotation, tibial slope, tibial coronal axis and patellar axial tilt after surgery.

**Results:** There was no significant difference in the tibial coronal axis correction between CWO and OWO. In the CWO group, mean tibial slope correction, axial tibial rotation, and patellar tilt change were  $11^\circ (\pm 3.8)$ ,  $7.7^\circ (\pm 4)$  and  $5.6^\circ (\pm 3.9)$ , respectively. In the OWO group, the respective values were  $5^\circ (\pm 5)$ ,  $2.8^\circ (\pm 2.3)$  and  $2.4^\circ (\pm 0.9)$ . All three parameters were significantly higher in the CWO group. After CWO, the tibia was rotated externally and the patella was tilted laterally in all cases. However, after OWO, in 50% of the cases the tibia was rotated externally and the patella was tilted laterally while in the other 50% of the cases the tibia was rotated internally and the patella was tilted medially.

**Conclusions:** Tibial rotation and patellar axial tilt are significantly greater following CWO compared to OWO. In addition, after all CWO procedures the tibia rotates externally and the patella tilts laterally. After OWO, the tibial rotation and patellar tilt may occur in either direction.

**Clinical Relevance:** Tibial rotation and axial changes of the patella should be taken into consideration while planning closing and opening wedge HTO.

#### Notes:

12:39pm–12:43pm

## Patient Perceived Outcomes And Physical Performance In TKA

Carlos J. Lavernia, MD  
 Jesus M. Villa, MD  
 David A. Iacobelli, MD  
 Mark D. Rossi, PhD

**Introduction:** Patient's answers in questionnaires such as the WOMAC and SF-36 do not always correlate with the actual physical performance of the patients. We assessed the func-

tional performance of patients before surgery and compared it to the patient perceived outcomes.

**Methods:** We studied 51 patients undergoing primary TKA secondary to osteoarthritis. Patients were divided in two groups based on their preoperative ability to do a squat to 90 degrees (group 1=able; group 2=not able). The Timed Up and Go (TUG) test, PPO (WOMAC, QWB-7, SF-36) along with Knee Society Knee and Function Score (KSFS, KSFS), and Hospital for Special Surgery (HSS) scores were collected 2 weeks preoperatively in both groups. We compared the preoperative TUG, PPO, and knee scores within groups.

**Results:** Group 1 [19 patients (37%)] had significantly faster TUG performance (14.5 sec.), and better WOMAC total score (52.1), and QWB-7 (0.555) than group 2 (23.0 sec., 56.9, 0.529; respectively). Group 1 had significantly better KSFS (62.3), KSFS (49.5), and HSS Knee Score (67.3) when compared to group 2 (46.5, 38.1, 58.3; respectively). In group 1, correlations between TUG and PPO scores ranged from 0.02 (SF-36 social) to -0.7 (SF-36 role). The correlation coefficients ranged from 0.006 (SF-36 vitality) to -0.63 (KSFS) in group 2.

**Discussion and Conclusion:** Although some of the physical performance parameters correlated with patient oriented outcomes the global statistical agreement was weak. For patients who could squat to 90 degrees their PPO and knee scores were associated with faster mobility. PPO may be measuring attitudes and perceptions and not "real" outcomes.

#### Notes:

12:44pm–12:48pm

## Cost-Effective Prophylaxis Against Venous Thromboembolism After Total Joint Arthroplasty: Warfarin Versus Aspirin

Reza Mostafavi Tabatabaei, MD

Mohammad R. Rasouli, MD

Mitchell G. Maltenfort, PhD

Javad Parvizi, MD, FRCS

**Background:** Although recently published guidelines suggesting aspirin is an effective and safe agent for venous thromboembolism (VTE) prophylaxis in low risk patients following total joint arthroplasty (TJA), there are no studies comparing the cost and health benefits of aspirin with warfarin. This study aims to compare cost and health benefits of warfarin with aspirin using a Markov cohort cost-effectiveness analysis.

**Methods:** A Markov model was created. Pulmonary embolism, deep venous thrombosis, postphlebitic syndrome, chronic pulmonary hypertension, operative and non-operative site bleeding, and surgical site infection were defined in the model. Transition probabilities, costs, and quality-adjusted life-years (QALYs) for all events were obtained based on the available literature for aspirin and warfarin and type of TJA (total knee arthroplasty (TKA) or total hip arthroplasty (THA)).

**Results:** In all age groups and for both THA and TKA, aspirin cost less and saved more QALYs than warfarin (Table III). For either surgery, cost/QALY of aspirin increased with age. At the age of 55 years, cost per QALY gained by aspirin was \$24,506.20 following THA, which increased to \$47,148.10 at the age of 85. The corresponding numbers for TKA were \$15,117.20 and \$24,458.10 respectively. In THA patients, cost per QALY gained by aspirin was greater than the corresponding ages in the TKA group.

**Conclusion:** Aspirin is the preferred VTE prophylaxis agent in patients undergoing THA without history of VTE compared to warfarin. In patients with no prior VTE undergoing TKA, aspirin is also the preferred agent, although if the probability of VTE is high and the probability of bleeding is negligible, warfarin might be a better choice.

### Notes:

12:49pm–12:53pm

## Comparison Of Revision Rates Of Non-Modular Constrained Versus Posterior Stabilized Total Knee Arthroplasty

Mohamed E. Moussa, MD

Geoffrey H. Westrich, MD

Lily Lee, MS

Stephan Lyman, PhD

Robert Marx, MD, MSc, FRCSC

**Introduction:** Attaining stability during total knee replacement is essential for a successful outcome. When angular deformities result in attenuation of collateral ligaments, soft tissue-balancing techniques alone may be insufficient to achieve stability, and increasing constraint may be required. Although traditional constrained total knee prostheses have been used with intramedullary stems, some devices have been used as an intermediary option, without the use of stems, referred to as nonmodular constrained condylar total knee arthroplasty (NMCK). As many of these prostheses have been implanted at our institution, the goal of this study was to compare revision rates for mechanical failures compared to a traditional PS design.

**Methods:** Between May 2007 and Dec 2012, patients who received primary PS total knees were compared with patients who received primary NMCK implants from the same manufacturer. To reduce the effect of treatment selection bias and confounding in this observational study, we performed propensity score matching adjusting for the differences in the baseline characteristics. In the propensity score-matched cohort, implant survivorship was examined using a Cox proportional hazards model. The final cohort consisted of 817 PS total knees and 817 NMCKs. Reasons for revision were identified.

**Results:** The average follow-up was 51 months. After revisions for infection, fracture, and other causes were excluded, 11 PS knees required revision for mechanical failure (1.34%) compared to 19 NMCKs (2.32%). No significant difference was found between PS and NMCK with regard to risk of revision due to mechanical failure (Hazard ratio 1.75; 95% CI, 0.83-3.70).

**Discussion:** While revisions rates in both cohorts are quite low, we did see a trend towards a higher revision rate with NMCKs, but recognize that these cases can be more complex. Although these findings are consistent with reports of

midterm success with NMCKK prostheses, other studies have shown an incidence of femoral loosening, and stemmed fixation may be more appropriate in certain clinical situations.

**Notes:**

**Saturday, October 25, 2014**

**Rapid Fire Session 16D — Shoulder**  
(Station D, Ritz-Carlton Ballroom Foyer)

**Moderator:** Kevin D. Plancher, MD

12:24pm–12:28pm

## **Diagnostic Accuracy Of Non-Contrast MRI For Detecting Glenohumeral Cartilage Lesions**

Corinne VanBeek, MD  
Mohammad R. Rasouli, MD  
Mitchell G. Maltenfort, PhD  
Javad Parvizi, MD, FRCS

**Introduction:** The purpose of this study was to determine the prevalence of glenohumeral articular cartilage lesions in patients with rotator cuff tendinopathy and assess the accuracy of non-contrast magnetic resonance imaging (MRI) at detecting these defects compared to the gold standard of arthroscopy.

**Materials and Methods:** Non-contrast MRI images obtained in 84 consecutive patients undergoing shoulder arthroscopy for rotator cuff tendinopathy (mean age 54.8 yrs; range, 17-82) were prospectively evaluated for glenohumeral cartilage lesions. Two fellowship trained, experienced musculoskeletal radiologists, blinded from arthroscopic findings, independently evaluated the glenoid and humeral head cartilage on two occasions, separated by an eight week interval.

**Results:** At arthroscopy, humeral head cartilage lesions were detected in 23 patients (frequency, 27.4%) and glenoid cartilage lesions were found in 20 patients (frequency, 23.8%). There were 17 full (International Cartilage Repair Society

(ICRS) grade 3 and 4) and 6 partial (ICRS grade 1 and 2) lesions of the humeral head along with 13 full and 7 partial lesions of the glenoid. For detecting humeral lesions on MRI, the radiologists' combined accuracy was 78%, sensitivity was 43%, and specificity was 91%. The combined accuracy for detecting glenoid lesions on MRI was 84%, sensitivity was 53%, and specificity was 93%. Combining the readers, low-grade lesions (ICRS grades 1 and 2) of the glenoid and humerus were read as negative on MRI in 63% and 86% of cases, respectively. Inter-observer agreement for detecting humeral lesions with non-contrast MRI was fair ( $K = 0.24$ ) and considered moderate ( $K = 0.41$ ) for detecting glenoid lesions. The ICC was 0.24 for the size of humeral lesions and 0.47 for glenoid lesions, indicating fair and moderate agreement, respectively, between and among the radiologists' lesion characterizations and the surgeon's measurements.

**Conclusion:** Overall accuracy of non-contrast MRI at detecting a glenohumeral articular cartilage lesion is good, however, interpretation is reader dependent and accuracy is significantly reduced for detecting low-grade lesions. Based on these findings we recommend that patients with rotator cuff tendinopathy undergoing arthroscopy be informed that the presence and severity of cartilage lesions may be underestimated on MRI.

**Notes:**

12:29pm–12:33pm

## **Arthroscopic Rotator Cuff Repair: The Characterization Of Preoperative And Postoperative Sleep Disturbance**

Luke Austin, MD  
Matthew Pepe, MD  
Bradford S. Tucker, MD  
Alvin C. Ong, MD  
Robert Nugent, BS  
Brandon Eck, BS  
Fotios Tjoumakaris, MD

**Introduction:** Sleep disturbance is a common complaint of patients with a rotator cuff tear. Poor sleep, along with pain, are often the driving symptoms for patients to proceed with

rotator cuff repair. To date, no studies examine sleep disturbance in patients undergoing rotator cuff repair, and there is no evidence that surgery improves sleep disturbance. We hypothesize 1) that sleep disturbance is prevalent in patients with a symptomatic rotator cuff tear, and 2) that sleep disturbance improves following arthroscopic rotator cuff repair.

**Methods:** Fifty-six patients undergoing arthroscopic rotator cuff repair for full thickness tears were enrolled in a prospective study. Patients were surveyed preoperatively and post-operatively at intervals of 2, 6, 12, 18 and 24 weeks. Patient outcomes were scored using the Pittsburgh Sleep Quality Index (PSQI), Simple Shoulder Test (SST), Visual Analog Score (VAS), and single assessment numeric evaluation score (SANE). Demographic and surgical factors were also collected for analysis.

**Results:** Eighty-nine percent of patients reported preoperative PSQI scores indicative of sleep disturbance. Following surgery, a statistically significant improvement in PSQI was achieved at 3 months ( $p = 0.0012$ , SE 0.593, 91% follow-up) and continued through 6 months ( $p = 0.0179$ , SE 0.757, 93% follow-up). Sleep disturbance correlated with SST score, VAS pain score and SANE score all of which improved from baseline to final follow-up. Six months following surgery only 38% of patients continued to have sleep disturbance. Multi-variable linear regression of all surgical and demographic factors vs. PSQI was performed. Preoperative narcotic use was found to negatively affect sleep.

**Conclusions:** Sleep disturbance is common in patients undergoing rotator cuff repair. Following surgery sleep disturbance improves to levels comparable with the general public. The use of narcotic pain medication negatively affects sleep. As expected, following rotator cuff repair function (SST and SANE) improved and pain (VAS) decreased.

#### Notes:

12:34pm–12:38pm

## Timing Of Debridement And Infection Rates In Open Fractures Of The Hand: A Systematic Review

Joseph Dwyer, MD

\*Constantinos Ketonis, MD, PhD

Asif Ilyas, MD

**Introduction:** Existing literature on open fracture infection rates and treatment guidelines has focused primarily on long bone fractures, with limited guidelines available for open fractures of the hand. The aim of this study was to systematically review the available literature on open fractures of the hand to determine infection rates and the effect of timing of debridement and antibiotic administration.

**Methods:** Searches of the MEDLINE, EMBASE, and Cochrane computerized literature databases and manual searches of bibliographies were performed. All studies (retrospective and prospective) which included relevant data for open fractures of the hand were included. Descriptive and quantitative data were extracted.

**Results:** The initial search yielded 61 references. Twelve articles with 1669 open fractures of the hand were included. There were 77 infections (4.6% infection rate). Of the 1391 patients who received antibiotics in the perioperative period yielded a 4.4% infection rate. Of the 171 patients who did not receive antibiotics perioperatively had a 9.4% infection rate. Debridement within 6 hours of injury was clearly defined in two studies, including 188 fractures, with an infection rate of 4.2%. Debridement within 12 hours of injury defined in one study, including 193 fractures, resulted in a 3.6% infection rate. Two studies looked specifically at timing to debridement, showing no correlation to the incidence of infection.

**Discussion/Conclusion:** The available literature indicates that the overall infection rate for open fractures of the hand is relatively low. There is a correlation between the administration of antibiotics and infection rate. The majority of infections encountered after an open fracture can be treated successfully with antibiotics alone. The timing of debridement in open hand fractures has not been shown to alter infection rates. The infection rate for open fractures of the hand is relatively low. The timing to debridement has not been shown to alter infection rates.

#### Notes:

12:39pm–12:43pm

## Subscapularis Fatty Infiltration And Clinical Evaluation After Tenotomy In Total Shoulder Arthroplasty

Michael T. Freehill, MD

Iker Iribarri, MD

Juan Pons-Villanueva, MD, PhD

Christian Candrian, MD

Patric Raiss, MD

Gilles Walch, MD

**Introduction:** A subscapularis tenotomy utilized during total shoulder arthroplasty (TSA) has been suggested to produce detrimental effects on both muscle characteristics and clinical results. The aim of this study was to assess the structural changes of the subscapularis muscle and its clinical outcomes when subscapularis tenotomy was performed during TSA.

**Methods:** Retrospective report of 24 shoulders in 20 patients, after TSA was performed with subscapularis tenotomy, with a mean age of 67.4 years. At mean follow-up of 72.6 months, a clinical evaluation was performed, as well as postoperative CT scan to evaluate progression of fatty infiltration (FI) of the subscapularis muscle. Interobserver and intraobserver reliabilities for the assessment of subscapularis FI were also studied.

**Results:** Subscapularis FI increased significantly from a mean value of 0.70 to 1.65. No FI progression was observed in 6 (25%) shoulders, one stage progression in 12 (50%), two stages in 5 (21%), and 3 stages in 1 (4%). No difference in Constant score was observed between patients with lower postoperative FI (Goutallier Stage 0 and 1) and those with higher FI (Stages 2 and 3) of the subscapularis muscle. However, a higher gain in Constant score (50 points) was observed when subscapularis FI did not increase. For interobserver and intraobserver reliabilities, the strength of the agreement was low for both preoperative and postoperative assessments, when analyzed by kappa statistics.

**Conclusions:** Our data suggests progression of subscapularis FI can impact the gain seen in clinical outcome. However, these results are guarded secondary to the low reproducibility and the artifact of postoperative CT scans. This data suggests a need of an alternative method for assessing muscle characteristics. Prospective randomized studies are needed to further analyze differences both radiographically and clinically between subscapularis tenotomy and lesser tuberosity osteotomy.

Notes:

12:44pm–12:48pm

## The Prevalence Of Rotator Cuff Tears In Operative Proximal Humerus Fractures

Joseph A. Abboud, MD

**Introduction:** Proximal humerus fractures and rotator cuff tears (RCTs) have both been shown to have increasing rates with advancing age, theoretically leading to significant overlap in the two pathologies. The purpose of this study was to examine the prevalence, associated factors, and effect on treatment of rotator cuff tears in surgically treated proximal humerus fractures.

**Materials and Methods:** A retrospective review was performed of all adult patients who had surgery for a proximal humerus fracture from January 2007 to June 2012 in the Shoulder & Elbow department of a large academic institution. Patient demographics, fracture characteristics, type of surgery done, presence and management of rotator cuff tears, complications, and revisions were recorded. Logistic regression analysis was performed to determine which factors were associated with the presence of a rotator cuff tear. For those fractures with tears, description of tear pattern and management were recorded.

**Results:** 349 fractures were reviewed in 345 patients. Of these, 30 (8.6%) were found to have concomitant RCTs. Those with RCTs were older (average age 68.7 years vs. 63.1 years), more likely to have had a dislocation (40% vs. 12.5%), and were more likely to have undergone arthroscopic repair or reverse total shoulder arthroplasty than those without a RCT. Of the 30 RCTs, only 5 were known or suspected preoperatively. Most (22 of 30) were treated with suture repair at the time of surgery, but 5 patients received a reverse total shoulder arthroplasty based on the intraoperative finding of a RCT.

**Conclusion:** A concomitant RCT in association with a proximal humerus fracture is relatively common, though somewhat less than would be expected based on the average age of the patient population. RCTs are associated with older patients

and those with a fracture-dislocation, and in rare cases may require the availability of a reverse shoulder prosthesis.

**Notes:**

12:49pm–12:53pm

## A Survey Of Expert Opinion Regarding Rotator Cuff Repair

Daniel C. Acevedo, MD

\*Joseph A. Abboud, MD

E. Scott Paxton, MD

Gerald R. Williams, MD

**Introduction:** Many patients suffering from rotator cuff tears have important questions for their surgeon regarding surgery, perioperative management, restrictions, therapy and work after rotator cuff surgery. Answers to most of these questions are often variable.

**Materials and Methods:** We conducted an online survey of members of the American Shoulder and Elbow Surgeons (ASES) and the Association of Clinical Elbow and Shoulder Surgeons (ACESS) to determine how experts in shoulder surgery respond to frequently asked questions (FAQs) regarding rotator cuff surgery, as well as their thoughts and practice patterns on other issues relating to rotator cuff problems.

**Results:** We surveyed 372 members of the ASES and ACESS, and 111 members (29.8%) completed all or part of the survey. 92.8% respondents answered every question. We demonstrated a consensus response (>50% agreement) on 49% (24/49) of the questions. Of note we found that an abduction sling with a pillow was used by a majority of the respondents (54.5%) for 5-6 weeks after repair of all tear sizes. According to our survey, most shoulder surgeons allowed patients to return to work at a sedentary job at 1-2 weeks after surgery regardless of the tear size. This time frame increased with regard to a laboring job. Most shoulder specialists allow early, supervised physical therapy; however, we did not find a consensus agreement on time frame for the start of therapy. Routine DVT prophylaxis was not used by a large number of respondents. 92.2% (95/103) responded that they would per-

form a rotator cuff repair on a smoker.

**Conclusion:** We demonstrated a consensus response for 49% (24/49) of the questions in our study. Variability in responses likely reflects clinical practices that have evolved over time based on clinical experience. The purpose of our study was to determine common clinical practices among experts regarding rotator cuff repair to assist others in counseling their patients. Further research is needed to help clarify the best answers to some questions with variable responses.

**Notes:**

Saturday, October 25, 2014

Rapid Fire Session 16E — Basic Science  
(Station E, Ritz-Carlton Ballroom Foyer)

Moderator: Anil S. Ranawat, MD

12:24pm–12:28pm

## Smart Collagen-Specific Anchors For Tendon-Targeted Delivery Of Therapeutic Cells

Mark Wang, MD, PhD

Pedro K. Beredjiklian, MD

Jolanta Fertala, PhD

Andrzej Steplewski, PhD

Andrzej Fertala, PhD

**Introduction:** Fibrosis after tendon injury and repair remains a challenging clinical problem impacting patient functional outcome. Current molecular strategies to improve tendon healing have focused on modulating cellular responses at the injury site. Limitations of previously explored methods include the inefficient therapeutic cell delivery, failure to retain cells within the injury site, and potential safety concerns of cell-based treatment. Our laboratory has engineered a novel artificial collagen-specific anchor (ACSA), enabling the controlled targeting of therapeutic cells to collagen-specific sites.. Potential benefits of the ACSA include an inducible collagen-targeting anchor, controlled delivery and retention

of cells within an injury site, and decreased requirement of therapeutic cells and duration of treatment. The purpose of this study is to test the hypothesis that 1) GFP-tagged ACSA is expressed on the surface of engineered cells in a promoter dependent fashion, and 2) ACSA expression enhances the attachment of the cell construct to collagen, and that this expression does not interfere with cell proliferation.

**Methods:** The engineered construct includes the following features: Murine fibroblasts (NIH 3T3), specific anchoring to human type I collagen (C-terminus,  $\alpha$ 2 chain), tetracycline (Tet)-responsive promoter, and GFP tag for localization. The stable expression of the ACSA-GFP construct was confirmed by culturing the selected transfected cells in the presence or the absence of doxycycline (Dox). The presence of the ACSA-GFP was confirmed by Western blot and microscopy. Cell attachment assays were performed on cells expressing the ACSA construct (Tet-On) and non-induced cells (Tet-Off). Cells were seeded on human collagen I-coated plates. Proliferation assays were performed colorimetrically (Sigma-Aldrich).

**Results:** GFP-tagged ACSA is expressed on the surface of engineered cells in a Tet promoter-dependent fashion. Specific antibodies identified the following: the extracellular fragment of the construct, the GFP portion, and DAPI-stained nuclei. ACSA enhances the attachment of the cell construct to collagen, and this expression does not interfere with cell proliferation.

**Discussion/Conclusion:** Fibrosis after tendon injury remains a vexing clinical problem, and current molecular strategies for improving tendon healing are limited by inefficient and non-specific therapeutic delivery. This novel cellular construct enables the controlled expression of collagen-targeting anchors at the surface of therapeutic cells, enhancing cellular attachment to collagen-rich sites without disrupting cell proliferation. Potential benefits may include the controlled targeting of therapeutic cells to the injury site, improved tendon healing efficiency, and the reduced dispersion of cells into surrounding tissue.

#### Notes:

12:30pm–12:34pm

## Platelet-Rich Plasma Increases TGF-Beta Expression Following Autologous Osteochondral Transplantation In An In Vivo Rabbit Model

Ethan J. Fraser, MD

\*Lorraine A. Boakye, BA

Keir A. Ross, BS

Jonh M. Pinski, MS

Niall A. Smyth, MD

Amgad M. Haleem, MD, MSc

John G. Kennedy, MD, FRCS (Orth)

**Purpose:** Platelet-rich plasma (PRP) has been investigated as an adjunct to autologous osteochondral transplantation (AOT) and other cartilage repair procedures. Although the exact combination of growth factors essential to the restorative properties of PRP are unknown, transforming growth factor-beta1 (TGF- $\beta$ 1) has been suggested to stimulate mesenchymal stem cells and chondrocytes and inhibit catabolic activity. The aim of this study was to explore the effect of PRP on expression patterns of TGF- $\beta$ 1 following AOT in a rabbit model. We hypothesized that TGF- $\beta$ 1 would have a different expression pattern in cartilage of PRP treated compared to saline treated knees.

**Methods:** Twelve New Zealand white rabbits were treated with bilateral AOT. A randomly selected knee was injected with autologous PRP and the other knee received saline injection. Animals were euthanized at three, six, and 12 weeks post-operatively. TGF- $\beta$ 1 antibody was used to stain articular cartilage sections. Predetermined histological regions of interest (ROI) were evaluated in both donor and graft sites using computer software. The total number of chondrocytes and number of chondrocytes expressing TGF- $\beta$ 1 in each ROI were quantified. Analysis focused on the percentage of cells stained to control for variability in overall cellularity in each ROI.

**Results:** Percentage of cells stained was higher in PRP treated knees for all ROIs. The difference between staining at the right interface of graft and host tissue in PRP and saline treated knees was not significant ( $p=0.72$ ). This difference was significant in all other ROIs ( $p\leq 0.05$ ). There was a significantly higher percentage of cells stained in the PRP group compared to saline at each post-operative time point ( $p\leq 0.05$ ). Percentage of cells stained when combining data at all post-operative time points and ROIs indicated that TGF- $\beta$ 1

expression was higher in PRP knees ( $41\% \pm 27$  vs.  $15\% \pm 20$  ( $p<0.01$ )).

**Conclusions:** Femoral condyles of rabbits treated with PRP exhibit increased patterns of TGF- $\beta$ 1 expression compared to saline following AOT. Our findings suggest that adjunctive PRP may increase TGF- $\beta$ 1 expression. TGF- $\beta$ 1 may play a role in the chondrogenic effect of PRP *in vivo* and PRP may be a viable adjunctive therapy in cartilage repair.

#### Notes:

and TIMP-4 demonstrated a statistically significant increase in concentration for subjects older than 30 years of age compared to those 30 years and younger.

**Discussion and Conclusion:** TIMP-2 and TIMP-4 are global inhibitors of MMPs, including MMP-2 (Gelatinase A). MMP-2 targets native collagens, gelatin and elastin to remodel the extracellular matrix during wound healing. A decreased availability of pharmacologically active MMP-2 may diminish the effectiveness of the use of activated, concentrated platelets from older patients, and may also contribute to longer healing times in this population.

#### Notes:

12:36pm–12:40pm

### Variance Of Matrix Metalloproteinases (MMP) And Tissue Inhibitor Of Metalloproteinases (TIMP) Concentrations In Activated, Concentrated Platelets From Healthy Male Donors

Justin M. Hire, MD  
J. Lee Evanson, DO  
Peter C. Johnson, MD  
David L. Oliver, MD  
Steven D. Zumbrun, PhD  
M. Kelly Guyton, PhD  
John A. Bojescul, MD

**Introduction:** The use of autologous blood concentrates, such as activated, concentrated platelets, in orthopaedic clinical applications has had mixed results. Research on this topic has focused on growth factors and cytokines, with little directed towards matrix metalloproteinases (MMPs) which are involved in post-wound tissue remodeling.

**Methods:** In this study, the authors measured the levels of MMP-2, MMP-9 and ADAMTS13 in activated platelets derived from blood of healthy, male volunteers ( $n=92$ ), 19 to 60 years old. The levels of the pharmacological inhibitors of these proteases, tissue inhibitor of metalloproteinase 1 (TIMP-1), TIMP-2 and TIMP-4 were also assessed.

**Results:** Notably, there was no significant change in concentration with age in four of six targets tested. However, TIMP-2

12:42pm–12:46pm

### Elimination Of Overlap In Small And Ring Metacarpal Measurements

Michael Rivlin, MD  
\*Nayoung Kim, BS  
Kevin Lutsky, MD  
Pedro K. Beredjikian, MD

**Introduction:** To date, only plain radiographic definitions of normal anatomical parameters have been described. Our study aims to describe normal anatomic measurements of small and ring metacarpals relevant to determining fracture displacement using a novel digital reconstruction technique based on raw CT image data. We hypothesize that current plain x-ray data incorrectly describes normal metacarpal anatomy in the lateral plane.

**Methods:** Thirty-five scans of the small and 30 scans of the ring metacarpals form the basis for this study. Using custom digital 3D image reformatting software, CT sections were reconstructed in the plane of each studied metacarpal. The 3D images were converted to sagittal and coronal weighted projections to represent lateral and posteroanterior (PA) two dimensional images that are equivalent to ‘perfect orthogonal’ radiographs. Using a customized image measurement program, shaft lengths, shaft-bending angle (SBA), and capital-axis angle (CAA) were measured.

**Results:** Our results show that CAA averaged 14 and 12 degrees in the ring and small metacarpals respectively. Apex dorsal SBA averaged 12 and 10 degrees in the ring and small metacarpals respectively. On the PA images the shafts are nearly straight. In contrast to prior reported values, we found the CAA to be less acute and the metacarpal curvature less pronounced on the lateral projection. We also demonstrated that much of the metacarpal apex dorsal bend is in the shaft itself.

**Discussion/Conclusion:** Normal anatomic parameters of metacarpals are based primarily on radiographic data, and as such are limited due to bony overlap in the lateral plane, as well as imperfect radiographic projections that are known to distort anatomical relationships. This novel method of image reconstruction eliminates metacarpal overlap and defines precise anatomical reference for metacarpals. Our novel imaging modality reveals differences in anatomic parameters compared to accepted existing data based on plain radiographs.

**Notes:**

12:48pm–12:52pm

## Interobserver Reliability In The Measurement Of Hand Compartment Pressures

Justin C. Wong, MD

\*Michael M. Vosbikian, MD

Joseph Dwyer, MD

Asif Ilyas, MD

**Introduction:** Compartment syndrome of the hand is an uncommon but potentially devastating diagnosis. Its timely diagnosis is dependent upon accurate physical examination or compartment pressure measurements. However, the efficacy of either technique in the hand has not been previously established. The aim of this study was to determine the reliability and accuracy of clinical assessment of elevated intracom-

partmental pressure by physical examination compared with needle measurement in a simulated compartment syndrome of the hand.

**Methods:** Cadaveric hands were configured with intravenous fluid infusion and an arterial line monitor to create and continuously measure intracompartmental pressures in the thenar and hypothenar compartments. Seventeen assessors were asked to determine the presence or absence of compartment syndrome based on physical exam and handheld intracompartmental measurements. A pressure of 30 mmHg or greater was positive for compartment syndrome.

**Results:** By clinical examination of the thenar eminence, the sensitivity and specificity of diagnosing compartment syndrome was 48.6% and 78.6%, respectively, with a positive predictive value (PPV) of 85.7% and negative predictive value (NPV) of 36.7%. Using the handheld intracompartmental monitor, the sensitivity and specificity increased to 97.3% and 85.7% with a PPV of 94.7% and an NPV of 92.3%. By clinical examination alone, diagnosis of compartment syndrome in the hypothenar compartment revealed a sensitivity and specificity of 61.6% and 83.3% with an increase to 100% and 100% with handheld monitoring, respectively. For the hypothenar compartment, the use of handheld monitoring improved the PPV from 92.3% to 100% and the NPV from 40% to 100%, compared with physical exam alone.

**Discussion/Conclusion:** In contrast to handheld intra-compartmental needle monitoring, physical examination demonstrates poor sensitivity and specificity in the diagnosis of compartment syndrome. We strongly recommend the use of handheld invasive pressure monitoring in order to augment the accuracy and reliability of the diagnosis of compartment syndrome and potentially improve patient outcomes.

**Notes:**

**Saturday, October 25, 2014**

**General Session 17- Mixed Topics**  
*(Ritz-Carlton Ballroom Salon 1)*

**Moderator:** Adam J. Rana, MD

12:58pm–1:04pm

**Elevated Hemoglobin A1C Levels Correlate With Blood Glucose Elevation In Diabetic Patients Following Local Corticosteroid Injection In The Hand: A Prospective Study**

Pedro K. Beredjiklian, MD

\*Nayoung Kim, BS

Jake Schroeder, BA

Jonas L. Matzon, MD

Kevin Lutsky, MD

C. Edward Hoffler II, MD, PhD

**Introduction:** Locally administered corticosteroids elevate serum glucose levels in diabetic patients. Hemoglobin A1C (HA1C) is the mainstay measure of plasma glucose control over time in diabetics. The purpose of this study is to test that HA1C levels are directly correlated to the degree of the hyperglycemic response to corticosteroid injections in diabetics.

**Methods:** We prospectively investigated diabetic patients presenting with disorders of the hand or wrist requiring an injection of corticosteroid. We excluded patients who required more than one injection. Twenty one patients (twelve women, nine men) with an average age of 63 years were included. Ten patients were insulin dependent diabetics, while eleven were non-insulin dependent diabetics. An injection of 1 mL /10 mg triamcinolone acetonide was given for the diagnoses of trigger finger (n=13), DeQuervain's tenosynovitis (n=3), carpal tunnel syndrome (n=2), thumb basal joint osteoarthritis (n=2), and wrist tendonitis (n=1). The most recent HA1C level and the normal fasting blood glucose levels were obtained. Post-injection glucose levels were performed daily.

**Results:** The average HA1C level was 6.8 mmol/mol (range 5.6 – 10.0). The average blood glucose level was 116 mg/dL (range 90-160) prior to injection, and increased to 208 mg/dL (range 123-385) at 24 hours post-injection. The majority (62%) had the highest hyperglycemic levels within 24 hrs of the injection, and the average duration of hyperglycemia was 2.3 days (range 1-8). Insulin dependent diabetics had signifi-

cantly higher post-injection blood glucose levels than non-insulin dependent. There was a significant correlation between high baseline HA1C levels and the extent to which glucose levels increased post-injection ( $r=0.76$ ). But no correlation for the duration of the hyperglycemic event ( $r=0.32$ ).

**Discussion/Conclusion:** It appears that baseline HA1C levels correlate strongly with the degree of blood glucose elevation following local administration of corticosteroids in the hand, and may represent an important tool for patient education in this common clinical scenario.

**Notes:**

1:06pm–1:12pm

**Founders' Award**

**Fluoroscopic Radiation Exposure: Are We Protecting Ourselves Adequately?**

C. Edward Hoffler II, MD, PhD

Asif Ilyas, MD

**Introduction:** While traditional intraoperative fluoroscopy protection relies on thyroid shields and aprons, recent data suggest that eyes and hands receive more exposure than previously appreciated. We examined which part of the surgeon is most at risk during distal radius fracture surgery to determine how much personal shielding equipment can decrease exposure.

**Methods:** An anthropomorphic model was fit with radiation-attenuating glasses, a thyroid shield, apron and gloves.

“Exposed” thermoluminescent dosimeters overlaid protective equipment at the eyes, thyroid, chest, groin and index finger while “Shielded” dosimeters were placed beneath the protective equipment. The model was positioned at a hand table with its hands flanking a volar plated distal radius sawbone. Fluoroscopy position and settings were standardized. Three mini and three standard c-arms scanned the wrist for 15 continuous minutes each. Ten dosimeter exposures were recorded for each c-arm.

**Results:** Hand exposure averaged 3.1 mrem/min (range 2.2-4.8), or 14.9 times more than other recorded exposures. Eye exposure averaged 0.4 mrem/min, or 1.7 times more than average thyroid, chest and groin exposure. Gloves reduced hand exposure 69.4%. Glasses decreased eye exposure 65.6%. Hand exposure with the mini was 26.5% less than the standard. Eye exposure was 165% less with the mini.

**Discussion/Conclusion:** Surgeons' hands receive the most radiation exposure during fluoroscopy. Radiation-attenuating gloves substantially reduced exposure. Eyes are exposed as well, but to a lesser extent. Minimum safe is exposure level is debatable. Radiation-attenuating glasses substantially reduced exposure. Thyroid, chest and groin exposure is minimal, yet these areas are most commonly protected. Some but not all mini c-arm units have lower exposure than standard units. This may reflect source placement within the c-arm housing, duty cycle and filtering. During fluoroscopy, surgeons' hands experience the largest exposure, which can be mitigated by protective equipment and fluoroscopy selection. Some but not all mini c-arm units have lower exposure than standard units.

**Notes:**

1:14pm–1:20pm

**Resident/Fellow Travel Grant Award**

**Conservative Management Of Elbow Dislocations With An Overhead Motion Protocol**

Joseph J. Schreiber, MD

Sophia Paul, BA

Robert N. Hotchkiss, MD

Aaron Daluiski, MD

**Introduction:** The preferred management of simple elbow dislocations is a non-operative rehabilitation protocol. Initiat-

ing early mobilization is integral to optimizing functional and motion outcomes, but must be done appropriately to minimize the risk of recurrent instability. We managed a cohort of patients who had sustained a simple elbow dislocation with an overhead motion protocol, and hypothesized that immediate motion in an inherently stable position could maximize range of motion and functional outcomes while minimizing the risk of recurrent instability.

**Methods:** 27 patients were included who sustained a simple elbow dislocation and were treated non-operatively with an overhead motion protocol designed to convert gravity from a distracting to a stabilizing force. Motion was initiated at an average of 1.3 days following initial presentation, and average follow-up was 27 months. Final arc of motion and prevalence of instability were the primary outcomes measures.

**Results:** Final mean arc of motion was 6 to 137 degrees in the flexion-extension axis, with 87 degrees of pronation and 86 degrees of supination. No recurrent instability was observed in this cohort, and all patients were fully functional and without limitations at latest follow-up.

**Conclusion:** We demonstrate that with an appropriate, supervised rehabilitation protocol, early motion can be initiated following an elbow dislocation event, and excellent functional outcomes can reliably be obtained. The motion protocol utilized in this cohort places patients in a supine position with the arm overhead, thereby minimizing the varus and distraction gravitational force and transitioning the triceps into an elbow stabilizer. The early motion maximizes the ability to achieve a full flexion-extension arc, while the positioning allows the collateral ligamentous complexes to heal in an isometric fashion. A functional arc of motion was reliably obtained, with no observed cases of recurrent instability.

**Notes:**

1:22pm–1:28pm

**Resident/Fellow Travel Grant Award****Targeting Skeletal Metastases Using HPMA Copolymer Nanoparticle Delivery And Retention**

Alexander B. Christ, MD

Chloe Horowitz, BS

Yen Hsun Chen, BS

P. Edward Purdue, PhD

Steven R. Goldring, MD

John H. Healey, MD

**Introduction:** Skeletal metastasis from carcinoma affects 350,000 patients in the United States each year. Current strategies for bone lesions include radiation and systemic chemotherapy, which are associated with significant local and systemic complications. Solid tumors and inflammatory tissues demonstrate preferential uptake and retention of nanoparticles through the Enhanced Permeability and Retention (EPR) effect, which are then internalized and sequestered into the lysosomal compartments of myeloid cells via ELVIS (Extravasation through Leaky Vasculature and subsequent inflammatory cell-mediated Sequestration). Myeloid populations are critical in the local control of tumor cell growth and survival, and macrophage differentiation may be essential in that process. Therefore, one strategy may be to target the macrophage populations of tumors, in addition to the carcinoma cells themselves. The goals of this study were to develop a model for carcinoma metastatic to bone, to confirm HPMA nanoparticle localization to the site of the tumor, and to harvest TAMs (tumor-associated macrophages) to confirm uptake of HPMA.

**Materials and Methods:** MDA-MB-231 osteotropic human breast carcinoma cells were injected into the right tibial plateau of Balb/c nude mice, followed by control injections into the left tibial plateau. The mice were then followed with weekly radiographs for evidence of tumor. Once tumor growth was confirmed, HPMA coupled to IR Dye and Alexa Fluor was administered via retro-orbital injection. The mice were then infrared imaged *in vivo* at 3 hours, 24 hours, and 48 hours post-injection, sacrificed, and their tumors harvested for histologic, cellular, and biochemical analysis.

**Results:** Tumors were successfully grown in 13/22 mice. All tumors demonstrated HPMA localization to the tumor, and

HPMA deposition within the tumor bed was confirmed with confocal microscopy.

**Discussion and Conclusion:** We have successfully developed a model to test metastatic carcinoma in mice, and have demonstrated HPMA nanoparticle localization to these tumors *in vivo*. This model can be used for targeted drug delivery to metastatic cancer in bone, and to further explore the role of TAMs in promoting or preventing tumor growth.

**Notes:**

1:30pm–1:36pm

**Red Cell Distribution Width: An Unacknowledged Predictor Of Mortality Following Revision Arthroplasty**

Pouya Aljanipour, MD

Snir Heller, MD

Fatih Kucukdurmaz, MD

Benjamin Zmistowski, MD

Javad Parvizi, MD, FRCS

**Introduction:** Red blood cell distribution width (RDW), a measure of erythrocyte heterogeneity, is routinely reported in complete blood cell analysis. It has been shown to be a mortality predictor in patients with acute and chronic heart failure, peripheral artery disease, pulmonary disease and acute kidney injury. The purpose of study was to examine whether RDW levels could be related to mortality following revision total joint arthroplasty.

**Methods:** In this single institutional retrospective study, 2,261 patients who underwent revision hip or knee arthroplasty during 2000-2009 were included. Postoperative mortality at one, three, and twelve months was assessed. Patients with hereditary anemias were excluded. Age, gender, BMI, Charlson comorbidity index and specific comorbidities were incorporated into multivariate analysis. Optimal thresholds were calculated based on receiver operating characteristic (ROC) analysis.

**Results:** The mortality rates at one, three, and twelve months postoperatively were 0.9, 1.3 and 3.1%, respectively. Mean

preoperative RDW values during admission were significantly higher in patients deceased at one (15.4 versus 14.1), three (15.6 versus 14.1), and twelve (15.4 versus 14.1) months. The final postoperative RDW values were also significantly higher in patients deceased at one (16.1 versus 14.6), three (16.3 versus 14.6), and twelve (16.2 versus 14.5) months. Both preoperative and final postoperative RDW values were independently correlated with mortality at all time points. ROC provided an optimal threshold for the final RDW prior to discharge of 14.65 to predict 90-day mortality (sensitivity: 87%, specificity: 61%).

**Conclusion:** RDW is an inexpensive parameter that is an independent predictor of mortality following revision arthroplasty. It should be analyzed as part of the routine perioperative work-up and used to counsel patients on their postoperative risk. Higher RDW values (anisocytosis) might reflect the sum of multiple physiologic impairments that ultimately lead to a fatal outcome.

**Notes:**

1:38pm–1:44pm

## Medicare Audits: Are We Hurting Our TKA Patients?

David A. Iacobelli, MD

\*Jesus M. Villa, MD

Carlos J. Lavernia, MD

Lawrence Brooks, PhD

**Introduction:** Pain is an important indication for arthroplasty surgery. Insurance companies and in particular Medicare are refusing to pay for a knee arthroplasty until the pain level is stratospheric and in some cases requiring 3 months of conservative management. Our objective was to assess the effects of the presurgical pain level on the outcome of TKA.

**Methods:** A consecutive series of 298 TKA patients were interviewed prior to surgery and at minimum 2-years following surgery. Statistical analyses were conducted to examine the effect of premorbid pain and other patient characteristics on outcomes (WOMAC, SF-36, and QWB-7). A high pain

(n=145) and low pain (n=153) group were determined by a median split of preintervention WOMAC pain scores. Stepwise regression analysis was used to determine whether presurgical WOMAC pain scores predicted follow-up WOMAC function score when controlling for key demographic and clinical variables.

**Results:** After surgery, subjects with high presurgical pain levels had significantly worse outcomes than those with low pain levels as measured by QWB-7 [0.571+/-0.01 (S.E.) vs. 0.625+/-0.01], SF-36 Bodily Pain (60.31+/-2.12 vs. 73.85+/-1.92), SF-36 Physical Functioning (42.22+/-2.11 vs. 52.27+/-1.88), WOMAC Pain (2.35+/-0.34 vs. 0.88+/-0.19), WOMAC Function (10.36+/-1.13 vs. 5.5+/-0.75), WOMAC Stiffness (0.84+/-0.13 vs. 0.33+/-0.07), and WOMAC Total scores (13.55+/-1.53 vs. 6.71+/-0.94). Stepwise regression analyses found that age at follow-up, Hispanic ethnicity, and baseline WOMAC pain scores significantly predicted follow-up WOMAC function scores. The pre-intervention WOMAC pain score was the strongest predictor of outcome.

**Discussion and Conclusion:** Preintervention pain significantly influences patient-reported outcomes after TKA. Our data suggests that waiting until a patient experiences extreme levels of pain before operating will lead to worse outcomes.

**Notes:**

1:46pm–1:52pm

## Modern Tapers Are More Flexible: A Mechanical Analysis Of THA Trunnion Designs

David A. Porter, MD

Robert M. Urban, PhD

Joshua J. Jacobs, MD

Jeremy L. Gilbert, PhD

Jose A. Rodriguez, MD

H. John Cooper, MD

**Background:** There is renewed concern surrounding the potential for corrosion at the modular head-neck junction to cause early failure in modern hip implants. Although taper corrosion involves a complex interplay of many factors, previ-

ous studies have correlated decreasing flexural rigidity of the femoral trunnion with an increased likelihood of corrosion at retrieval. Purpose: This study was designed to document the flexural rigidity of various trunnion designs, and to describe historical trends in how trunnions have changed over time.

**Methods:** A multi-center retrieval analysis of 85 modular femoral stems was performed to calculate the flexural rigidity of various femoral trunnions. Stems were implanted between 1991-2012 and retrieved between 2004-2012. There were 10 different taper designs from 16 manufacturers. Digital calipers were used to measure taper geometries by two independent observers.

**Results:** Mean flexural rigidity was 262 Nm<sup>2</sup>, however there was a wide range of values among the various stems spanning nearly an order of magnitude between the most flexible (80 Nm<sup>2</sup>) and most rigid (623 Nm<sup>2</sup>) trunnions, which was due in part to the taper geometry and in part to the material properties of the base alloy. There was a significant negative correlation between flexural rigidity of the trunnion and release date of the stem.

**Conclusions /Clinical Relevance:** This wide variability in flexural rigidity may predispose particular prostheses to an increased risk of corrosion at the modular head-neck taper, and may in part explain why taper corrosion is being seen with increasing frequency in modern hip arthroplasty.

#### Notes:

1:54pm–2:00pm

## Surgical Case Order In Total Joint Arthroplasty Has No Effect On Infection Risk

Antonia F. Chen, MD, MBA

Joshua Greenbaum, BA

Camilo Restrepo, MD

Mitchell G. Maltenfort, PhD

Javad Parvizi, MD, FRCS

**Introduction:** Periprosthetic joint infections (PJIs) in total joint arthroplasty (TJA) patients are terrible complications,

but no study has been conducted to evaluate whether surgical case order affects the development of PJIs. Thus, the purposes of our study were to determine if surgical case order was an independent risk factor for PJI in TJA, and if TJA patients that follow an infected case have a higher infection risk.

**Methods:** A retrospective study was conducted on 12897 TJAs (6686 total hip arthroplasty–THA, 6211 total knee arthroplasty–TKA) at a single institution from 2007-10. Patients were included if they were undergoing primary or revision TJA for septic or aseptic reasons. Surgical case order was determined by the case start time on the day of surgery within the same operating room. Development of a PJI was determined by the MSIS criteria. Logistic regression was used to estimate the effect of case order and presence of prior infected case on the likelihood of a patient being infected.

**Results:** The average infection rate in THA was 1.1% and TKA was 1.2%. For THAs, there were 2339 first cases, 2027 second cases, 1467 third cases, 769 fourth cases, and 165 fifth or higher cases. For TKAs, there were 1792 first cases, 1756 second cases, 1577 third cases, 878 fourth cases, and 208 fifth or higher cases. Neither case order nor prior infected case were significant in any of these analyses. An infected case preceded non-infected cases in 105/12897 TJAs (0.81%,*p*=0.82). Case order had an odds ratio of 1.0 (95%CI 0.9-1.1,*p*=0.97) per increment in position, implying that even if the sample size were large enough for statistical significance, the result would still not be clinically meaningful.

**Discussion and Conclusion:** Our study demonstrates that surgical case order is not an independent risk factor for PJI, and TJA patients that follow an infected case do not have a higher infection risk. With improved sterile technique, the risk of developing a subsequent infection may be less likely.

#### Notes:





# Eastern Orthopaedic Association

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## Scientific Poster Exhibits

October 23 – 25, 2014

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Poster presenters will have an opportunity to report their findings at designated times indicated on the Meeting-at-a-Glance Schedule.

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Scientific Posters will be on display during the Scientific Program in Ritz-Carlton Ballroom Foyer.

Please plan to visit the Scientific Posters.

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# 2014 Poster Abstracts

## Thursday-Saturday

(An asterisk (\*) by an author's name indicates the presenter.)

### Poster 1

#### Suture Anchor Fixation Of Displaced Olecranon Fractures In The Elderly

Dexter Bateman, BS

\*Joseph A. Abboud, MD

Jonathan Barlow, MD, MS

Corinne VanBeek, MD

**Introduction:** Olecranon fractures are common in elderly patients, causing significant morbidity and functional impairment. Traditional surgical treatments are often complicated by hardware failure and prominence, frequently requiring reoperation. To address these concerns, a suture anchor fixation technique was developed and clinically evaluated.

**Methods:** A consecutive series of elderly patients treated with this technique from January 1, 2006 to December 31, 2013 at a single institution was studied. All cases were surgically repaired using biocomposite fully threaded suture anchors in a double row fashion. Each patient was evaluated with a physical examination, radiographs, and the following clinical outcome measures: the Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH) score; the Oxford Elbow Score (OES); and the Short-Form Health Survey (SF-12).

**Results:** Nine female patients with Mayo IIA or IIB fractures were identified. The mean patient age at time of operation was  $73.6 \pm 10.0$  years (range 59.3 – 88.8 years). The average time from injury to operation was 5.2 days  $\pm$  3.4 days. The average time from operation to long-term follow-up was 5.1 years  $\pm$  2.5 years (range: 0.8 – 7.4

years). Six patients were available for long-term follow-up. One patient had deceased, and two patients were unable to be contacted despite multiple attempts. There were no intraoperative complications or reoperations. Eight of nine patients healed uneventfully in acceptable position without displacement. Postoperatively, the average Oxford Elbow Score (OES) was  $47.17 \pm 2.04$ ; the average QuickDASH score was  $6.43 \pm 9.47$ ; and the average Short-Form Health Survey (SF-12) scores were  $49.02 \pm 16.59$  and  $55.38 \pm 4.05$  for the physical and mental component scales, respectively.

**Discussion and Conclusion:** Suture anchor fixation of olecranon fractures in the elderly population provides excellent long-term radiographic and clinical outcomes. Importantly, this technique reduces complications and reoperations for symptomatic hardware, as compared with traditional surgical treatments.

### Poster 2

#### Complications And Mortality In Chronic Renal Failure Patients Undergoing Total Joint Arthroplasty

Priscilla K. Cavanaugh, MS

Antonia F. Chen, MD, MBA

Mitchell G. Maltenfort, PhD

Mohammad R. Rasouli, MD

Zachary D. Post, MD

Fabio R. Orozco, MD

Alvin C. Ong, MD

**Introduction:** There is a paucity of large studies comparing chronic kidney disease (CKD) and end stage renal disease

(ESRD) versus non-CKD/ESRD patients undergoing TJA. This study aims (1) to identify in-hospital complications and mortality in CKD/ESRD and non-CKD/ESRD patients, and (2) to compare in-hospital complications and mortality between dialysis and renal transplantation patients undergoing TJA.

**Methods:** Using the ICD-9 diagnosis and procedure codes, we queried the Nationwide Inpatient Sample database for patients with and without the diagnosis of CKD/ESRD undergoing primary or revision total knee or hip arthroplasty from 2007 to 2011. The same coding system was used to determine in-hospital complications. There were 38,308 renal failure and 978,378 non-CKD/ESRD arthroplasty cases. Further, the renal failure group was divided into a renal transplant group ( $n=1,055$ ) and dialysis group ( $n=1,747$ ).

**Results:** In multivariate analysis, CKD/ESRD was associated with greater risk of surgical site infection (SSI) (OR= 1.4, 95% CI: 1.3-1.5), wound complications (OR=1.1, 95% CI: 1.0-1.2), transfusions (OR= 1.6, 95% CI: 1.5-1.6), deep vein thrombosis (OR=1.2, 95% CI: 1.0-1.4) and mortality (OR= 2.1; 95% CI: 1.8-2.5) than non-CKD/ESRD patients. Dialysis patients had significantly higher rates of SSI, wound complications, transfusions and mortality compared to renal transplant patients.

**Discussion and Conclusion:** Our findings emphasize the importance of CKD as a predictor of clinical outcome in TJA. Appropriate CKD patients who are renal transplant candidates may benefit from transplantation prior to TJA if they are on dialysis.

### Poster 3

## The Alpha-Defensin Biomarker For PJI Responds To A Wide Spectrum Of Organisms

Carl Deirmengian, MD

Alexander Cameron, BS

Kevin Schiller, BS

Michael Citrano, BS

Simmi Gulati, RM (ASM)

Patrick Kilmartin, BS, MS

Keith Kardos, PhD

**Introduction:** Alpha-Defensin has been identified as a highly accurate synovial fluid biomarker for peripros-

thetic joint infection (PJI), and has been previously demonstrated to match the MSIS definition for PJI. The purpose of this study is to describe the breadth of organisms that stimulate alpha-defensin during PJI, and secondarily, to identify any organism-specific influence on alpha-defensin levels.

**Methods:** A retrospective review of 1937 de-identified synovial fluid samples having both the Synovasure PJI test and culture identified 498 alpha-defensin-positive samples, and 1439 alpha-defensin-negative samples. Samples were received from 418 surgeons in 42 states. 239 of the alpha-defensin-positive synovial fluid samples (48%) had organism growth from the synovial fluid, whereas only 19 of the alpha-defensin-negative samples (1.3%) had organism growth. A total of 41 different species of bacteria and yeast were isolated and classified by cell type, species, Gram-type, and virulence. Mean alpha-defensin signal to cutoff (S/CO) levels were calculated for these various classifications of organisms, and the ANOVA test was utilized to identify any potential organism-specific influences on the synovial fluid alpha-defensin level.

**Results:** All organisms typically isolated in relationship to arthroplasty were found to result in a positive synovial fluid alpha-defensin level. The mean semi-quantitative alpha-defensin S/CO among 239 alpha-defensin positive, culture-positive samples was 4.68, compared to 0.30 among 1439 alpha-defensin-negative samples. Gram-positive bacteria (87%), gram-negative bacteria (10 %), and yeast (3%) demonstrated no statistically significant differences in the mean associated synovial fluid alpha-defensin S/CO (4.7, 5.3, 3.8 respectively). Similarly, the virulence of the organism had no statistically significant influence on the mean alpha-defensin S/CO.

**Conclusions:** This study demonstrates that a wide variety of gram-positive bacteria, gram-negative bacteria, and yeast result in a positive synovial fluid alpha-defensin level, without any evidence of an organism-specific influence. The alpha-defensin test appears to provide diagnostic value for PJI, regardless of the infecting organism.

**Poster 4**

## **Systemic Manifestation Of Periprosthetic Infection Is Associated With Increased In-Hospital Mortality**

Gregory K. Deirmengian, MD

Anthony Tokarski, BS

Javad Parvizi, MD, FRCS

Alex Uhr, BS

**Introduction:** Although it is known that patients with systemic inflammatory response syndrome (SIRS) and septicemia can have increased in-hospital complications, few have investigated systemic illness in the presence of periprosthetic joint infection (PJI). The purpose of this study was to determine the incidence of SIRS in patients with acute PJI treated on an urgent basis and to report outcomes in these patients.

**Methods:** Using our institutional database, we identified all patients surgically treated for deep PJI on an urgent basis from 2002-2012. Electronic medical records were used to collect patient demographics, preoperative vital signs, blood culture results, in-hospital mortality, ICU admissions, and subsequent reoperation for deep infection. Patients were classified as having SIRS based on the criteria set by the American College of Chest Physicians.

**Results:** During the study period, 491 patients were treated for deep PJI on an urgent basis. Of those, 128 (26%) developed SIRS preoperatively. At least one concomitant blood culture was present in 30 (6%) of the patients with SIRS. In total, there were 7 in-hospital deaths for our cohort. Patients with SIRS and at least one positive blood culture were at a significantly higher risk of in-hospital mortality (10% vs 0.9%; p = 0.002). Systemic illness was not an independent risk factor for ICU admission or recurrence of PJI.

**Discussion and Conclusions:** Our study demonstrates that patients who develop SIRS preoperatively and present with concomitant positive blood cultures are at an increased risk of in-hospital mortality. We have also shown that there is a high incidence of preoperative SIRS in patients with acute PJI. Given these findings, careful medical management should be undertaken in patients presenting with systemic illness in the presence of PJI.

**Poster 5**

## **Results Of Operative Intervention For Post-Traumatic Finger Stiffness**

Joseph Dwyer, MD

\*Constantinos Ketonis, MD, PhD

Jonas L. Matzon, MD

Kevin Lutsky, MD

Nayoung Kim, BS

Pedro K. Beredjiklian, MD

**Introduction:** Surgical treatment of post-traumatic finger stiffness can be challenging, and there is a paucity of data in the literature regarding outcomes of operative intervention for this common clinical problem.

**Methods:** We retrospectively identified all patients over a three year period who underwent an operative procedure to improve post-traumatic finger stiffness. We included only patients who were undergoing soft tissue procedures (tenolysis, capsular releases) without bony reconstruction. Nineteen patients had procedures including capsulectomy, tenolysis, and hardware removal. We collected demographic data including age, initial diagnosis and treatment, health history, and workers compensation status. We recorded the number of days between surgical release and initiation of therapy. Total Active Motion (TAM) was recorded prior to surgical release and at the patient's last follow up. Patients were followed until range of motion plateaued in physical therapy.

**Results:** Average follow up was 151 days. Improvements in TAM after surgical release averaged 42 degrees (range = -30 to 115). Four patients had a net decrease in TAM after release. Patients who started physical therapy within seven days (avg. 2.7 days) of the release improved by an average of 57.3 degrees, whereas those who started physical therapy after seven days (avg. 11.5 days) lost an average of 19.3 degrees. Patients with worker's compensation claim improved an average of 9.3 degrees, compared to 55.9 degrees for non-worker's compensation patients. Degree of TAM improvement had a very weak correlation with patient age or preoperative TAM.

**Discussion/Conclusion:** Surgical release for stiff fingers can offer modest improvements in select patients, but the overall results of these operations are generally limited. Immediate physical therapy is essential to maximize improvements in TAM postoperatively. Patients involved in worker's compen-

sation claims demonstrated significantly lower TAM improvement after surgical intervention.

### Poster 6

## Intraoperative Femur Fracture During Primary Total Hip Arthroplasty and Hemiarthroplasty

David S. Geller, MD

\*Robert Brochin, BS

Simon Greenbaum, BA

**Introduction:** Total hip arthroplasty and hemiarthroplasty are commonly performed orthopedic procedures with over 300,000 performed annually in the US. These numbers can be expected to increase with the aging population. Intraoperative femur fracture during femoral stem implant is a recognized event that may result in additional cost and complications for the patient. The purpose of this study is to evaluate the incidence of this event.

**Methods:** A retrospective observational review of x-ray images following all primary press fit total hip arthroplasties and hemiarthroplasties over a 3-year period (January 2010-December 2012) was performed at an academic medical center. Intraoperative fracture was considered when cerclage wire was noted. Statistical difference between genders and age cohorts (less than 65 vs. greater than or equal to 65 years) was performed using chi-square analysis.

**Results:** A total of 859 primary non-cemented total hip arthroplasties and hemiarthroplasties were performed in 859 unique patients over the study period. The study population consisted of 509 females and 350 males with an average age of 65.8 years and an age range of 15-102 years. Intraoperative fracture occurred in 49 cases (5.7%). The average age of patients with intraoperative fracture was 68.1 years with a range of 21-102 years. Intraoperative fracture occurred in 11.1% of patients greater than 91 years, but there was not a significant difference in fracture incidence between age cohorts. Fracture occurrence rates in females (33, 6.5%) and males (16, 4.6%) did not significantly differ.

**Discussion and Conclusion:** An intraoperative fracture rate of 5.7% falls within previously reported ranges of fracture incidence in press fit hip arthroplasty. These findings suggest realized intraoperative fracture may occur in approximately

17,000 patients per year. Cost of revision, additional surgery, and limb length discrepancies may carry significant burden. Clinicians should be cognizant of this potential complication.

### Poster 7

## Plate Versus Screw Fixation of Radial Neck Fractures: A Biomechanical Study

Christina J. Gutowski, MD, MPH

Asif Ilyas, MD

Kurosh Darvish, PhD

Christopher Jones, MD

**Hypothesis:** Fixation of non-committed radial neck fractures can be achieved with a plate and screw construct or with two obliquely-oriented screws. The hypothesis of this study was that the mechanical properties, specifically stiffness and load to failure, of these two fixation strategies are similar in a cadaver model.

**Methods:** Ten matched-pair cadaver arms were skeletonized and the radii were removed. X-ray and visual inspection were performed to ensure absence of preexisting trauma. DEXA scans were obtained to measure bone density. A transverse osteotomy was created at the neck of each radius, which was subsequently fixed: all right-sided radii were fixed with two oblique headless compression screws, and all left-sided radii were fixed with a plate and screws. The distal aspect of each radius was potted in polymethylmethacrylate bone cement. The radial head was loaded in cantilever bending in 4 different planes, 90 degrees apart and orthogonal to the radial shaft using an MTS machine. Stiffness and load to failure were recorded for each specimen.

**Results:** All ten radii were free of preexisting injury. The stiffness of both constructs was similar in all planes except for loading from medial to lateral (opposite of the plate) where the screw construct was 1.8 times stiffer. Ultimate failure occurred at 229N for the plate and 206N for the screws. Failure mode for the plate was plate bending while the screws failed by pullout and fracture.

**Discussion and Conclusion:** The two strategies provide similar strength and stiffness to transverse, non-committed fractures. While plate-and-screw constructs are more appropriate when there is bone loss or comminution, this study supports the utilization of two oblique screws in simple

transverse neck fractures, especially since screw fixation requires less exposure and the hardware is buried and unobtrusive.

### Poster 8

## Transverse Radioulnar Instability In Essex-Lopresti Injuries

Christina J. Gutowski, MD, MPH

Kurosh Darvish, PhD

Christopher Jones, MD

**Introduction:** In Essex-Lopresti injuries, radioulnar instability in the longitudinal axis has been well studied. However, radioulnar instability in the transverse plane, and its effect on forearm rotational mechanics is not well-understood. We investigated the change in radioulnar interosseous distance and in a simulated Essex-Lopresti injury.

**Methods:** Pronosupination range of ten cadaver arms was measured with a goniometer. Using digital radiograph and curve-fit software, the interosseous distance along the length of the forearm was measured in lateral elbow, neutral forearm alignment. Forearm rotation and interosseous distance were re-measured after: 1) release of the interosseous ligament (IOL) central band, and 2) release of the entire IOL and TFCC radioulnar ligaments. The radial head and annular ligament were left intact. Statistical comparison of forearm motion and maximum interosseous space were performed.

**Results:** Average maximum supination of the uninjured forearms was 87°. This increased to 95° after central band disruption and 100° after the entire IOL was sectioned. There was a similar increase in pronation: 69° before injury and 84° after complete IOL disruption. Maximum interosseous distance averaged 19.8mm in the uninjured arm, 20.1mm after central band release (1.8% increase), and 21.3 mm after complete IOL disruption (7.7% increase).

**Discussion/Conclusion:** In a simulated Essex-Lopresti injury, in the absence of dynamic forearm muscle forces, the maximum interosseous distance increases nearly 8%. This suggests that the interosseous ligament tensions the bow of the radius which creates joint reaction forces at the proximal and dis-

tal radioulnar joints, facilitating smooth and stable forearm rotation. The notable increase in forearm rotation observed in this study is consistent with the IOL's role in stabilizing and constraining forearm motion. These findings might have implications in the treatment of Essex-Lopresti injuries and IOL healing potential. Future work will focus on the utility of comparative forearm radiographs in diagnosing an Essex-Lopresti injury.

### Poster 9

## Survivorship And Complications of Revision Total Hip Arthroplasty With A Mid-Modular Femoral Stem

Jason Hochfelder, MD

\*Aldo M. Riesgo, MD

Edward Adler, MD

Richard Iorio, MD

Christopher Nathasingh, BA

Nick Brownstone, BA

Lawrence M. Specht, MD

**Introduction:** The number of revision total hip arthroplasties (THA) performed each year continues to rise; however, there is no consensus on the optimal femoral implant.

Diaphyseal fitting mid-modular femoral components with variable metaphyseal sizing options are the most utilized femoral stems for revision THA in the United States. Corrosion at the mid-modular interface leading to aseptic loosening and implant failure, as well as loosening leading to subsidence, have been reported. The purpose of this study is to evaluate the survivorship and complications of diaphyseal fitting mid-modular femoral components used in revision THA.

**Methods:** We reviewed all revision THA with a diaphyseal fitting mid-modular femoral component performed by 10 different surgeons at two high volume academic medical centers. The number of failures and the reason for failure were recorded. Failure was defined as aseptic loosening, mechanical failure, septic revision, periprosthetic fracture, or need for revision for any reason. Radiographs were reviewed for signs of boney ingrowth and signs of loosening.

**Results:** One hundred fifty-eight patients were identified who had a total of 161 revision THA with diaphyseal fitting mid-modular femoral components. The average follow-up

was 3 years. At final follow-up, 5 (3%) patients required re-revision for failure of the femoral component; 4 for loosening of femoral component and 1 for fracture of the femoral component. There were a total of 24 (14.9%) revisions for any reason, with the most common reason being septic failure (10 of 24).

**Discussion and Conclusion:** To our knowledge this is the largest reported series of revision THA with diaphyseal fitting mid-modular femoral components. Our results show that these stems have a low rate of aseptic loosening, subsidence, and mechanical failure. While revision THA may be a challenging procedure, these stems provide a safe and effective solution for many femoral problems.

#### Poster 10

### Radiation Exposure To The Eye With Mini C-Arm Use During Hand Surgery

C. Edward Hoffler II, MD, PhD

Mark Wang, MD, PhD

Frederick Liss, MD

Asif Ilyas, MD

Charles S. Leinberry, MD

Pedro K. Beredjikian, MD

**Introduction:** Fluoroscopic radiation exposure is a potential occupational health risk to the Hand Surgeon, given operator proximity and the relative lack of eye shielding. At present, the amount of radiation exposure to the eye, associated with the routine use of mini C-arm fluoroscopy is unknown. The association of eye radiation exposure and the early development of cataracts have been previously reported. The purpose of this study is to test that eye radiation exposure, sustained during routine mini C-arm use, does not exceed that of previously reported critical radiation dosages to the eye.

**Methods:** Over a four month period, eye radiation exposure was measured in four Board-Certified Hand Surgeons utilizing mini C-arm fluoroscopy during routine surgical procedures. Eye dosimeters were secured to surgical loupes at the level of the orbit. Accumulated radiation dosage was analyzed and compared to control badges on a monthly basis, and background exposure was eliminated. For each procedure, mini C-arm radiation output was logged, including the dose rate, total accumulated dosage, and total exposure time.

**Results:** Average monthly eye dosimetry values included the following: dose rate was  $0.50 \pm 0.03$  mGy/sec, total accumulated dosage was  $32.16 \pm 7.88$  mGy, and total exposure time was  $75.72 \pm 16.36$  sec. Average monthly eye radiation exposure values were less than 30 mrem (previously reported maximum eye dosage is 1,250 mrem per month). 46 procedures were performed over the collection period. The most commonly performed procedures included ORIF distal radius fractures (14), metacarpal and phalangeal surgery (9), and basilar thumb arthritis surgery (7). ORIF of the distal radius fracture was associated with higher average exposure time (93.57 sec) and average accumulated dosage (51.73 mGy).

**Discussion/Conclusion:** Our study suggests that eye radiation exposure, from routine mini C-arm fluoroscopy use, on an average monthly basis, does not approach previously reported critical eye radiation loads associated with cataracts.

#### Poster 11

### Handedness-Based Patient Perceptions Of Disability From Common Hand Disorders

Nayoung Kim, BS

Michael T. Milone, BA

Mitchell G. Maltenfort, PhD

Pedro K. Beredjikian, MD

**Introduction:** The QUICK Disabilities of the Arm, Shoulder and Hand (QDASH) Outcome Measure is a commonly utilized questionnaire for people with upper limb disorders. Although intuition suggests that disease of the more utilized “dominant” hand would be associated with higher patient perceptions of disability, our clinical experience suggests otherwise. We hypothesize that whether the diseased hand is the dominant hand does not affect disability scores.

**Methods:** Patient charts from our institution were retrospectively reviewed over a two year period who initially presented with unilateral carpal tunnel syndrome (CT), DeQuervain’s tenosynovitis (DQ), lateral epicondylitis (LE), thumb basal joint arthritis (TBJ), or trigger finger (TF). Charts were reviewed for hand dominance, side of injury, QDASH, and SF-12 health survey scores. Linear regression was performed to estimate the effect of diagnosis and hand dominance on

QDASH scores; an interaction term was included to allow diagnoses to have differential impacts on dominant and non-dominant hands.

**Results:** QDASH scores were available for 1016 patients (637 female, 379 male; mean age 60 years): 191 to 244 for each of the five diagnoses. SF-12 scores did not differ according to hand-dominance as well as for those within each diagnosis-specific subgroup. Linear regression showed that QDASH scores were associated with both diagnosis and hand dominance, and that diagnoses could have differential effects on dominant and non-dominant hands. When gender was included in the analysis, it was found to affect these differentials. For females, QDASH scores were about ten points lower in the non-dominant hand for CMC ( $40.76 \pm 2.22$  vs  $31.29 \pm 1.87$ , mean  $\pm$  SE) and for TF ( $39.03 \pm 2.73$  vs  $29.17 \pm 2.72$ ). Male QDASH scores were 12-14 points lower than female dominant hand scores in both these diagnoses and there was no differential between dominant and non-dominant within males. Subgroup analysis confirmed that for CTS, female QDASH scores were  $8.08 \pm 3.10$  points higher than males but there was no association with dominance. There was no statistical association with gender and handedness for LE or DEQ.

**Discussion/Conclusion:** Where there is a difference between hand dominance, it appears to be present in females over males. It is not clear whether a common cause explains the lower QDASH scores for males and for non-dominant hands in females.

## Poster 12

### Disability Due To Finger Metacarpophalangeal Joint Collateral Ligament Injury

Kevin Lutsky, MD  
Nayoung Kim, BS  
Pedro K. Beredjiklian, MD

**Introduction:** Collateral ligament injuries to the metacarpophalangeal joints (MPJ) of the fingers are less common than in the thumb. Injury to the index finger radial collateral ligament (RCL) is thought to be the most disabling due to the role of this ligament in stabilizing pinch. However, injuries to the collateral ligaments of the other fingers can cause pain, difficulty with

grip, or limitations in function. The purpose of the current study was to assess the degree of disability associated with collateral ligament injury of the fingers, and to compare the disability from index RCL injury to that of the other fingers.

**Methods:** A retrospective review of all patients presenting with finger MPJ collateral ligament injuries over the past 3 years was performed. Injuries to the RCL of the index finger were compared to injuries of the collateral ligaments of the other digits.

**Results:** There were 23 patients with injuries to the index finger RCL. The average age was 44 years (range: 16-67 yo). Of these patients, 65% (n=15) complained of moderate or moderate to severe pain. The average DASH score in the 10 patients in whom this was available was 28.0. There were 56 patients with injuries to the collateral ligaments of the remaining digits. The average age was 44 years (range: 13-82 yo). 26 patients reported moderate or severe pain. For the long finger there were 15 RCL and 8 ulnar collateral ligament (UCL). For the ring finger there were 5 RCL and 1 UCL injury. In the small finger there were 25 RCL injuries and 0 UCL injuries. The average DASH score in the 28 patients in whom this was available was 28.7.

**Discussion and Conclusion:** Injuries to the collateral ligaments of the MPJs of the fingers can be associated with pain and disability. The index finger MPJ RCL is typically thought to be the most clinically important finger CL due to its importance in pinch, however the degree of disability associated with injury to this ligament is similar to that of the other digits. Surgeons should remain vigilant in diagnosing and recognizing the potential functional impact of these injuries.

## Poster 13

### Sonication Of Clinically Infected Trauma Hardware

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**Introduction:** Sonication is a relatively new technology that has demonstrated improved rates of detection for hip

and knee arthroplasty infections. The utility of sonication in infected trauma hardware has not previously been investigated.

**Methods:** 32 consecutive patients were treated for infected hardware at a single institution from September 2010 to May 2013. Sonication and routine cultures were obtained for all patients. Sonication and routine culture results were retrospectively reviewed in a consecutive series of patients treated with hardware removal for implant associated infection. Clinical, radiographic, laboratory, and intraoperative findings were collected for each patient. Sonication results were considered positive for growth of greater than or equal to 20 CFU (colony forming units).

**Results:** Among 32 patients with clinically infected hardware, 30 showed positive routine cultures (93.8%) and 19 showed positive sonication cultures (59.4%). All 19 patients with positive sonication results produced the same bacterial species as grown by routine cultures. There was one patient for whom sonication identified additional organisms not detected by routine cultures. There were no patients with a negative routine culture and positive sonication culture.

**Discussion and Conclusion:** Sonication of clinically infected trauma hardware is a viable practice and provides clinically meaningful results. The routine use of sonication cultures in this patient population offers little additional value over routine cultures and may not be indicated.

#### Poster 14

### Previous Periprosthetic Joint Infection Predicts Infection After New Primary Arthroplasty

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**Introduction:** Periprosthetic joint infection (PJI) is a dreaded complication with high morbidity and mortality. It is well-known that patients treated for PJI have a high-risk

of repeat infection in that joint. However, after effective management of PJI, patients often present with end-stage arthritis deserving total joint arthroplasty (TJA) in a distant joint. Unknown to the community is the risk of subsequent PJI in the distant joint. Therefore, this study attempts to identify this risk.

**Methods:** The institutional PJI database was utilized to identify patients that were treated for PJI from April 2000 to July 2012. This was then cross-referenced with the institutional arthroplasty database to identify those patients that underwent primary TJA after management of PJI. The incidence of subsequent PJI in the new joint was then determined and the relationship between the infecting organisms was analyzed.

**Results:** Thirty-one patients underwent primary TJA at a mean of 1,110 days (range: 113-4,770) after management of PJI in a distant joint. Four of these patients (12.9%; 4/31) went on to develop PJI in the new joint at a mean of 400 days (range: 24-1,093) after TJA. Two of these patients (6.4%; 2/31) were infected with the same pathogen in both joints (24 and 68 days post-arthroplasty).

**Conclusion:** A history of PJI in a distant joint increases the risk of infection in a new prosthetic joint. While patient factors likely play a role in this increased risk, the persistence of a sub-clinical infection does appear to complicate a new arthroplasty. Patients in this scenario must be counseled of their increased risk.

#### Poster 15

### Risk Factors For Periprosthetic Infection In Young Patients After THA

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**Introduction:** The patient-related risk factors for periprosthetic joint infection (PJI) after total hip arthroplasty (THA) have recently been evaluated in several large Medicare database studies. However, much remains to be discovered regarding the epidemiology, demographics, and risk factors for PJI after THA in younger and/or privately insured patients.

**Methods:** The PearlDiver patient records database was used to gather patient demographic data on 45,202 privately-insured patients that underwent primary THA between 2007-2011. The vast majority of these patients were under 65 years of age. 750 (1.7%) of these patients went on to acquire a diagnosis of periprosthetic joint infection. The database was searched for documentation of 35 common medical comorbidities utilizing CPT and ICD-9 codes among this population. The incidence of PJI was stratified by age, gender, and region of the United States. Relative risk and odds ratios for developing PJI were then calculated for all comorbid conditions.

**Results:** Cumulative incidence of PJI in this cohort ranged from 0.81% at 30 days to 1.66% at 5 years. There was a significant difference in the prevalence of PJI by age, with the highest rate occurring in the 30-34 year old population (2.85%) trending downward with increasing age until 65-69 years old (1.74%). There were no significant differences in PJI prevalence by sex or region of the country. Of the 35 comorbidities evaluated, 20 demonstrated an increased risk for PJI (odds ratio >1.0) including dementia, chronic pulmonary disease, alcohol and drug abuse, liver disease, anemia, and complicated diabetes.

**Discussion and Conclusion:** Interestingly, the risk of PJI seems to be higher in younger patients. This is likely multifactorial in nature. Further, the medical comorbidities which constitute risk factors for PJI in elderly and/or Medicare patients observed in other studies seem to be largely conserved in this younger population

## Poster 16

### Fingertip Amputation Treatment: A Survey Study

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**Introduction:** Distal fingertip amputations are common injuries in both work and non-work related accidents. Treatment options range from simplistic, such as wound care, to more involved interventions including flaps and replantations, all with reported good overall outcomes. Treatment of

long fingertip amputations vary according to surgeon demographic factors such as country of origin, years of experience, institution type and training background.

**Methods:** A 16 question survey was sent to the members of the American Association for Surgery of the Hand, as well as selected international hand societies. The survey was comprised of 6 demographic questions, 5 clinical scenarios with various level long fingertip amputations, and 5 treatment preference questions. Logistic regressions were used to estimate adjusted odds ratios for treatment choices controlling for all predictors.

**Results:** A total of 199 hand surgeons, 62% from the US and 38% international, responded to the survey. For each clinical scenario (Allen level 2, 3, 4, and volar oblique amputation) there was a wide variation of treatment preferences. Wound care was less likely performed by surgeons with greater than 30 years of experience or plastic surgery backgrounds. Replantation was more commonly performed internationally and by academic practice surgeons. Skeletal shortening with closure was more likely to be performed by hand with fewer than five years of experience compared to other demographics.

**Discussion/Conclusion:** For all levels and orientation of fingertip amputation queried, there is a wide range of treatment preferences among hand surgeons. Differences in treatment principles vary according to practice demographics and training background. However, clinical decision making is likely anecdotal in part given the limited amount of comparative research. The survey highlights the need for a prospective randomized trial to determine the most effective treatments for distal fingertip amputations.

## Poster 17

### Periprosthetic Shoulder Infection In The United States: Incidence And Economic Burden

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**Background:** Periprosthetic joint infection (PJI) is a major cause of morbidity following shoulder arthroplasty. There is

little known about infections following shoulder arthroplasty. The purpose of this study was to analyze the incidence, predisposing factors, and economic burden of PJI after shoulder arthroplasty in the United States.

**Methods:** Patients who underwent shoulder arthroplasty were identified using the ICD 9-CM codes 81.80, 81.81 and 81.88 in the National Inpatient Sampling (NIS) database from 2002 through 2011. Shoulder PJI was identified using arthrotomy for device removal (80.01) and prosthetic infection (996.66) codes. Multivariate logistic regression analysis was utilized to identify predisposing factors for shoulder PJI.

**Results:** The overall infection rate over the course of the ten years studied was 0.98% and did not vary significantly over this period of time. The factors most strongly associated with PJI were weight loss (OR 2.62; p = 0.00047), drug abuse (OR 2.38; p = 0.0011) and anemia from either blood loss (OR 2.43; p = 0.00031) or deficiency (OR 2.05; p < 0.0001) and older age (OR 0.98/year; p < 0.0001). Patients in urban private hospitals had greater risk of infection than patients in urban academic hospitals (OR 1.93; p < 0.0001). Adjusted to 2011 dollars, the median total charges for a shoulder PJI patient increased from \$26,757 in 2002 to \$48,421 in 2011.

**Conclusions:** The incidence of PJI following shoulder arthroplasty did not change substantially over the decade of study period. This study identified some modifiable risk factors and the economic burden that is associated with shoulder PJI. The rising number of shoulder arthroplasties performed will result in a greater absolute number of shoulder PJI cases in the future with an increasing economic burden on the health care.

## Poster 18

### Fever After Total Joint Arthroplasty: Use Of A Simple Workup To Avoid Delayed Discharge

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**Introduction:** Postoperative fevers are a common occurrence following total joint arthroplasty (TJA). With more emphasis on accelerated recovery and shorter length of stay (LOS), postoperative fever has implication for discharge planning and cost. The aims of our study were to determine which patients were at risk of developing postop fever and to investigate the usefulness of a simple, relatively inexpensive, fever workup.

**Methods:** Under IRB approval we retrospectively reviewed all TJA patients between June 2010 and June 2011. 745 patients were identified. Of these, 137 patients were 55 or younger (Group A), 353 were 56-69 (Group B), and 258 were 70 or older (Group C). There were 455 females and 290 males. The surgical technique, anesthesia, and postoperative management of all patients was identical. Fever workup was performed in all patients with Temp > 100.4. Workup included surgical site examination, chest x-ray, urinalysis, blood culture, and venous duplex. Patients were allowed discharge if the workup was negative. Incidence, findings on workup and LOS were analyzed.

**Results:** 251 patients developed a postoperative fever for an incidence of 34%. Group B had a significantly higher incidence of postop fever. Accounting for all patients, males were more likely to develop fever. There was no association between postop fever and complications. There was no correlation between fever and findings on the medical workup. LOS was not increased by the occurrence of fever in any group.

**Conclusion:** We found an increased incidence of postoperative fever in the middle age range for joint patients and in males. Postoperative fever was not associated with infection or any other postoperative complication. The use of our simple postoperative fever workup after TJA likely led to decreased length of stay and consequently decreased cost.

**Poster 19**

## **Geographic Variability In Hospital Charges And Reimbursements For Spine Fusion Surgery. An Analysis Of The 2011 Medicare Database**

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**Introduction** The Centers for Medicare Services recently released 2011 charge and reimbursement data according to Diagnosis Related Groups. This study aims to identify regions with the highest cost to reimbursement ratio and highest regional variability in the cost of spine care.

**Methods:** Two “diagnosis related groups” were analyzed: 460 (Thoracic/lumbar fusion), 473 (Cervical spine fusion). The average hospital charge, reimbursement, and charge to reimbursement ratio (CRR) were analyzed. Associations were evaluated with a Pearson’s correlation. Geographic variability was analyzed by state and referral area to calculate coefficients of variation (ratio of standard deviation to mean) for CRR.

**Results:** For Thoracic/lumbar fusion: Charge  $\$95.5 \pm 47.1$ , Reimbursement  $\$27.8 \pm 16.7$  (in thousands), and CRR  $3.47 \pm 1.52$ . States with the highest and lowest CRR were CA, CO, FL, NV, NJ (4.39 to 4.86) and MD, VT, RI, DE, ME (1.06 to 1.94) respectively. The states and referral areas with the highest CRR variability were NJ, PA, VA, AL, GA (0.42 to 0.54) and Philadelphia, San Antonio, Memphis, Fort Worth, Houston (0.39 to 0.47) respectively. For Cervical Fusion: Charge  $\$54.5 \pm 25.4$ , Reimbursement  $\$14.7 \pm 3.2$  and (CRR)  $3.77 \pm 1.63$ . States with the highest and lowest CRR were CA, FL, CO, NV, SD (4.65 to 5.44) and MD, RI, DE, ND, MA (1.05 to 2.4) respectively. The states and referral areas with the highest CRR variability were MS, AL, VA, PA, SC (0.43 to 0.54) and Charlotte, Boston, Philadelphia, Phoenix, Dallas (range 0.38 to 0.47) respectively.

**Conclusions:** Nationally, hospital charges to Medicare are four-fold higher than the reimbursements, which may be expected given that surgeon fees are 5-fold higher than Medicare payment. States with the highest charge to reimbursement ratio were CA, FL, CO, NV while MD, RI, DE have the lowest. Significant charge variability also exists within individual referral areas. Policy makers, patients and the medical community will increasingly scrutinize these patterns.

**Poster 20**

## **Long-Term Clinical Results Of A First Generation Highly Cross-Linked Polyethylene In Young And Active Patients**

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**Background:** Highly cross-linked polyethylene (HCLPE) was introduced to improve wear related osteolysis in total hip arthroplasty (THA). There is limited data regarding wear rates and clinical performance of HCLPE in young and active patients. The purpose of this prospective study was to assess minimum 10-year wear rates and survivorship of non-cemented total hip arthroplasty using metal on HCLPE in patients in young and active patients.

**Material and Methods:** Between January 2001 to December 2003, 52 hips consecutive THAs (43 patients; 26 males and 17 females) age of 55 years and younger with an average University of California Los Angeles activity (UCLA) score of 5 and above at the time of surgery were identified from our Institutional Review Board-approved prospective database. The mean age of patients was  $47.4 \pm 7.8$  years old (range 24 to 55 years) and the mean UCLA was  $7.3 \pm 1.5$  (range 5 – 10). Indication for surgery included osteoarthritis in all cases. All operations were performed by the senior surgeon via a posterolateral approach. All components were non-cemented femoral stem, Cobalt-Chromium (Co-Cr) femoral head, and solid acetabular shell with HCLPE acetabular liner. At minimum 10-years follow-up (mean  $11.5 \pm 0.94$  years), wear rates (Roman software), clinical and radiographic data and survivorship were analyzed.

**Results:** The mean linear wear was  $0.019 \pm 0.018$  mm/year (range 0-0.082). There were no revisions for osteolysis or loosening, periprosthetic infection or dislocation in this cohort. Kaplan-Meier survivorship was 100% for all failures.

**Conclusion:** This study demonstrates that metal-on-HCLPE has an excellent survivorship rates at a minimum 10-year follow-up in young-active patients. Moreover, oxidation concern with Crossfire up to 10 years has not shown any clinical significance.

### Poster 21

## Total Joint Arthroplasty In Transplant Recipients: In-Hospital Adverse Outcomes

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**Introduction:** The increase in patients undergoing organ transplantation along with their improved survival rates has increased the number of transplant recipients undergoing total joint arthroplasty (TJA). This study aims to determine in-hospital complications in transplant recipients undergoing TJA.

**Methods:** The Nationwide Inpatient Sample database was queried for patients coded for history of transplant and hip or knee arthroplasty (primary or revision) over the period of 1993-2011. Approximately 0.19% of TJA cases had at least one transplant among kidney, heart, liver, lung, pancreas or bone marrow, with kidney transplants representing the largest group. Transplants were most commonly seen in revision hip (0.50%), followed by primary hip (0.30%). Logistic regression was used to analyze data.

**Results:** Kidney transplant significantly increased risk of periprosthetic joint infection (PJI) (odds ratio (OR)=2.05), systemic infection (OR=2.95), deep venous thrombosis (DVT) (OR=2.11), acute renal failure (ARF) (OR=3.61), respiratory (OR=1.37), and cardiac (OR=1.22) complications. Liver transplant was significantly associated with PJI (OR=2.33), respiratory complications (OR=1.68), cardiac complications (OR=1.34), and ARF (OR=4.49). Heart transplant signifi-

cantly increased the risk of wound complications (OR=2.05), respiratory complications (OR=1.91), and ARF (OR=4.74). Lung transplant was associated with respiratory complications (OR=3.37), and ARF (OR=6.10). Bone marrow transplant was associated with cardiac complications (OR=1.56), and ARF (OR=4.31). Pancreas transplant was not statistically associated with complications. There was no significant difference between transplant and non-transplant groups regarding both the incidence of pulmonary embolism and in-hospital mortality.

**Discussion and Conclusion:** It seems that transplant patients might be at an increased risk of in-hospital complications, particularly ARF. Further studies with longer follow up are recommended.

### Poster 22

## Major Adverse Events Following Total Joint Arthroplasty In Patients With Coronary Revascularization

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**Introduction:** There is a paucity of literature about outcome of total joint arthroplasty (TJA) in patients with history of coronary revascularization including angioplasty/stent or coronary artery bypass graft (CABG). This study evaluates perioperative complications and mortality in these patients undergoing TJA.

**Methods:** We used the Nationwide Inpatient Sample data from 2002 to 2011. Using the Ninth revision of the International Classification of Disease (ICD-9-CM) codes, we identified patients with a history of coronary revascularization and compared in-hospital complications in these patients with controls (no history of coronary revascularization).

**Results:** Cardiac complications occurred in 1.06%, 0.95% and 0.82% of cases with prior CABG, coronary angioplasty/stent and controls, respectively. Using multivariate analysis, history of coronary revascularization was not associated with a higher risk of cardiac complications. However, myocardial infarction (MI) occurred at significantly higher rate in CABG

(odds ratio (OR): 1.24) and angioplasty/stenting (OR: 1.96) groups compared to the controls. Prior coronary revascularization did not increase the risk of non-cardiac complications and mortality. Cardiac complications occurred in 5.36%, 8.48% and 0.28% of patients with atrial fibrillation (AF), other arrhythmias and no arrhythmia. AF was an independent predictor of all complications. Other dysrhythmias were also independent predictors of mortality.

**Discussion and Conclusion:** Prior coronary revascularization does not seem to increase risk of in-hospital mortality and complications (except for MI) after TJA. We also found perioperative cardiac arrhythmia, particularly AF, to be an independent predictor of in-hospital adverse events.

### Poster 23

## The Prevalence Of Obesity, Hypertension And Diabetes In Student Athletes Age 10-17

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**Introduction:** Over the past 30 years there has been a dramatic increase in the prevalence of childhood obesity in the United States. Further evidence supports an increasing prevalence obesity associated diseases, such as diabetes and hypertension. These alarming trends should be viewed as a significant health concern with potentially widespread public health implications in the near future. The preparticipation sports physical examination (PPE) provides orthopaedic physicians with an opportunity to identify patients at risk for obesity and obesity associated disease whom may otherwise have limited exposure or access to medical care, and further serve in a role of a community health advocate by using this encounter as an entry point into the health care system for patients underserved patients at risk for these chronic diseases. The purpose of this study was (1) to identify the prevalence of obesity among a population of high school athletes, (2) identify patient factors associated with an increased or decreased prevalence of overweight and obesity, and (3) to identify the prevalence of obesity associated cardiometabolic risk factors, hypertension and diabetes.

**Methods:** 21,013 Physical examination forms obtained between August 2009 and August 2013 from student athletes presenting for sports preparticipation physical examination

were reviewed to evaluate the prevalence of obesity, elevated blood pressure (using age and sex normative anthropometric reference data) and PMH of diabetes.

**Results:** Among the population studied, the prevalence of overweight and obesity was 19.9% and 23.4 % respectively. 66.5% of individuals had normal BP on initial screening, 12.2% were pre-hypertensive and 21.4% of patients BP qualified as hypertensive, anthropometric normative values. A higher prevalence of Obesity and HTN was seen among minority populations, and participants in specific sports such as football and baseball. Participants in sports of basketball, cross country, soccer and individuals participating in multiple sports demonstrated lower prevalence of obesity and HTN.

**Discussion:** The prevalence of obesity and obesity associated diseases appear to be significant even among in student athlete populations. Our data is comparable to established benchmarks for non-athlete populations. Participation in “running sports” and multi-sport athletes demonstrated the lowest prevalence of disease. These data may encourage policy makers to financially support athletic programs based on their lower prevalence of obesity and associated disease, and implementation of certain sports programs as part of physical education curriculum aimed at obesity prevention. Further this study highlights the role of the orthopaedic surgeon as a community health advocate and the potential general health benefits of diversifying an athlete’s sports participation through multi-sport enrolment.

### Poster 24

## Delaying Reimplantation Following Resection Arthroplasty Does Not Improve Outcomes: A Report From Two High Volume Orthopaedic Centers

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**Introduction:** In North America, the preferred surgical treatment of chronic periprosthetic joint infection (PJI) is two-stage exchange arthroplasty. Although reimplantation gener-

ally occurs 6-8 weeks after resection arthroplasty the optimal timing for reimplantation is unknown. This study aims to determine if the timing between the first and second stages of a two-stage exchange influenced the outcome of this procedure in terms of infection control.

**Methods:** We used data from two high volume centers to identify all PJI cases treated with two-stage exchange arthroplasty between 2002 and 2012. Reimplantation failure was defined as the need for further surgical intervention for the treatment of PJI. Multivariate logistic regression and Cox proportional hazard test were used to determine predictors of subsequent failure of the prosthesis due to infection.

**Results:** The final cohort consisted of 433 patients. Mean duration of follow up from time of reimplantation was 2.4 ± 1.9 years (minimum of 90 days). 97 patients (22.4%) experienced subsequent failure. Logistic regression analysis indicated that PJI of knee (Odds Ratio (OR) = 2.08), spacer exchange (OR = 12.21), and polymicrobial PJI (OR = 9.48) but not time to reimplantation were some of the predictors of reimplantation failure. The Cox proportional hazards model showed that BMI (OR = 1.04), knee infection (OR = 1.95) and spacer exchange (2.56) were predictors of failure at any time.

**Conclusions:** It is a commonly held belief that reimplantation for patients with “severe” infection should be delayed. Based on our findings, it appears that the timing between first and second stage does not influence the outcome of two-stage exchange arthroplasty. Although timing of reimplantation may need to be individualized, the best metric to guide surgeons regarding the optimal timing of reimplantation still remains unknown.

## Poster 25

### Diagnostic Accuracy Of Non-Contrast MRI For Detecting Glenohumeral Cartilage Lesions

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**Introduction:** The purpose of this study was to determine the prevalence of glenohumeral articular cartilage lesions in patients with rotator cuff tendinopathy and assess the accuracy of non-contrast magnetic resonance imaging (MRI) at detecting these defects compared to the gold standard of arthroscopy.

**Materials and Methods:** Non-contrast MRI images obtained in 84 consecutive patients undergoing shoulder arthroscopy for rotator cuff tendinopathy (mean age 54.8 yrs; range, 17-82) were prospectively evaluated for glenohumeral cartilage lesions. Two fellowship trained, experienced musculoskeletal radiologists, blinded from arthroscopic findings, independently evaluated the glenoid and humeral head cartilage on two occasions, separated by an eight week interval.

**Results:** At arthroscopy, humeral head cartilage lesions were detected in 23 patients (frequency, 27.4%) and glenoid cartilage lesions were found in 20 patients (frequency, 23.8%). There were 17 full (International Cartilage Repair Society (ICRS) grade 3 and 4) and 6 partial (ICRS grade 1 and 2) lesions of the humeral head along with 13 full and 7 partial lesions of the glenoid. For detecting humeral lesions on MRI, the radiologists’ combined accuracy was 78%, sensitivity was 43%, and specificity was 91%. The combined accuracy for detecting glenoid lesions on MRI was 84%, sensitivity was 53%, and specificity was 93%. Combining the readers, low-grade lesions (ICRS grades 1 and 2) of the glenoid and humerus were read as negative on MRI in 63% and 86% of cases, respectively. Inter-observer agreement for detecting humeral lesions with non-contrast MRI was fair ( $K = 0.24$ ) and considered moderate ( $K = 0.41$ ) for detecting glenoid lesions. The ICC was 0.24 for the size of humeral lesions and 0.47 for glenoid lesions, indicating fair and moderate agreement, respectively, between and among the radiologists’ lesion characterizations and the surgeon’s measurements.

**Conclusion:** Overall accuracy of non-contrast MRI at detecting a glenohumeral articular cartilage lesion is good, however, interpretation is reader dependent and accuracy is significantly reduced for detecting low-grade lesions. Based on these findings we recommend that patients with rotator cuff tendinopathy undergoing arthroscopy be informed that the presence and severity of cartilage lesions may be underestimated on MRI.

**Poster 26**

## **Characterization And Outcomes Of Combat-Related Spinal Cord Injuries Requiring Operative Treatment**

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**Introduction:** Few studies have described the injury pattern and clinical follow-up after complete and incomplete, combat-related spinal cord injuries (SCI). We set out to characterize combat-related SCI, and report outcomes following operative treatment.

**Methods:** Retrospective analysis of surgical databases at three military institutions was performed. Patients undergoing spine surgery following a combat-related injury in Operations Enduring and/or Iraqi Freedom between July 2003 and July 2013 were evaluated. Inclusion criteria consisted of trauma sustained in direct relation to combat operations while requiring operative treatment, with a complete or incomplete spinal cord injury (SCI).

**Results:** Our review identified 105 casualties requiring definitive surgical management for combat-related spine injuries after return to the United States. 31 (29.5%) of these patients sustained complete or incomplete spinal cord injuries, including four patients with injuries isolated to the conus medullaris or cauda equina. The mean patient age was 26.0 years. 48.4% sustained complete (ASIA A) SCI. The most common mechanism of injury was gunshot wound (45.2%), followed by mounted improvised explosive device (IED, 32.3%). Average length of follow up after injury was 27.8 months. There was no significant recovery of function any ASIA A patients. 42.0% of patients were medically retired upon most recent follow up, and the average time from injury to retirement was 20.1 months. One patient died from an unrelated injury while in rehabilitation.

**Conclusion:** To our knowledge, this study is the first and largest series characterizing operative intervention for combat-related spinal cord injuries (SCI). We found that ballistic penetrating trauma was the most common mechanism of injury, and no patients sustaining an ASIA A SCI had significant functional recovery after injury. Almost half of all patients sustaining any SCI were unable to return to duty. Despite its

relative rarity, combat related SCI is a significant burden to the military healthcare system.

**Poster 27**

## **Outcomes Following Cervical Disc Arthroplasty: A Retrospective Review**

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**Introduction:** Cervical radiculopathy is a common problem in society that causes significant disability. Cervical disc arthroplasty (CDA) is increasingly being used as an alternative to anterior discectomy and fusion (ACDF). Various industry sponsored FDA IDE trials have established CDA as a safe alternative to ACDF, however there have been few non-sponsored studies evaluating clinical outcomes. We set out to further evaluate the outcomes of cervical disc arthroplasty.

**Methods:** We performed a retrospective review of 176 consecutive patients undergoing CDA at a single, military tertiary medical center from 2008 to 2012. All construct types (1-level CDA, 2-level CDA/ACDF hybrid, and multi-level CDA) were included for review.

**Results:** Of the 176 patients, 40 were female (22.7%) with an average age of  $41.6 \pm 8.1$  years. Surgical indication was radiculopathy in 141 patients (84.4%), myelopathy in 13 patients (7.8%), and both in 10 patients (6.0%). Average follow-up was  $8.5 \pm 7.6$  months. 111 patients (63.1%) underwent single-level CDR. CDR/ACDF hybrid constructs were used in 52 patients (29.5%) and 13 patients (7.4%) underwent a two-level CDR. The most frequently addressed levels were C6-7 (42.0%) and C5-6 (39.6%). At most recent follow up, average CDA range of motion was 7.46 degrees ( $\pm 3.6$  degrees). 94.5% of patients experienced complete resolution of their pre-operative symptoms and 93.6% of patients returned to full activity. 36 patients (21.8%) experienced persistent posterior neck pain. Other complications included one superficial infection, five recurrent laryngeal nerve injuries and 18 patients reporting persistent dysphagia.

**Conclusion:** This is the largest non-sponsored single center study of cervical disc arthroplasty. Our data demonstrates relief of pre-operative symptoms (94.5%) and return to full activity (93.6%) with an average follow-up of 8.5 months. There was a low complication rate without device or implant related complications. Arthroplasty continues to be a safe and reliable option in treating patients with cervical radiculopathy or myelopathy.

## Poster 28

### Smart Collagen-Specific Anchors For Tendon-Targeted Delivery Of Therapeutic Cells

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**Introduction:** Fibrosis after tendon injury and repair remains a challenging clinical problem impacting patient functional outcome. Current molecular strategies to improve tendon healing have focused on modulating cellular responses at the injury site. Limitations of previously explored methods include the inefficient therapeutic cell delivery, failure to retain cells within the injury site, and potential safety concerns of cell-based treatment. Our laboratory has engineered a novel artificial collagen-specific anchor (ACSA), enabling the controlled targeting of therapeutic cells to collagen-specific sites. Potential benefits of the ACSA include an inducible collagen-targeting anchor, controlled delivery and retention of cells within an injury site, and decreased requirement of therapeutic cells and duration of treatment. The purpose of this study is to test the hypothesis that 1) GFP-tagged ACSA is expressed on the

surface of engineered cells in a promoter dependent fashion, and 2) ACSA expression enhances the attachment of the cell construct to collagen, and that this expression does not interfere with cell proliferation.

**Methods:** The engineered construct includes the following features: Murine fibroblasts (NIH 3T3), specific anchoring to human type I collagen (C-terminus,  $\alpha 2$  chain), tetracycline (Tet)-responsive promoter, and GFP tag for localization. The stable expression of the ACSA-GFP construct was confirmed by culturing the selected transfected cells in the presence or the absence of doxycycline (Dox). The presence of the ACSA-GFP was confirmed by Western blot and microscopy. Cell attachment assays were performed on cells expressing the ACSA construct (Tet-On) and non-induced cells (Tet-Off). Cells were seeded on human collagen I-coated plates. Proliferation assays were performed colorimetrically (Sigma-Aldrich).

**Results:** GFP-tagged ACSA is expressed on the surface of engineered cells in a Tet promoter-dependent fashion. Specific antibodies identified the following: the extracellular fragment of the construct, the GFP portion, and DAPI-stained nuclei. ACSA enhances the attachment of the cell construct to collagen, and this expression does not interfere with cell proliferation.

**Discussion/Conclusion:** Fibrosis after tendon injury remains a vexing clinical problem, and current molecular strategies for improving tendon healing are limited by inefficient and non-specific therapeutic delivery. This novel cellular construct enables the controlled expression of collagen-targeting anchors at the surface of therapeutic cells, enhancing cellular attachment to collagen-rich sites without disrupting cell proliferation. Potential benefits may include the controlled targeting of therapeutic cells to the injury site, improved tendon healing efficiency, and the reduced dispersion of cells into surrounding tissue.

**Poster 29****Long-Term Results Of Extensor Mechanism Reconstruction Using Achilles Tendon Allograft After Knee Arthroplasty**

Brent T. Wise, MD

Greg Erens, MD

Aidin Eslam Pour, MD

Thomas Bradbury, MD

James Roberson, MD

**Background:** Disruption of the extensor mechanism after total knee arthroplasty is an infrequent but devastating complication. Limited published data exists to guide physicians to the optimal treatment and provide insight into the long-term outcomes. This study presents long-term results of extensor mechanism reconstruction using Achilles tendon allograft following patellar and quadriceps tendon rupture after TKA.

**Methods:** Patients who underwent reconstruction of their knee extensor mechanism using Achilles tendon allograft following TKA between January 2003 and January 2012 were identified. Sixteen patients with 17 reconstructions were enrolled. The 17 reconstructions consisted of 10 patellar tendon and 7 quadriceps tendon ruptures. All patients underwent evaluation at an average of 46 months. Ten patients, with a minimum of two years follow up, were followed to an average of 65 months. Nine of these 10 completed an SF-36 form.

**Results:** The average extensor lag was  $6.6^\circ$  and average range of motion was  $105.1^\circ$ . Of the patients with a minimum follow up of 2 years and an average follow up of 65 months, the average extensor lag and range of motion was  $8.4^\circ$  and  $107.9^\circ$ , respectively, with strength maintained at 4/5. The quadriceps tendon reconstructions had an average extensor lag and range of motion of  $2.9^\circ$  and  $103^\circ$ , respec-

tively. Five patients died during the follow up period with 4 of those being in the quad tendon group. All but one of the patients were below the mean for age-matched controls on the SF-36.

**Conclusion:** This study demonstrates that Achilles tendon reconstruction is a reliable and durable treatment for patients who sustain not only patellar tendon ruptures, but also quadriceps tendon ruptures following TKA. This technique can predictably restore extensor mechanism function and strength while maintaining range of motion. Despite the success of this technique, the injury and procedure have a profound impact on overall function.

## **Individual Orthopaedic Instruction/ Multimedia Education**

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### **Schedule:**

Thursday, October 23, 2014	4:00 pm–5:00 pm
Friday, October 24, 2014	4:00 pm–5:00 pm
Saturday, October 25, 2014	3:00 pm–4:00 pm

The following AAOS DVDs are available for individual viewing at the above times in the Ambassador Room.

1. **Anatomy of the Knee** (25 minutes)  
Stephen L. Brown, MD; Patrick M. Connor, MD; Donald F. D'Alessandro, MD;  
James E. Fleischli, MD
2. **Pectoralis Major Transfer for Irreparable Rotator Cuff Tears** (11 minutes)  
Suman G. Krishnan, MD and Kenneth C. Lin, MD
3. **Surgical Dislocation and Debridement for Femoro-Aacetabular Impingement** (22 minutes)  
Christopher L. Peters, MD and Jill A. Erickson, PhD
4. **Hip Resurfacing: Direct Anterior Approach** (12 minutes)  
William J. Hozack, MD; Michael M. Nogler, MD; Stefan Kreuzer, MD; and Martin Krismer, MD
5. **Imageless Navigation in Hip Resurfacing Arthroplasty** (15 minutes)  
Michael L. Swank, MD and Amy L. Hallock, MEd
6. **Basics of Computer Navigation in Total Knee Arthroplasty** (11 minutes)  
James B. Stiehl, MD
7. **Lateral Approach for Valgus Total Knee Arthroplasty** (12 minutes)  
James B. Stiehl, MD
8. **Molded Articulating Cement Spacers for Treatment of Infected Total Knee Arthroplasty** (12 minutes)  
Adolph V. Lombardi Jr., MD, FACS; Keith R. Berend, MD; and Joanne B. Adams, BFA
9. **Arthroscopic Suprascapular Nerve Release** (23 minutes)  
Laurent Lafosse, MD
10. **Open Repair of Acute and Chronic Distal Biceps Ruptures** (25 minutes)  
James Michael Bennett, MD; Thomas Lynn Mehlhoff, MD; and James Burlin Bennett, MD
11. **Arthroscopic Acetabular Labral Repair: Surgical Technique** (9 minutes)  
Marc J. Philippon, MD; Mike J. Huang, MD; Karen K. Briggs, MPH, MBA; and David A. Kuppersmith, BS

12. **Anterior Cruciate Ligament Reconstruction Using Achilles Allograft and Interference Screws** (10 minutes)  
Colin G. Looney, MD and William I. Sterett, MD
13. **Osteochondral Lesion of the Talus (OLT): Technique of Osteochondral Autologous Graft Transfer** (11 minutes)  
Sameh A. Labib, MD and Brett A. Sweitzer, MD
14. **Revision ACL Reconstruction Using the Anatomic Double Bundle Concept** (14 minutes)  
Freddie H. Fu, MD; Nicholas J. Honkamp, MD; Wei Shen, MD, PhD; Anil S. Ranawat, MD; and Fotios Tjoumikaris, MD
15. **The Krukenberg Procedure for Children** (25 minutes)  
Hugh Godfrey Watts, MD; John F. Lawrence, MD; and Joanna Patton, ROT
16. **Single Incision Direct Anterior Approach to Total Hip Arthroplasty** (13 minutes)  
William J. Hozack, MD; Michael M. Nogler, MD; Javad Parvizi, MD, FRCS; Eckart Mayr, MD; and Krismer Martin, MD
17. **Medial Patellofemoral Ligament Reconstruction** (13 minutes)  
Ryan E. Dobbs, MD; Patrick E. Greis, MD; and Robert T. Burks, MD
18. **Hip Arthroscopy: Operative Set-Up and Anatomically Guided Portal Placement** (8 minutes)  
Allston Julius Stubbs, MD; Karen K. Briggs, MPH, MBA; and Marc J. Philippon, MD
19. **Anatomy of the Shoulder** (24 minutes)  
Donald F. D'Alessandro, MD
20. **Anterolateral Approach in Minimally Invasive Total Hip Arthroplasty** (18 minutes)  
Leonard Remia, MD
21. **Patient Specific Knee Design: An Evolution in Computer-Assisted Surgery** (22 minutes)  
Adolph V. Lombardi Jr., MD, FACS; Keith R. Berend, MD; and Joanne B. Adams, BFA
22. **Hemiarthroplasty for a Comminuted Fracture of the Proximal Humerus** (20 minutes)  
Jon J.P. Warner, MD; Darren J. Friedman, MD; Zachary R. Zimmer, BA; and Laurence D. Higgins, MD
23. **Rotator Interval Repari of the Shoulder: Biomechanics and Technique** (7 minutes)  
LCDR Matthew T. Provencher, MD, MC, USN and Daniel J. Solomon, MD
24. **Excision of Calcaneonavicular Tarsal Coalition** ( 7 minutes)  
Maurice Albright, MD; Brian Grottkau, MD; and Gleeson Rebello, MD
25. **Extensile Surgical Approach for the Resection of Large Tumors of the Axilla and Brachial Plexus** (9 minutes)  
James C. Wittig, MD; Alex R. Vap, BA; Camilo E. Villalobos, MD; Brett L. Hayden, BA; Andrew M. Silverman, BA; and Martin M. Malawer, MD

26. **The Anterior Supine Intermuscular Approach in Primary Total Hip Arthroplasty** (18 minutes)  
Keith R. Berend, MD; Adolph V. Lombardi Jr., MD; and Joanne B. Adams, BFA, CMI
27. **Robotic Arm-Assisted Unicompartmental Knee Arthroplasty: An Introductory Guide** (15 minutes)  
Christopher John Dy, MD; Kristofer Jones, MD; Samuel Arthur Taylor, MD; Anil Ranawat, MD; and Andrew D. Pearle, MD
28. **Vertical Humeral Osteotomy for the Revision of Humeral Components in Shoulder Arthroplasty** (21 minutes)  
Geoffrey Van Thiel, MD; Gregory P. Nicholson, MD; James Patrick Halloran, MD; Dana Piasecki, MD; Matthew T. Provencher, MD; and Anthony A. Romeo, MD
29. **Techniques for Safe Portal Placement in the Shoulder: The Ring of Fire** (13 minutes)  
Keith D. Nord, MD; Bradford A. Wall, MD; Prithviraj Chavan, MD; and William H. Garrett, BS
30. **Reconstruction of the Medial Collateral Ligament of the Elbow** (12 minutes)  
James Michael Bennett, MD; Thomas Lynn Melhoff, MD; and Rodney K. Baker
31. **Reconstruction of Abductor Mechanism-Gluteus Maximus Flap Transfer** (15 minutes)  
Leo Whiteside, MD and Marcel Roy, PhD
32. **Kinematic Alignment with Modified Conventional Instruments Instead of Patient-Specific Guides** (26 minutes)  
Stephen Howell, MD
33. **Arthroscopic Management of Femoroacetabular Impingement** (12 minutes)  
J. W. Thomas Byrd, MD
34. **Arthroscopic Suprascapular Nerve Decompression: Etiology, Diagnosis, and Surgical Technique** (21 minutes)  
Sanjeev Bhatia, MD; Adam B. Yanke, MD; Neil S. Ghodadra, MD; Seth Sherman, MD; Anthony A. Romeo, MD; and Nikhil N. Verma, MD
35. **Combined Cartilage Restoration and Distal Realignment for Patellar and Trochlear Chondral Lesions** (12 minutes)  
Peter Chalmers, MD; Adam B. Yanke, MD; Seth Sherman, MD; Vasili Karas, BS; and Brian Cole, MD, MBA
36. **Simple Arthroscopic Anterior Capsulo-Labral Reconstruction of the Shoulder** (17 minutes)  
Stephen J. Snyder, MD and Jeffrey D. Jackson, MD
37. **Proximal Humerus Resection for Parosteal Osteosarcoma** (16 minutes)  
Yvette Ho, MD; Camilo E. Villalobos, MD; and James C. Wittig, MD
38. **Biceps Tenodesis: Open Subpectoral and Arthroscopic Technique** (19 minutes)  
Adam B. Yanke, MD; Peter N. Chalmers, MD; Anthony A. Romeo, MD; and Nikhil N. Verma, MD

39. **Total Shoulder Arthroplasty: Steps to Get It Right** (15 minutes)  
Richard J. Hawkins, MD
40. **ACL Anatomic Single Bundle Reconstruction Technical Note and Results** (20 minutes)  
Michael W. Moser, MD; Gonzalo Samitier Solis, MD; Terese L. Chmielewski, PT, PhD; and Trevor Lentz, PT
41. **Surgical Repair of Proximal Hamstring Avulsion in the Athlete** (15 minutes)  
Tal S. David, MD and Gabriel L. Petrucelli, MD
42. **Removal of a Broken Intramedullary Nail and Exchange Nailing for Tibial Nonunion** (10 minutes)  
Kenneth A. Egol, MD; Abiola Atanda, MD; Mathew Hamula, BA, BS; and Jason P. Hochfelder, MD
43. **Radical Resection of the Glenoid and Scapular Neck for Sarcoma and Reconstruction** (11 minutes)  
Brendon J. Comer, BA; Brett L. Hayden, BA; Camilo E. Villalobos, MD; and James C. Wittig, MD
44. **Shoulder Arthrodesis: Surgical Technique** (11 minutes)  
Ryan Warth, MD and Peter J. Millett, MD, MSc
45. **Approaches to the Hip: Minimally Invasive Posterolateral Total Hip Arthroplasty** (24 minutes)  
Cesare Faldini, MD; Francesco Traina, MD; Mohammadreza Chehrassan, MD; Raffaele Borghi, MD; Daniele Fabbri, MD; Matteo Nanni, MD; Federico Pilla, MD; Marco Pedrini, MD; and Sandro Giannini, MD
46. **Modified Anterolateral Approach with Femoral Anterior Cortical Window for Revision Total Hip Arthroplasty** (15 minutes)  
Amgad M. Haleem, MD, MSc; Morteza Meftah, MD; Brian Domingues, BA; and Stephen J. Incavo, MD
47. **Spine Scapular Non-Union ORIF Solution** (8 minutes)  
Thomas W. Wright, MD and Gonzalo Samitier Solis, MD, PhD
48. **Fixation of Odontoid Fractures with an Anterior Screw: Surgical Technique** (14 minutes)  
Manuel Valencia, MD; Paulina De La Fuente, MD; Selim Abara, MD; Felipe Novoa, MD, Andres Leiva, MD; and Arturo Olid, MD
49. **Partial Two-Stage Exchange for Infected Total Hip Arthroplasty** (16 minutes)  
Adolph V. Lombardi Jr., MD, FACS; Timothy Ekpo, DO; Keith R. Berend, MD; Michael J. Morris, MD; and Joanne B. Adams, BFA, CMI
50. **Medial Mobile-Bearing UKA with Twin-Peg Femoral Design and Enhanced Instrumentation** (18 minutes)  
Keith R. Berend, MD; Adolph V. Lombardi Jr., MD, FACS; Jason M. Hurst, MD; Michael J. Morris, MD; Joanne B. Adams, BFA, CMI; Keri L. Satterwhite; and Michael A. Sneller, BS

51. **Surgical Treatment of Spondylolisthesis by Posterolateral Arthrodesis and Instrumentation**  
(9 minutes)

Antonello Montanaro, MD; Francesco Turturro, MD; Cosma Calderaro, MD; Luca Labianca, MD; Vicenzo Di Sanzo, MD, PhD; Pierpaola Rota, MD; Alessandro Carducci, MD; and Andrea Ferretti, MD

52. **Transosseous Equivalent Pectoralis Major Tendon Repair** (8 minutes)

Kevin W. Farmer, MD and Gonzalo Samitier Solis, MD, PhD

53. **Posterolateral Corner Primary Repair And Reconstruction Case Based** (18 minutes)

Mark D. Miller, MD; Sean Higgins; and Brian C. Werner, MD

## Multimedia Financial Disclosure

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The following participants have disclosed whether they or a member of their immediate family:

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- n. No Conflicts to Disclose.

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Felipe Novoa, MD (n.)	William I. Sterett, MD (1. Biomet; 3b. Arthrex, Inc.; 5. Arthrex, Inc., Smith & Nephew, Ossur, Siemens)
Arturo Olid, MD (n.)	James B. Stiehl, MD (1. Zimmer, Innomed; 2. Blue Orthopaedics Computer Company, Zimmer; 3b. Blue Orthopaedics Computer Company, Zimmer 3c. Exactech, Inc.; 4. Blue Orthopaedics Computer Company, Traumis, Inc. Technology Company; 8. Knee, Journal of Arthroplasty)
Javad Parvizi, MD, FRCS (3b. Biomet, Covidien, NIAMS & NICHD, Salient Surgical, Smith & Nephew, Stryker, TissueGene, Zimmer; 5. 3m, Musculoskeletal Transplant Foundation, NIAMS & NICHD, Stryker, Zimmer; 7. Saunders/Mosby-Elsevier, SLACK Inc., Wolters Kluwer Health - Lippincott Williams & Wilkins ;8. American Journal of Orthopedics, Current Opinion in Orthopaedics, International Orthopaedics, Journal of Bone and Joint Surgery - American, Journal of Bone and Joint Surgery – British, Journal of the American Academy of Orthopaedic Surgeons, Orthopedics Today, SLACK Inc.; 9. AAHKS, ABOS, British Orthopaedic Association, CD Diagnostics, EOA, Hip Society, OREF, ORS, SmartTech, United Healthcare)	Allston J. Stubbs, MD (3b. Smith & Nephew; 4. Johnson & Johnson, Inc.; 5. Bauerfeind, AG; 8. VuMedi.com, Journal of Arthroscopy; 9. International Society for Hip Arthroscopy, American Orthopaedic Society for Sports Medicine, Arthroscopy Association of North America)
Joanna Patton, ROT (n.)	Michael L. Swank, MD (3b. Brainlab, DePuy; 6. Brainlab, DePuy)
Andrew D. Pearle, MD (n.)	Brett A. Sweitzer, MD (n.)
Marco Pedrini, MD (n.)	Samuel Arthur Taylor, MD (n.)
Christopher L. Peters, MD (1. Biomet; 2. Biomet; 3b. Biomet; 8. Journal of Arthroplasty; 9. AAOS)	Fotios P. Tjoumakaris, MD (2. Ferring Pharmaceutical)
Gabriel L. Petruccelli, MD (5. KFx Medical, Inc.)	Francesco Traina, MD (n.)
Marc J. Philippon, MD (1. Smith & Nephew, Bledsoe, Donjoy, Arthrosurface; 3b. Smith & Nephew; 4. Arthrosurface, Hipco, MIS; 5. Ossur, Arthrex, Siemens, Smith & Nephew; 6. Smith & Nephew; 7. SLACK Inc., Elsevier; 9. International Society for Hip Arthroscopy, AOSSM, Steadman Philippon Research Institute)	Francesco Turturro, MD (n.)
Dana Piasecki, MD (n.)	Manuel Valencia, MD (n.)
Federico Pilla, MD (n.)	Geoffrey S. Van Thiel, MD (n.)

Alex R. Vap, BA ( <i>n.</i> )	Hugh Godfrey Watts, MD ( <i>n.</i> )
Nikhil N. Verma, MD ( <i>1. Smith &amp; Nephew; 2. Arthrosurface; 3b. Smith &amp; Nephew, Arthrex, Inc.; 4. Omeros; 5. Arthrex, Inc., Smith &amp; Nephew, Athletico, ConMed Linvatec, Miomed, Mitek, Arthrosurface; 7. Vindico Medical-Orthopedics Hyperguide, Arthroscopy; 8. Journal of Knee Surgery: Arthroscopy: SLACK Inc.; 9. Arthroscopy Association Learning Center Committee</i> )	Brian C. Werner, MD ( <i>n.</i> )
Camilo E. Villalobos, MD ( <i>n.</i> )	Leo Whiteside, MD ( <i>1. Smith &amp; Nephew, Stryker; 2. Smith &amp; Nephew; 3b. Signal Medical Corp.; 3c. Smith &amp; Nephew; 4. Signal Medical Corp.; 8. Journal of Arthroplasty, Clinical Orthopaedics and Related Research, Journal of Orthopaedics and Traumatology</i> )
Bradford A. Wall, MD ( <i>n.</i> )	James C. Wittig, MD ( <i>n.</i> )
Jon J.P. Warner, MD ( <i>1. Zimmer, Tornier; 6. Arthrocare, DJ Orthopaedics, Arthrex, Inc., Mitek, Breg, Smith &amp; Nephew</i> )	Thomas W. Wright, MD ( <i>1. Exactech, Inc.; 5. Exactech, Inc.; 7. Wolters Kluwer Health - Lippincott Williams &amp; Wilkins; 8. Journal of Hand Surgery – American</i> )
Ryan Warth, MD ( <i>n.</i> )	Adam B. Yanke, MD ( <i>n.</i> )
	Zachary R. Zimmer, BA ( <i>n.</i> )



## Eastern Orthopaedic Association

45<sup>th</sup> Annual Meeting

October 23–25, 2014

The Ritz-Carlton  
Amelia Island, Florida

### 2014 CME Credit Record

#### Multimedia Education

**Instructions:** To ensure correct CME credit is awarded, please complete this form, indicating the DVDs you watched. Return this form to the EOA Registration Desk or complete the Credit Record online at [www.eoa-assn.org](http://www.eoa-assn.org). This form may also be mailed to EOA, 110 West Road, Suite 227, Towson, MD 21204. CME Certificates will be awarded to all registered participants. Unless you have provided a legible email address, please allow up to 30 days to receive your CME certificate.

**Please Print:**

Name: \_\_\_\_\_

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City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

*Thank you for your cooperation.*

**2014 CME Credit Record Multimedia Education**

Please place an **x** in the box by each DVD viewed and write any comments you may have in the space provided.  
You will be awarded hour per hour credit for time of participation.

- |  |  |  |  |  |
|--|--|--|--|--|
| <input type="checkbox"/> DVD 1 (25 min)  | <input type="checkbox"/> DVD 12 (10 min) | <input type="checkbox"/> DVD 23 (7 min)  | <input type="checkbox"/> DVD 34 (21 min) | <input type="checkbox"/> DVD 45 (24 min) |
| <input type="checkbox"/> DVD 2 (11 min)  | <input type="checkbox"/> DVD 13 (11 min) | <input type="checkbox"/> DVD 24 (7 min)  | <input type="checkbox"/> DVD 35 (12 min) | <input type="checkbox"/> DVD 46 (15 min) |
| <input type="checkbox"/> DVD 3 (22 min)  | <input type="checkbox"/> DVD 14 (14 min) | <input type="checkbox"/> DVD 25 (9 min)  | <input type="checkbox"/> DVD 36 (17 min) | <input type="checkbox"/> DVD 47 (8 min)  |
| <input type="checkbox"/> DVD 4 (12 min)  | <input type="checkbox"/> DVD 15 (25 min) | <input type="checkbox"/> DVD 26 (18 min) | <input type="checkbox"/> DVD 37 (16 min) | <input type="checkbox"/> DVD 48 (14 min) |
| <input type="checkbox"/> DVD 5 (15 min)  | <input type="checkbox"/> DVD 16 (13 min) | <input type="checkbox"/> DVD 27 (15 min) | <input type="checkbox"/> DVD 38 (19 min) | <input type="checkbox"/> DVD 49 (16 min) |
| <input type="checkbox"/> DVD 6 (11 min)  | <input type="checkbox"/> DVD 17 (13 min) | <input type="checkbox"/> DVD 28 (21 min) | <input type="checkbox"/> DVD 39 (15 min) | <input type="checkbox"/> DVD 50 (18 min) |
| <input type="checkbox"/> DVD 7 (12 min)  | <input type="checkbox"/> DVD 18 (8 min)  | <input type="checkbox"/> DVD 29 (13 min) | <input type="checkbox"/> DVD 40 (20 min) | <input type="checkbox"/> DVD 51 (9 min)  |
| <input type="checkbox"/> DVD 8 (12 min)  | <input type="checkbox"/> DVD 19 (24 min) | <input type="checkbox"/> DVD 30 (12 min) | <input type="checkbox"/> DVD 41 (15 min) | <input type="checkbox"/> DVD 52 (8 min)  |
| <input type="checkbox"/> DVD 9 (23 min)  | <input type="checkbox"/> DVD 20 (18 min) | <input type="checkbox"/> DVD 31 (15 min) | <input type="checkbox"/> DVD 42 (10 min) | <input type="checkbox"/> DVD 53 (18 min) |
| <input type="checkbox"/> DVD 10 (25 min) | <input type="checkbox"/> DVD 21 (22 min) | <input type="checkbox"/> DVD 32 (26 min) | <input type="checkbox"/> DVD 43 (11 min) |  |
| <input type="checkbox"/> DVD 11 (9 min)  | <input type="checkbox"/> DVD 22 (20 min) | <input type="checkbox"/> DVD 33 (12 min) | <input type="checkbox"/> DVD 44 (11 min) |  |

Please indicate the DVD(s) you found to be most meaningful and any comments. Begin with the DVD number.

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Please indicate any feedback that you may have concerning other DVDs. Begin with the DVD number.

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Please indicate any comments or suggestions that you have regarding the Multimedia Presentations.

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## Eastern Orthopaedic Association

**45<sup>th</sup> Annual Meeting**

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The Ritz-Carlton  
Amelia Island, Florida

### 2014 CME Credit Record

#### Scientific Program

**Instructions:** To ensure correct CME credit is awarded, please complete this form, indicating the Sessions you attended. Return this form to the EOA Registration Desk or go online to [www.eoa-assn.org](http://www.eoa-assn.org) to complete the Credit Record. This form may also be mailed to EOA, 110 West Road, Suite 227, Towson, MD 21204. CME certificates will be awarded to all registered participants. Unless you have provided a legible email address, please allow up to 30 days to receive your CME certificate.

**Please Print:**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

### 2014 CME Credit Record Scientific Program

Please rate by circling the appropriate number: **5 = Excellent** **4 = Good** **3 = Satisfactory** **2 = Fair** **1 = Poor**

**Thursday, October 23, 2014**

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 1</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposia 1</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposia 2</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 2A or Session 2B or Session 2C or Session 2D or Session 2E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 3</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

# C M E F O R M S

**Thursday, October 23, 2014 (Cont.)**

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 4</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 5A or Session 5B or Session 5C or Session 5D or Session 5E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 6</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

**Friday, October 24, 2014**

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 7</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 3</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 8A or Session 8B or Session 8C or Session 8D or Session 8E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 4</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 9</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 10</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 11A or Session 11B or Session 11C or Session 11D or Session 11E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 12</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

**Saturday, October 25, 2014**

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 13</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 5</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 6</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 14A or Session 14B or Session 14C or Session 14D or Session 14E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 15</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 7</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Rapid Fire Session 16A or Session 16B or Session 16C or Session 16D or Session 16E</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 17</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1



## Eastern Orthopaedic Association

45<sup>th</sup> Annual Meeting

October 23–25, 2014

The Ritz-Carlton  
Amelia Island, Florida

### 2014 CME Credit Record

#### Poster Presentations

**Instructions:** To ensure correct CME credit is awarded, please complete this form, indicating the posters viewed. Return this form to the EOA Registration Desk or go online to [www.eoa-assn.org](http://www.eoa-assn.org) to complete the Credit Record. This form may also be mailed to EOA, 110 West Road, Suite 227, Towson, MD 21204. CME certificates will be awarded to all registered participants. Unless you have provided a legible email address, please allow up to 30 days to receive your CME certificate.

**Please Print:**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

*Thank you for your cooperation.*

## 2014 CME Credit Record Poster Presentations

Please indicate posters viewed and include comments in the space provided. Each poster viewed will account for 10 minutes of CME credit. There is a maximum of 3 CME credits available during the course of the meeting for viewing posters (or a total 18 posters).

**Poster Sessions attended:**

(Please check the boxes of the poster sessions you attended).

- |                            |                             |                             |                             |                             |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 7  | <input type="checkbox"/> 13 | <input type="checkbox"/> 19 | <input type="checkbox"/> 25 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 8  | <input type="checkbox"/> 14 | <input type="checkbox"/> 20 | <input type="checkbox"/> 26 |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 9  | <input type="checkbox"/> 15 | <input type="checkbox"/> 21 | <input type="checkbox"/> 27 |
| <input type="checkbox"/> 4 | <input type="checkbox"/> 10 | <input type="checkbox"/> 16 | <input type="checkbox"/> 22 | <input type="checkbox"/> 28 |
| <input type="checkbox"/> 5 | <input type="checkbox"/> 11 | <input type="checkbox"/> 17 | <input type="checkbox"/> 23 | <input type="checkbox"/> 29 |
| <input type="checkbox"/> 6 | <input type="checkbox"/> 12 | <input type="checkbox"/> 18 | <input type="checkbox"/> 24 |                             |

Please indicate the poster(s) you found to be most meaningful and any comments. Begin with the poster number.

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Please indicate any feedback that you may have concerning other posters. Begin with the poster number.

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Please indicate any comments or suggestions that you have regarding the Poster Presentations.

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**2014 Overall Scientific Evaluation**

Your feedback is critical to program planning and future course development. Please take a few minutes to complete and return this evaluation form to the registration desk prior to departure.

<b>Why did you choose to attend this Meeting?</b>	<b>High Importance</b>	<b>Some Importance</b>	<b>Little Importance</b>	<b>No Importance</b>
Course Topic(s) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Learning Method(s).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Program Faculty .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of Program .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timeliness .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtaining CME Credit .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poster Presentations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How did we do overall?</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Course Educational Objectives .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical Application to Practice .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faculty Selection .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity to Interact with Faculty .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Course Syllabus .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity to Ask Questions .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lighting, Seating, and General Environment .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Course Length .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Registration Fee.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Refreshment Breaks, Food and Beverages ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lodging Accommodations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of Lodging Accommodations .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall Course Rating.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>How did we do on Poster Presentations?</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Poster Educational Objectives.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical Application to Practice .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity to Interact with Poster Presenter/Co-Author .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poster Syllabus Material .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity to Ask Questions .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poster Location .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## C M E F O R M S

<b>How did we do on Multimedia?</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Multimedia Educational Objectives .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical Application to Practice .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DVD Selection.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multimedia Location.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>The program content was:</b>	<input type="checkbox"/> <b>Just right</b>	<input type="checkbox"/> <b>Too Advanced</b>	<input type="checkbox"/> <b>Too basic</b>	
<b>How much of the content was new to you?</b>	<input type="checkbox"/> <b>Almost all</b>	<input type="checkbox"/> <b>About 75%</b>	<input type="checkbox"/> <b>About 50%</b>	
	<input type="checkbox"/> <b>About 25%</b>	<input type="checkbox"/> <b>Almost none</b>		
<b>Would you recommend this meeting to colleagues?</b>	<input type="checkbox"/> <b>Yes</b>	<input type="checkbox"/> <b>No</b>		
<b>Did you perceive industry (commercial) bias in this meeting?</b>	<input type="checkbox"/> <b>Yes</b>	<input type="checkbox"/> <b>No</b>		
<i>If yes, describe</i> _____				
<b>What I liked best about this meeting:</b> _____				
<b>How I would improve this meeting:</b> _____				
<b>Overall, did we deliver what you came to learn?</b>	<input type="checkbox"/> <b>Yes</b>	<input type="checkbox"/> <b>No</b>		
<b>What did you learn from attending this meeting? List an example of something you learned that can be applied to your practice:</b> _____				
_____				

## 2015 Needs Assessment Survey

Please list any medical topics that you would like included in future programs planned by EOA.

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Please list any Office Management Topics that you would like included in the program.

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# **Future Meetings**

## **46th Annual Meeting**

June 17-20, 2015  
Grand Wailea  
Maui, Hawaii

## **47th Annual Meeting**

October 19-22, 2016  
The Ritz-Carlton  
New Orleans, Louisiana

# Grantor & Exhibitor Acknowledgements

The Eastern Orthopaedic Association is grateful for the support of its educational grantors and exhibitors. Thank you for your participation and commitment to EOA.

## Platinum

Pacira Pharmaceuticals, Inc.

## Gold

ConvaTec, Inc.

Mallinckrodt Pharmaceuticals - Hospital Division

## Silver

Zimmer, Inc. — *Grantor*

## Bronze

Arthrex, Inc. — *Grantor*

Smith & Nephew, Inc.

## Copper

Blue Belt Technologies  
CeramTec Medical Products  
ConforMIS  
DePuy Synthes  
DJO Global, Inc.  
Exactech, Inc.  
Ferring Pharmaceuticals Inc.

Innovative Medical Products, Inc.  
Integrity Rehab Group  
Marathon Pharmaceuticals, LLC  
MES Solutions  
MicroAire Surgical Instruments  
National Surgical Healthcare  
Quill / Surgical Specialities Corp.

## Exhibitors

3D Systems, Simbionix  
American Academy of Orthopaedic Surgeons  
ACIGI Relaxation  
BBL Medical Facilities  
Biocomposites  
Ceterix Orthopaedics  
EOS imaging  
Hospital Corporation of America  
iRemedy  
LifeNet Health  
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Medtronic Advanced Energy  
MicroPort Orthopedics  
Modernizing Medicine, Inc.  
Nutramax Laboratories Customer Care, Inc.  
Ortho-Preferred  
Osiris Therapeutics, Inc.  
ProScan Reading Services  
Skeletal Dynamics  
Terason  
THINK Surgical  
VirtaMed AG