



Eastern Orthopaedic Association

44th Annual Meeting

October 30-November 2, 2013

Loews Miami Beach
Miami Beach, Florida

2013

Meeting Program

Chuck Freitag

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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 Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint Sponsorship 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 27.5 *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

Dear Colleagues:



David S. Zelouf, MD

Susan and I take great pleasure in welcoming you to the 44th Annual Meeting of the Eastern Orthopaedic Association. Thank you all for attending what will surely be remembered as a truly fantastic educational and social meeting! This year's venue at The Loews Hotel in South Beach offers something for everyone, from culture to just beaching it. Be sure to take a stroll along Ocean Avenue and check out the historic Art Deco hotels. The people watching and shopping on Collins Avenue is also not to be missed.

The restaurants and nightlife are second to none, but be sure to wake up bright and early as Dr. Jay Parvizi, our Program Chair, has put together a phenomenal meeting filled with six interesting and innovative symposia and over 100 podium presentations chosen from a record number of 350 submitted abstracts. The meeting is jam packed with a great variety of papers and poster presentations, and we have been approved for a total of 27.5 CME credits. Due to the efforts of your EOA Board and specifically former EOA President John Richmond, we are also happy to offer our first EOA Self-Assessment Examination which will enable you to earn 10 SAE credits toward your MOC requirements.

We are once again pleased to award the 15 top papers with Resident/Fellow travel awards, and the top two papers will again be presented at the upcoming 2014 AAOS meeting. Congratulations to the recipients!

We would also like to welcome our colleagues from the New Jersey Orthopaedic Society to our meeting. For the first time, our organization is partnering with a state society and your board is pleased to announce this new venture. We are confident it will be a "win-win" for both organizations.

We are grateful to our exhibitors who continue to support our educational mission despite tough economic times. Without their support, it is doubtful that any of the regional orthopaedic societies would continue to exist. I encourage you to visit the exhibit hall during the breaks.

The Presidential Guest Speaker is my good friend and mentor, Dr. Joseph D. Zuckerman. Dr. Zuckerman is the Walter A. L. Thompson Professor of Orthopaedic Surgery at the New York University School of Medicine and Chairman of the Department of Orthopaedic Surgery at NYU Hospital for Joint Diseases. He is also a Past President of the American Academy of Orthopaedic Surgeons (AAOS) and the American Shoulder and Elbow Surgeons (ASES). His talk entitled "Healthcare Reform in 2013: Is Universal Coverage Possible," is sure to be thought provoking and is not to be missed.

The Howard Steel Lecture features Mr. Bill Scheft, noted American comedy writer and novelist. Nephew of the late Herbert Warren Wind, legendary golf and profile writer for The New Yorker, Scheft is best known for being a staff writer for David Letterman since 1991, during which time he has been nominated for 16 Emmy awards. Author of five books, including "Everything Hurts" and his upcoming release "Shrink Thyself," his talk is guaranteed to be hilarious!

Susan and I hope you enjoy all that the meeting and venue have to offer. The welcome reception on Halloween should be great. We do hope you will stay around for our annual Saturday night Founder's Dinner where we plan to samba well into the night!

Sincerely,

A handwritten signature in black ink that reads "David S. Zelouf". The signature is written in a cursive, flowing style.

David S. Zelouf, MD
President, Eastern Orthopaedic Association

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Future EOA Meetings	Inside Back Cover
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Meeting-at-a-Glance

Times and locations are subject to change.

Badges or wristbands are required for admittance to all events.

EOA welcomes its special guests—the New Jersey Orthopaedic Society.

Wednesday, October 30, 2013

6:30am–8:00am	President’s Council Meeting (<i>Poinciana 3</i>)
8:00am–12:00pm	Board of Directors Meeting (<i>Poinciana 3</i>)
9:00am–10:00am	Spouse’s Board Meeting (<i>Boardroom–3rd Level</i>)
2:00pm–6:00pm	Meeting Registration (<i>Americana Ballroom Foyer</i>)
2:30pm–6:00pm	Speaker Ready Room (<i>Americana Ballroom Foyer</i>)
2:30pm–6:00pm	Scientific Poster Setup (<i>Americana Ballroom Foyer</i>)
6:00pm–8:00pm	Sponsor/Exhibit Setup (<i>Americana Ballroom Salon 3</i>)

Thursday, October 31, 2013

6:00am–7:00am	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–1:00pm	Meeting Registration (<i>Americana Ballroom Foyer</i>)
6:00am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Americana Ballroom Salon 3</i>) The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
6:00am–5:00pm	Speaker Ready Room (<i>Americana Ballroom Foyer</i>)
6:45am–7:00am	First Business Meeting (<i>Americana Ballroom Salon 4</i>)
7:05am–1:00pm	Scientific Program (<i>Americana Ballroom Salon 4</i>)
7:05am–1:00pm	Concurrent Sessions (<i>Poinciana 1 & 2</i>)
8:00am	Beach Walk (<i>Meet in the Lobby</i>)
9:00am–10:30am	Spouse/Children Hospitality (<i>Preston’s Terrace</i>)
10:00am–10:50am	Presidential Guest Speaker (<i>Americana Ballroom Salon 4</i>)
10:50am–11:20am	Presidential Address (<i>Americana Ballroom Salon 4</i>)
11:20am–12:20pm	Industry Sponsored Workshop Luncheon — ConvaTec and Cadence Pharmaceuticals, Inc. (<i>Americana Ballroom Salon 4</i>) *Not for CME credit
1:00pm–2:00pm	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
2:00pm–4:00pm	Multimedia Education Session (<i>Americana Ballroom Foyer</i>)

* See Activities Information on pages 9-11 for more details.

2:00pm–4:00pm	Advocacy Updates with New Jersey Orthopaedic Society (<i>Poinciana 1 & 2</i>)
3:00pm–4:00pm	Art Deco Walking Tour (<i>Meet at Fountain in Palm Court Area</i>)
4:00pm–5:00pm	Case Presentations 1 — Joints (<i>Americana Ballroom Salon 4</i>)
6:15pm–7:00pm	New Member Reception (<i>Rotunda–2nd Level</i>)
7:00pm–10:00pm	Welcome Reception (<i>Americana Lawn</i>)

Friday, November 1, 2013

6:00am–7:00am	Regional and AAOS Presidents' Breakfast Meeting with State Presidents and Board of Councilors (<i>Poinciana 3</i>)
6:00am–7:00am	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–1:00pm	Meeting Registration (<i>Americana Ballroom Foyer</i>)
6:00am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Americana Ballroom Salon 3</i>) The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
6:00am–5:00pm	Speaker Ready Room (<i>Americana Ballroom Foyer</i>)
7:00am–1:00pm	Scientific Program (<i>Americana Ballroom Salon 4</i>)
7:00am–1:00pm	Concurrent Sessions (<i>Poinciana 1 & 2</i>)
8:00am	Beach Walk (<i>Meet in the Lobby</i>)
9:00am	Book Discussion (<i>Table 100 – Preston Restaurant</i>)
10:00am	Party Bridge (All Levels Welcome) (<i>Table 100 – Preston Restaurant</i>)
11:15am–12:15pm	Industry Sponsored Workshop Luncheon — CeramTec Medical Products (<i>Americana Ballroom Salon 4</i>) *Not for CME credit
12:15pm–5:30pm	Golf Tournament (<i>Meet at Fountain in Palm Court Area</i>) *Transportation to golf course will depart at 12:15pm. Teetime is 1:00pm.
1:00pm–2:00pm	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
1:00pm–4:30pm	Cuban Heritage Tour (<i>Meet at Fountain in Palm Court Area</i>)
2:00pm–4:00pm	Multimedia Education Session (<i>Americana Ballroom Foyer</i>)
4:00pm–5:00pm	Case Presentations 2 — Upper Extremity (<i>Americana Ballroom Salon 4</i>)
5:30pm–7:30pm	Exhibitor Reception (<i>Americana Ballroom Salon 3</i>)
5:30pm–7:30pm	Kid's Movie and Arts & Crafts (<i>Poinciana 1 & 2</i>)

Saturday, November 2, 2013

6:00am–7:00am	Board of Directors Meeting (<i>Poinciana 3</i>)
6:00am–7:00am	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–1:00pm	Meeting Registration (<i>Americana Ballroom Foyer</i>)

* See Activities Information on pages 9-11 for more details.

6:00am–1:00pm	Speaker Ready Room (<i>Americana Ballroom Foyer</i>)
6:00am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Americana Ballroom Salon 3</i>) The drawing will take place at the end of the first break in the exhibit area. You must be present to win!
6:45am–7:00am	Second Business Meeting (<i>Americana Ballroom Salon 4</i>)
7:00am–1:00pm	Scientific Program (<i>Americana Ballroom Salon 4</i>)
7:00am–1:00pm	Concurrent Sessions (<i>Poinciana 1 & 2</i>)
8:00am	Beach Walk (<i>Meet in the Lobby</i>)
10:05am–10:45am	Howard Steel Lecture (<i>Americana Ballroom Salon 4</i>)
1:00pm–2:00pm	Scientific Poster Session (<i>Americana Ballroom Foyer</i>) Note: Presenters will be available to answer questions.
1:00pm–6:00pm	Deep Sea Fishing (<i>Meet at Fountain in Palm Court Area</i>)
2:00pm–3:30pm	Bass Museum (<i>Meet at Fountain in Palm Court Area</i>)
2:00pm–4:00pm	Multimedia Education Session (<i>Americana Ballroom Foyer</i>)
7:00pm–8:00pm	Jazz Band Reception (<i>Americana Ballroom Foyer</i>)
7:00pm–11:00pm	Kid's Movie and Arts & Crafts (<i>Poinciana 1 & 2</i>)
8:00pm–11:00pm	Founders' Dinner Dance (<i>Americana Ballroom Salon 4</i>)

* See Activities Information on pages 9-11 for more details.

Scientific Program Agenda

Presenters and times are subject to change.

Thursday, October 31, 2013

- 6:00am–7:00am **Scientific Poster Session** (*Americana Ballroom Foyer*)
 Note: Presenters will be available to answer questions.
- 6:45am–7:00am **First Business Meeting** (*Americana Ballroom Salon 4*)
- 7:05am–8:00am **Concurrent Session 1 — Total Joint Arthroplasty** (*Americana Ballroom Salon 4*)
- 7:05am–8:00am **Concurrent Session 2 — Basic Science** (*Poinciana 1 & 2*)
- 8:00am–8:20am **Break — Please visit exhibitors** (*Americana Ballroom Salon 3*)
- 8:20am–9:00am **Symposium 1 — Healthcare Reform** (*Americana Ballroom Salon 4*)
- 9:00am–9:40am **Symposium 2 — Update On DVT Prophylaxis** (*Americana Ballroom Salon 4*)
- 9:40am–10:00am **Break — Please visit exhibitors** (*Americana Ballroom Salon 3*)
- 10:00am–11:20am **General Session 3 — Presidential Guest Speaker & Presidential Address**
 (*Americana Ballroom Salon 4*)
- 11:20am–12:20pm **Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals, Inc. and ConvaTec** (*Americana Ballroom Salon 4*)
 *Not for CME credit
- 12:20pm–1:00pm **Concurrent Session 4 — Foot & Ankle** (*Americana Ballroom Salon 4*)
- 12:20pm–1:00pm **Concurrent Session 5 — Upper Extremity** (*Poinciana 1 & 2*)
- 1:00pm–2:00pm **Scientific Poster Session** (*Americana Ballroom Foyer*)
 Note: Presenters will be available to answer questions.
- 2:00pm–4:00pm **Multimedia Education Session** (*Americana Ballroom Foyer*)
- 4:00pm–5:00pm **Case Presentations 1 — Joints** (*Americana Ballroom Salon 4*)

Friday, November 1, 2013

- 6:00am–7:00am **Scientific Poster Session** (*Americana Ballroom Foyer*)
 Note: Presenters will be available to answer questions.
- 7:00am–8:00am **Concurrent Session 6 — Total Joint Arthroplasty** (*Americana Ballroom Salon 4*)
- 7:00am–8:00am **Concurrent Session 7 — Pediatrics** (*Poinciana 1 & 2*)
- 8:00am–8:20am **Break — Please visit exhibitors** (*Americana Ballroom Salon 3*)
- 8:20am–9:05am **Symposium 3 — Value in Healthcare** (*Americana Ballroom Salon 4*)
- 9:05am–9:50am **Symposium 4 — Facts and Fictions in Orthopedics** (*Americana Ballroom Salon 4*)
- 9:50am–10:10am **Break — Please visit exhibitors** (*Americana Ballroom Salon 3*)
- 10:10am–11:15am **Symposium 5 — What Is New In Orthopedics: Developing Horizon**
 (*Americana Ballroom Salon 4*)

11:15am–12:15pm	Industry Sponsored Workshop Luncheon — CeramTec Medical Products <i>(Americana Ballroom Salon 4) *Not for CME credit</i>
12:15pm–1:00pm	Concurrent Session 8 — Basic Science <i>(Americana Ballroom Salon 4)</i>
12:15pm–1:00pm	Concurrent Session 9 — Spine <i>(Poinciana 1 & 2)</i>
1:00pm–2:00pm	Scientific Poster Session <i>(Americana Ballroom Foyer)</i> Note: Presenters will be available to answer questions.
2:00pm–4:00pm	Multimedia Education Session <i>(Americana Ballroom Foyer)</i>
4:00pm–5:00pm	Case Presentations 2 — Upper Extremity & Hand <i>(Americana Ballroom Salon 4)</i>

Saturday, November 2, 2013

6:00am–7:00am	Scientific Poster Session <i>(Americana Ballroom Foyer)</i> Note: Presenters will be available to answer questions.
6:45am–7:00am	Second Business Meeting <i>(Americana Ballroom Salon 4)</i>
7:00am–8:05am	Concurrent Session 10 — Trauma <i>(Americana Ballroom Salon 4)</i>
7:00am–8:05am	Concurrent Session 11 — Upper Extremity <i>(Poinciana 1 & 2)</i>
8:05am–8:10am	Change Rooms
8:10am–9:15am	Concurrent Session 12 — Infection <i>(Americana Ballroom Salon 4)</i>
8:10am–9:15am	Concurrent Session 13 — Spine & Trauma <i>(Poinciana 1 & 2)</i>
9:15am–9:40am	Break — Please visit exhibitors <i>(Americana Ballroom Salon 3)</i>
9:40am–10:45am	General Session 14 — BOC, OREF, AAOS Report & Howard Steel Lecturer <i>(Americana Ballroom Salon 4)</i>
10:45am–11:50am	Symposium 6 — Orthopedic Infections <i>(Americana Ballroom Salon 4)</i>
11:50am–12:00pm	Change Rooms/Refreshment Break <i>(Americana Ballroom Foyer)</i>
12:00pm–1:00pm	Concurrent Session 15 — Total Joint Arthroplasty <i>(Americana Ballroom Salon 4)</i>
12:00pm–1:00pm	Concurrent Session 16 — Sports Medicine & Oncology <i>(Poinciana 1 & 2)</i>
1:00pm–2:00pm	Scientific Poster Session <i>(Americana Ballroom Foyer)</i> Note: Presenters will be available to answer questions.
2:00pm–4:00pm	Multimedia Education Session <i>(Americana Ballroom Foyer)</i>

Activities Information

Badges or wristbands are required for admittance to all events.

Thursday, October 31, 2013

Beach Walk

8:00am (Meet in the Lobby)

Price: *Included in registration fee*

Spouse/Children Hospitality

9:00am–10:30am (Preston's Terrace)

EOA is pleased to have Victoria Pesce Elliott as the speaker for the spouse hospitality. She has been a restaurant critic and food writer for *The Miami Herald* since 2000. She has authored a number of travel books, including *Frommer's Guide to Miami & The Keys*, *Knopf's Miami* series and *Miami Zagat Guides for South Florida*. Her work has also appeared in numerous cooking and entertaining publications. We look forward to learning about her culinary insight!

Price: *Included in registration fee or \$40 per unregistered adult guest; \$20 per unregistered child*

Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals, Inc. and ConvaTec

11:20am–12:20pm (Americana Ballroom Salon 4)

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

Presented by:

Christopher Gharibo, MD, NYU Medical Center, New York, NY
Javad Parvizi, MD, FRCS, Rothman Institute, Philadelphia, PA
Amar Ranawat, MD, Hospital for Special Surgery, New York, NY

- Risk Mitigation of Infection in Total Joint Arthroplasty
- Recent Advances in Post-Operative Wound Management
- Perioperative Pain Management for Orthopedic Surgery

*Not for CME credit

Price: *Included in registration fee; lunch is provided*

Advocacy Updates with New Jersey Orthopaedic Society

2:00pm–4:00pm (Poinciana 1 & 2)

Federal Health Care and How It Affects Orthopaedic Surgeons

Congressman Michael Burgess, Lewisville, TX

Rep. Burgess is a physician and practiced in North Texas for over 30 years. He serves on the House Energy and Commerce Committee and is the Vice Chairman of the Subcommittee on Health. In 2009, Rep. Burgess founded, and currently serves as Co-Chair, of the Congressional Health Caucus.

New Jersey Legislature Update

Mark E. Manigan, Esq., Roseland, NJ

Mark Manigan is a partner at the Brach Eichler Law Firm in Roseland, New Jersey, and serves as the legal counsel for the New Jersey Orthopaedic Society.

Price: *Included in registration fee*

Art Deco Walking Tour

3:00pm–4:00pm (Meet at Fountain in Palm Court Area)

Located on Miami Beach, lovers of the unique Art Deco style of architecture will be in awe of the largest group of Art Deco buildings in America. More buildings of this period are being restored every day. Cotton candy-colored hotels and apartment houses dot the square miles on South Beach, the only 20th century historic district listed in the U.S. National Register of Historic Places. This streamlined architecture and style popular in the 20s and 30s is enjoying a resurgence and the Art Deco District is one of the East Coast's hottest night spots. One-hour guided tour.

Price: *\$32 per person (Minimum 20 people)*

New Member Reception

6:15pm–7:00pm (Rotunda–2nd Level)

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 (Americana Lawn)

Have a wonderful evening overlooking the ocean with food delicacies and drinks to be enjoyed! Don't forget it is Halloween and the kids will have an opportunity to show off their costumes!

Attire: Resort Casual (no coat required)

Price: *Included in registration fee or \$100 per unregistered adult guest; \$50 per unregistered child (5-17 years)*

Friday, November 1, 2013

Regional and AAOS President's Breakfast Meeting with State Presidents and Board of Councilors

6:00am–7:00am (Poinciana 3)

Price: *Included in registration fee*

Beach Walk

8:00am (Meet in Lobby)

Price: *Included in registration fee*

Book Discussion

9:00am (Table 100 – Preston Restaurant)

A discussion of the *Invisible Thread* by Laura Schroff.

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

Party Bridge

10:00am (All Levels Welcome) (Table 100 – Preston Restaurant)

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

Industry Sponsored Workshop Luncheon – CeramTec Medical Products

11:15am–12:15pm (*Americana Ballroom Salon 4*)

Ceramics Today: What are the Key Issues?

Symposium Chairman: Javad Parvizi, MD, FRCS

Discussion:

- Reduced Wear when Ceramic Components Articulate with PE and XPE — Amar Ranawat, MD
- Metal Ion Generation on Modular Junctions Can Be Minimized Using Ceramics — Stephen Kurtz, PhD
- Reliability and Squeaking: What We Know Today — Javad Parvizi, MD, FRCS
- Soft Tissue Friendly New Ball Head Design for Ceramic Ball Heads — Orhun Muratoglu, PhD

*Not for CME credit

Price: *Included in registration fee; lunch is provided*

Golf Tournament

12:15pm–5:30pm (*Meet at Fountain in Palm Court Area*)

Enjoy Friday afternoon at one of the premier golf courses in Miami Beach featuring challenging fairways and greens. Transportation to the golf course will depart the hotel at 12:15pm. The tournament will be a 1:00pm shotgun start with scramble format.

Price: *\$215 per person (Included in price are greens fees, lunch, beverage cart, prizes and transportation.)*

Cuban Heritage Tour

1:00pm–4:30pm (*Meet at Fountain in Palm Court Area*)

The Castro revolution in Cuba in 1959 changed Miami forever. Wave after wave of Cuban refugees have transformed Miami into the Capital of the Americas, a fast-paced, internationally-connected commercial and entertainment hub with a racy Latin image. From the food to the accents on the street to the fashion scene and artists' studios, Miami now pulses with an original blended culture. Experience the passion and vision that these motivated exiles brought to their new home. We will be visiting Miami's own version of the Statue of Liberty, a well-loved marketplace, great Cuban food spots, moving monuments, lively street scenes and a place of spiritual reflection and longing. Take in the smells, sights, sounds and colors of a street that launched the dramatic transformation of Miami over four decades ago and prepare yourself for a day of discovery and fun.

Price: *\$145 per person (Minimum 15 people)*

Exhibitor Reception

5:30pm–7:30pm (*Americana Ballroom Salon 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*

Kid's Movie Party and Arts & Crafts

5:30pm–7:30pm (*Poinciana 1 & 2*)

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, November 2, 2013

Beach Walk

8:00am (*Meet in Lobby*)

Price: *Included in registration fee*

Deep Sea Fishing

1:00pm–6:00pm (*Meet at Fountain in Palm Court Area*)

Enjoy the thrill of catching the fish of a lifetime aboard a state-of-the-art sport fishing boat. Troll for sailfish, marlin, dolphin, wahoo, kingfish, tuna, barracuda and shark or bottom fish for grouper, snapper and amberjack in the enriched waters of the Gulf Stream and Atlantic Ocean. The captain and mate provide all the fishing tackle, rigged bait and instruction required. Box lunch and beverages included.

Price: *\$345 per person (Minimum 6 people)*

Bass Museum

2:00pm–3:30pm (*Meet at Fountain in Palm Court Area*)

A short walk from the Loews Hotel, and located in the heart of Miami Beach's historic Art Deco District, the Bass Museum of Art is a landmark for its history and blend of Art Deco and modern architecture. Exhibitions that create stimulating dialogue between the museum's classical collection and contemporary art await you. Docent tour.

Price: *\$7 per person (Minimum 15 people)*

Jazz Reception/Founders' Dinner Dance

7:00pm–11:00pm (*Americana Ballroom Foyer/Americana Ballroom Salon 4*)

The evening begins with a lovely reception and music brought to you by the EOA Jazz Band. The Jazz 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 dancing music.

Attire: Coat & Tie

Price: *Included in registration fee or \$150 per unregistered adult guest; \$75 surcharge per child*

Kid's Movie Party and Arts & Crafts

7:00pm–11:00pm (*Poinciana 1 & 2*)

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 service is provided only for parents attending the Founders' Dinner and children must be registered.

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

Meeting Information

FORMAT

The educational sessions will be held October 31-November 2, 2013, from approximately 7:00am until 1:00pm.

TARGET AUDIENCE

The 44th 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 27.5 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- *15.5 CME Credits for Scientific Program
- *6 CME Credits for Scientific Poster Sessions
- *6 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 to complete the EOA 2013 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.

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.

2013 President

*44th Annual Meeting
Miami Beach, Florida*

David S. Zelouf, MD

Philadelphia, Pennsylvania

EOA Past Presidents

1969-1970	Howard H. Steel, MD, PhD	1991-1992	George P. Bogumill, MD, PhD
1970-1971	Howard H. Steel, MD, PhD	1992-1993	Glen A. Barden, MD
1971-1972	Warner D. Bundens Jr., MD*	1993-1994	Henry R. Cowell, MD, PhD
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2013 Howard Steel Lecture



Bill Scheft
Author of "Everything Hurts"

EOA is pleased to have Bill Scheft present the Howard Steel Lecture. He is a novelist, columnist, and television writer. During the last two decades, Mr. Scheft has established himself as a versatile, singular, and influential comedic voice. His latest and most ambitious work, *Everything Hurts* (Simon and Schuster), is now being made into a film starring Paul Rudd. His critically acclaimed first novel, *The Ringer*, was optioned for film by United Artists, for whom he wrote the screen adaptation. His second novel, *Time Won't Let Me*, was a finalist for the 2006 Thurber Prize for American Humor, the nation's highest honor for literary humor.

In addition to his long-form fiction, Mr. Scheft is widely known for his weekly humor column, "The Show," which appeared in *Sports Illustrated* for three years. A collection of his columns, *The Best of The Show*, was published in 2005. Before coming to *Sports Illustrated*, he spent two and a half years at *ESPN Magazine* writing a similar column, called "The Monologue."

After twelve years touring as a stand-up comedian, Mr. Scheft was hired as a monologue writer for *Late Night with David Letterman* in 1991. He was with the program for its last two years at NBC, then moved over to CBS in August 1993 to work on *Late Show with David Letterman*. He served as head monologue writer for the *Late Show* until 2004, and during his 17 years with Letterman has been nominated for 15 Emmys. (Which, ah, means he never won.)

A 1979 graduate of Harvard College, where he majored in Latin because he "thought the church was going to come back," Mr. Scheft began his professional career as a sports writer for the *Albany Times-Union* before he came to the realization, "Hey, what the hell am I doing in Albany?" He moved to New York City in December 1980. He still lives in Manhattan with his wife, comedian Adrienne Tolsch, and the voices in his head.

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Innovative Medical Products, Inc. (IMP) is focused on developing and marketing innovative patient positioning products to benefit and improve efficiency in the operating room and hospital clinics where patient stability and positioning are required.

MAKO Surgical Corp.

2555 Davie Road
Ft. Lauderdale, FL 33317
866-647-6256
www.makosurgical.com

MAKO Surgical Corp.® is proud to support surgeons' efforts to restore patient mobility and lifestyle by offering MAKOpasty®. MAKOpasty® is empowered by robotic arm technology to bring a new level of precision and confidence to total hip and partial knee surgery. For a hands-on demonstration, please stop by our booth.

Medical Compression Systems, Inc.

3101 N. Hampton Drive, Suite 1407
Alexandria, VA 22302
703-589-3525
www.mcsmed.com

Medical Compression Systems (MCS) is a leader in innovative, non-invasive solutions for the prevention of venous thromboembolism (VTE). The company is the first and currently the only to offer the healthcare market a new class of proven Continuous Enhanced Circulation Therapy in combination with MCS's patented Synchronized Flow Technology (C.E.C.T.® + S.F.T.) devices, which can minimize the need for pharmaceutical therapy as the current standard of care.

Medical Protective

5814 Reed Road
Fort Wayne, IN 46835
800-463-3776 (800-4MEDPRO)
www.medpro.com

Medical Protective, a Warren Buffett Berkshire Hathaway Company, protects the reputation and assets of healthcare providers with four levels of unmatched protection — strength, defense, solutions, since 1899.

Medtronic Advanced Energy

180 International Drive
Portsmouth, NH 03801
603-842-6219
www.medtronic.com

Medtronic Advanced Energy develops and manufactures advanced energy devices that deliver proprietary TRANSCOLLATION® technology, a combination of radio frequency (RF) energy and saline, to provide haemostatic sealing of soft tissue and bone. The company's AQUAMANTYS® System was designed to reduce blood loss in a broad range of orthopaedic procedures.

Medtronic, Inc.

2600 SofamorDanek Drive
Memphis, TN 38132
800-876-3133
www.medtronic.com

Nutramax Laboratories, Inc.

2208 Lakeside Boulevard
Edgewood, MD 21040
800-925-5187
www.nutramaxlabs.com

Nutramax Laboratories, Inc. researches, develops, manufactures and markets products that improve the quality of life for people and their pets. We manufacture in the U.S. and follow standards practiced by the pharmaceutical industry. Cosamin® joint health supplement is the #1 Researched Glucosamine/Chondroitin brand.

OREF

6300 North River Road, Suite 700
Rosemont, IL 60018
847-698-9980
www.oref.org

OREF is an independent, 501(c)(3) organization that raises funds to support research and education on diseases and injuries of bones, joints, nerves, and muscles. OREF-funded research and education enhance clinical care, leading to improved health, increased activity, and a better quality of life for patients.

Ortho-Preferred

110 West Road, Suite 227
Towson, MD 21204
877-304-3565
www.Ortho-Preferred.com

Take advantage of the next evolution in professional liability insurance with the Ortho-Preferred Program. When you

choose the Ortho-Preferred Program you not only receive comprehensive professional liability insurance coverage at competitive rates through Medical Protective, but also additional benefits above and beyond your coverage through DT Preferred Group, LLC, a risk purchasing group. Choose the Ortho-Preferred Program and find out how much you could save on your professional liability insurance today!

Pacira Pharmaceuticals, Inc.

5 Sylvan Way
Parsippany, NY 07054
973-254-3560
www.pacira.com

Pacira Pharmaceuticals, Inc. is an emerging specialty pharmaceutical company focused on the development, commercialization and manufacture of new pharmaceutical products, based on its proprietary DepoFoam® drug delivery technology, for use in hospitals and ambulatory surgery centers. The Pacira Approach: Controlling postsurgical pain is the key to improving patient outcomes, yet up to 80% of patients report pain that is moderate to extreme in intensity after surgery.

Planmed USA

100 North Gary Avenue, Suite A
Roselle, IL 60172
630-894-2200
www.planmed.com

Planmed, a trusted leader in imaging solutions, designs, manufactures and markets equipment for healthcare professionals to over 100 countries worldwide. Planmed systems are well known for imaging performance, user-friendliness and excellent ergonomics. The Planmed Verity Cone Beam CT scanner for extremities delivers detailed diagnostics with ortho-3D imaging. The motorized gantry with adjustable height and tilt allows the patient to be imaged in a more relaxed manner than conventional CT and at a lower x-ray dose.

PolyGel, LLC

30 Leslie Court
Whippany, NJ 07981
973-884-3300
www.polygel.com

ProScan Reading Services

5400 Kennedy Avenue
Cincinnati, OH 45213
877-PROSCAN
www.proscan.com

ProScan Reading Services — Teleradiology for your Practice: Our team of board-certified, fellowship-trained (MSK MRI) radiologists support the launch and growth of your imaging division. ProScan Reading Services is committed to improving the quality of care through education, access, expertise and technology. ProScan Teleradiology— Everything you need, we deliver!

QTC Medical Services

21700 Copley Drive, Suite 200
Diamond Bar, CA 91765
800-260-1515
www.qtcm.com

QTC is the largest private provider of government-outsourced occupational health and disability examination services in the nation. Our more than 30-year history has been marked by a focus on delivering technology-driven examination solutions for our customers.

Quill™ Angiotech

100 Dennis Drive
Reading, PA 19606
877-991-1110
www.quilldevice.com

The Quill Knotless Tissue-Closure Device is designed to evenly distribute tension along a closure by replacing knots with running closures. Tiny barbs on the suture provide immediate tissue hold on placement, making soft tissue approximation faster and easier. Quill™ helps enable surgeons to reshape, remold, lift, quilt, close, and secure tissue.

Riverside Health System

491 McLaws Circle, Suite 2
Williamsburg, VA 23185
757-645-2523
www.rivhs.com

Simbionix-USA

7100 Euclid Avenue, Suite 180
Cleveland, OH 44103
services@simbionix.com
866-746-2466

Simbionix is a world leader in medical education and surgical simulation solutions. The ARTHRO Mentor provides advanced training simulation on **Knee and Shoulder** arthroscopic surgical procedures. Anatomical models, haptic sensation, 3D images, and a realistic set of tools including an arthroscopic camera to help reduce training time and considerably improve the learning curve of complex surgery techniques. This true-to-life hands-on experience is available in a demo in the Simbionix booth.

Skeletal Dynamics

8905 SW 87th Avenue
Miami, FL 33176
305-596-7585
www.skeletaldynamics.com

Skeletal Dynamics designs and develops unique orthopedic devices and technologies for surgeons to enhance the surgical experience, and the lives of their patients.

Smith & Nephew, Inc.

150 Minuteman Road
Andover, MA 01810
978-749-1000
www.smith-nephew.com

Smith & Nephew is committed to helping people regain their lives by repairing and healing the human body. Our two

divisions—Advanced Surgical Devices and Advanced Wound Management—are dedicated to developing innovative, cost effective products and techniques that deliver significant advantages and make life better for our customers and their patients.

Stryker Orthopaedics

325 Corporate Drive
Mahwah, NJ 07430
800-447-7836
www.stryker.com

Stryker is one of the world's leading medical technology companies and is dedicated to helping healthcare professionals perform their jobs more efficiently while enhancing patient care. The Company offers a diverse array of innovative medical technologies including reconstructive implants, medical and surgical equipment, and neurotechnology and spine products to help people lead more active and more satisfying lives.

Tesla Motors

3500 Deer Creek Road
Palo Alto, CA 94304
650-213-6593
www.teslamotors.com

Tesla's goal is to accelerate the world's transition to electric mobility with a full range of increasingly affordable electric cars. California-based Tesla produces Model S, the world's first premium sedan built from the ground up as an electric vehicle. Tesla vehicles deliver both unprecedented range and a thrilling drive experience.

VirtaMed AG

Rütistrasse 12
CH-8952 Schlieren, Zurich
Switzerland
+41 44 500 96 90
www.virtamed.com
www.youtube.com/user/VirtaMed

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.

Wright Medical Technology, Inc.

5677 Airline Road
Arlington, TN 38002
800-238-7188
www.wmt.com

Wright Medical Technology is a global manufacturer and distributor of reconstructive joint devices and bio-orthopaedic materials. We provide a wide variety of knee, extremity and biologic products for our customers. With over 50 years in business, Wright Medical provides a trusted name in orthopaedics.

Zimmer

1800 W. Center Street
Warsaw, IN 46581
800-631-6131
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

Loews Miami Beach
Miami Beach, Florida
Americana Ballroom Salon 4

Thursday, October 31, 2013
6:45am–7:00am

First Business Meeting Agenda

- I. Reading of the Minutes of the previous meeting
by the Secretary (and their approval) James T. Guille, MD
- II. Report of the President David S. Zelouf, MD
- III. Report of the Immediate Past President Henry A. Backe Jr., MD
- IV. Report of the First Vice President David W. Romness, MD
- V. Report of the Second Vice President Mark J. Lemos, MD
- VI. Report of the Treasurer Geoffrey H. Westrich, MD
- VII. Report of the Historian Robert P. Boran Jr., MD
- VIII. Report of the Program/Professional Education Committee Javad Parvizi, MD, FRCS
- IX. Report of the Membership Committee Kevin D. Plancher, MD
- X. Report of the Managing Director E. Anthony Rankin, MD
- XI. Report of Member at Large (1 yr) Michael P. Bolognesi, MD
- XII. Report of Member at Large (2 yr) Marc J. Levine, MD
- XIII. Report of Member at Large (3 yr) John D. Kelly IV, MD
- XIV. Report of the Bylaws Committee John J. Callahan, Jr., MD
- XV. Report of the Technical Exhibit Committee Amar S. Ranawat, MD
- XVI. Report of Finance Committee Geoffrey H. Westrich, MD
- XVII. Report of Audit Committee David W. Romness, MD
- XVIII. Report of Nominating Committee/Presentation of Slate Henry A. Backe Jr., MD
2013-2014 Nominating Committee:
Glen A. Barden, MD
Scott D. Boden, MD
Robert V. Dawe, MD
Kevin D. Plancher, 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.

(b) Nominations from the Floor for the Audit Committee

Audit Committee Members:

Michael Sidor, MD (2012-2014) (Appointed)

James C. Vailas, MD (2011-2013) (Elected)

Audit Committee Requirements:

The Audit Committee shall consist of the First Vice President as Chair, and two (2) Active Members of the association not otherwise officers. One (1) Active Member shall be appointed by the Board of Directors, and one (1) shall be elected by majority vote at alternate Annual Meetings, after nominations from the floor. None of the members of the Audit Committee may be a member of the Finance Committee. The elected member and the appointed member shall serve for alternate terms of two (2) years.

XX. Announcement

XXI. Adjournment

2012 Eastern Orthopaedic Association Annual First Business Meeting Minutes

Bolton Landing, New York
Thursday, June 21, 2012

Reading of the Secretary, James T. Guille, MD: The minutes from the previous First Business Meeting from Williamsburg, 2011, were approved as submitted in the Meeting Syllabus.

Report of the President, Henry A. Backe Jr., MD: Dr. Backe welcomed everyone to The Sagamore for the 43rd annual EOA meeting. He reported on the educational aspects of the meeting and commended Dr. Kelly and the Program Committee for putting together an excellent meeting.

Report of the Immediate Past President, John C. Richmond, MD: He stated that it had been an honor to serve as President and thanked everyone for their support during his year as President.

Report of the 1st Vice President, David S. Zelouf, MD: Dr. Zelouf welcomed everyone to join EOA for the 44th annual meeting to be held October 30 – November 2, 2013 at Loews Miami Beach in Miami Beach, FL. Dr. Javad Parvizi will be the Program Chair.

Report of the 2nd Vice President, David W. Romness: Dr. Romness reported that the 45th annual meeting will be October 22-25, 2014 at the Ritz-Carlton Amelia Island in Florida. He encouraged everyone to attend the meeting.

Report of the Treasurer, Geoffrey H. Westrich, MD: Dr. Westrich reported that as a result of strong meeting attendance, exhibitor revenue, and improvement in our portfolio, the EOA is in good financial condition.

Report of the Historian, Robert P. Boran, MD: Dr. Boran held a moment of silence for deceased members.

Report of the Program Chair, John D. Kelly IV, MD: Dr. Kelly thanked all those who aided him with the meeting

Report of the Membership Committee, Brian J. Galinat, MD: Dr. Galinat reported that membership is down and

encouraged everyone to spread the word about EOA to recruit new members.

Report of the Managing Director, E. Anthony Rankin, MD: Dr. Rankin thanked the Board for their stewardship of the Association.

Report of the Member at Large (1 yr), Javad Parvizi, MD: Dr. Parvizi encouraged the Academic institutions to support the meeting through submission of research and attendance at the meeting.

Report of the Member at Large (2 yr), Michael P. Bolognesi, MD: Dr. Bolognesi reported on the status of the State Reps and encouraged anyone interested in serving to let him know.

Report of the Member at Large (3 yr), Marc J. Levine, MD: Dr. Levine encouraged EOA to involve state societies in membership and at meetings.

Report of the Bylaws Committee, Mark J. Lemos, MD: Dr. Lemos presented bylaws changes that would be voted on Saturday.

Report of the Technical Exhibit Committee, Amar S. Ranawat, MD: Dr. Ranawat encouraged all to visit and thank the exhibitors for supporting our meeting.

Report of the Finance Committee, Geoffrey H. Westrich, MD: Dr. Westrich reported EOA had a positive year financially, with a portfolio of \$669k. He also reported that our investment strategy remains conservative at this time.

Report of the Audit Committee, David S. Zelouf, MD: Nothing to report.

Report of the Nominating Committee/Presentation of Slate, John C. Richmond, MD, Chairman: Dr. Richmond presented the slate of officers to the membership. These include:

President: David S. Zelouf, MD
First Vice President: David W. Romness, MD
Second Vice President: Mark J. Lemos, MD
Secretary: James T. Guille, MD
Treasurer: Geoffrey H. Westrich, MD
Member at Large: John D. Kelly IV, MD
Historian: Robert P. Boran, MD

The slate of officers will be voted on at the Second Business Meeting on Saturday.

New Business: Nominations from the floor for the 2013 Nominating Committee were opened. The nominations were:

1. Glen Barden, MD
2. Scott D. Boden, MD
3. Robert Dawe, MD

Nominations were then closed and will be voted on during the Second Business Meeting on Saturday.

There being no further new business. Dr. Backe adjourned the meeting at 7:10am.

Respectfully submitted,
James T. Guille, MD
Secretary, EOA

Eastern Orthopaedic Association

Loews Miami Beach
Miami Beach, Florida
Americana Ballroom Salon 4

Saturday, November 2, 2013
6:45am–7:00am

Second Business Meeting Agenda

- I. Reading of the Minutes of the previous meeting
by the Secretary (and their approval) James T. Guille, MD
- II. Report of Telecommunications Committee Richard M. Wilk, 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
- VIII. New Business
 - (a) Election of 2014-2015 Nominating Committee
- IX. Election of the Slate of Nominees
- X. Installation of First Vice President as President
- XI. Adjourn

2012 Eastern Orthopaedic Association Second Business Meeting Minutes

Bolton Landing, New York
Saturday, June 23, 2012

The meeting was called to order at 7:00 AM by President, Henry A. Backe Jr., MD. He determined that a quorum was present to appropriately conduct the business of the Association.

Reading of the Secretary, James T. Guille, MD: The minutes from the previous Second Business Meeting from Williamsburg, 2011, were approved as submitted in the Meeting Syllabus.

Report of the Telecommunications Committee, Richard M. Wilk, MD: No report.

Report of the CME Committee, Robert N. Richards Jr., MD: Dr. Richards reported that the AAOS approved the 2012 EOA Annual Meeting for 26.75 *AMA PRA Category 1 Credits*.

Report of the Newsletter Editor, Scott D. Boden, MD: No report.

Report of the Jazz Band Coordinator, Robert N. Richards, MD: Dr. Richards reported that the Jazz Band will be playing at the reception at 7:00 pm, followed by dinner at 8:00 pm

Report of the EOEf, Chitranjan S. Ranawat, MD: Dr. Ranawat gave a brief update and encouraged everyone to participate in the silent auction and donate to the EOEf.

Report of the Bylaws Committee, Mark J. Lemos, MD: Dr. Lemos reported bylaws changes were published in the newsletter.

Action Item: It was moved and seconded to approve the bylaws changes as published. The motion carried.

Report of the Nominating Committee/Presentation of Slate, Henry A. Backe Jr., MD, President: Dr. Backe presented the slate of officers to the membership for approval:

President:	David S. Zelouf, MD
First Vice President:	David W. Romness, MD
Second Vice President:	Mark J. Lemos, MD
Secretary:	James T. Guille, MD
Treasurer:	Geoffrey H. Westrich, MD
Member at Large:	John D. Kelly IV, MD

MOTION: It was moved and seconded that the 2013 Slate of Officers be approved as presented. The motion carried.

New Business: Dr. Henry A. Backe Jr. performed the installation ceremony for the incoming president, Dr. David S. Zelouf. He presented him with the EOA Medallion. Dr. Zelouf then acknowledged Dr. Backe for his outstanding leadership during the past year and for his outstanding meeting. He was then presented with the EOA Presidential Pin for his service.

There being no further new business, Dr. Zelouf adjourned the meeting at 7:15 AM.

***Past Annual Meetings of the
Eastern Orthopaedic Association 1970–2012***

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

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

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

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

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

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

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

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

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

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

Sixth Annual Meeting

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

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



Eastern Orthopaedic Association

Scientific Program

October 31-November 2, 2013

Loews Miami Beach
Miami Beach, Florida

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

2013 Program Chair



Javad Parvizi, MD, FRCS
Philadelphia, Pennsylvania

Javad Parvizi, MD, FRCS is a Professor of Orthopaedic Surgery at the Rothman Institute and Thomas Jefferson University with interest in reconstruction of complex pelvis, hip, and knee diseases with special emphasis on joint preservation. As the Vice Chair for Research, he oversees the operations of clinical and basic science research. He has extensive experience conducting clinical trials and outcome studies on joint replacement patients. He is also actively involved in basic science research in tissue engineering and has received numerous grants from the National Institute of Health, Department of Defense, and other funding bodies for his work on development of self-protective smart orthopaedic implants and molecular diagnosis of periprosthetic joint infection. He is a member of numerous National and International Societies such as the Hip Society, The Knee Society, Association of Hip and Knee Surgeons and has served in leadership roles in a large number of national committees. He serves as a member of the study section for the National Institute of Health and various other funding organizations. He is a member of various editorial boards for orthopaedic journals. He has received wide recognition for his clinical and basic science research including the Brazilian Presidential Award of Honor, five Hip Society awards, and four Knee Society awards, as well as numerous honors from other societies. He has authored over 400 peer reviewed manuscripts, is the editor of 5 textbooks in orthopaedics and has authored over 120 chapters.

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2013 Presidential Guest Speaker



Joseph D. Zuckerman, MD
Mamaroneck, New York

Joseph D. Zuckerman, MD, is the Walter A.L. Thompson Professor of Orthopaedic Surgery at New York University (NYU) School of Medicine and Chairman of the Department of Orthopaedic Surgery at NYU Hospital for Joint Diseases (HJD).

Dr. Zuckerman graduated from Cornell University and received his medical degree from the Medical College of Wisconsin and was elected for membership in the Alpha Omega Alpha Honor Society. He completed a residency in orthopaedic surgery at the University of Washington Affiliated Hospitals, a fellowship in adult reconstructive surgery and arthritis research at Brigham and Women's Hospital, and was a visiting clinician in shoulder surgery at the Mayo Clinic.

Dr. Zuckerman recently served as President of the American Academy of Orthopaedic Surgeons (AAOS), the world's largest professional orthopaedic association. He has also served as President of the American Shoulder and Elbow Surgeons, and Chair of the Council on Education for the AAOS. He has received the "Teacher of the Year Award" five times from HJD orthopaedic residents, and in 2011 he was selected as a recipient of the Distinguished Teaching Award from New York University. He serves on the Editorial Boards of several medical journals and has authored 14 textbooks, 81 book chapters and over 300 scientific articles.

Dr. Zuckerman maintains an active clinical practice in shoulder surgery and hip and knee replacement, performing over 300 procedures annually. He is married to Janet Rivkin Zuckerman, PhD, a clinical psychologist and psychoanalyst practicing in Mamaroneck, New York. They have two sons – Scott, age 26, a resident in Neurosurgery at Vanderbilt University Medical Center and Matthew, age 23, an architect living in New York City.

EOA is honored to have such a distinguished leader in orthopaedics as its Presidential Guest Speaker for the 44th Annual Meeting.

2013 EOA Resident/Fellow Award Recipients

Founders' Award Winner

Ibrahim J. Raphael, MD

Aspirin: An Alternative for Pulmonary Embolism Prophylaxis Following Arthroplasty

Thursday, October 31, 7:05am–7:11am, Americana Ballroom Salon 4

Ranawat Award Winner

Steven C. Gross, MD

Can All Tibial Shaft Fractures Weight Bear Following Intramedullary Nailing? A Randomized Clinical Trial

Saturday, November 2, 7:00am–7:06am, Americana Ballroom Salon 4

Resident/Fellow Award Winners

Xudong Li, MD, PhD

An In Vitro and In Vivo Investigation of Annulus Fibrosus Cell "Stemness": A Potential Pathogenesis of Disc Degeneration

Thursday, October 31, 7:17am–7:23am, Poinciana 1 & 2

Moiz Manaqibwala, MD (Presented by Katherina A. Butler, MD)

Complications of Hip Fracture Surgery on Patients Receiving Clopidogrel Therapy

Saturday, November 2, 7:24am–7:30am, Americana Ballroom Salon 4

Mohammad R. Rasouli, MD

Risk Factors of Surgical Site Infection Following Total Joint Arthroplasty

Saturday, November 2, 8:10am–8:16am, Americana Ballroom Salon 4

Resident/Fellow Travel Grant Award Winners

John P. Cody, MD

Biomechanical Contribution of Transverse Connectors in the Setting of a Thoracic Pedicle Subtraction Osteotomy

Thursday, October 31, 7:47am–7:53am, Poinciana 1 & 2

Louis Lewandowski, MD

Combat-Related Hemipelvectomy: Fourteen Cases, A Review of the Literature and Lessons Learned

Saturday, November 2, 7:18am–7:24am, Americana Ballroom Salon 4

Paul M. Lichstein, MD, MS

Aspirin May Be Adequate for Prevention of Thromboembolic Events Following Revision Total Joint Arthroplasty

Thursday, October 31, 7:29am–7:35am, Americana Ballroom Salon 4

Richard Ma, MD

Evaluation of Hip Internal and External Rotation Range of Motion as an Injury Risk Factor for Hip, Abdominal and Groin Injuries in Professional Baseball

Saturday, November 2, 12:00pm–12:06pm, Poinciana 1 & 2

Alexander S. McLawhorn, MD, MBA

Effects of Steroids on Thrombogenic Markers in Patients Undergoing Unilateral Total Knee Arthroplasty

Saturday, November 2, 12:12pm–12:18pm, Poinciana 1 & 2

Praveen G. Murthy, AB

Mini-Incision Release Versus Extended Release with Neurolysis and Tenosynovectomy for Severe Carpal Tunnel Syndrome

Thursday, October 31, 12:20pm–12:26pm, Poinciana 1 & 2

David Ross, BS

Operative Time Directly Correlates with Blood Loss and Need for Transfusion

Friday, November 1, 7:42am–7:48am, Americana Ballroom Salon 4

EOA/OREF Resident /Fellow Travel Grant Award Winners

Mikael Starecki, MD

Evaluation of Amniotic Derived Membrane Biomaterial as an Adjunct for Repair of Critical Sized Bone Defects

Thursday, October 31, 7:11am–7:17am, Poinciana 1 & 2

Anthony T. Tokarski, BS

Incidence of and Risk Factors for Failing Dental Clearance Prior to Hip and Knee Arthroplasty

Friday, November 1, 7:36am–7:42am, Americana Ballroom Salon 4

Robert W. Tracey, MD

Outcomes of Single-Level Cervical Disc Arthroplasty Versus Anterior Discectomy and Fusion: A Single Center, Retrospective Review

Friday, November 1, 12:15pm–12:21pm, Poinciana 1 & 2

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The following participants have disclosed whether they or a member of their immediate family:

1. Receive royalties for any pharmaceutical, biomaterial, or orthopaedic product or device;
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8. Serves on the editorial or governing board of any medical and/or orthopaedic publication;
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- n. No conflicts to disclose.

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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 exhibits.

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 on Thursday, Friday, and Saturday, October 31-November 2.

MULTIMEDIA EDUCATION

Multimedia education materials will be offered on Thursday, Friday, and Saturday, October 31-November 2, 2:00pm-4:00pm. 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 Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint Sponsorship 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 27.5 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- * 15.5 CME credits for Scientific Program
- * 6 CME credits for Poster Sessions
- * 6 CME credits for Multimedia 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 to complete the EOA 2013 Annual Meeting CME Credit Records. CME Certificates will be awarded to all registered participants.

CEC CREDIT

Physician's Assistants can receive up to 27.5 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 to complete the EOA 2013 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 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.

2013 Scientific Program

Thursday, October 31, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

6:00am–7:00am	Scientific Poster Session (Poster Presenters Available) <i>(Americana Ballroom Foyer)</i>	7:00am–7:05am	Welcome to EOA’s 44th Annual Meeting <i>(Americana Ballroom Salon 4)</i> David S. Zelouf, MD, President Javad Parvizi, MD, FRCS, Program Chair
6:45am–7:00am	First Business Meeting <i>(Americana Ballroom Salon 4)</i>		

Concurrent Session 1 — Total Joint Arthroplasty *(Americana Ballroom Salon 4)*

Moderators: Theodore L. Stringer, MD
Hari Bezwada, MD

7:05am–7:11am	Founders’ Award Winner Aspirin: An Alternative for Pulmonary Embolism Prophylaxis Following Arthroplasty <i>Ibrahim J. Raphael, MD, The Rothman Institute, Philadelphia, PA</i>
7:11am–7:17am	Readmission Incidence and Burden Assessment in Total Joint Arthroplasty Using Institutional Real World Data <i>Michael Suk, MD, JD, MPH, FACS, Geisinger Medical Center, Danville, PA</i>
7:17am–7:23am	Intraoperative Fluoroscopy Does Not Improve Component Positioning in Total Hip Arthroplasty (THA): Findings from a High Volume Institution Degeneration <i>Fabio Orozco, MD, The Rothman Institute, Philadelphia, PA</i> <i>*Presented by Alvin Ong, MD</i>
7:23am–7:29am	Clinical and Morphologic Factors Associated with Suture Anchor Refixation of Labral Tears in the Hip <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i> <i>*Presented by John Ruder, BS</i>

Concurrent Session 2 — Basic Science *(Poinciana 1 & 2)*

Moderators: Carl A. Deirmengian, MD
Henry A. Backe Jr., MD

7:05am–7:11am	Alpha-Defensin: A Novel Synovial Fluid Biomarker That Outperforms Leukocyte Esterase When Diagnosing Periprosthetic Joint Infection (PJI) <i>Carl A. Deirmengian, MD, The Rothman Institute, Philadelphia, PA</i>
7:11am–7:17am	EOA/OREF Resident Travel Grant Award Winner Evaluation of Amniotic Derived Membrane Biomaterial as an Adjunct for Repair of Critical Sized Bone Defects <i>Mikael Starecki, MD, The Feinstein Institute for Medical Research, Manhasset, NY</i>
7:17am–7:23am	Resident/Fellow Award Winner An In Vitro and In Vivo Investigation of Annulus Fibrosus Cell “Stemness”: A Potential Pathogenesis of Disc Degeneration <i>Xudong Li, MD, PhD, University of Virginia, Charlottesville, VA</i>
7:23am–7:29am	Is There a Chondroprotective Effect of Autologous Protease Inhibitor Concentrate (APIC) in an Osteoarthritis (OA) Rabbit Model? <i>Gaetano J. Scuderi, MD, Cytonics, Jupiter, FL</i> <i>*Presented by Shawn Browning, PhD</i>

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

Thursday, October 31, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Concurrent Session 1 *con't*

- 7:29am–7:35am **Resident Travel Grant Award Winner**
Aspirin May Be Adequate for Prevention of Thromboembolic Events Following Revision Total Joint Arthroplasty
Paul M. Lichstein, MD, MS, The Rothman Institute, Philadelphia, PA
- 7:35am–7:41am Synergistic Effect of a Multimodal Approach to Blood Management After Total Hip Replacement
Zachary D. Post, MD, The Rothman Institute, Philadelphia, PA
- 7:41am–7:47am Migration and Thigh Pain with a New Short Modular Femoral Stem for Total Hip Replacement
Jose A. Rodriguez, MD, North Shore Long Island Jewish Lenox Hill Hospital, New York, NY
- 7:47am–8:00am Discussion
- 8:00am–8:20am **Break — Please visit exhibitors**
(Americana Ballroom Salon 3)

Concurrent Session 2 *con't*

- 7:29am–7:35am Risk Factors for Readmission Following Inpatient Orthopedic Surgery: A Review of 13,663 Cases
Joseph A. Bosco III, MD, NYU Hospital for Joint Diseases, Langone Medical Center, New York, NY
- 7:35am–7:41am Olecranon Tip Osteoarticular Autograft Transfer for Irreparable Coronoid Process Fractures. A Biomechanical Study
Miguel A. Ramirez, MD, MedStar Union Memorial Hospital, Baltimore, MD
- 7:41am–7:47am Unexpected Dispensable Role of MMP9 in a Stabilized Femur Fracture Model
Cesar S. Molina, MD, Vanderbilt University Medical Center Orthopedic Trauma Institute, Nashville, TN
- 7:47am–7:53am **Resident Travel Grant Award Winner**
Biomechanical Contribution of Transverse Connectors in the Setting of a Thoracic Pedicle Subtraction Osteotomy
John P. Cody, MD, Walter Reed National Military Medical Center, Bethesda, MD
- 7:53am–8:00am Discussion
- 8:00am–8:20am **Break — Please visit exhibitors**
(Americana Ballroom Salon 3)

Symposium 1 — Healthcare Reform *(Americana Ballroom Salon 4)*

Moderator: Carlos J. Lavernia, MD, FAAOS

- 8:20am–8:30am Legislative Update
Carlos J. Lavernia, MD, FAAOS, Orthopaedic Institute at Mercy Hospital, Miami, FL

- 8:30am–8:40am How Will It Affect Private Practices?
Michael E. West, CPA, MBA, The Rothman Institute, Philadelphia, PA
- 8:40am–8:50am Academic Perspective
L. Scott Levin, MD, University of Pennsylvania, Philadelphia, PA

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

Thursday, October 31, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

8:50am–9:00am How to Survive in Community Practice
Kevin D. Ploncher, MD, Orthopaedic Foundation for Active Lifestyles, Cos Cob, CT

9:40am–10:00am **Break —Please visit exhibitors**
(Americana Ballroom Salon 3)

Symposium 2 — Update on DVT Prophylaxis (Americana Ballroom Salon 4)

Moderator: Geoffrey H. Westrich, MD

9:00am–9:10am The AAOS Guidelines
Richard Iorio, MD, NYU Hospital for Joint Diseases, New York, NY

9:10am–9:20am The ACCP Guidelines
Theodore L. Stringer, MD, Colorado Springs Orthopedic Group, Colorado Springs, CO

9:20am–9:30am What Does SCIP Demand?
Gwo-Chin Lee, MD, University of Pennsylvania, Philadelphia, PA

9:30am–9:40am Who Is at High Risk for VTE?
Hari Bezwada, MD, Princeton Orthopaedic Association, Princeton, NJ

General Session 3 —Presidential Guest Speaker & Presidential Address (Americana Ballroom Salon 4)

Moderator: David W. Romness, MD

10:00am–10:50am **Presidential Guest Speaker**
 Healthcare Reform in 2013: Is Universal Coverage Possible?
Joseph D. Zuckerman, MD, NYU Hospital for Joint Diseases, New York, NY

10:50am–11:20am **Presidential Address**
 Life, Golf and Orthopaedic Surgery: Lessons for the Journey
David S. Zelouf, MD, The Philadelphia Hand Center, Philadelphia, PA

11:20am–12:20pm **Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals Inc. and ConvaTec** (Americana Ballroom Salon 4) *Not for CME credit

Concurrent Session 4 — Foot &Ankle (Americana Ballroom Salon 4)

Moderators: David I. Pedowitz, MD
 Sameh A. Labib, MD

12:20pm–12:26pm Incidence and Long-Term Outcome of Nonsurgical Management of Displaced Oblique Shaft Fractures of the Fifth Metatarsal (Dancer’s Fracture)
Michael C. Aynardi, MD, The Rothman Institute, Philadelphia, PA

12:26pm–12:32pm Outcomes After Total Ankle Replacement in Association with Ipsilateral Hindfoot Arthrodesis
John S. Lewis Jr., MD, Duke University Medical Center, Durham, NC

12:32pm–12:38pm The Effect of Platelet-Rich Plasma on Autologous Osteochondral Transplantation: An In Vivo Rabbit Model
Niall A. Smyth, MD, Hospital for Special Surgery, New York, NY

Concurrent Session 5 — Upper Extremity (Poinciana 1 & 2)

Moderators: Mark D. Lazarus, MD
 A. Lee Osterman, MD

12:20pm–12:26pm **Resident Travel Grant Award Winner**
 Mini-Incision Release Versus Extended Release with Neurolysis and Tenosynovectomy for Severe Carpal Tunnel Syndrome
Praveen G. Murthy, AB, The Philadelphia Hand Center/Thomas Jefferson University, Philadelphia, PA

12:26pm–12:32pm The Association of Metabolic Syndrome Markers with Adhesive Capsulitis
Min Jung Park, MD, MMSc, The University of Pennsylvania, Penn Sports Medicine Center, Philadelphia, PA
 *Presented by Itai Gans, BS

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

Thursday, October 31, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Concurrent Session 4 *con't*

- 12:38pm–12:44pm Anterior Talofibular Ligament Abnormality on Routine Magnetic Resonance Imaging of the Ankle
Patrick W. Kane, MD, The Rothman Institute, Philadelphia, PA
- 12:44pm–12:50pm Juvenile Allograft Cartilage Implantation for Treatment of Osteochondral Defects (OCDs) of the Talus
Dinesh Dhanaraj, MD, NYU Hospital for Joint Diseases, Langone Medical Center, New York, NY
- 12:50pm–12:56pm Clinical and MRI Outcomes Following Arthroscopic Microfracture of Osteochondral Lesions of the Distal Tibial Plafond
Keir A. Ross, BS, Hospital for Special Surgery, New York, NY
- 12:56pm–1:00pm Discussion

Concurrent Session 5 *con't*

- 12:32pm–12:38pm Arthroscopic Treatment of Anterior Shoulder Instability in Contact and Noncontact Athletes
Kevin D. Plancher, MD, Orthopaedic Foundation for Active Lifestyles, Cos Cob, CT
- 12:38pm–12:44pm MRI Findings in Acute Elbow Dislocation: Insight Into Mechanism
Joseph J. Schreiber, MD, Hospital for Special Surgery, New York, NY
- 12:44pm–12:50pm Outcomes of Elbow Dislocations in the National Football League (NFL)
Edward Chang, MD, The Rothman Institute, Philadelphia, PA
- 12:50pm–12:56pm Short-Term Effects of Steroid Injection Treatment of Trigger Finger
Karthik Jonna, MD, Maimonides Medical Center, Brooklyn, NY
**Presented by Jenifer Hashem, MD*
- 12:56pm–1:00pm Discussion

- 1:00pm–2:00pm **Scientific Poster Session**
(Poster Presenters Available)
(Americana Ballroom Foyer)
- 2:00pm–4:00pm **Multimedia Session** *(Americana Ballroom Foyer)*
- 4:00pm–5:00pm **Case Presentations 1 — Joints**
(Americana Ballroom Salon 4)
Michael P. Bolognesi, MD, Duke University Medical Center, Durham, NC
Theodore L. Stringer, MD, Colorado Springs Orthopedic Group, Colorado Springs, CO
Matthew S. Austin, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA
Amar S. Ranawat, MD, Hospital for Special Surgery, New York, NY
Henry A. Backe Jr., MD, Orthopaedic Specialty Group, Fairfield, CT

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

Friday, November 1, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

6:00am–7:00am **Scientific Poster Session**
(Poster Presenters Available)
(Americana Ballroom Foyer)

Concurrent Session 6 — Total Joint Arthroplasty (Americana Ballroom Salon 4)

Moderators: John D. Kelly IV, MD
James J. Purtill, MD

- 7:00am–7:06am Percent Body Fat Is More Discriminatory than BMI for Perioperative Outcomes After Total Joint Arthroplasty
Ramon A. Ruberte Thiele, MS, Duke University Medical Center, Durham, NC
- 7:06am–7:12am Evaluating Complications of the Direct Anterior and Direct Lateral Approaches in Total Hip Replacement
Lesley Walinchus, BS, The Rothman Institute, Philadelphia, PA
**Presented by Javad Parvizi, MD, FRCS*
- 7:12am–7:18am Heterotopic Ossification After Primary Total Hip Arthroplasty with Direct Anterior Approach: Influence of Technique and Chemoprophylaxis
Rupesh Tarwala, MD, North Shore Long Island Jewish Lenox Hill Hospital, New York, NY
- 7:18am–7:24am Orthopaedic Device Regulation: Should New Implants for Total Joint Replacement Undergo Further Scrutiny?
Kshitij Kumar Agrawal, MD, Massachusetts General Hospital, Boston, MA
- 7:24am–7:30am Predicting Factor for High Metal Ions and Failures of a Modular Neck Stem
Morteza Meftah, MD, Hospital for Special Surgery, New York, NY
- 7:30am–7:36am Do Ceramic Femoral Heads Reduce Taper Fretting Corrosion in Hip Arthroplasty?
Steven M. Kurtz, PhD, Implant Research Center Drexel University, Philadelphia, PA

Concurrent Session 7 — Pediatrics (Poinciana 1 & 2)

Moderators: James T. Guille, MD
Laurel C. Blakemore, MD

- 7:00am–7:06am Anatomic Physseal Distance About the Knee in Skeletally Immature Patients
Randall Roy, MD, MBA, Children's National Medical Center, Washington, DC
- 7:06am–7:12am It's Always Sunny in the Operating Room: The Effects of Weather on Operative Pediatric Volume at One Institution
Kushagra Verma, MD, duPont Children's Hospital, Wilmington, DE/Thomas Jefferson University Hospital, Philadelphia, PA
**Presented by Christina J. Gutowski, MD*
- 7:12am–7:18am The Simplified Skeletal Maturity Method and Its Correlation with Curve Progression in Idiopathic Scoliosis
Prakash Sitoula, MD, Nemours/duPont Children's Hospital, Wilmington, DE/Thomas Jefferson University, Philadelphia, PA/University of Rochester Medical Center, Rochester, NY
**Presented by Kushagra Verma, MD*
- 7:18am–7:24am Pediatric ATV Injuries: Incidence and Cost in the State of Pennsylvania
Kent Strohecker, MS, Geisinger Medical Center, Danville, PA

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

Friday, November 1, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Concurrent Session 6 *con't*

- 7:36am–7:42am **EOA/OREF Resident Travel Grant Award Winner**
Incidence of and Risk Factors for Failing Dental Clearance Prior to Hip and Knee Arthroplasty
Anthony T. Tokarski, BS, The Rothman Institute, Philadelphia, PA
- 7:42am–7:48am **Resident Travel Grant Award Winner**
Operative Time Directly Correlates with Blood Loss and Need for Transfusion
David Ross, BS, The Rothman Institute, Philadelphia, PA
- 7:48am–8:00am Discussion
- 8:00am–8:20am **Break— Please visit exhibitors**
(Americana Ballroom Salon 3)

Concurrent Session 7 *con't*

- 7:24am–7:30am Are Early Post-Operative Radiographs After Adolescent Idiopathic Scoliosis Surgery Clinically Useful?
Michael Pensak, MD, Connecticut Children's Medical Center, Hartford, CT
- 7:30am–7:36am Intraoperative Monitoring of Epiphyseal Perfusion in Slipped Capital Femoral Epiphysis
Christopher R. Jones, MD, Children's Healthcare of Atlanta, Atlanta, GA
*Presented by Timothy Schrader, MD
- 7:36am–7:42am Transphyseal Tunnel Reconstruction of the ACL in Patients with Open Physes — Not a Cause for Growth Arres
Marielle A. Connor, MD, Nemours Children's Clinic, Jacksonville, FL
- 7:42am–7:48am Lateral Growth of the Acetabular Roof After Salter Pelvic Osteotomy
John Handelsman, MD, FRCS, Schneider Children's Hospital/Cohen Children's Medical Center/North Shore Long Island Jewish Medical Center, New Hyde Park, NY
- 7:48am–8:00am Discussion
- 8:00am–8:20am **Break— Please visit exhibitors**
(Americana Ballroom Salon 3)

Symposium 3 — Value in Healthcare (Americana Ballroom Salon 4)

Moderator: Matthew S. Austin, MD

- 8:20am–8:30am Measuring and Reporting Value in Healthcare
Richard C. Mather III, MD, Duke University Medical Center, Durham, NC
- 8:30am–8:40am Increasing Practice Productivity
Michael R. Gagnon, MBA, Duke University Medical Center, Durham, NC

- 8:40am–8:50am Patient Centered Care: Customer Determining the Value
Matthew S. Austin, MD, The Rothman Institute, Thomas Jefferson University Hospital, Philadelphia, PA
- 8:50am–9:00am Comparative Effectiveness Research
Jashvant Poeran, MD, PhD, Weill Cornell Medical College, New York, NY
- 9:00am–9:05am Discussion

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

Friday, November 1, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Symposium 4 — Facts and Fictions in Orthopaedics (*Americana Ballroom Salon 4*)

Moderator: Kevin D. Plancher, MD

- 9:05am–9:14am Plasma Rich Platelets
A. Lee Ostermon, MD, The Philadelphia Hand Center, Philadelphia, PA
- 9:14am–9:23am Glucosamine and Chondroitin Sulfate
Joshua A. Baumfeld, MD, Lahey Clinic, Peabody, MA
- 9:23am–9:32am Type of Anesthesia: General Versus Regional
Eugene R. Viscusi, MD, Thomas Jefferson University Hospital, Philadelphia, PA
- 9:32am–9:41am Fibromyalgia
Marc J. Levine, MD, Trenton Orthopaedic Group, Mercerville, NJ
- 9:41am–9:50am Visco Supplementation Therapy
John C. Richmond, MD, New England Baptist Hospital, Boston, MA
- 9:50am–10:10am **Break— Please visit exhibitors**
(Americana Ballroom Salon 3)

Symposium 5 — What Is New in Orthopedics: Developing Horizon (*Americana Ballroom Salon 4*)

Moderator: Randall W. Culp, MD

- 10:10am–10:22am Joint Arthroplasty
Amar S. Ranawat, MD, Hospital for Special Surgery, New York, NY
- 10:22am–10:34am Shoulder and Elbow
Grant E. Garrigues, MD, Duke University Medical Center, Durham, NC
- 10:34am–10:46am Hand Surgery
A. Lee Osterman, MD, The Philadelphia Hand Center, Philadelphia, PA
- 10:46am–10:58am Spine Surgery
Jay M. Zampini, MD, University Spine Institute, Philadelphia, PA
- 10:58am–11:10am Foot and Ankle
Sameh A. Labib, MD, Emory University, Atlanta, GA
- 11:10am–11:15am Discussion
- 11:15am–12:15pm **Industry Sponsored Workshop Luncheon — CeramTec Medical Products** (*Americana Ballroom Salon 4*) *Not for CME credit

Concurrent Session 8 — Basic Science (*Americana Ballroom Salon 4*)

Moderators: Rowena McBeath, MD, PhD
Joshua J. Jacobs, MD

- 12:15pm–12:21pm The Novel Use of a Hydro-Dissecting Device for Biofilm Dispersal from Metal Implants
Constantinos Ketonis, MD, Thomas Jefferson University, Philadelphia, PA
- 12:21pm–12:27pm Bone Marrow Derived Stem Cells as a Treatment for Osteoarthritis of the Knee
Daniel T. Eglinton, MD, Park Ridge Health, Fletcher, NC

Concurrent Session 9 — Spine (*Poinciana 1 & 2*)

Moderators: Linda D'Andrea, MD
Marc J. Levine, MD

- 12:15pm–12:21pm **EOA/OREF Resident Travel Grant Award Winner**
Outcomes of Single-Level Cervical Disc Arthroplasty Versus Anterior Discectomy and Fusion: A Single Center, Retrospective Review
Robert W. Tracey, MD, Walter Reed National Military Medical Center, Bethesda, MD

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

Friday, November 1, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Concurrent Session 8 *con't*

12:27pm – 12:33pm	The Effects of Pulsed Electromagnetic Fields on Diabetic Bone Fracture Healing <i>Amit Sood, MD, UMDNJ- New Jersey Medical School, Newark, NJ</i>
12:33pm–12:39pm	Photo/Chemical Bonding of Osteochondral Transplants Through Novel Chitosan Hydrogel Cross-Linkers <i>Amgad M. Haleem, MD, Hospital for Special Surgery, New York, NY</i>
12:39pm–12:45pm	The Effects of Atorvastatin Calcium on Lumbar Vertebrae in Corticosteroid Treated Rabbits <i>David M. Hampton, MD, Einstein Medical Center, Philadelphia PA</i>
12:45pm–12:51pm	Regeneration of Osteochondral Defects Using Multipotent Adult Stem Cells (MASCs) <i>Omowunmi Ajibola, BS, New York Medical College, Valhalla, NY</i>
12:51pm–1:00pm	Discussion

Concurrent Session 9 *con't*

12:21pm–12:27pm	Morbidity of Neurologic Deficits in Vertebral Osteomyelitis <i>Sina Pourtaheri, MD, Seton Hall University/St.Joseph's Regional Medical Center, South Orange, NJ</i>
12:27pm–12:33pm	Pulmonary Function Testing and Risk of Perioperative Pulmonary Complications in Patients with Cervical Myelopathy and Myelomalacia <i>Jeremy D. Shaw, MD, MS, New England Baptist Hospital, Boston, MA</i> <i>*Presented by David H. Kim</i>
12:33pm–12:39pm	What Drives Quality in Spine Surgery? Perceptions Among Medical Device Representatives <i>Amy S. Wasterlain, MD, Stanford University, Stanford, CA</i> <i>*Presented by Gaetano J. Scuderi, MD</i>
12:39pm–12:45pm	Midterm Self-Reported Quality of Life Outcomes After Spine Surgery for Lumbar Spinal Stenosis <i>Alexander Richter, MD, MS, North Shore Long Island Jewish Lenox Hill Hospital, New York, NY</i>
12:45pm–12:51pm	Risk and Predisposing Factors in Surgical Site Infections After Pediatric Spinal Deformity Surgery: Density Case-Control Assessment <i>Jesse Allert, MD, Nemours/duPont Children's Hospital, Wilmington, DE</i>
12:51pm–1:00pm	Discussion

1:00pm–2:00pm **Scientific Poster Session**
(Poster Presenters Available)
(Americana Ballroom Foyer)

2:00pm–4:00pm **Multimedia Session**
(Americana Ballroom Foyer)

4:00pm–5:00pm **Case Presentations 2 —Upper Extremity & Hand** (Americana Ballroom Salon 4)

Neal C. Chen, MD,
The Philadelphia Hand Center,
Philadelphia, PA
Mark D. Lazarus, MD, The Rothman Institute, Philadelphia, PA
Jesse Jupiter, MD, Massachusetts General Hospital, Boston, MA
Randall W. Culp, MD, the Philadelphia Hand Center,
Philadelphia, PA

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

Saturday, November 2, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

6:00am–7:00am **Scientific Poster Session**
(Poster Presenters Available)
(Americana Ballroom Foyer)

6:45am–7:00am **Second Business Meeting**
(Americana Ballroom Salon 4)

Concurrent Session 10 — Trauma (Americana Ballroom Salon 4)

Moderators: Jaimo Ahn, MD, PhD
John D. Kelly IV, MD

7:00am–7:06am **Ranawat Award Winner**
Can All Tibial Shaft Fractures Bear Weight Following Intramedullary Nailing? A Randomized Clinical Trial
Steven C. Gross, MD, NYU Hospital for Joint Diseases/Jamaica Hospital Medical Center, New York, NY

7:06am–7:12am Can an Evidence-Based Treatment Algorithm for Intertrochanteric Hip Fractures Maintain Quality at a Reduced Cost?
Alejandro I. Marciano, MD, NYU Hospital for Joint Diseases, Langone Medical Center, New York, NY

7:12am–7:18am The Potential Efficacy of an Anesthesiology-Driven Pre-Operative Triage Protocol for Hip Fracture Patients
Catherine J. Fedorka, MD, Hahnemann University Hospital/Drexel University College of Medicine, Philadelphia, PA

7:18am–7:24am **Resident Travel Grant Award Winner**
Combat-Related Hemipelvectomy: Fourteen Cases, A Review of the Literature and Lessons Learned
Louis Lewandowski, MD, Walter Reed National Military Medical Center, Bethesda, MD

7:24am–7:30am **Resident/Fellow Award Winner**
Complications of Hip Fracture Surgery on Patients Receiving Clopidogrel Therapy
Moiz Manaqibwala, MD, Robert Wood Johnson Medical School, New Brunswick, NJ
**Presented by Katherine A. Butler, MD*

Concurrent Session 11 — Upper Extremity (Poinciana 1 & 2)

Moderators: Joshua A. Baumfeld, MD
Grant E. Garrigues, MD

7:00am–7:06am All-Metal Distal Radius Hemiarthroplasty Combined with Proximal Row Carpectomy
Abdo Bachoura, MD, The Philadelphia Hand Center, Philadelphia, PA
**Presented by Mark Elzik, MD*

7:06am–7:12am Does the Use of an Inferiorly Offset Glenosphere in Reverse Shoulder Arthroplasty Reduce Scapular Notching? A Radiographic and Functional Outcome Analysis
Xinning Li, MD, Hospital for Special Surgery, New York, NY

7:12am–7:18am Complication Rates in Elbow Arthroscopy
Raghuveer Muppavarapu, MD, New England Baptist Hospital, Roxbury Crossing, MA/Tufts Medical Center, Boston, MA

7:18am–7:24am Arthroscopic Trapeziectomy with Suture Button Suspensoplasty: Moving from an Open to an Arthroscopic Surgery for All Stages of Symptomatic Carpo-Metacarpal Arthritis
Genevieve Landes, MD, The Philadelphia Hand Center, Philadelphia PA

7:24am–7:30am Posterior Interosseous Nerve Localization in the Proximal Forearm — A Patient Normalized Localizing Parameter
Crystal Norgren, MD, University of Kentucky, Lexington, KY
**Presented by Jeremy Burnham, MD*

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

Saturday, November 2, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 44-52.

Concurrent Session 10 *con't*

7:30am–7:36am	Atypical Femur Fractures and Bisphosphonate Use: A Clinical Study <i>Ramin Sadeghpour, MD, Maimonides Medical Center, Brooklyn, NY</i>
7:36am–7:42am	Hemiarthroplasty for Undisplaced and Stable Femoral Neck Fractures <i>Raveesh D. Richard, MD, Geisinger Medical Center, Danville, PA</i>
7:42am–7:48am	What Is the Impact of Age on Reoperation Rates for Femoral Neck Fractures Treated with Closed Reduction Percutaneous Pinning and Hemiarthroplasty? <i>Joshua S. Griffin, MD, Scott and White Memorial Hospital, Temple, TX</i>
7:48am–7:54am	Nature's Wrath —The Effect of Daily Weather Patterns on Postoperative Pain Following Orthopaedic Trauma <i>Brandon S. Shulman, BA, NYU Hospital for Joint Diseases, Langone Medical Center, New York, NY</i>
7:54am–8:05am	Discussion
8:05am–8:10am	Change Rooms

Concurrent Session 11 *con't*

7:30am–7:36am	Factors Affecting Hospital Charges After Shoulder Arthroplasty: An Evaluation of the National Inpatient Sample Database <i>Daniel E. Davis, MD, MS, The Rothman Institute, Philadelphia, PA</i>
7:36am–7:42am	Radiation Exposure to the Hand Surgeon's Hands: A Practical Analysis <i>Michael M. Vosbikian, MD, Thomas Jefferson University Hospital, Philadelphia, PA</i>
7:42am–7:48am	Large Hill-Sachs Lesion: A Comparative Study of Patients Treated with Remplissage or Isolated Bankart Repair <i>Grant H. Garcia, MD, University of Pennsylvania, Philadelphia, PA</i>
7:48am–7:54am	Cost Effectiveness of Reverse Total Shoulder Arthroplasty Versus Hemiarthroplasty for Proximal Humerus Fractures <i>Shahin Sheibani-Rad, MD, McLaren-Flint/Michigan State University, Flint, MI</i>
7:54am–8:05am	Discussion
8:05am–8:10am	Change Rooms

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

Saturday, November 2, 2013

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Disclosure Information is listed on pages 44-52.

Concurrent Session 12 — Infection (Americana Ballroom Salon 4)

Moderator: Matthew S. Austin, MD

- 8:10am–8:16am **Resident/Fellow Award Winner**
Risk Factors of Surgical Site Infection Following Total Joint Arthroplasty
Mohammad R. Rasouli, MD, The Rothman Institute, Philadelphia, PA
- 8:16am–8:22am Risk Factors for Nasal Colonization by Staphylococcus Aureus in Patients Undergoing Spinal Fusion or Joint Arthroplasty
Kirk A. Campbell, MD, NYU Hospital for Joint Diseases, Langone Medical Center, New York, NY
- 8:22am–8:28am The Potential Role of Urinary Tract Colonization on the Development of Periprosthetic Infection. An Observational Study
Jeffrey Muenzer, BS, The Rothman Institute, Philadelphia, PA
**Presented by Camilo Restrepo, MD*
- 8:28am–8:34am Optimal Irrigation and Debridement of Infected Total Joint Implants with Chlorhexidine Gluconate Solution
Daniel C. Smith, MD, Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY
- 8:34am–8:40am Changes in Mechanical Properties of Hand Mixed Chemotherapy Bone Cements After Drug Elution
Nathan C. Tiedeken, MD, Einstein Medical Center, Philadelphia, PA
- 8:40am–8:46am Effects of Articulating and Static Spacers on Mental Health During Interim Period in Two Staged Revision Total Knee Arthroplasty for Periprosthetic Joint Infection
Kwang Am Jung, MD, Joint & Arthritis Research Himchan Hospital, Seoul, Korea

Concurrent Session 13 — Spine & Trauma (Poinciana 1 & 2)

Moderators: Linda D'Andrea, MD
Derek J. Donegan, MD

- 8:10am–8:16am Selection Criteria and Early Peri-Operative Outcomes of Minimally Invasive Transforminal Interbody Fusion in the Outpatient Setting
Eiman Shafa, MD, Seton Hall University - St. Joseph's Regional Medical Center, Paterson, NJ
- 8:16am–8:22am Effect of DEXA Scan and Patient Education on Osteoporosis Treatment Compliance
James T. Monica, MD, University Orthopaedic Associates, Somerset, NJ
- 8:22am–8:28am Midterm Self-Reported Quality of Life Outcomes After Spine Surgery for Lumbar Radiculopathy
Stelios Koutsoumbelis, MD, Long Island Jewish Medical Center, New Hyde Park, NY
- 8:28am–8:34am The Effect of Non-Steroidal Anti-Inflammatory Drug (Indomethacin) and External Beam Radiation on the Development of Heterotopic Ossification Following Extremity Blast Amputation in a Rat Model
Astor D. Robertson, MBBS, University of Maryland School of Medicine, Baltimore, MD
- 8:34am–8:40am Treating Elderly Patients with Surgical Spinal Decompression and Fusion with Multiple Comorbidities
David Eidelson, BA, JD, Delray Beach, FL
**Presented by Stewart G. Eidelson, MD*

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

Saturday, November 2, 2013

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Concurrent Session 12 *con't*

- 8:46am–8:52am Diagnosis of Periprosthetic Joint Infection in Medicare Patients: The Role of Multicriteria Decision Analysis
Claudio Diaz-Ledezma, MD, The Rothman Institute, Philadelphia, PA
- 8:52am–8:58am Transfer of Patient Care Between Stages of a Two-Stage Exchange for Chronic Periprosthetic Joint Infection Leads to Inferior Outcomes
Matthew J. Dietz, MD, Massachusetts General Hospital, Boston, MA
- 8:58am–9:04am Acute Periprosthetic Infection in TKA: Keep the Implant or Take It Out?
David A. Iacobelli, MD, Arthritis Surgery Research Foundation, Miami, FL
- 9:04am–9:15am Discussion
- 9:15am–9:40am **Break — Please visit exhibitors**
(Americana Ballroom Salon 3)

Concurrent Session 13 *con't*

- 8:40am–8:46am That Resident Sutured in the Drain... Now What? — A Biomechanical Evaluation of Sutured and Retained Surgical Drains
Michael Rivlin, MD, The Rothman Institute, Philadelphia, PA
**Presented by Olga Zielinska, BA*
- 8:46am–8:52am Split-Thickness Skin Grafts for Residual Limb Coverage and Preservation of Amputation Length
Elizabeth Polfer, MD, Walter Reed National Military Medical Center, Bethesda, MD
**Presented by Gregory Van Blarcum, MD*
- 8:52am–8:58am Distal Tibia Fractures: Locking or Non-Locking Plate?
Nader Toossi, MD, Drexel University College of Medicine, Philadelphia, PA
- 8:58am–9:04am The Effects of End Stage Renal Disease on Hospital Course and Readmission Rates in Hip Fracture Patients
Matthew Reuter, MD, Monmouth Medical Center, Long Branch, NJ
- 9:04am–9:15am Discussion
- 9:15am–9:40am **Break — Please visit exhibitors**
(Americana Ballroom Salon 3)

General Session 14— BOC, OREF, AAOS Report & Howard Steel Lecturer *(Americana Ballroom Salon 4)*

Moderator: David S. Zelouf, MD

- 9:40am–9:45am Report of BOC Representative
John C. Richmond, MD, New England Baptist Hospital, Boston, MA
- 9:45am–9:50am OREF Report
Ramon L. Jimenez, MD, Monterey, CA

- 9:50am–10:05am AAOS Report
Joshua J. Jacobs, MD, President, American Academy of Orthopaedic Surgeons, Rush University Medical Center, Chicago, IL

- 10:05am–10:45am **Howard Steel Lecturer**
Have the Standards Dropped for Selecting the Howard H. Steel Guest Lecturer?
Bill Scheft, New York, NY

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

Saturday, November 2, 2013

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Symposium 6—Orthopedic Infections (Americana Ballroom Salon 4)

Moderator: N. George Kasparyan, MD, PhD

10:45am–11:00am The CDC Guidelines: An Update
Javad Parvizi, MD, FRCS, The Rothman Institute, Philadelphia, PA

11:00am–11:15am MRSA Screening and Decolonization: Should We Bother?
Antonia F. Chen, MD, MBA, The Rothman Institute, Philadelphia, PA

11:15am–11:30am Making Sense of Pus in the Joint: Infection Versus Metal on Metal Failure
Joshua J. Jacobs, MD, Rush University Medical Center, Chicago, IL

11:30am–11:45am Wound Drainage: Plugging the Hole
James J. Purtill, MD, Thomas Jefferson University Hospital, Philadelphia, PA

11:45am–11:50am Discussion

11:50am–12:00pm Change Rooms/Refreshment Break
(Americana Ballroom Foyer)

Concurrent Session 15: Total Joint Arthroplasty (Americana Ballroom Salon 4)

Moderators: Joshua J. Jacobs, MD
Henry A. Backe Jr., MD

12:00pm–12:06pm Diabetic Control in Total Joint Arthroplasty Outcomes
Carlos J. Lavernia, MD, FAAOS, Orthopaedic Institute at Mercy Hospital, Miami, FL

12:06pm–12:12pm Vitamin D Deficiency in Total Knee Replacement Surgery
Jesus M. Villa, MD, Arthritis Surgery Research Foundation, Miami, FL

12:12pm – 12:18pm **Resident Travel Grant Award Winner**
Effects of Steroids on Thrombogenic Markers in Patients Undergoing Unilateral Total Knee Arthroplasty
Alexander S. McLawhorn, MD, MBA, Hospital for Special Surgery, New York, NY

12:18pm–12:24pm Implant Failure Associated with an M2 Macrophage Immunopathology
Jeffrey A. Moore, BS, UMDNJ- New Jersey Medical School, Newark, NJ

Concurrent Session 16— Sports Medicine & Oncology (Poinciana 1 & 2)

Moderators: Mark J. Lemos, MD
John A. Abraham, MD

12:00pm–12:06pm **Resident Travel Grant Award Winner**
Evaluation of Hip Internal and External Rotation Range of Motion as an Injury Risk Factor for Hip, Abdominal and Groin Injuries in Professional Baseball
Richard Ma, MD, Hospital for Special Surgery, New York, NY

12:06pm–12:12pm Use of an Emergency Room External Fixator for Initial Stabilization of Pilon Fractures
Philip McClure, MD, Rhode Island Hospital/Brown University, Providence, RI

12:12pm–12:18pm Cost Benefit Analysis of Athletic Team Coverage by an Orthopaedic Practice
Brandon Eck, BS, The Rothman Institute, Philadelphia, PA

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

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12:24pm–12:30pm	Length of Stay and Day of Surgery in Total Knee Arthroplasty <i>Antonia F. Chen, MD, MBA, University of Pittsburgh Medical Center, Pittsburgh, PA</i>
12:30pm–12:36pm	Intraarticular Pain Pump Reduces Opioid Consumption After TKA <i>Hind Sawan, BS, The Rothman Institute, Philadelphia, PA</i>
12:36pm–12:42pm	The Reduction of Implant-Related Errors and Waste in Total Knee Arthroplasty Using a Novel, Computer Based, eLabel and Compatibility System <i>Michael P. Ast, MD, Hospital for Special Surgery, New York, NY</i>
12:42pm–12:48pm	Total Joint Arthroplasty in Patients with Inflammatory Bowel Disease <i>Jeffrey Oliver, BS, The Rothman Institute, Philadelphia, PA</i>
12:48pm–12:54pm	Multimodal Pain Management: An Unexpected Benefit <i>Joseph Karam, MD, The Rothman Institute, Philadelphia, PA</i>
12:54pm–1:00pm	Discussion

Concurrent Session 16 con't

12:18pm–12:24pm	Female Athlete Triad Awareness Among Residents and Attendings Across Specialties <i>Catherine Logan, MD, MBA, MSPT, Brigham and Women's Hospital, Boston, MA</i>
12:24pm–12:30pm	Epiphyseal and Growth Plate Sparing in Children with Malignant Bone Tumors. Segmental Resection and Reconstruction Using Allograft Vascularized Fibular Graft. The Biological Solution <i>Samuel Kenan, North Shore Long Island Jewish Lenox Hill Hospital, New York, NY</i>
12:30pm–12:36pm	Does Age Affect Healing Time and Functional Outcomes After Fracture Nonunion Surgery <i>David P. Taormina, MS, Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY</i>
12:36pm–12:42pm	Intramedullary Nail Stabilization with Adjuvant Bisphosphonate and Radiation Use for Impending Pathologic Fractures: A Retrospective Review <i>Alexandria Starks, BA, The Rothman Institute, Philadelphia, PA</i>
12:42pm–12:48pm	Preoperative Predictors of Postoperative Opioid Usage and Referral to a Pain Management Service in Total Knee Arthroplasty <i>Geoffrey H. Westrich, MD, Hospital for Special Surgery, New York, NY</i>
12:48pm–1:00pm	Discussion

1:00pm–2:00pm **Scientific Poster Session**
(Poster Presenters Available)
(Americana Ballroom Foyer)

2:00pm–4:00pm **Multimedia Session**
(Americana Ballroom Foyer)

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2013 Scientific Program Abstracts — Thursday

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

Thursday, October 31, 2013

**Concurrent Session 1 — Total Joint Arthroplasty
(Americana Ballroom Salon 4)**

**Moderators: Theodore L. Stringer, MD
Hari Bezwada, MD**

7:05am–7:11am

Founders' Award Winner

Aspirin: An Alternative for Pulmonary Embolism Prophylaxis Following Arthroplasty

Ibrahim J. Raphael, MD
Eric H. Tischler, BA
Ronald Huang, MD
Richard H. Rothman, MD, PhD
William J. Hozack, MD
Javad Parvizi, MD, FRCS

Introduction: The most effective agent for prophylaxis against venous thromboembolic disease (VTE) following total joint arthroplasty (TJA) remains unknown. The paucity of literature comparing the different methods of pulmonary embolus (PE) prophylaxis and fear of litigation make it difficult for surgeons to abandon the use of aggressive chemical prophylaxis. The purpose of our study is to compare the outcomes of a consecutive group of patients undergoing TJA that received aspirin or warfarin prophylaxis.

Materials and Methods: There are 28,923 patients in the database who underwent TJA between January 2000 and June 2012. 2,800 received aspirin (325 mg twice daily) as prophylaxis against VTE while 26,123 received warfarin. The incidence of PE, deep vein thrombosis, hematoma formation, infection, wound complications and mortality up to 90 days postoperatively was collected from a prospectively maintained database. A multivariate analysis and propensity

score matching for comorbid and demographic variables were performed.

Results: Overall PE rate in patients receiving aspirin at 0.14% was significantly lower than the overall PE rate of 1.07% among patients receiving warfarin. This difference did not change after a multivariate analysis, a 3:1 and 5:1 propensity score matching. The aspirin group had also significantly less DVT and wound related problems. Hospital length of stay was longer for patients receiving warfarin.

Discussion: Following publication of AAOS guidelines, some surgeons have utilized aspirin as a prophylaxis following TJA. Based on the findings of this study, it appears that aspirin is superior to warfarin in preventing pulmonary embolus following joint replacement and results in lower rates of DVT and wound complications.

Notes:

7:11am–7:17am

Readmission Incidence and Burden Assessment in Total Joint Arthroplasty Using Institutional Real World Data

Michael Suk, MD, JD, MPH, FACS
Ronald B. Levine, MBA
Sashi Yadalam, PhD
Jeffrey Hammond, MD, MPH, FACS
Anuprita Patkar, PhD

Introduction: Declining reimbursements alongside rising costs in total joint arthroplasties (TJA) pose a significant challenge and increased scrutiny on quality measures such as readmission rates. There is a need for understanding the predictors for readmissions, which may adversely impact payer and provider costs and patient care-continuum. This study is a retrospective evaluation of the economic burden of readmissions

across Geisinger Health System using real-world electronic health record (EHR) data.

Methods: All patients (N=2,893) who underwent hip or knee TJA, identified with at least one of the procedure codes (TKA 81.54, 27130; THA 81.51, 27130, 27132; Other Hip: 81.47, 81.52, 81.53, 84.56, 84.57, 27488, 27090-27091, 00.85-87, 00.70-77), from 2008-2011, were captured from the de-identified EHR-based data extract of Geisinger Health system, under Medmining license. Readmissions within 90 days of discharge from the initial admission were identified by a combination of the encounter data diagnoses and financial billing codes. A multivariable logistic regression model with adjustments of covariates included the baseline patient-level surgical risk factors and hospital characteristics.

Results: The overall 90-days readmission rate in TJA was 6.8% (TKA: 5.6%; THR & Other Hip: 8.9%), consistent with the rates reported in the literature. The most common causes of readmission remain surgical/medical complications related to infection/inflammation of device/graft (25%), arthropathies/musculoskeletal (19%), cardio-pulmonary condition (12%), inpatient health services for specific procedures (8%), and other bacterial diseases (4%). After adjusting for confounding factors, 90-day readmission was significantly associated with delay from admission to surgery, history of myocardial infarction, obesity (BMI > 30 or ICD9:'287/'278/'V85.3'), ASA scores (≥ 3), and procedure type (hip/knee).

Discussion and Conclusion: Infection/inflammation, cardiopulmonary complications and musculoskeletal complaints are the most common causes of readmission after TJA. Recognition of the identified risk factors may lead to employment of risk-mitigating strategies to potentially reduce readmissions.

Notes:

7:17am–7:23am

Intraoperative Fluoroscopy Does Not Improve Component Positioning in Total Hip Arthroplasty (THA): Findings from a High Volume Institution Degeneration

Fabio Orozco, MD
*Alvin Ong, MD
Vinay Aggarwal, BA
Haroldo Pacheco, MD
Zachary D. Post, MD
Eric H. Tischler, BA

Introduction: Accurate component placement is imperative for successful outcome after THA. Although technology-assisted techniques offer potential for greater accuracy in prosthesis positioning, the need for additional resources prevents their widespread use. The objectives of this study were to compare primary THA procedures performed with and without intraoperative fluoroscopic guidance with regards to accuracy of prosthesis placement, operative times, and postoperative complications.

Methods: We reviewed 341 consecutive cases in 330 patients undergoing primary THA at our institution from September 2007 to January 2010. Postoperative AP radiographs were used to measure acetabular inclination angle, leg length discrepancy (LLD), and femoral offset discrepancy. Operative times and postoperative complications related to implant positioning were recorded. The control cohort underwent THA without fluoroscopic guidance and had 43% males, mean age of 64.6 years, and mean BMI of 29.6 kg/m². The study cohort underwent THA with fluoroscopic guidance and had 49% males, mean age of 63.9 years and mean BMI of 28.9 kg/m².

Results: Mean acetabular inclination angle, LLD, and offset discrepancy for the control vs. study groups were: 43.0° (range 32.2°-61.4°) vs. 43.8° (range 29.0°-55.1°), 4.75 cm (range 0–25) vs. 4.24 cm (range 0–27), and 8.47 cm (range 0–9.7) vs. 7.70 cm (range 0–31), respectively. Complication rates were not significantly different between the control (8.1%) and study (5.3%) groups. Mean operative time was significantly higher in the study group compared to the control group (59.8 vs. 52.8 minutes).

Conclusion: While the risks of THA failure due to component malpositioning are well noted, our study indicated intraoperative fluoroscopy may not improve prosthesis accuracy or decrease postoperative complication rates com-

pared to a freehand technique. Because of significantly increased operative time and costs associated with fluoroscopic guidance, we discourage the use of this technique in uncomplicated primary THA at high volume arthroplasty institutions.

Notes:

7:23am–7:29am

Clinical and Morphologic Factors Associated with Suture Anchor Refixation of Labral Tears in the Hip

Anil S. Ranawat, MD
 *John Ruder, BS
 Erin Magennis, BA
 Bryan T. Kelly, MD

Introduction: The acetabular labrum is critical to hip function. It can be damaged by abnormal bony morphologies such as femoroacetabular impingement (FAI). Surgical options for treatment of a damaged labrum include removal, debridement, and refixation using suture anchors. Recent literature favors refixation with suture anchors due to better outcomes. Studies suggest this is due to the labrum’s ability to heal by ways of fibrovascular scar tissue to the acetabulum. The purpose of this study is to determine if certain patient demographic and osseous morphological factors result in increased labral damage requiring suture refixation.

Methods: Data was collected prospectively from a consecutive series of 334 procedures performed from August 2010-June 2011 for FAI. Demographic data, including age, sex, and race, was collected from patient charts. 3D CT scans were reviewed to retrieve alpha angles, acetabular version, femoral version and lateral center edge angle on the symptomatic hip.

Results: In 238 (71.3%) of the procedures, the labrums required refixation using suture anchors with a mean of 2.74 anchors being used. 78.8% of males required suture anchors and 62.3% of females required suture anchors. Among procedures requiring suture anchors, significantly more suture anchors were used in males (2.92) than females (2.47). Regression analysis showed a positive association between

alpha angle, acetabular retroversion at 1 and 2 o’clock, and the number of suture anchors used. The mean alpha angle in the cohort that required suture anchors (63.1°) was significantly greater than the cohort that did not (59.4°).

Discussion and Conclusion: This study found femoral deformities to contribute more to labral damage than acetabular deformities and highlights the importance of preoperative 3D CT scans. This study provides demographic and morphologic factors to review preoperatively to evaluate if extensive labral damage is present and if ultimately, suture anchor refixation will be required.

Notes:

7:29am–7:35am

Resident Travel Grant Award Winner

Aspirin May Be Adequate for Prevention of Thromboembolic Events Following Revision Total Joint Arthroplasty

Paul M. Lichstein, MD, MS
 Javad Parvizi, MD, FRCS
 Jenny Cai, BS
 Rachael L. Wynne, RN
 Eric B. Smith, MD
 Gregory K. Deirmengian, MD

Introduction: The increased risks of venous thromboembolic disease (VTE) and wound complications associated with revision TJA may influence the choice of agent for chemical VTE prophylaxis. The goal of our study was to determine whether large differences in complication rates existed in patients receiving aspirin or warfarin for VTE prophylaxis after revision TJA.

Materials and Methods: We retrospectively reviewed a consecutive cohort of 223 revision TJAs. 137 patients received aspirin and 86 received warfarin for VTE prophylaxis. Univariate analysis was used to assess whether the VTE prophylaxis agent influenced risks of symptomatic VTE, bleeding, wound healing complications, and infection.

Results: The incidence of symptomatic VTE was 0.7% in patients receiving ASA, compared to 5.8% for patients receiving warfarin. The incidence of major bleeding was lower (3.6%) in the ASA group than the warfarin group (5.8%). The rate of wound complications at 10.2% and infection at 3.6% was lower in the ASA cohort, compared to 14.0% and 4.7%, respectively, in the warfarin group. Due to the small sample size, none of these difference reached statistical significance. With the observed effect size and power analysis, a minimum of 338 patients would be needed to avoid type II error for risk of VTE and 2436 patients for major bleeding.

Conclusions: The findings of this study reveal that aspirin may be an acceptable prophylaxis following revision TJA as the incidence of symptomatic VTE events does not seem to be substantially higher in the cohort that received aspirin compared to those who received more aggressive prophylaxis. Revision TJA patients are at increased risk of bleeding, and agents that are effective against VTE without causing increased bleeding would be a desirable choice in this patient cohort. The findings of this study are compelling enough to warrant further investigations.

Notes:

7:35am–7:41am

Synergistic Effect of a Multimodal Approach to Blood Management After Total Hip Replacement

Zachary D. Post, MD
Fabio Orozco, MD
Victoria Younger, BS
Omkar Baxi, BS
Alvin Ong, MD

Introduction: There is a substantial risk of transfusion after total hip arthroplasty (THA). For several years we have utilized a preoperative blood conservation program (BCP) to lower this risk. We recently began using IV tranexamic acid (TEA) to further minimize the risk of transfusion. The purpose of this study is to determine if a combination of these approaches could synergistically decrease the risk of transfusion.

Methods: We identified 254 consecutive primary THA patients treated during 2012. 123 patients participated in the BCP where they were given erythropoietin, iron or dietary recommendations based on Hgb levels. 215 patients were treated with tranexamic acid. Patients were stratified according to which interventions they received. Group 1 consisted of 73 patients who participated in the BCP and received TEA. Group 2 had 50 patients that participated in the BCP but did not get TEA. Group 3 was 142 patients that got TEA, but did not participate in the BCP. Group 4 was 19 patients that did not do the BCP and had no TEA. Transfusion rates were assessed for all groups.

Results: There were a total of 25 transfusions (9.8%). There were 3 transfusions in group 1 (4.11%). There were 5 transfusions in group 2 (10.0%). Group 3 had 13 transfusions (9.2%), and group 4 had 4 transfusions (21.0%).

Discussion and Conclusion: Both BCP and TEA decreased by half the incidence of transfusion compared to no intervention. However, the combination of BCP and TEA produced a synergistic effect, lowering the incidence of transfusion further than either intervention did on its own. The combined use of these tools could make transfusion a rare event for THA patients.

Notes:

7:41am–7:47am

Migration and Thigh Pain with a New Short Modular Femoral Stem for Total Hip Replacement

Jose A. Rodriguez, MD
H. John Cooper, MD
Parthiv A. Rathod, MD

Introduction: Short femoral stems are receiving increasing attention for less invasive total hip replacement (THR). The purpose of this study is to report our initial experience with a short modular femoral (SMF) stem at a minimum two-year follow up.

Methods: Twenty-six primary total hip arthroplasties (THAs) using the SMF stem were performed between August 2009 and January 2010. Patients were evaluated

clinically with Harris Hip Score (HHS) and radiographically up to two years. Radiographs were analyzed to determine the degree of stem migration from its initial postoperative position. These parameters were compared to those of a cohort of 54 patients implanted with a monolithic tapered wedge stem from the same manufacturer over the same time period.

Results: There were three early revisions of the femoral component for thigh pain in the SMF group, and one revision for CoCr allergy, with improvement in HHS from 60 to 89. Radiographically, 20 of 26 stems (76%) migrated into varus in the first six weeks. Of these, eight patients (29.6%) reported moderate to severe thigh pain. Radiographic evidence of isolated lateral cortical hypertrophy at the stem tip was seen in 46% of study patients, and evidence of osteointegration was seen in all cases by one year. Between one and two years post op the pain had resolved in four patients not revised. It was persistent in one patient. Comparative analysis with the control group demonstrated no significant difference in stem subsidence, but a significantly greater varus shift in coronal-plane angulation (Mean 4.3°, SD 3.8° vs. Mean 1.0°, SD 1.1°; $p < 0.0001$). Mean HHS was lower in the SMF group (85.2 vs. 91.4; $p < 0.01$) at last follow up.

Discussion and Conclusion: The SMF stem demonstrated a tendency towards migration into a varus position where the lateral stem touches the lateral cortex of the femur, with resulting relatively higher incidence of thigh pain and early aseptic revision.

Notes:

7:47am–7:53am

Multimodal Pain Management: An Unexpected Benefit

Joseph Karam, MD
 Benjamin Zmistowski, BS
 Camilo Restrepo, MD
 Javad Parvizi, MD, FRCS

Introduction: Elevated temperatures following total joint arthroplasty (TJA) are not uncommon and can be a source of anxiety for both the patient and the surgical team. Although

this is rarely a result of acute infection, many patients are subjected to extensive work-up. We recently implemented a multimodal pain management regimen for TJA which includes acetaminophen, pregabalin, and celecoxib or toradol. The hypothesis of this study was that patients subjected to this protocol are less likely to exhibit postoperative fever after primary TJA.

Methods: 1,627 patients undergoing primary TJA and receiving opioid pain medication alone were compared to 2,660 patients receiving multimodal agents. Oral temperature readings in the first five postoperative days were collected and charts were reviewed for fever work-up tests, including urinalysis, urine culture, chest x-ray and blood culture. Fever was defined by the presence of a temperature measurement over 101.4°F. Patients having preoperative fever or postoperative fever starting later than postoperative day 5 were excluded.

Results: The 2 groups had comparable preoperative temperature measurements. The average midnight temperature response was significantly lower in the multimodal analgesia group and only 4.5% of patients developed postoperative fever, compared to 25.4% in the opioid-alone group. Furthermore, there was a significant decrease in the number of cases undergoing work-up for fever in the multimodal analgesia cohort (1.8% of cases undergoing 155 individual tests), compared to the opioid cohort (9.8% of patients undergoing 247 individual tests).

Discussion and Conclusion: In addition to fewer adverse effects and better pain control, the multimodal analgesia protocol has the hidden benefit of dampening the temperature response to the surgical insult of TJA. The decreased rate of postoperative fever avoids unnecessary anxiety for the patient and the treating team, and reduces healthcare resource utilization occasioned by working up postoperative fever.

Notes:

Thursday, October 31, 2013

Concurrent Session 2 — Basic Science
(Poinciana 1 & 2)

Moderators: Carl A. Deirmengian, MD
Henry A. Backe Jr., MD

7:05am–7:11am

Alpha-Defensin: A Novel Synovial Fluid Biomarker That Outperforms Leukocyte Esterase When Diagnosing Periprosthetic Joint Infection (PJI)

Carl A. Deirmengian, MD
Keith Kardos
Patrick Kilmartin, MSc
Gregory Kazarian
Kyle Birkmeyer
Dana M. Gaiser, BSc
Javad Parvizi MD, FRCS

Introduction: A comprehensive synovial fluid biomarker program has recently identified alpha-defensin, an antimicrobial peptide, as a highly accurate biomarker for diagnosis of PJI. The purpose of this study is to evaluate the clinical performance of alpha-defensin, and compare it to the performance of the recently described leukocyte esterase (LE) colorimetric test strip.

Methods: Synovial fluid was prospectively collected from patients during evaluation for revision hip or knee arthroplasty. Using the MSIS criteria, 23 patients were classified as infected while other 23 patients had aseptic failure. All synovial fluid samples were tested with both a novel synovial-fluid-optimized immunoassay for alpha-defensin and the LE colorimetric test strip.

Results: The synovial fluid alpha-defensin immunoassay correctly predicted presence or absence of PJI demonstrating a sensitivity and specificity of >98% for the diagnosis of PJI. The average alpha-defensin concentration among infected samples was 59,604ng/ml, which was 60-fold higher than the average level among aseptic samples (986ng/ml). The leukocyte esterase test strip could not be interpreted in 8 of 46 samples (17%) due to blood interference, yielding a best-case scenario of 78% sensitivity and 100% specificity, and a worst-case scenario of 60% sensitivity and 96% specificity.

Discussion: Based on the findings of this study alpha-defensin immunoassay of synovial fluid was found to be a promising biomarker for diagnosis of PJI. This biomarker appears to overcome the issue with blood stained fluid that precludes the use of LE strips.

Notes:

7:11am–7:17am

EOA/OREF Resident Travel Grant Award Winner

Evaluation of Amniotic Derived Membrane Biomaterial as an Adjunct for Repair of Critical Sized Bone Defects

Mikael Starecki, MD
Pasquale Razzano, MS
John A. Schwartz, BS
Daniel A. Grande, PhD

Introduction: Autogenous bone graft is the gold standard in reconstruction of bone defects. Unfortunately, the use of autogenous bone graft is problematic because of limited availability of bone as well as donor site morbidity. The objective of this study is to evaluate a novel biomaterial to be used as an alternative to autogenous bone graft. The biomaterial evaluated was amniotic membrane, rich in growth factors and mesenchymal stem cells (MSCs). We have previously shown amniotic membrane to improve biomechanical strength of rat Achilles tendons.

Methods: Twenty-one adult male Sprague-Dawley Rats were implanted with biomaterial using the rat critical size femoral gap model. A HMW polyethylene fracture fixation plate was attached to the femur. Next, an 8mm transverse mid diaphyseal bone segment was removed. After creation of the critical size femoral gap animals were randomized to one of the following groups:

Group 1 (Control): gap left empty and received no treatment.

Group 2 (Experimental): the gap was filled with commercially available bone graft.

Group 3 (Experimental): the gap was filled with Bone graft plus Nucler amniotic tissue preparation.

The animals were sacrificed at six weeks post-operatively and femurs harvested. Fracture healing was analyzed using histology and radiography.

Results: The experimental groups demonstrated excellent conduction of new bone formation compared to controls. The results were evident on radiographs and histology. Histology showed Group 1 controls to have 11.1% new bone formation, 37.8% for group 2, and 49.2% for Group 3. These results were statistically significant. Of note, the amniotic membrane group, showed near complete bridging of the gap with pronounced periosteal woven bone formation.

Discussion and Conclusions: The study demonstrates that amniotic membrane products have potential to provide bridging of bone defects. The ability to fix large bone defects without harvesting autogenous bone would provide a significant improvement in patient care.

Notes:

7:17am–7:23am

Resident/Fellow Award Winner

An In Vitro and In Vivo Investigation of Annulus Fibrosus Cell “Stemness”: A Potential Pathogenesis of Disc Degeneration

Xudong Li, MD, PhD
Li Jin, PhD
Phillip Scott
Qihai Liu, PhD
Francis Shen, MD

Introduction: Low back pain is an endemic problem and is associated with intervertebral disc degeneration. Cartilage, bone, and nerve tissues exist and worsen the degenerated disease. The goal is to investigate the hypo-chondrogenic, osteogenic, and vessel formation of the annulus fibrosus (AF) tissue in two in vivo models.

Methods: Rabbit AF cells were cultured under chondrogenic and osteogenic condition, and characterized with

RT-PCR, histology, and immunostaining. Two models were used in vivo experiments: subcutaneous implantation of the rabbit AF tissue in a demineralized bone matrix (DBM) cylinder, and subcutaneous implantation of needle punctured intervertebral discs from male rats to female nude mice. The specimens were evaluated with radiograph, histology and immunostaining at different time points.

Results: In a pellet culture system, rabbit AF cells expressed significant higher amount of collagen and aggrecan in mRNA and protein levels under chondrogenic than control medium. With osteogenic induction, the cells exhibited increased mineralization and expression of osteogenic markers e.g. osteopontin, Runx2, and BMP2. Four weeks after implantation of DBM/AF, bone formation in AF was detected by radiograph, histology, and immunostaining of osteocalcin, which increased at 8- and 12-week. Safranin-O and H&E staining confirmed the hypochondrocytes and osteoblasts. Collagen I, II, X, and osteocalcin expressions were observed in AF/DBM specimens 8 weeks after implantation. Only collagen II was detected in AF tissue without DBM. The similar phenomenon was observed in needle punctured discs. The vessel formation was detected in the inner region of injured discs by isolectin B4. Up to 6 months, almost all the discs turned into bone tissues.

Conclusion: Rabbit AF cells differentiate to different cells under specific stimuli. The characterization of these stem cells will provide a new tool in the study of disc biology and build a foundation for future corresponding therapies, which could include targeting stem cell stabilization or maintaining the capability of cells for undifferentiated self-renewal.

Notes:

7:23am–7:29am

Is There a Chondroprotective Effect of Autologous Protease Inhibitor Concentrate (APIC) in an Osteoarthritis (OA) Rabbit Model?

Gaetano J. Scuderi, MD

*Shawn Browning, PhD

Vanessa G. Cuellar, MD

Jason M. Cuellar, MD, PhD

S. Raymond Golish, MD, PhD

Lewis S. Hanna, PhD

Introduction: The pathology of osteoarthritis is known to involve the upregulation of inflammatory mediators and catabolic factors such as matrix metalloproteases (MMPs). Alpha-2-macroglobulin (A2M) is a naturally-occurring plasma glycoprotein that functions throughout multiple tissues and extracellular spaces as a protease inhibitor but does not normally reach high levels within the intra-articular joint space. A2M is believed to modulate cartilage catabolism by its ability to bait, trap and clear various MMPs and may modulate immune responses via a binding site for growth factors and cytokines. This investigation tested the hypotheses that intra-articular administration of APIC in a rabbit model of post-traumatic arthritis will attenuate progression of cartilage damage and modulate cytokine response in the synovial fluid.

Methods: New Zealand White rabbits underwent a blood draw that was immediately processed to produce an autologous protease inhibitor concentrate (“APIC”) that contains a supraphysiological concentration of alpha-2-macroglobulin (A2M). Transection of the anterior cruciate ligament (ACL) was performed to accelerate OA development. The rabbits were divided into two groups. The treatment group (N=6) was administered 3 autologous doses of APIC at 1, 4 and 14 days post-surgery while the control group (N=6) received no treatment post-surgery. Rabbits also received sham surgery on the contralateral knee. At the end of 6 weeks animals were sacrificed and knees were processed and analyzed for gross and histologic pathology. Cartilage pathology was evaluated by macroscopic and histologic examination of the femoral condyles and tibial plateaus using the OARSI grading scale.

Results: 12 rabbits underwent ACL-T, 6 in each group. Macroscopic evaluation of the femur and tibia demonstrated that application of APIC reduced cartilage degradation by 53.2%

compared to untreated controls. The concentration of α -2-Macroglobulin (A2M) in the APIC varied from 5 – 65 mg/ml. There was a dose-dependent correlation between higher concentrations of A2M in the APIC and decreased OARSI total knee score on the macroscopic evaluation. There was also a dose-dependent therapeutic benefit to APIC treatment observed in sum OARSI histopathology evaluations of Safarin-O staining, Structure, Chondrocyte density, and Cluster Formation.

Conclusions: This pilot study suggests that 3 injections of APIC starting 24 hours after the intra-articular injury may prevent cartilage catabolism in an animal model of OA, and may provide chondroprotective effects following injury. This activity may be explained by the increased concentration of A2M in APIC over its physiologic concentration in blood. This conclusion is in agreement with our in-vitro and ex-vivo experiments that demonstrate the chondroprotective effect of A2M on cartilage.

Notes:

7:29am–7:35am

Risk Factors for Readmission Following Inpatient Orthopedic Surgery: A Review of 13,663 Cases

Joseph A. Bosco III, MD

Tracey Hunter, BA

Philip A. Band, PhD

Lorraine Hutzler, BA

James Slover, MD

Introduction: Previous studies have reported that co-morbidities and socioeconomic status are risk factors for orthopaedic readmission, the latter evaluated using Medicare and Medicaid status as a surrogate for income. Because individuals with relatively high incomes may be receiving Medicare coverage, Medicare status may not be an appropriate surrogate for socioeconomic status. We therefore used an alternative method to evaluate socioeconomic status as a risk factor for readmission, and evaluated other risk factors to put socioeconomic status into perspective.

Methods: The socioeconomic status, co-morbidity status, and length of stay (LOS) for the index admission were ana-

lyzed using an administrative database that included 325 30-day readmission cases and 13,338 non-readmission cases, for orthopaedic patients admitted during the September 2008 to April 2011 time period. Each patient's zip code provided a surrogate for income, using median household income values for each zip code from 1999 US Census data. The patients were divided into quintiles based on income. Comorbidity was categorized by combining groups of DRG-based classifications into 3 classifications: no co-morbidities, minor co-morbidities, or major co-morbidities. Risk factors were analyzed for readmission using a Bayesian logistic regression model. Differences in readmission rate for co-morbidity categories were analyzed using the chi-square test.

Results: There were 1272 unique zip codes in the analyzed patient population, with median incomes ranging from \$6,450 to \$189,763. The regression model found a significantly increased risk of readmission for LOS (OR = 1.45, $p < 0.0001$), minor co-morbidities (OR = 1.74, $p < 0.0001$) and income quintile 4 (\$32,303- \$42,374, OR =1.46, $p=0.04$). The reference income range was \$70,101-\$189,763 (quintile 1). The proportion of patients readmitted was significantly different across co-morbidity categories ($p < 0.0001$). There was a 126% increase in the readmission rate when comparing patients with no co-morbidities to those with major co-morbidities ($p < 0.0001$).

Conclusion: These data suggest that LOS and co-morbidity status are primary risk factors for orthopaedic readmission. Socioeconomic status had a moderate impact on risk, with patients of low-mid income having a significantly higher risk of readmission. A limitation of our analysis is that zip code-level income may measure area-level effects (e.g. neighborhood resources) more so than individual socioeconomic status.

Notes:

7:35am–7:41am

Olecranon Tip Osteoarticular Autograft Transfer for Irreparable Coronoid Process Fractures: A Biomechanical Study

Miguel A. Ramirez, MD
Jose M. Ramirez, MA
Brent G. Parks, MSc
Michael Tsai, BS
Anand M. Murthi, MD

Introduction: Coronoid process fractures are common in traumatic elbow injuries. With extensive fracture comminution, few options exist for reconstruction. The olecranon tip, being morphologically similar to the coronoid, may be a suitable option for reconstruction. We evaluated the suitability and biomechanics of an olecranon tip transfer for type III coronoid fractures.

Materials and Methods: Six fresh-frozen cadaveric elbows were tested. All soft tissues were removed, leaving the collateral ligaments intact. The coronoid process was osteotomized to create a type III fracture model and subsequently reconstructed using the appropriate amount of olecranon process. The elbows were mounted on a custom jig on an MTS load frame and an axial load of 100N was applied to the elbows at 15mm/min in 15-degree intervals from 0 to 120 degrees of flexion. Posterior ulnohumeral displacement was obtained using crosshead motion data in each of 3 configurations: 1. intact coronoid; 2. osteotomized coronoid; 3. olecranon transfer. Elbow range of motion was compared between the intact and reconstructed states. A paired t-test was used to compare differences in posterior displacement between the osteotomized and reconstructed states.

Results: Maximum ulnohumeral translation was seen between 30 and 105 degrees of flexion. Type III coronoid fracture increased posterior humeral translation over the control by an average of 63% during this range of motion arc (range, 23-143%). Olecranon tip transfer reduced posterior ulnohumeral translation to 4% over the intact state (range, -4- 30%)($p < 0.05$). No statistical differences in the reconstructed versus intact groups were seen between 30 and 105 degrees. The transfer was a near anatomic fit in every trial.

Conclusions: Autograft osteoarticular olecranon tip transfer for type III coronoid fractures can restore elbow stability during axial loading without compromising elbow range of

motion This is a promising, novel option for patients with irreparable coronoid fractures.

Notes:

7:41am–7:47am

Unexpected Dispensable Role of MMP9 in a Stabilized Femur Fracture Model

Cesar S. Molina, MD
Masato Yuasa, MD, PhD
Jonathan G. Schoenecker, MD, PhD

Purpose: Previous research has identified MMP-9 as a key regulator of fracture healing. However, these studies were conducted in a closed, non-stabilized murine tibia fracture model. To determine if MMP-9 remained to be indispensable in promoting fracture angiogenesis in a more clinically relevant model, we utilized a murine stabilized transverse femoral fracture and compared key aspects of fracture healing, with an emphasis on vascularity, in mice with and without MMP-9. We hypothesize that MMP-9 would also prove to be essential for fracture healing in a stabilized femur fracture model.

Methods: We used an open femur fracture model on wild type(WT) and MMP-9 deficient(MMP-9 KO) mice. Fracture healing was followed radiographically at 7, 10, 14 and 21 days post-fracture(dpf). Mice were sacrificed at 7,10,14 and 21 dpf and were injected with radio-opaque Microfil. 3D-vascular reconstruction was achieved by using uCT. Using histology, we then measured cartilage(CA) and total-callus area(TA) with which a ratio was produced, CA/TA(mm²). Students T-Test was used for evaluation of statistical significance between groups.

Results: Both WT(n:17) and MMP-9KO(n:21) mice displayed similar fracture healing radiographically. At each end point, there were no statistically significant differences of CA/TA ratio in WT and MMP-9KO mice by examining with Saf-ranin-O staining. Vascularity in the calluses of MMP-9KO mice seemed similar to that of WT mice.

Conclusion: Despite previous reports, we found that a loss of MMP-9 resulted in no significant differences in the development of soft tissue callus or vascular invasion and subsequent development and remodeling of hard tissue callus in a stabi-

lized femur fracture model. We hypothesize that this difference is due to two potential mechanisms: 1) stabilization of the fracture, 2) differences in the vascularity of the femur as opposed to the tibia, suggesting that MMP-9 is essential only in a fracture with a relatively reduced initial vascular supply. These results highlight the potential differing results of various employed fracture models.

Notes:

7:47am–7:53am

Resident Travel Grant Award Winner

Biomechanical Contribution of Transverse Connectors in the Setting of a Thoracic Pedicle Subtraction Osteotomy

John P. Cody, MD
Ronald A. Lehman, MD
Haines Paik, MD
Daniel G. Kang, MD
Robert W. Tracey, MD
Anton E. Dmitriev, PhD

Introduction: Little data is available to guide longitudinal construct planning after a pedicle subtraction osteotomy (PSO) in the thoracic spine. Previous investigations have suggested the role of transverse connectors (TC) in enhancing torsional rigidity following long segment thoracic pedicle screw-rod instrumentation. However, the biomechanical effect of augmentation with one or two TC after PSO in the thoracic spine has not been previously evaluated.

Methods: Seven (7) fresh-frozen human cadaveric thoracic spines (T3-T11) were prepared, maintaining all osteoligamentous structures, and intact range of motion testing was performed with non-destructive loading (± 6 Nm) in a six-degree-of-freedom spine simulator. The specimens were then instrumented from T4-T10 with bilateral 5.5-mm polyaxial titanium pedicle screws and 5.5-mm contoured rods, and then a PSO performed at T7. Range of motion was subsequently analyzed in the unaugmented construct, with 1 TC (T8-T9) and then 2 TC (T5-T6 and T9-T10). Range of motion (ROM) was analyzed in axial rotation, flexion-extension, and lateral bending loading planes over T4-T10 and at the PSO level (T6-T8),

using a repeated measures ANOVA with Sidak correction for multiple comparisons.

Results: After PSO and instrumentation with a thoracic pedicle screw-rod construct, T4-T10 ROM was significantly reduced in all planes of motion from the intact condition (p0.05). In contrast, during axial rotation, T4-T10 ROM was reduced by 43% following addition of 2 TC (p0.05), but did not reach statistical significance. Focal segmental stability (T6-T8) at the PSO level had similar improvement in axial rotation stability following the addition of transverse connectors, with a 48% decrease in axial rotation after 2 TC (p0.05).

Discussion and Conclusion: Two transverse connectors (cross links) improved torsional rigidity by 43%, with no differences in stability for all planes of motion over the use of one transverse connector. Therefore, in the setting of a PSO and long segment pedicle screw-rod construct, augmentation with at least two transverse connectors improves torsional rigidity.

Notes:

Thursday, October 31, 2013
Concurrent Session 4 — Foot and Ankle <i>(Americana Ballroom Salon 4)</i>
Moderators: David I. Pedowitz, MD Sameh A. Labib, MD

12:20pm–12:26pm

Incidence and Long-Term Outcome of Nonsurgical Management of Displaced Oblique Shaft Fractures of the Fifth Metatarsal (Dancer’s Fracture)

Michael C. Aynardi, MD
 David I. Pedowitz, MD
 Christine Piper, BA
 Heather Saffell
 Steven M. Raikin, MD

Introduction: Non-operative management has been the preferred treatment for displaced oblique spiral fractures of the

distal shaft of the fifth metatarsal bone (dancer’s fracture). While it is assumed that non-operative treatment results in satisfactory functional outcome, a paucity of literature supports this claim. The purpose of this investigation is to report the incidence and long-term outcome in the largest cohort of dancer’s fractures reported to date.

Methods: From 2005-2010, 2990 patients sustaining metatarsal fractures were seen and treated at our institution. A retrospective review was conducted to identify fractures described as displaced oblique spiral fractures of the distal shaft of the fifth metatarsal. All identified cases were confirmed by radiographs. All patients were treated non-operatively, weight bearing as tolerated in a hard soled shoe for 8 weeks with transition to normal footwear when clinically asymptomatic. Initial follow up was conducted at 6 and 12 week intervals. Afterwards, long-term follow-up was conducted, demographic information was obtained, and the SF-12 and Foot and Ankle Ability Measure (FAAM) were administered. For all patients in this study, there was a minimum of two year follow-up.

Results: 141 new dancer’s fractures occurred from 2005-2010 for an incidence of 4.72%. Average follow up was 3.5 years. There were 116 females and 25 males, average age 55. FAAM activities of daily living subscale scores averaged 93.22 (±12.12), while FAAM sports subscales were 92.92 (±16.58). SF-12 physical and mental scores averaged 52.42 (±8.17) & 50.67(±6.35) respectively.

Discussion and Conclusion: This large cohort describes the incidence, natural history, and functional outcomes of displaced oblique fracture of shaft of the fifth metatarsal bone. Most importantly, non-operative management of these fractures results in excellent, long-term functional outcomes.

Notes:

12:26pm–12:32pm

Outcomes After Total Ankle Replacement in Association with Ipsilateral Hindfoot Arthrodesis

John S. Lewis Jr., MD
Samuel B. Adams Jr., MD
Robin M. Queen, PhD
James K. DeOrio, MD
James A. Nunley II, MD, MS
Mark E. Easley, MD

Introduction: Ipsilateral hindfoot arthrodesis in combination with total ankle replacement (TAR) may diminish functional outcome and prosthesis survivorship compared to isolated TAR. We compare the outcome of isolated TAR to outcomes of TAR with ipsilateral hindfoot arthrodesis.

Methods: In a consecutive series of 404 primary TARs in 396 patients, 70 (17.3%) had a hindfoot fusion before, after, or at the time of TAR; most had either isolated subtalar arthrodesis (n=43; 62%) or triple arthrodesis (n=15; 21%). The remaining 334 isolated TARs served as the control group.

Results: Mean patient follow-up was 3.2 years (range, 24-72 months). The SF-36 total and subscales, AOFAS hindfoot-ankle pain subscale, Foot and Ankle Disability Index, and SMFA Function and Bother scores were significantly improved at the most recent follow-up after TAR compared to pre-operative assessment, with no significant differences between the hindfoot arthrodesis and control groups. The AOFAS hindfoot-ankle total, function and alignment scores were significantly improved at most recent follow-up for both groups; the control group demonstrated significantly higher scores in all three scales. The control group demonstrated a significantly greater improvement in VAS pain score when compared with the hindfoot arthrodesis group. Walking speed, sit-to-stand time, and four-square step-test time were significantly improved for both groups at each post-operative time point, albeit with the hindfoot arthrodesis group completing these tests significantly slower than the control group. Outcomes and implant survivorship were not significantly different between the two groups.

Discussion and Conclusion: To our knowledge, this study represents the first series evaluating the clinical outcome of TARs performed with and without hindfoot fusion using implants available in the United States. At midterm follow-up, TAR performed with ipsilateral hindfoot arthrodesis results in significant improvements in pain and functional outcome; in

contrast to prior studies, however, overall outcome may be inferior to that of isolated TAR.

Notes:

12:32pm–12:38pm

The Effect of Platelet-Rich Plasma on Autologous Osteochondral Transplantation: An In Vivo Rabbit Model

Niall A. Smyth, MD
Amgad M. Haleem, MD
Christopher D. Murawski, BS
Huong T. Do
Jonathan T. Deland, MD
John G. Kennedy, MD, FRCS (Orth)

Background: Autologous osteochondral transplantation (AOT) restores a cartilage defect with a cylindrical unit of bone and articular cartilage. Previous studies have described poor graft integration at the chondral interface and degeneration of the cartilage. This has prompted the investigation of adjuncts to address these concerns, including platelet-rich plasma (PRP), which has the potential to improve chondral interface integration and decrease cartilage degeneration. The purpose of this study was to evaluate the effect of PRP on AOT in a rabbit model.

Methods: Bilateral osteochondral defects (2.7 mm in diameter, 5 mm in depth) were created on the femoral condyles of 12 New Zealand white rabbits. Osteochondral grafts were harvested from the ipsilateral femoral condyle and, after randomization, treated with either PRP or saline before implantation into the defect site. The rabbits were euthanized at 3, 6, and 12 weeks post operatively. The osteochondral graft was assessed using the ICRS macroscopic and modified ICRS histological scoring systems.

Results: Macroscopic assessment revealed no statistically significant difference between the two groups (11.2 + 0.9 vs. 10.3 + 0.9). The mean modified ICRS histological score was significantly higher overall and at each time point for the PRP treated osteochondral transplants compared to the control (overall mean 18.2 + 2.7 vs. 13.5 + 3.3). Assessing graft integration specifically, the mean score for the PRP treated group was significantly higher compared to the control group (2.5 +

0.9 vs. 1.6 + 0.7). No adverse events occurred as a result of the surgical procedure or PRP.

Conclusion: The results of this study show that PRP may improve the integration of an osteochondral graft at the cartilage interface and decrease graft degeneration in an in vivo model.

Notes:

12:38pm–12:44pm

Anterior Talofibular Ligament Abnormality on Routine Magnetic Resonance Imaging of the Ankle

Patrick Kane, MD
 Adam C. Zoga, MD
 Steven M. Raikin, MD
 David I. Pedowitz, MD

Introduction: Injury to the anterior talofibular ligament (ATFL) is frequently encountered on magnetic resonance imaging (MRI) of patients with ankle sprains. However, abnormalities of the ATFL are also frequently seen as incidental findings when imaging the foot and ankle for other reasons. Previous studies have documented the prevalence of abnormal MRI findings in asymptomatic individuals in other areas of orthopaedics, most notably shoulder and spine. To our knowledge, no such investigation has been made with regards to the ATFL in the ankle. The purpose of this study is to determine the prevalence of abnormal MRI findings of the ATFL in asymptomatic individuals.

Methods: A total of 108 foot and ankle MRIs were eligible for inclusion in this study. Studies were excluded if performed on patients with documented ankle sprains or lateral ankle trauma. An attending musculoskeletal radiologist reviewed each MRI evaluating the integrity of the ATFL as well as confirming the primary pathology noted in the initial report. The ATFL was graded as either normal, chronically thickened, attenuated, chronically torn, or acutely torn.

Results: Of the 108 foot and ankle MRIs examined, only 42 had a normal appearing ATFL; 33 were chronically thickened, 28 were attenuated, and 23 were chronically torn. None were found to be acutely torn. The most frequently encountered primary pathology was Achilles tendinosis followed by plantar fasciitis.

Discussion and Conclusion: The results of this study demonstrate a large majority of patients undergoing MRI evaluation for alternative foot and ankle pathology have an abnormal ATFL. The results of this study may have important implications for clinical practice. Patient history and exam should be taken into careful consideration when reviewing the radiographic appearance of the ATFL, as treatment in asymptomatic individuals will likely result in continued dissatisfaction.

Notes:

12:44pm–12:50pm

Juvenile Allograft Cartilage Implantation for Treatment of Osteochondral Defects (OCDs) of the Talus

Dinesh Dhanaraj, MD
 Mathew Hamula, BS
 Robert Meislin, MD
 Kenneth Mroczek, MD
 Cary B. Chapman, MD

Introduction: To evaluate the outcomes of patients treated with particulated juvenile allograft cartilage implantation for osteochondral defects of the talus.

Methods: A total of thirteen patients with either 1) osteochondral lesions of the talus measuring at least 1cm² (average 1.5cm²) or 2) patients who failed microfracture underwent arthroscopic assisted implantation of graft into defects. All defects were secured with a fibrin sealant and patients post-operatively were restricted to non-weight bearing for six weeks. The median age at operation was 43.4 years (range 35-57). Patients were evaluated using physical examination, patient interviews, and pre and post-operative VAS, SF-36, FAAM and AOFAS scores. Patients had a minimum follow-up of 15 months (range 15-24 months).

Results: The average pre-operative pain score was 7.4 with reduction to 2.5 post-operatively. Similar improvements were seen in SF-36 scores with ten out of thirteen patients reporting good to excellent outcomes. Average pre-operative AOFAS score was 60 with an improvement to 85 post-operatively, and improvements were also seen in FAAM scores. All improvements were statistically significant (p=0.05).

Discussion and Conclusion: The treatment of osteochondral defects of the talus remains a challenge. Currently, a wide variety of options are available to surgeons without a clear-cut gold standard. To our knowledge, our study is the largest case series to date. We advocate the use of arthroscopic assisted implantation of talar OCD lesions as a highly effective single procedure treatment modality.

Notes:

12:50pm–12:56pm

Clinical and MRI Outcomes Following Arthroscopic Microfracture of Osteochondral Lesions of the Distal Tibial Plafond

Keir A. Ross, BS
Charles P. Hannon
Niall A. Smyth, MD
Hunter Newman
Timothy W. Deyer
John G. Kennedy, MD, FRCS (Orth)

Introduction: Osteochondral lesions (OCLs) of the distal tibial plafond are uncommon compared to talar lesions. There is little evidence regarding the clinical outcomes of arthroscopic microfracture of tibial OCLs and there are no reports regarding the magnetic resonance imaging (MRI) findings in the literature. The treatment outlines that exist for talar lesions have not been established for tibial OCLs. The objective of this study is to present the results of the largest clinical case series and first MRI outcomes following arthroscopic microfracture of the distal tibial plafond in the literature to date.

Methods: 32 tibial OCLs in 31 patients (32 ankles) underwent arthroscopic microfracture. Additionally, 5 patients had a kissing lesion with an OCL on the opposing surface of the talus. The Foot and Ankle Outcome Score (FAOS) and Short Form-12 (SF-12) general health questionnaire provided patient reported outcome scores pre- and post-operatively. MRI scans were assessed post-operatively using the Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score in 19 ankles.

Results: The mean follow-up for all patients was 35.5 months. The mean FAOS improved significantly from 53 points pre-

operatively to 75 points post-operatively. The mean SF-12 scores also improved significantly from 40 points pre-operatively to 60 points post-operatively. Average lesion size was 36 mm² (range = 3.14 – 78.5). Average MOCART score was 67.9 and 59.5 in all tibial osteochondral lesions and tibial lesions with a reciprocating talar lesion respectively.

Discussion and Conclusion: This study confirms that microfracture is an adequate treatment strategy for OCLs of the distal tibial plafond, however the repair tissue as assessed on MRI reveals inferior tissue repair. Follow-up studies are required to evaluate long-term outcomes of distal tibia OCLs with arthroscopic microfracture.

Notes:

Thursday, October 31, 2013

Concurrent Session 5 — Upper Extremity
(Poinciana 1 & 2)

Moderators: Mark D. Lazarus, MD
A. Lee Osterman, MD

12:20pm–12:26pm

Resident Travel Grant Award Winner

Mini-Incision Release Versus Extended Release with Neurolysis and Tenosynovectomy for Severe Carpal Tunnel Syndrome

Praveen G. Murthy, AB
Sidney M. Jacoby, MD
Abdo Bachoura, MD
Eon K. Shin, MD
A. Lee Osterman, MD

Introduction: There are few studies in the current literature addressing treatment options for severe carpal tunnel syndrome (CTS), as defined by electrodiagnostic studies showing non-recordable distal sensory latency of the median nerve. Our study aims to compare the efficacy of mini-incision carpal tunnel release versus extended release with neurolysis and tenosynovectomy in treating patients with severe CTS.

Methods: A retrospective review of patients who underwent primary carpal tunnel release for severe CTS was conducted. Patients were treated with either a mini-incision (2-cm) release of the transverse carpal ligament (group 1), or extended release with neurolysis and tenosynovectomy (group 2), each by a single surgeon at our center from 2008-2011. Group 1 included 85 hands in 65 patients, while group 2 included 98 hands in 82 patients. Patients were evaluated based on pre- and post-operative grip strength as well as Boston Carpal Tunnel Questionnaires, with an average follow-up of 40.0 months in group 1 and 40.5 months in group 2.

Results: On average, grip strength increased by 37.3% in group 1 and 42.4% in group 2, yielding no significant difference between the two groups ($p=0.829$). Post-operatively, patients in the mini-incision cohort reported an average BCTQ symptom severity score of 12.38 (out of 55) and functional status score of 8.63 (out of 40). In the extended release cohort, average scores were 12.88 and 9.06, respectively. There was no significant difference in postoperative symptom severity or functional scores between the two groups ($p=0.589$ and $p=0.482$, respectively). One patient in the mini-incision cohort required revision surgery after two years.

Discussion and Conclusion: Mini-incision carpal tunnel release and extended release with neurolysis and tenosynovectomy are both effective treatment options for severe carpal tunnel syndrome. Our study found no significant differences between the two procedures with regard to patient-rated symptom severity or functional status outcomes.

Notes:

12:26pm–12:32pm

The Association of Metabolic Syndrome Markers with Adhesive Capsulitis

Min Jung Park, MD, MMSc

*Itai Gans, BS

Daniel C. Austin, BA

James L. Carey, MD, MPH

John D. Kelly IV, MD

Introduction: Research has associated adhesive capsulitis with diabetes mellitus, but suggests that glucose mediated injury may begin before diabetes is diagnosed. The period pre-

ceding diabetes is often marked by the metabolic syndrome. We studied the relationship between metabolic syndrome components (insulin resistance, hypertension, dyslipidemia, and obesity) and the development of adhesive capsulitis.

Methods: We retrospectively reviewed 150 consecutive adhesive capsulitis patient charts to determine the prevalence of obesity and use of medications for treating metabolic syndrome elements. We compared this data to previously reported baseline values from nationwide surveys. Ninety-five percent confidence intervals for all prevalence values allowed the groups to be effectively compared.

Results: The overall prevalence of diabetic medications in adhesive capsulitis patients was 18.4% [95% CI 12.9-25.7], twice the national rate of diagnosed diabetes of 7.6% [95% CI 6.7-8.5]. In the 20-39 year old age group, the prevalence of diabetic medications in the adhesive capsulitis group, 26.3% [95% CI 11.8-48.8], was over 10x the nationwide rate. The overall prevalence of hypertensive medications in the adhesive capsulitis group, 33.1% [95% CI 25.9-41.2], was notably higher than the nationwide rate, 21.6% [95% CI 19.8-23.4]. In the 40-64 year old age group, the prevalence of hypertensive medications in adhesive capsulitis patients, 36.8% [28.6-46.0], was notably higher than nationwide rates of 24.5% [95% CI 22.2-27.0]. The prevalence of lipid medications and obesity were similar between the two groups.

Discussion and Conclusion: Our results confirm that diabetes is strongly associated with adhesive capsulitis with dramatically higher rates of the disease observed within these patients. Higher rates of hypertension medications in patients with adhesive capsulitis suggest that hypertension may also be associated with the disease. Dyslipidemia and obesity do not appear to be associated with adhesive capsulitis. Further prospective studies are necessary to fully elucidate the relationship between metabolic syndrome and adhesive capsulitis.

Notes:

12:32pm–12:38pm

Arthroscopic Treatment of Anterior Shoulder Instability in Contact and Noncontact Athletes

Kevin D. Plancher, MD
Stephanie C. Petterson, MPT, PhD
Monet France, MD

Introduction: The success of arthroscopic repair for anterior shoulder instability rivals that of open repair. Arthroscopic repair yields improved arc of motion and function with minimal insult to the subscapularis in the overhead athlete, yet controversy still exists for the collision/contact athlete. The purpose of the study is to prospectively evaluate arthroscopic inferior capsular shift with suture anchors in contact and non-contact athletes.

Methods: 61 consecutive patients underwent treatment for anterior instability with arthroscopic-modified, inferior capsular shift from 1999 to 2009 by 1 orthopaedic surgeon. Inclusion criteria were traumatic, recurrent dislocation (≥ 2 or more), labral detachment from 12-6 o'clock, non-engaging Hill-Sachs lesion, and a minimum follow-up of 2 years. Patients completed the WOSI, MISS, Rowe, Constant-Murley, and Simple Shoulder Test and underwent physical examination. Data were analyzed with repeated measures ANOVA with significance level of 0.05.

Results: 21 athletes (Nmale=15, Nfemale=6; mean age=34±10 years) met the inclusion criteria (Ncontact=13, Nnoncontact=8)(mean follow up=3.8±3.2yrs). One failure occurred at 10 months and another at five years. 97% returned to sports at an average of 5.1 months (contact=5.4 months, non-contact=4.7 months, $p>0.05$); 86% returned at their preoperative performance level. There were no differences between contact and noncontact athletes on any outcome measure. Significant improvement in function was found on all shoulder scoring systems. Flexion ROM significantly improved post-operatively to $174.5^{\circ}\pm 5.59^{\circ}$ ($p=0.012$). There was a trend towards improved postoperative ABD ROM ($174.5^{\circ}\pm 5.5^{\circ}$) ($p=0.06$). ER was maintained postoperatively ($91.7^{\circ}\pm 10.6^{\circ}$; $p=0.18$). Internal rotation significantly improved from T12/L1 to T9 postoperatively ($p=0.002$).

Discussion and Conclusion: Contact and non-contact athletes exhibited similar outcomes following modified inferior capsular shift for anterior shoulder instability with significant improvement in ROM and return to sport following surgery.

Arthroscopic stabilization should be considered for contact and non-contact athletes undergoing treatment in anterior instability without an engaging osseous defect.

Notes:

12:38pm–12:44pm

MRI Findings in Acute Elbow Dislocation: Insight into Mechanism

Joseph J. Schreiber, MD
Hollis G. Potter, MD
Russell F. Warren, MD
Robert N. Hotchkiss, MD
Aaron Daluiski, MD

Introduction: The deforming forces and mechanism of elbow dislocation are not entirely understood, with the relative contribution and sequence of ligamentous disruption still in question. The purpose of this MRI study was to catalog the incidence and location of ligamentous disruption following acute elbow dislocation.

Methods: Blinded post-dislocation MRI images of 16 patients were assessed for signal intensity and morphology of the anterior (AMCL) and posterior (PMCL) bands of the anterior bundle, the lateral ulnar collateral ligament (LUCL) and the radial collateral ligament (RCL). Distinction was made between intact ligaments, low-grade partial tear ($< 50\%$ of the ligament), high-grade partial tear ($>50\%$) and full thickness disruption. Chi-squared test assessed the association between location and severity and Fisher's exact test compared injury frequency across sites.

Results: Medial-sided findings revealed complete tears of the AMCL and PMCL in the significant majority of patients (69%, 81% respectively), with no low-grade partial tears or intact evaluations. Laterally, the LUCL most frequently showed complete disruption but was occasionally found to be intact, while the RCL was completely torn in only 25% of studies. Complete tears occurred with significant more frequency on the medial side (AMCL/PMCL) as compared to the lateral side (LUCL/RCL).

Conclusion: Complete ligamentous tears are more common on the medial side (AMCL, PMCL) than the lateral side

(LUCL, RCL) of the elbow following dislocation. While no MRI studies showed an intact AMCL or PMCL, both the LUCL and the RCL were occasionally found to be intact. These data support that some acute elbow dislocations occur with an initial medial-sided disruption, perhaps resulting from a hyperphysiologic valgus moment, and that complete ligamentous disruption of the lateral side is not always present. Information on elbow ligamentous injuries is important for directing post-dislocation rehabilitation, as various protocols can selectively protect or stress different ligaments.

Notes:

12:44pm–12:50pm

Outcomes of Elbow Dislocations in the National Football League (NFL)

Edward Chang, MD
 Michael G. Ciccotti, MD
 Christopher C. Dodson, MD
 Matthew L. Ramsey, MD
 Peter F. DeLuca, MD

Introduction: The elbow is the second most commonly dislocated joint in the body behind the shoulder in the adult population. Although much literature exists regarding the treatment and management of elbow dislocations in the general population, there is little information regarding management of the athletic population. Furthermore, there is no literature regarding the post-injury treatment and the factors that influence return to play in the professional, contact athlete. The purpose of this study is to follow the clinical course of elbow dislocations in the professional athlete and determine what factors influence the patient’s outcome and ability to return to play.

Methods: From 2000-2011, patients with elbow dislocations were identified from the NFL Injury Database. Roster position, player activity and clinical course will be reviewed. The average days lost as well as use of external bracing will also be recorded.

Results: From 2000-2011, there were 35,324 injuries. 62 (0.17%) patients with elbow dislocations were identified. 52/62 (83.8%) occurred during the game while 10/62 (16.1%) occurred during practice and the offseason. 40/62 (64.5%) dislocations were found in defensive players, 12/62 (19.4%)

were in offensive players, and 10/62 (16.1%) were in special teams. 4/62 patients (6.5%) required surgery. Average days lost in patients treated conservatively were 32.7 days (Median 25.0 days, Min, Max 0.0-118) while patients treated with surgery were 54.8 days (Median 46.5 days, Min-Max 3.0-123.0). 2 patients (3.2%) wore bracing or wrapping upon return to play.

Conclusion: Elbow dislocations comprise less than 1% of all injuries in the National Football League. The majority of injuries occurred in defensive players. Most dislocations were treated conservatively. Average days lost was greater upon patients receiving surgery. Upon return, protective bracing or wrapping was not generally employed.

Notes:

12:50pm–12:56pm

Short-Term Effects of Steroid Injection Treatment of Trigger Finger

Karthik Jonna, MD
 *Jenifer Hashem, MD

Introduction: While there is ample information available on the long-term outcomes of corticosteroid injection in the treatment of trigger finger, there is a dearth of information available on the immediate impact of this treatment. This study examines the short-term timeframe of flexor tenosynovitis (trigger finger) symptom relief in adults following corticosteroid injection.

Methods: Adult patients presenting with trigger finger were recruited from the practice of the senior author. Treatment entailed a local injection of 5mg triamcinolone (TCA, or kenalog) with 1.0ml of 1% lidocaine. Patients were then given a chart and a survey to track the improvement of their symptoms over the two weeks immediately following treatment. Short-term responses to treatment and symptom severity were assessed daily over the survey period.

Results: Our study examined 48 patients. The mean age of the group was 60 years. The majority of patients were female (65%). 88% of patients were right-hand dominant and 65% of patients reported triggering in their dominant hand. The median duration of symptoms prior to treatment was 3

months. 10% of patients were diabetic. Median recovery time was 4 days for non-diabetics versus 21 days for diabetics.

Discussion and Conclusions: Our study provides important information that surgeons can impart to patients about recovery timeframes following trigger finger injection. . There was a trend toward earlier recovery from a steroid injection for non-diabetics than for diabetics; however, this result did not reach significance due to the small number of diabetic patients. With this information, patients can be advised to undergo surgery in a timely fashion if injection fails to provide relief. Patient outcomes may also be improved with better-informed expectations for the timing and extent of their recovery.

Notes:

2013 Scientific Program Abstracts — Friday

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

Friday, November 1, 2013

**Concurrent Session 6 — Total Joint Arthroplasty
(Americana Ballroom Salon 4)**

**Moderators: John D. Kelly IV, MD
James J. Purtill, MD**

7:00am–7:06am

Percent Body Fat Is More Discriminatory than BMI for Perioperative Outcomes After Total Joint Arthroplasty

Ramon A. Ruberte Thiele, MS
Cameron K. Ledford, MD
Robert J. Butler
J. Stephen Appleton Jr.
Samuel S. Wellman, MD
David E. Attarian, MD
Robin M. Queen, PhD
Michael P. Bolognesi, MD

Introduction: Obesity is classically defined by body mass index (BMI); however, BMI fails to distinguish fat mass from lean mass which can be distinguished by measuring percent body fat (PBF) using clinically efficacious methods. Since PBF provides a more patient-specific measure, it may be more helpful than BMI in identifying perioperative total joint arthroplasty (TJA) risk and outcomes but this has yet to be examined.

Methods: Perioperative outcomes were collected on 155 adult patients undergoing primary total knee (86) or total hip (69) arthroplasty. Height and weight were measured to calculate BMI while PBF was determined by bioelectrical impedance. Patients with BMI ≥ 30 kg/m² and PBF $\geq 25\%$ in men or $\geq 31\%$ in women were classified as obese. Statistical analysis was performed using independent t-tests and ANOVA for continuous measures while Chi-Square analyses were used for dichotomous variables.

Results: 136 (88%) patients were obese by PBF while 95 (61%) were obese by BMI. There were no significant differences for PBF and BMI in operative time, estimated blood loss, or adverse hospital events. Patients receiving postoperative blood transfusion had a higher PBF (44.5 \pm 11.4 vs. 37.6 \pm 9.8). Similarly, patients with 3-4 day length of stay (LOS) had a higher PBF (41.3 \pm 9.8) than patients who had a 2-day LOS (33.7 \pm 7.1). Finally, patients who were discharged to an extended care facility exhibited a greater PBF (42.2 \pm 10.5) compared to patients discharged home (36.8 \pm 9.5). Interestingly, no significant differences for blood transfusion, LOS, or discharge disposition were observed for BMI.

Discussion and Conclusion: Higher PBF was more discriminatory in perioperative blood transfusion, increased hospital LOS, and discharge to an extended care facility compared to BMI. PBF may prove to be a more effective measure in screening for perioperative risks associated with TJA. We continue to use this screening technique to improve our ability to identify TJA patients at risk.

Notes:

7:06am–7:12am

Evaluating Complications of the Direct Anterior and Direct Lateral Approaches in Total Hip Replacement

Lesley Walinchus, BS
*Javad Parvizi, MD, FRCS
Mitchell Maltenfort, PhD
Camilo Restrepo, MD

Introduction: In recent years, the intermuscular direct anterior approach (DA) has become increasingly more frequent in total hip arthroplasty (THA) and is sometimes favored over the direct lateral approach (DL). The goal of this study

is to evaluate the incidence of complications and reoperations in relation to both approaches.

Methods: Using our institutional database, we retrospectively evaluated 582 patients (48.5 % female, age 60.79 [16.88 to 95.29]) who underwent THA from three experienced surgeons in 2010. There were 286 (49.1 %) patients who received the DA approach and 296 (50.9%) patients who received DL. Each surgeon had well surpassed the learning curve for either DA or DL. Four analyses were performed to investigate any complication, reported anemia, surgical repair, and revision.

Results: A higher incidence of complications was shown to be significant in patients who received the DL approach (OR: 2.98). Other additional variables shown to have higher incidence of any general complication were bilateral patients, patients with low preoperative hematocrit levels, and higher Charleston Comorbidity Index. The DL approach also proved to be a strong predictor of reported anemia (OR: 3.60). Approach type was not found to be associated with incidence of revision, yet DL showed borderline association with incidence of surgical repair.

Discussion and Conclusion: In this analysis, the DL approach was associated with both higher incidence of any general complication as well as reported anemia. In the future, a larger cohort could further support this conclusion and provide greater support for surgeons who favor the direct anterior approach.

Notes:

7:12am–7:18am

Heterotopic Ossification After Primary Total Hip Arthroplasty with Direct Anterior Approach: Influence of Technique and Chemoprophylaxis

Rupesh Tarwala, MD
Jose A. Rodriguez, MD
Parthiv A. Rathod, MD
Jonathan Robinson, MD

Introduction: The incidence of heterotrophic ossification after primary total hip arthroplasty (THA) has been reported

to be between 8 to 90%. There exists limited data on the incidence of heterotrophic ossification after direct anterior approach (DAA) THA. The purpose of this study was to assess the incidence of heterotrophic ossification after THA via the direct anterior approach and the influence of surgical technique and chemoprophylaxis

Method: A consecutive series of four hundred two primary uncemented direct anterior approach total hip arthroplasties in 378 patients was reviewed for incidence of heterotrophic ossification. In the first 200 total hip arthroplasties an anterior capsulectomy (Group 1) was done for exposure while in the subsequent 202 total hip arthroplasties a capsulotomy (Group 2) followed by complete release of supero-lateral flap of from its attachment to the gluteus minimus muscle and trochanter was performed. Group 1 received warfarin for thromboprophylaxis; while aspirin (thromboprophylaxis prophylaxis) and celecoxib (pain) was used in group 2. Heterotrophic ossification was classified according to Brooker's classification on plain radiographs.

Results: Heterotrophic ossification was significantly less in group 2 (4/202, 1.98%) as compared to group 1 (29/200, 14.5%). No severe heterotrophic ossification was found in group 2.

Conclusion: Release of the superior-lateral capsular flap from the minimus exposes the trochanter for ease of retractor placement. When combined with aspirin and celecoxib chemoprophylaxis, this technique may diminish heterotrophic ossification.

Notes:

7:18am–7:24am

Orthopaedic Device Regulation: Should New Implants for Total Joint Replacement Undergo Further Scrutiny?

Kshitijkumar Agrawal, MD
Hany Bedair, MD

Introduction: Many recent studies and implant recalls have called into question device approval process by the FDA. Currently, Implants either undergo a 510K approval where a new device has to be shown as substantially equivalent to predicate device and pre-market approval (PMA) process

which require safety and efficacy data. In this study, we tried to determine if either of these FDA approval processes can predict performance of the implant.

Methods: We reviewed the 2011 Australian Registry for the five top and bottom performing Hip and Knee prosthesis. We then queried the FDA’s databases for these implants to determine their approval process. For devices approved by the 510k process, we also investigated the approval lineage of predicate device(s) similarly. We then compared the approval processes between the top and bottom performing devices.

Results: Of twenty devices reviewed, only one implant underwent the more stringent PMA approval. The implants approved through 510k process were found to have demonstrated substantial equivalence to a chain of at least 3 predicate devices before being associated with a device that underwent PMA approval. All three recently recalled implants were approved through 510K premarket approval. Both well performing, poorly performing, and recalled implants served as predicates for new implants.

Discussion and Conclusion: The 510k approval process may not be able to identify the small differences in implant designs which affect their performance however, even the top performing implants are approved through the similar process of substantial equivalence. A balance should be achieved between the PMA and 510k processes in order to continue to promote the tradition of orthopedic device innovation while maintaining the highest level of safety and efficacy standards for our patients. Without significant post-approval surveillance of implants, poor performing implants may not be identified and catastrophic failures, as those seen recently, will continue.

Notes:

7:24am–7:30am

Predicting Factor for High Metal Ions and Failures of a Modular Neck Stem

Morteza Meftah, MD
Stephen J. Incavo, MD

Background: A modular neck stem was recently recalled due to the increase in corrosion at the neck-stem junction. The aim of this study was to investigate the clinical and

radiographic results of this stem, and analyze the correlation between with the metal ion levels and failures.

Methods: Between June 2009 and July 2012, 107 stems with modular neck against highly cross-linked polyethylene were implanted in 92 patients by a single surgeon via the modified anterolateral approach. Correlation between clinical results, serum Chromium (Cr) and Cobalt (Cb) levels, and failures were analyzed.

Results: The mean follow-up was 2 years. The mean Cr and Cb levels were $2 \pm 1.2 \mu\text{g/L}$ (0.1 – 4.3) and $5.1 \pm 5.7 \mu\text{g/L}$ (0.2 – 25.2), respectively. 46% of patients had elevated metal ion levels. There were 13 revisions (12%) due to high Cr/Cb levels and painful hips (so far); with a mean Cr and Cb levels of $2.4 \mu\text{g/L}$ and $13.8 \mu\text{g/L}$. Higher body mass index (BMI) and younger age were significant predictors of high cobalt levels ($p < 0.001$). Presence of adverse local tissue reaction and pseudotumor was strongly correlated with failures.

Discussion and Conclusions: High failure rate of the modular neck stem due to metal corrosion is alarming. The majority of the failures occurred during the second year after the implantation. We suspect more symptomatic patients in this cohort will be scheduled for revision in near future. The use of modular neck implants, especially in obese or young patients are not recommended.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

7:30am–7:36am

Do Ceramic Femoral Heads Reduce Taper Fretting Corrosion in Hip Arthroplasty?

Steven M. Kurtz, PhD
Sevi Kocagöz, BS
Josa A. Hanzlik, MS
Jeremy L. Gilbert, PhD
Daniel W. MacDonald, MS
Javad Parvizi, MD, FRCS
Clare Rinnac, PhD

Background: Recent implant design trends have raised renewed concern regarding metal wear debris release from

modular connections. Previous studies regarding modular head-neck taper corrosion were largely based on cobalt chrome (CoCr) alloy femoral heads. Comparatively little is known about head-neck taper corrosion with ceramic femoral heads.

Questions/purpose: This study addressed the following research questions: 1) Could ceramic heads mitigate electrochemical processes of taper corrosion compared to CoCr heads? 2) Which factors influence stem taper corrosion with ceramic heads? 3) How does the mechanism of stem corrosion at the interface with a ceramic femoral head differ from stem corrosion with a CoCr head?

Methods: 100 femoral head-stem pairs were analyzed for evidence of fretting and corrosion. A matched cohort design was employed in which 50 ceramic head-stem pairs were matched with 50 CoCr head-stem pairs based on implantation time, lateral offset, stem design and flexural rigidity.

Results: The fretting and corrosion scores were significantly lower for the stems in the ceramic head cohort when compared with the CoCr head cohort. Stem alloy and stem flexural rigidity were predictors of stem fretting and corrosion damage in the ceramic head cohort, however these stem factors were not predictors for the metal head cohort. The basic mechanism of mechanically assisted crevice corrosion was the same in the two cohorts, with the exception being that, in the case of a ceramic femoral head, only one of the two surfaces (i.e., the male metal taper) engaged in the oxide abrasion and repassivation process.

Conclusions: The results suggest that by using a ceramic femoral head, CoCr fretting and corrosion from the modular head-neck taper may be mitigated, but not completely eliminated. The findings of this study support further study of the role of ceramic heads in potentially reducing femoral taper corrosion.

Notes:

7:36am–7:42am

EOA/OREF Resident Travel Grant Award Winner

Incidence of and Risk Factors for Failing Dental Clearance Prior to Hip and Knee Arthroplasty

Anthony T. Tokarski, BS
Raj G. Patel, BS
Javad Parvizi, MD, FRCS
Gregory K. Deirmengian, MD

Introduction: Although a direct association between preoperative dental infection and periprosthetic infection has not been established, it is common to screen for and treat dental infection prior to joint replacement surgery. We seek to investigate the incidence of and risk factors for preoperative dental clearance failure in joint replacement patients.

Methods: Over a 1-year period, all patients scheduling joint arthroplasty completed a dental questionnaire developed by the authors. Data collected included patient demographics, past medical history, medications, tobacco and alcohol use, past dental symptoms, past dental history, dental hygiene practices, and frequency of dental care. The results of the preoperative dental visit were collected and classified as passed or failed based on the presence of active dental infection that required treatment prior to the dentist granting clearance. Using the data, we calculated the incidence of dental clearance failure and identified risk factors associated with failed clearance.

Results: 300 patients completed our questionnaire and were evaluated by a dentist preoperatively. 35 patients (12%) failed dental clearance and required a tooth extraction and/or root canal. Risk factors for failed dental clearance included tobacco use (19%), poor flossing habits (36%); history of one or more tooth extractions (55%), older age, narcotic use (11%), and not visiting a dentist with 1 year prior to taking the survey (13%). Within our cohort, 90 patients had none of these risk factors, excluding age and poor flossing habits, with only 3 failing dental clearance (3%).

Discussion and Conclusions: Dental clearance failure is common prior to joint arthroplasty. We have identified 6 risk factors for failed dental clearance. Patients who lack 4 of these risk factors have a 4-fold decreased incidence of failing dental clearance. Selective dental clearance based on

patient risk stratification may be a reasonable approach to combating the costs associated with the process.

Notes:

7:42am–7:48am

Resident Travel Grant Award Winner

Operative Time Directly Correlates with Blood Loss and Need for Transfusion

David Ross, BS
 Ömer F. Erkoçak, MD
 Mohammed R. Rasouli, MD
 Javad Parvizi, MD, FRCS

Introduction: Allogeneic blood transfusion in patients undergoing total joint arthroplasty (TJA) has been shown to negatively affect patient outcomes. The purpose of this study was to examine if there is a correlation between operative time and the need for allogeneic blood transfusions during TJA.

Methods: We performed a retrospective review of 866 patients who underwent primary TJA during a one-year period at our institution. Logistic regression was performed to identify the association between operative time and need for allogeneic blood transfusion, controlling for other patient and surgical factors. Multiple linear regression analysis was also performed, looking at how the same factors affected calculated blood loss (CBL).

Results: Of the 866 cases, 13% (115) were simultaneous bilateral. 52% (449) of patients received preoperative autologous blood donation. The average operative time for unilateral and bilateral patients was 74.1 ± (33.9) and 132.6 ± (36.0) minutes, respectively. Average CBL for unilateral patients was 2120mL ± (1208) and 4051mL ± (1311) for bilateral cases. The average number of allogeneic transfusions was also higher within the bilateral group (0.49 vs. 1.15 units). Multivariate analysis indicated that duration of surgery (odds ratio (OR): 1.35 per 15 minutes) and bilateral TJA (OR: 2.97) increases the risk of allogeneic blood transfusion, while patients having total knee arthroplasty are less likely to receive allogeneic blood transfusion (OR: 0.50).

CBL also increased significantly with surgical duration (211.5mL per 15 minutes).

Discussion and Conclusion: A subgroup analysis confirmed that there was a correlation between operative time and need for allogeneic transfusion following unilateral TJA (OR: 1.31). Expedient surgery can minimize blood loss and subsequent need for blood transfusion with all its associated adverse consequences.

Notes:

Friday, November 1, 2013

Concurrent Session 7 — Pediatrics
(Poinciana 1 & 2)

Moderators: James T. Guille, MD
 Laurel C. Blakemore, MD

7:00am–7:06am

Anatomic Physeal Distance About the Knee in Skeletally Immature Patients

Randall Roy, MD, MBA
 Craig H. Bennett, MD
 Nabile Safdar, MD
 Kelechi Okoroa, BS
 Augustine C. Obirieze, MBBS, MPH

Introduction: Mid-substance tears of the anterior cruciate ligament (ACL) in children or adolescents can no longer be considered a rare injury. The purpose of this study was to provide measurements to aide in safe placement of femoral & tibial tunnels during ACL reconstruction by providing average distances to the physis about the knee in the skeletally immature patient.

Methods: Magnetic resonance images (MRIs) of one hundred and ninety nine children (age range, six to seventeen years) were evaluated. Three measurements were made on the lateral femoral condyle from the physis to base of the cartilage cap to determine an average height. Three measurements were made in the tibia, one for height, and two for proposed tibial tunnels for placement of ACL grafts. Tibial height was measured from the physis to the subchon-

dral bone at the posterior edge of the ACL. The potential epiphyseal tibial tunnel measurement was made also from the physis to subchondral bone but at a 55-degree angle from the horizontal physis to the posterior aspect of the ACL. Transphyseal tibial tunnel measurement was made along same 55degree angle from the subchondral bone to inner anterior cortex.

Results: The mean average of lateral femoral epiphyseal height increased sequentially with age and reached a plateau of 21.5mm at an age of sixteen years. The mean tibial epiphyseal height also increased to reach its peak of 13.3mm at thirteen years. The mean transphyseal tibial tunnel measurement was highest at sixteen years of age (35.5mm).

Discussion and Conclusion: Drilling transepiphyseal tunnels in the femur & the tibia appear to allow safe placement of tunnels up to 10mm & 8mm respectively in children/adolescents between the ages 10-17 years of age. These tunnel diameters may support physeal-sparing anatomic ACL reconstruction for skeletally immature patients in the future.

Notes:

7:06am–7:12am

It's Always Sunny in the Operating Room — The Effects of Weather on Operative Pediatric Volume at One Institution

Kushagra Verma, MD
*Christina J. Gutowski, MD
Eleanor R. Lewin, BS, BA
Peter G. Gabos, MD

Introduction: It has been anecdotally proposed that over-cast weather patterns result in fewer pediatric orthopaedic injuries, however, this has never been investigated. Understanding the weather related trends of orthopedic injuries may help hospital systems delegate resources in an efficient and cost effective manner.

Methods: We retrospectively reviewed the operative schedule for all add-on orthopaedic trauma cases at one institution from June 1st to August 30th 2012. For each patient that underwent surgery, we reviewed the identified the nature and the date of the injury. Cases without a causative

traumatic injury or without a known date of injury were excluded. Using climate data from the National Weather Service, the amount of cloud coverage (on a scale from 0 to 10) was recorded over the same time period. Three groups were compared: sunny (0-2), partly cloudy (3-6), or cloudy (7-10). The number of operative days, total cases, and number of cases per day were recorded for each group. ANOVA analysis was used to compare groups.

Results: There were a total of 37 sunny days, 30 party cloudy days, and 19 cloudy days. Of the 119 operative injuries included in the analysis, the vast majority occurred on sunny days (n = 70, 1.9 injuries/day), followed by party cloudy days (n = 38, 1.4 injuries/day), with the least number of cases occurring on cloudy days (n = 11, 0.4 injuries/day). The number of injuries per day was significantly higher on sunny days compared to cloudy days (p < 0.001).

Conclusion: Sunny days with minimal cloud coverage resulted in four-fold increase in operative trauma cases compared with cloudy days.

Notes:

7:12am–7:18am

The Simplified Skeletal Maturity Method and Its Correlation with Curve Progression in Idiopathic Scoliosis

Prakash Sitoula, MD
*Kushagra Verma, MD
Laurens Holmes Jr., PhD
Peter G. Gabos, MD
James O. Sanders, MD
Petya Yorgova, MD
Suken A. Shah, MD

Introduction: The simplified skeletal maturity score (SSMS) has been utilized to predict curve progression in idiopathic scoliosis (IS). Using a large cohort, this study aimed to assess the correlation of the SSMS to curve progression.

Methods: A retrospective review of 1100 patients (girls aged 8-14 years and boys aged 10-16 years) with (IS) evaluated between 2005 and 2011 was performed. Data collected

at initial and final follow-up: age, height, weight, family history, gender, menarchal status (girls), curve magnitude, modified Lenke curve type (1-6), Risser stage, duration of follow-up and initial SMSS. The end-point was defined by skeletal maturity or curve progression to $\geq 50^\circ$. Patients with less than 1 year follow-up, non-idiopathic curves or previous spine surgery were excluded. Chi square test and logistic regression models were used.

Results: There were 135 patients, 113 (83.7%) girls and 22 (16.3%) boys. Mean age of girls was 12.2 years (8.4-14) and of boys was 14.1 years (12.6-15.6). Distribution of patients within SMSS 1 through 7 was: 5, 25, 36, 34, 6, 26 and 3 respectively and modified Lenke curve types 1- 6 was: 20, 8, 55, 4, 32 and 16 respectively. All patients with initial Cobb angles (35° - 45°) in the SMSS 1, 2 and 3 progressed to $\geq 50^\circ$. On the other hand, no patients with initial 10° - 30° curves in the Sanders stages 5-7 progressed to $\geq 50^\circ$. The observed progression in patients with an initial curve of 30° was: SMSS 2=86%, SMSS 3=60% and SSMS 4=20%. The percentage progression to $>50^\circ$ for all initial curves of 15° - 20° was less than 50%. No patient with an initial curve of 10° progressed to surgery in this cohort.

Conclusion: This substantially larger cohort shows a strong predictive correlation between SSMS and initial Cobb angle for probability of curve progression in idiopathic scoliosis to surgery.

Notes:

7:18am-7:24am

Pediatric ATV Injuries: Incidence and Cost in the State of Pennsylvania

Kent Strohecker, MS
 Christian J. Gaffney, MD
 Raveesh D. Richard, MD
 Thomas R. Bowen, MD
 Wade R. Smith, MD, FACS

Background: ATV (All-Terrain Vehicle) injuries are a source of significant morbidity and mortality across all age groups. Pennsylvania is second in ATV related injury and deaths with children < 16 accounting for 28% of these inju-

ries in 2007. Despite recommendations from the American Academy of Pediatrics that children under 16 not drive ATV's, children < 12 accounted for 51% of ATV related hospital admissions. We hypothesized that these injuries carry a substantial cost.

Aims: Evaluate the severity and incidence of ATV related pediatric injuries in the state of Pennsylvania and correlate these with a cost model generated from admission data to Geisinger Medical Center.

Methods: Population-based retrospective cohort design. We reviewed the costs of care of children injured during a four-wheeled ATV accident January 1, 2007, to December 31, 2009 admitted to our institution.

Results: In this cohort of 78 pediatric patients (age 2-16) involved in ATV accidents, the cost of care varied greatly, from a few hundred dollars to over \$300,000. In general, older patients had higher costs on average and those patients who wore helmets, were drivers, had an ejection or a crash with a stationary object (as opposed to other types of crash) had lower costs on average. The only statistically significant finding was that crashes with stationary objects resulted in lower costs on average than other types of crashes (cost ratio = 0.40, 95% confidence interval = 0.20 to 0.79). Patients involved in rollover accidents were much more likely to require a hospital stay of 1 day or longer as compared to patients in all other types of crashes (odds ratio 3.58, 95% confidence interval = 1.39 to 9.25, $p=0.01$). In addition, patients who wore helmets were marginally less likely to require an overnight hospital admission than those who did not (odds ratio 0.34, $p=0.07$).

Conclusions: Interventions to increase helmet use among ATV riders and measures to improve ATV stability seem warranted.

Notes:

7:24am–7:30am

Are Early Post-Operative Radiographs After Adolescent Idiopathic Scoliosis Surgery Clinically Useful?

Michael Pensak, MD

Mark Lee

Jennifer Bayron

Jeffrey Thomson

Introduction: It is unclear whether the high frequency, routine spine radiographs in the first 6 months after posterior spinal fusion (PSF) for adolescent idiopathic scoliosis (AIS) contribute meaningfully to clinical management, while exposing the patient to increased ionizing radiation.

Methods: A single institution, retrospective chart and radiograph review of patients undergoing PSF for AIS over a 5-year period was performed. Radiographic abnormalities on standing scoliosis films were classified as hardware-related findings (malpositioning and/or hardware failure) and non-hardware related (thoracic and abdominal abnormalities). Charts and additional radiographic studies were reviewed to identify abnormalities missed on standing scoliosis radiographs and to determine if the plain radiographic finding altered clinical management.

Results: 129 patients were included in the study: 91 females and 38 males with an average age at surgery of 14.4 yrs. 761 total spine radiographs were taken in the first 6 months after surgery (average 5.9 films per patient). 749 (98.4%) films were normal and 12 (8 patients) were abnormal (1.6%). Of the 121 patients with normal radiographs, one patient was later found to have a screw malposition requiring return to the OR and another patient had a spontaneous duodenal perforation identified on an abdominal series requiring repair. Of the 8 patients with abnormal films, one patient had a partial screw pullout that was treated with bracing and another patient had a pleural effusion that required drainage. The remaining 6 patients had mild pulmonary findings that required no change in clinical management.

Discussion and Conclusion: Routine use of serial standing radiographs after scoliosis surgery has a low sensitivity in detecting clinically relevant hardware-related or non-hardware related complications in the first 6 months after surgery for AIS. Consideration should be given to modifying the typical algorithm of high frequency serial

plain radiographs in the early post-operative period after AIS surgery.

Notes:

7:30am–7:36am

Intraoperative Monitoring of Epiphyseal Perfusion in Slipped Capital Femoral Epiphysis

Christopher R. Jones, MD

*Timothy Schrader, MD

Adam Kaufman, MD

Introduction: This study evaluates an innovative method of intra-operatively monitoring femoral head (epiphyseal) perfusion in patients with slipped capital femoral epiphysis and compares those results with the subsequent development of avascular necrosis.

Methods: Standard percutaneous SCFE screw fixation technique utilizing a radiolucent table and supine positioning is performed. A fully threaded cannulated stainless steel 7.0-mm screw is inserted into the epiphysis. The guide wire is removed and a sterile ICP probe is placed through the screw such that the tip is in the epiphyseal bone past the tip of the screw. Intra-operative epiphyseal pressure and waveform are recorded. Based on clinical and intra-operative data, a hip capsulotomy is performed. The ICP probe is removed and the cannulated screw is advanced to its final seating depth. Radiographs are monitored for the development of AVN.

Results: No complications from the use of the ICP monitor have occurred. Waveforms recorded intra-operatively are similar to arterial tracings. Our series includes unstable SCFE patients with poor flow pre-capsulotomy and increased perfusion post-capsulotomy. All patients left the operating room with measurable femoral head flow; no patient has subsequently developed AVN of the femoral head.

Discussion and Conclusion: Femoral head perfusion in patients with SCFE can be measured intra-operatively using this technique. Demonstrating perfusion before leav-

ing the operating room has correlated with the absence of AVN postoperatively. Our pressure monitoring technique has application beyond SCFE; it is applicable in the orthopaedic trauma setting for AVN prone fracture sites such as the talar neck, femoral neck, proximal humerus or proximal scaphoid. If the pressure monitoring system indicates poor flow, the surgeon can tailor the operative plan appropriately (i.e. hemiarthroplasty for an elderly patient with a femoral neck fracture as opposed to cannulated screw fixation). Intra-operative ICP monitoring data allows the surgeon to prognosticate outcomes and counsel patients accordingly.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

7:36am–7:42am

Transphyseal Tunnel Reconstruction of the ACL in Patients with Open Physes — Not a Cause for Growth Arrest

Marielle A. Connor, MD
 Kris Wheeler, MD, MBA
 Kevin M. Neal, MD

Introduction: Anterior cruciate ligament ruptures in skeletally immature patients are an increasingly common problem. Numerous methods have been described to restore stability to the skeletally immature patient after an ACL rupture including primary repairs, extraarticular tenodeses, all-epiphyseal reconstructions, and transphyseal reconstructions. However, the optimal surgical treatment in the immature knee with open physes remains controversial. This study was designed to evaluate the safety and efficacy of transphyseal ACL reconstruction in patients with open physes. Our hypothesis was that transphyseal ACL reconstructions do not cause significant growth disturbances, including limb length discrepancies or angular deformities.

Methods: This study is a retrospective review of skeletally immature patients who underwent transphyseal ACL reconstructions at a single institution from January, 2000 to December, 2011. Pre- and post-operative imaging and medical records were reviewed to determine the presence or

absence of premature physeal closure, clinical leg length discrepancies, and angular deformities.

Results: Seventy-eight patients underwent reconstruction by four different surgeons. After excluding patients with closed physes at presentation (12), with short follow up (10), and with inadequate radiographs at final follow-up (28), there were 28 patients available for review. The average age at the time of reconstruction was 12 years 6 months (range 8 years 9 months to 14 years 7 months). The average femoral and tibial tunnels were 7mm and 8mm in diameter. Average follow up was 28.6 months. No growth disturbances were noted. No patient had a leg length discrepancy or angular deformity at final follow up.

Discussion and Conclusion: Placing soft tissue grafts across the femoral and tibial physes to reconstruct the ACL did not cause growth disturbances in this patient population. Transphyseal ACL reconstruction should be considered a viable treatment option for ACL ruptures in skeletally immature patients.

Notes:

7:42am–7:48am

Lateral Growth of the Acetabular Roof After Salter Pelvic Osteotomy

John E. Handelsman, MD, FRCS
 Catherine Shin, MD
 Jacob Weinberg, MD

Introduction: The Salter pelvic osteotomy effectively redirects the acetabulum in the treatment of hip dysplasia and Perthes disease. We have also observed that in time, the acetabulum appears to enlarge by elongation of the roof. This study measures this acetabular roof change.

Methods: Radiographs of 14 unilateral Salter osteotomy patients were measured before surgery and followed up for an average of 2.6 years. The osteotomy was performed for developmental hip dysplasia in 8 patients, for Perthes disease in 3 patients, and for neuromuscular hip dysplasia in 3 patients. The distance between the upper lateral margin of the triradiate cartilage and the lateral point of the acetabular roof was measured and analyzed in AP pelvic radiographs.

Results: An increase in the lateral coverage of the acetabular roof was observed in 13 of 14 patients. Immediately after the Salter osteotomy, the acetabular roofs were equal in length. However, in 13 patients, the rate of growth on the operated side was consistently higher in comparison to the non-operated side, averaging 0.57 cm/year (range: 0.13 cm/year to 1.6 cm/year), compared to an average of 0.32 cm/year for the non-operated side. The actual difference between acetabular roof measurements ranged from 0.1 cm to 1.7 cm and averaged 0.59 cm. At final follow-up, the operated side was an average of 1.2 times larger than the contralateral side

Discussion and Conclusion: This study suggests that the Salter osteotomy not only redirects the acetabulum but also stimulates an increase in acetabular growth, producing additional femoral head coverage.

Notes:

Friday, November 1, 2013

Concurrent Session 8 — Basic Science
(*Americana Ballroom Salon 4*)

Moderators: Rowena McBeath, MD, PhD
Joshua J. Jacobs, MD

12:15pm–12:21pm

The Novel Use of a Hydro-Dissecting Device for Biofilm Dispersal from Metal Implants

Constantinos Ketonis, MD
Sana S. Dastgheyb, BS
Danielle M. Pineda, MD
Javad Parvizi, MD, FRCS
Gary A. Tuma, MD, FACS

Introduction: Periprosthetic joint infection (PJI) remains a feared complication. The major reason for failure of treatment relates to formation implant-adherent bacteria, or so called biofilm, that allows infecting organism to evade the immune surveillance of the host and protection from systemic antibiotics. Various mechanical methods, such as pulse lavage, have been used to disrupt this glycocalyx

matrix. However, this “blast” approach carries the risk of pushing bacteria deeper into the surgical deep and possible soft tissue contamination. Herein, we explore the novel use of a hydro-debridement system for the targeted biofilm dissociation on metal prosthesis.

Methods: Staphylococcus aureus (SA) was seeded on Titanium alloy (Ti6Al4V) disks and allowed to form mature biofilms for 24 hours. Samples were then either: left untreated as controls; Pulse-lavaged, hydro-debrided, incubated in 10µl/ml vancomycin for 3 hrs. All samples were then immunostained and visualized using confocal microscopy, and scanning electron microscopy (SEM). Surface topography was assessed and morphometric analysis was used to quantify bacterial burden on surfaces and expressed as percentage decrease from controls.

Results: Surfaces were successfully colonized with SA that produced thick biofilm as seen by SEM, which was grossly unaffected after treatment with antibiotics. Following staining and confocal microscopy, morphometric analysis showed that vancomycin incubation, hydro-debridement and pulse lavage resulted in 75.5%, 97.5% and 99.8% decrease in bacterial colonization of the metal surfaces, respectively. Qualitatively, hydro-debridement seemed to incompletely disrupt biofilm within surface crevices while also mildly altering sample topography of the metal by creating micro-scratches.

Discussion: New tools are needed to disrupt biofilms and divest bacteria off implant surfaces in a controlled and targeted manner. We show that the use of a hydro-dissecting system for this novel application is feasible and discuss basic modifications in design that could significantly improve its efficacy in biofilm dispersal while offering distinct advantages over currently available systems.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

12:21pm–12:27pm

Bone Marrow Derived Stem Cells as a Treatment for Osteoarthritis of the Knee

Daniel T. Eglinton, MD

Introduction: A prospective, cohort randomized longitudinal study to develop protocols, criteria, and outcomes of measurements to evaluate the effectiveness of this treatment in osteoarthritis of the knee. Current treatment regimens for osteoarthritis in the active older population have followed the treatment regimen of Feely et al presented in AAOS v.18, page 406-415. These have resulted in variable outcomes, and the number of patients and reconstructive procedures have exploded. Can stems cells provide an adjunct to current treatment regimens to delay those reconstructive procedures and their associated costs? To this to end the study was developed based on an exhaustive literature review of the biology and interventions of stem cells as of 2013.

Methods: 60cc's of bone marrow aspirate was obtained from the anterior iliac crest. The aspirate was centrifuged and separated into stem cell rich (5-7,000 cfu's) and stem cell poor with platelet poor plasma from which a plasma gel was made. After standard arthroscopic debridement and chondroplasty with micro-fracture the stem rich (6cc) with 6cc's of the poor (activated with thrombulin and calcium) was injected into the knee.

Results: 1. Study ran on 06/12/2009 to 05/21/2010. 2. 96 patients (75 female and 21 male) 3. Range Average 61 years old 4. 30 Right, 28 Left, Bilateral 38 Knees 5. ROM, Pre-op Average 10 degrees – 100 degrees, post-op Average 5 degrees – 115 degrees. 6. Tegner Scores (84-90 Good), Womac Pain Pre-op and Post-op 3, Weight change? 10% lost 10-75lbs 85% the same, 5% gained. 7. Grade Arthritis, grade 3 (32%) Grade 3-4 (78% of which 20% primarily Grade 4. 8. 25% Uni-compartmental, 25% Bi-compartmental, 50% Tri-compartmental. 9. Swelling 19-22 days dramatic decrease. 10. Would recommend at 6mc 100% one year 95% (6 totals/one at one year 16% failure major complaint, increased pain over function which remained good except for stairs.

Discussion and Conclusion: Stem cell therapy use in Grade 3 and Grade 3-4 osteoarthritis predominantly appears to show promise as an adjunctive treatment for osteoarthritis of the knee. In the 6 patients in which a total knee replace-

ment was performed at one year all showed 3-5 mm of hyaline (hyaline like) cartilage with new bone formation. A future level 2-3 study is planned based on newer imaging techniques and cytokine measurements to assess the effectiveness of this treatment regimen.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

12:27pm – 12:33pm

The Effects of Pulsed Electromagnetic Fields on Diabetic Bone Fracture Healing

Amit Sood, MD
Catherine Cunningham, BS
Elan Goldwaser, BS
Eric A. Breitbart, MD
Sheldon S. Lin, MD

Introduction: Treatment of fractures in the diabetic patient remains a significant challenge to orthopaedic surgeons. Diabetic osteopathy leads to decreased bone formation, impairment of bone healing, and osteoporosis which results in an increased incidence of delayed union or nonunion. With limited side effects and non-invasive delivery, pulsed electromagnetic field (PEMF) therapy has long been used in clinical settings to enhance fracture healing. Although analysis of PEMF has been performed in vitro and in vivo, the specific effects of PEMF upon fracture healing remain unknown. This study aims to evaluate the effect of PEMF as a fracture healing adjunct in diabetes mellitus.

Methods: Diabetic rats underwent unilateral femur fracture and were subsequently exposed to PEMF treatment at a regular cycle of 8 hours per day. Bone healing was evaluated through cellular proliferation and histomorphometric analysis at 4 and 7 days post fracture. Callus strength was tested via mechanical testing at 6 weeks, and local growth factor quantification was performed at 4 days.

Results: Femora resected at days 4 and 7 post-fracture revealed significant increases in proliferating cells, three-fold higher than controls at day 4 post-fracture ($p < 0.001$)

and 2.5-fold higher at day 7 ($p < 0.001$). Additionally, day 4 femora showed significant increases in cartilage generation ($p < 0.001$) and callus area ($p < 0.001$). Mechanical testing at 6 weeks revealed a two-fold greater maximum torque to failure ($p < 0.001$) and stiffness ($p = 0.006$) versus control groups. No significant differences were found in levels of PDGF-AB, TGF- β 1, VEGF, or IGF-1 in the callus extracts from the PEMF-treated diabetic rats.

Discussion and Conclusion: PEMF treatment increases callus cell proliferation and early chondrogenesis in diabetic rats, resulting in improved mechanical parameters of the fracture callus 6 weeks after fracture. These effects on early callus formation led to a 2-fold increase in peak torque to failure and stiffness.

Notes:

12:33pm–12:39pm

Photo/Chemical Bonding of Osteochondral Transplants Through Novel Chitosan Hydrogel Cross Linkers

Amgad M. Haleem, MD
Jamila S. Gittens, MS
Stephanie Grenier, PhD
Niall A. Smyth, MD
Peter A. Torzilli, PhD
John G. Kennedy, MD, FRCS (Orth)

Introduction: Repair of the graft-host interface in autologous osteochondral transplants occurs with the formation of fibrocartilage. Moreover, the discontinuity at the transplant-host interface allows synovial fluid influx, causing cyst formation. This study explores the use of chondroitinase-ABC (Ch-ABC) and three different polymer/cross-linker combinations: chitosan and genipin (Chi-GP); chitosan and rose bengal (Chi-RB); and chitosan, rose bengal and genipin (Chi-RB-GP) to improve the cartilage-to-cartilage interface.

Methods: Bovine cartilage plugs were sliced into 2 mm thick discs and a 5 mm defect was created using a biopsy punch, establishing an annulus and core. Ch-ABC was brushed onto the surface of the annulus and core. A chitosan and a cross-linker mixture was then introduced. The specimens treated with Chi-GP were incubated for 15 min at

room temperature to allow diffusion of the mixture within the tissue and efficient initiation of the gelation process. Chi-RB and Chi-RB-GP samples were first incubated for 15 min, and then exposed to visible light for another 15 min period. For the control group, the cores were inserted into their respective annuli without any treatment and incubated in PBS. Push-out tests were performed to determine the adhesion strength at the interface. The fluid permeability of the specimens was also assessed.

Results: When compared to the control, all of the treated explants produced significantly higher adhesion strengths. The Chi-RB-GP treatment resulted in significantly superior adhesion strength in comparison to the other two treatments. Indeed, there was no statistically significant differences in fluid velocity found between the intact and treated specimens in all groups.

Discussion: Chitosan used in combination with cross-linking reagents provided strong interfacial mechanical properties, while the Chi-GP duo provided superior restoration of the permeability at the area of cartilage divergence. Future studies will be conducted to determine chondrocyte viability in treated and untreated explants in vitro.

Notes:

12:39pm–12:45pm

The Effects of Atorvastatin Calcium on Lumbar Vertebrae in Corticosteroid Treated Rabbits

David M. Hampton, MD
Nathan Tiedeken, MD
John A. Handal, MD
Congli Wang, MD
Jasvir S. Khurana, MD
Mary F. Barbe, PhD
Solomon P. Samuel

Introduction: Statins may have a protective effect on corticosteroid-induced osteoporosis, a clinically important question. We have previously shown that this protection does not extend to the appendicular skeleton. We extend this work now to the axial skeleton, since the two bone compartments may behave differently.

Methods: 20 adult NZW Rabbits were divided into control, corticosteroid alone (2 mg/kg/week), and two statin groups (receiving both weekly corticosteroid and daily oral atorvastatin calcium at 2 and 20 mg, respectively). L6 vertebrae were tested under a compressive load to measure the yield strength. L7 vertebrae were evaluated by histomorphometry of sections.

Results: Mechanical testing of L6 vertebrae showed that irrespective of atorvastatin dosage, the vertebrae from steroid treated animals were at least 50% weaker than controls (statistically significant). Histomorphometry revealed that the corticosteroid only group had global osteopenia, with decreased trabecular volume and number, and increased trabecular separation. In contrast, the statin group had increased metaphyseal trabecular bone, but frank trabecular bone loss at mid-vertebra and increased woven bone, a mechanically weaker bone.

Discussion and Conclusions: The preliminary data shows that the yield strength of corticosteroid plus statin treated rabbit vertebra were at least 50 % lower than the control rabbit group. This is in contrast to our previous study where the long bones lost approximately 27% of its mechanical strength when compared to controls. Spine may be more affected by corticosteroids or the combination than the long bones. Histomorphometry also confirmed the mechanical testing results by showing frank loss in the mid vertebra and formation of weak woven bone. Other statins such as simvastatin and rosuvastatin may have different effects on bone and may be better at preventing weakening from corticosteroid induced osteoporosis. This is another avenue of further investigation.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

12:45pm–12:51pm

Regeneration of Osteochondral Defects Using Multipotent Adult Stem Cells (MASCs)

Omowunmi Ajibola, BS
Paul A. Lucas, PhD
Paul D. Marino, BA
Andrew Grose, MD

Introduction: Osteochondral defects are a serious problem that involves destruction of the cartilage and sometimes the underlying subchondral bone. We tested whether undifferentiated MASCs, when grown into a polyglycolic acid (PGA) felt matrix, would regenerate cartilage and bone in critical-sized full-thickness articular cartilage defects in adult rabbits.

Methods: We harvested MASCs from the skeletal muscle of an adult female rabbit, expanded them in culture, seeded them into PGA felts and cultured the constructs in vitro for either 24hrs or 2wks prior to implantation. Thirty adult female rabbits were anesthetized and 3mm diameter defects were made into the center of the femoropatellar groove or medial condyle; each animal was operated on both knees. There were four experimental groups: 1) the empty defect (control); 2) PGA alone (matrix control); 3) PGA+MASCs cultured in the PGA for 24hr (24hr MASC); 4) PGA+MASCs cultured in the PGA for 2wks (2wk MASC). Animals were euthanized 26wks post-op. Some defects were used for histological (according to the O'Driscoll scale) and mechanical testing. Results are expressed as % stiffness of adjacent normal cartilage.

Results: Our results shows that the defects treated with PGA+MASCs had regeneration of cartilage and bone whereas empty or PGA-alone defects contained either connective tissue or fibrocartilage. Mean histological scores for PGA+2wk MASCs were 22.9% and 23.7% for the femoropatellar groove and medial condyle defects, respectively; defects treated with PGA alone had scores of 8.8% and 8.6% for the corresponding defects. Mechanical test results had similar disparity in mean scores.

Conclusion: Undifferentiated MASCs, when placed in critical-sized full-thickness articular cartilage defects in adult rabbits, were capable of regenerating the articular cartilage and restoring both the histology and mechanical strength. Further testing of MASCs in larger animals is needed, and if

successful, may represent a viable future treatment for humans.

Notes:

Friday, November 1, 2013

Concurrent Session 9 — Spine (Poinciana 1 & 2)

**Moderators: Linda D'Andrea, MD
Marc J. Levine, MD**

12:15pm–12:21pm

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

Outcomes of Single-Level Cervical Disc Arthroplasty Versus Anterior Discectomy and Fusion: A Single Center, Retrospective Review

Robert W. Tracey, MD
John P. Cody, MD
Ronald A. Lehman, MD
Daniel G. Kang, MD
Adam J. Bevevino, MD
Michael K. Rosner, MD

Introduction: Several studies have established the safety and efficacy of cervical disc arthroplasty (CDA) as compared to anterior discectomy and fusion (ACDF). There are few single center comparative trials, and current studies do not contain large numbers of patients. We set out to perform a single center, review in comparison of CDA to ACDF.

Methods: We performed a retrospective cohort comparison review at a single, military institution to capture all patients who underwent single-level CDA or single-level ACDF. Radiographs and patient charts were reviewed by independent researchers to determine multiple outcome variables. Data were analyzed descriptively and through the use of student t-tests where applicable.

Results: There were 198 patients included in the study. The CDA group contained 110 patients and the ACDF group had

88 patients. Average follow up time was 9.7 (\pm 8.8) months. The CDA and ACDF groups demonstrated 90.9% and 86.4% rates of symptom relief, respectively. 93.6% of patients who underwent CDA were able to return to full activity, as compared to 88.6% in the ACDF group. The rates for recurrent laryngeal nerve (RLN) injury and dysphagia were 3.6% and 5.5%, respectively, in the CDA group. The ACDF group had no RLN injuries and 3.4% of patients reported dysphagia. The CDA group had a 16.4% rate of persistent posterior neck pain. The ACDF group had 11 patients (12.5%) with persistent posterior neck pain, and a rate of symptomatic pseudoarthrosis requiring reoperation of 2.3%.

Conclusion: In the largest non-sponsored study of its kind to date, our data suggest that both CDA and ACDF result in approximately 90% (93.6% CDA and 88.6% ACDF) of patients with complete symptom relief and a relatively low complication rate. Patients who underwent CDA had a higher rate of persistent posterior neck pain, and patients who underwent ACDF were at risk for symptomatic pseudoarthrosis.

Notes:

12:21pm–12:27pm

Morbidity of Neurologic Deficits in Vertebral Osteomyelitis

Sina Pourtaheri, MD
Eiman Shafa, MD
Tyler Stewart
Kimona Issa
Mark J. Ruoff, MD

Introduction: The purpose of the study is to evaluate of the outcomes of patients with a neurologic deficit from vertebral osteomyelitis.

Methods: A retrospective review of 920 spinal osteomyelitis from 2001-2011 from one institution was performed. Inclusion criteria included appropriate initial imaging, lab results, and no treatment done prior to admission. Chi-squared statistic and single sample t-tests were used to examine the data.

Results: One-hundred and six patients meet the inclusion criteria specifically for the management of spinal osteomy-

elitis: 62 men (58%), 44 women (42%), mean age 54 yrs., mean follow-up 38 months. Forty-six (43%) patients had a neurologic deficit (ND) on presentation and 60 (57%) were neurologically intact (NI). The mean age (54 yrs.) and length of hospital admission (14 days) were identical in the two groups (ND, NI). The amount of deaths (directly attributable to the osteomyelitis) was higher in the ND (n=7) than NS groups (n=2) [OR: 5, p=0.04]. The ND group had higher Charlson comorbidity index scores [4.1 vs. 2.9, p=0.01]. The rate the osteomyelitis cleared was similar in the two groups: ND 63% (n=55) and NI 65% (n=39) [p=0.8]. Oswestry scores from initial presentation to final follow-up significantly improved in the NS (62 to 38) compared to the ND group (63 to 46). Thecal sac compression was significantly higher in the ND 39% (n=18) compared to the NI group 17% (n=10) [OR: 3.2, p=0.01]. The mean cost of hospital admission (directly related to the osteomyelitis) for ND and NI were similar [\$234,819 vs. \$245,613].

Conclusion: Patients with a neurologic deficit from osteomyelitis have significantly more morbidity and mortalities: higher Charlson comorbidity indexes, less improvement in Oswestry scores, and higher mortality rates. The rates at which the osteomyelitis cleared and the cost of the hospital admissions were equivocal.

Notes:

12:27pm–12:33pm

Pulmonary Function Testing and Risk of Perioperative Pulmonary Complications in Patients with Cervical Myelopathy and Myelomalacia

Jeremy D. Shaw, MD, MS

*David H. Kim

Julia F. Martha

Ling Li

Tal Rencus

David J. Hunter

Brian Kwon

Introduction: The association between traumatic cervical spinal cord injury (SCI) and pulmonary complications is well-established. A potential similar relationship between

cervical myelopathy and cervical myelomalacia has not previously been examined. The purpose of this study was to prospectively evaluate pulmonary function and the occurrence of adverse pulmonary events in a series of patients with cervical myelopathy and myelomalacia.

Methods: Twenty-two consecutive patients undergoing surgical decompression for cervical spondylotic myelopathy were selected based on preoperative MRI cord signal changes. Myelopathy was graded and all patients were prospectively evaluated for pulmonary function (PFT). Pulmonary-related complications were noted. MRIs were evaluated by three readers.

Results: Formal PFT revealed a mild but significant impairment of pulmonary function based on forced vital capacity and forced expiratory volume in 1 second. There was no association between the severity of clinical myelopathy and PFT performance. Similarly, the severity of radiologic myelomalacia was not associated with PFT measures. No association was noted between cervical myelopathy, spinal stenosis, or myelomalacia and the occurrence of adverse pulmonary events. However, patients with elevated body-mass index (BMI) and high Charlson Index score experience an elevated rate of adverse pulmonary events following surgical decompression (BMI 35.8±6.0 vs. 28.5±6.2; Charlson Index score 3.0±0.8 vs. 1.0±1.4).

Discussion and Conclusion: This prospective study supports the concept that cervical stenosis with myelomalacia is a form of mild chronic SCI. Resultant neuromuscular weakness may include muscles of respiration leading to measurable impairment of pulmonary function. Overall, the clinical consequences of such impairment appear to be mild, and no association with perioperative pulmonary complications was observed; therefore, routine PFT screening is not recommended. However, underpowering in this series may not have detected a slight risk increase. Obesity and medical comorbidities appear to represent greater risk for adverse pulmonary events in the perioperative period following treatment for cervical myelopathy.

Notes:

12:33pm–12:39pm

What Drives Quality in Spine Surgery? Perceptions Among Medical Device Representatives

Amy S. Wasterlain, MD

*Gaetano J. Scuderi, MD

S. Raymond Golish, MD, PhD

Michael L. Reed, PT, DPT, OCS, MTC

Hillary J. Braun, BA

Introduction: Patient safety is one of the highest priorities in healthcare. Although existing research has focused on drivers of quality and surgical outcomes, little has been published on perceptions of quality. Evidence that surgeons perceive teamwork within their own teams more highly than others suggests that physicians may not be the best equipped to evaluate their own performance. We believe medical device representatives provide a unique lens into the operating room (OR) because they have a medical foundation in spine procedures and are exposed to a variety of cases, institutions, and surgical teams.

Methods: 108 spine implant medical device representatives with at least one year of OR experience were given a 21 question survey during the week of the 2011 AAOS in San Diego, CA to understand how their perceptions of spine surgical outcomes differ based on institution type, case complexity, staff quality, and surgical team composition. Four distinct practice settings were identified: university, small and large private hospitals (defined as < 6 or > 6 spine implant cases/week), and ambulatory surgery center (ASC). Overall perceptions were assessed by asking respondents how likely they would be to recommend surgery to friends/family for cases of varying complexity and practice settings.

Results: Respondents included 96 males (89%) and 12 females (11%) with a mean (\pm SD) of 6.3 (\pm 3.3) years OR experience. Respondents rated their impressions of surgeons as excellent (26.5%), good (53.9%), average (16.1%), fair (3.2%), or poor (0.3%). The proportion of surgeons rated as excellent or good was significantly lower in ASC's than in other settings ($p < 0.01$). Significantly fewer circulating nurses were rated as excellent or good in universities versus small and large hospitals ($p < 0.001$). In small hospitals, it was significantly more likely that 75% or more of the primary team members had worked together before versus universities ($p < 0.001$) or large hospitals ($p = 0.01$), while there was no difference between universities and large hospitals

or between small hospitals and ASC's ($p > 0.05$). There were significantly more cases in which >3 people were scrubbed at universities versus all other settings ($p < 0.01$). Complication rates did not differ significantly across settings ($p > 0.05$). Respondents were more likely to recommend a university or large private hospital for complex instrumentation cases ($p < 0.001$), whereas they recommended large private hospitals over universities for simple instrumentation ($p < 0.01$). For cases without instrumentation, respondents were more likely to recommend a large private hospital over a university ($p = 0.003$).

Discussion: Overall, medical device representatives were most likely to recommend large private hospitals for simpler spine cases, and large private or university hospitals for complex cases. Large private and university hospitals were associated with higher surgeon ratings, less consistency in the primary OR team, and similar complication rates relative to other practice settings. However, nurses received lower ratings, and more cases had at least 3 people scrubbed in university hospitals relative to large private hospitals. Together, these data suggest that the quality of all members of the surgical team, including nurses and other assistants, plays an integral role in how surgical teams are perceived.

Notes:

12:39pm–12:45pm

Midterm Self-Reported Quality of Life Outcomes After Spine Surgery for Lumbar Spinal Stenosis

Alexander Richter, MD, MS

Stelios Koutsoumbelis, MD

Sara Merwin, MPH

Matthew J. Goldstein, MD

Jeff Silber, MD, DC

Introduction: Lumbar spinal stenosis (LSS) is a source of significant morbidity and economic burden, largely affecting older adults, with U.S. prevalence estimated between 8-27%, resulting in over 37,000 Medicare surgeries per year. The investigators hypothesized that patients would report overall improvement in functional and pain status postoperatively. The surgeon's database was used to identify all LSS patients who underwent surgical treatment within the past 2–10 years.

Methods: IRB approval was obtained for a patient questionnaire with a validated instrument (Oswestry Disability Index) and 9 questions devised by the surgeon. Variables include: surgery type (laminectomy with/without fusion, interspinous device), pre-surgical symptoms (back pain, leg pain, muscle weakness, numbness, claudication) and demographics (age, sex, years since surgery).

Results: Of the initial 531 meeting inclusion, 5.4% had expired, 2.1% elected to withdraw, and 5.1% could not be traced. The patient population was 54% female with a mean age of 60.9 years (SD=14.8). The mean time since surgery at follow-up was 5 years (SD=2). Laminectomy was performed in 175 patients, laminectomy with fusion in 231, and interspinous device in 101. Pre-operatively 86.7% and 77.2% of patients rated back and leg pain as 7 out of 10 or greater, respectively. Postoperatively this improved to 13.9% and 12.7% respectively. 3.6% of cohort required additional surgery during the follow-up time period; 40.5% continued to use analgesic medication (56.7% NSAIDs). The ODI score averaged 21% corresponding to mild/moderate disability.

Discussion and Conclusion: The majority of this operative cohort reported a substantial decrease in pain after surgery with disability in the mild to moderate range. Less than 4% of patients required further surgery. These preliminary findings suggest that operative treatment for LSS by this surgeon resulted in favorable outcomes. Future analyses will focus on elucidating procedures, predisposing factors yielding the best results and outcomes at various timepoints post-operatively.

Notes:

12:45pm–12:51pm

Risk and Predisposing Factors in Surgical Site Infections After Pediatric Spinal Deformity Surgery: Density Case-Control Assessment

Jesse Allert, MD
 Sina Pourtaheri, MD
 Freeman Miller, MD
 Suken A. Shah, MD

Summary: Risk factors for SSIs include: increased body weight, severe spasticity, wound problems and prolonged

surgical time. SSI patients had more intra-operative complications and longer ICU stays.

Introduction: The purpose of the current study was to identify risk factors for deep wound infections with pediatric spine deformities surgery.

Methods: A retrospective review of 851 spinal deformity surgeries from 2006-2010. Cases that required an operative I&D were defined as deep wound infections. Stratified systematic random sampling with a 1:3 ratio [deep wound infections: the control group (non-infected cohort)] was used. Chi-squared statistic, Fisher’s exact, and independent sample t tests were used to examine the data.

Results: 21 patients had SSI: AIS 14%, CP 67%, syndromic 14%, congenital scoliosis 5%. The control (non-infected) group consisted of 58 patients with similar characteristics. The SSI and control groups were well matched: mean age at surgery = 13.8 yrs. (SSI), 13.8 yrs. (control); Male: Female = 1.2: 1 (SSI), 1: 1.3 (control); Cobb angle = 76.8 (SSI), 78.7 (control), levels fused = 18 (SSI), 16 (control). Main risk factors for SSI events were weight, level of spasticity, wound status, and length of surgery. Mean weight = 47.6 KGS. (SSI), 38.1 KGS. (control) [p=0.06]. The SSI group had greater spasticity requiring oral baclofen or a baclofen pump [χ^2 (df) = 11.1 (3), p=0.01]. The SSI cohort had more cases of dehiscence and significant drainage within 3 days of surgery [χ^2 (df) = 27.7 (2), p<0.001]. Mean length of surgery = 7.5 hrs (SD± 3.1) for the SSI group vs. 6.1 hrs. (SD± 2.1) for controls, p=0.03. There were more intraoperative complications in the SSI group (25 %) compared to the control (12.7%). The SSI cohort spent two extra days post-op in the ICU (8.4 vs. 10.2 days).

Conclusion: Risk factors for SSI in pediatric deformity surgery are increased weight, severe spasticity, incompetent wounds, and prolonged surgical time. The SSI cohort had more intraoperative complications and longer ICU stays.

Notes:

2013 Scientific Program Abstracts — Saturday

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

Saturday, November 2, 2013

Concurrent Session 10 — Trauma
(Americana Ballroom Salon 4)

Moderators: Jaimo Ahn, MD, PhD
John D. Kelly IV, MD

7:00am–7:06am

Ranawat Award Winner

Can All Tibial Shaft Fractures Bear Weight Following Intramedullary Nailing? A Randomized Clinical Trial

Steven C. Gross, MD
David K. Galos, MD
David P. Taormina, MS
Kenneth A. Egol, MD
Nirmal C. Tejwani, MD

Introduction: There currently exists no consensus regarding the appropriate postoperative weight-bearing status following intramedullary nailing of tibial shaft fractures. This prospective randomized study was designed to examine the potential benefits or risks associated with postoperative weight-bearing versus non-weight-bearing. The null hypothesis was that initial weight-bearing status had no effect on outcome following tibial nailing.

Methods: Over a 2-year period 62 tibial shaft fractures (OTA Type 42) surgically treated with an IM Nail that met inclusion criteria were identified. Patients were asked to consent to randomization of their post-operative protocol. Patients were randomized to one of two groups. Group 1: Immediate weight-bearing-as-tolerated (WBAT). Group 2: Non-weight-bearing for the first six postoperative weeks (NWB). Regular follow-up was performed, including radiographs. The Short Musculoskeletal Function Assessment (SMFA) questionnaire was used to record functional outcomes at regular intervals. Patients were followed until union or until treatment failure/revision surgery. All complications were recorded.

Results: A total of 50 patients had complete follow up (27 WBAT, 23 NWB). The groups did not differ in regards to demographics, surgical implants used, injury mechanisms, wound classification and fracture patterns. There was no difference in the observed time to union between groups (23.12 weeks, 22.18 weeks). Rates of complications, including hardware failure and delayed/non-union, did not differ between groups. No incidents of loss of reduction leading to malunion were recorded. SMFA scores for all domains were similar between groups, both at six weeks postoperatively and at union.

Discussion and Conclusion: Immediate weightbearing following intramedullary nailing of tibial shaft fractures is safe and is not associated with an increase in adverse events or complications. Patients should be allowed to bear weight as tolerated following nailing.

Notes:

7:06am–7:12am

Can an Evidence-Based Treatment Algorithm for Intertrochanteric Hip Fractures Maintain Quality at a Reduced Cost?

Alejandro I. Marciano, MD
Kenneth A. Egol, MD
Lambert Lewis, BS
Nirmal C. Tejwani, MD
Toni M. McLaurin, MD
Roy I. Davidovitch, MD

Introduction: Our objective was to compare treatment costs of intertrochanteric hip fractures before and after

implementation of a classification-based treatment algorithm using the OTA classification system.

Methods: A classification-based treatment algorithm specifying implant selection for particular types of intertrochanteric hip fractures was implemented throughout our department. 102 consecutive patients with intertrochanteric fractures were followed prospectively (post-algorithm group). Another 117 consecutive patients who were treated immediately prior to the implementation were identified retrospectively (pre-algorithm group). OTA classification, hardware implanted, cost and perioperative complications were recorded. Comparisons were made between both groups. The algorithm was retrospectively applied to the pre-algorithm group to determine potential savings that would have resulted if the protocol was followed with these cases.

Results: Prior to implementation 41.9% of patients were treated with a different implant than what was prescribed by the algorithm. Under the new protocol 89% surgeon compliance was obtained. Prior to algorithm implementation total cost was \$357,475 (mean: \$3,055.19 \pm \$1,310.84) consisting of 28% SHS, 20% short IMN and 52% long IMN; compared to \$255,120.50 (mean: \$2,501.18 \pm 1,272.35) post-algorithm, consisting of 40% SHS, 35% short IMN, 25% long IMN. Patients treated after algorithm implementation had fewer complications (18.8% vs. 9.8%; $p=0.096$). The algorithm was applied retrospectively to the pre-algorithm group to determine the implants that should have been used (40.17% SHS, 38.46% short IMN, 21.37% long IMN, similar to post-algorithm distribution), a total cost of \$287,162.50 (mean: \$2,454.38 \pm \$1,230.12) could have been obtained and \$70,294.50 potentially saved. The amount of savings per case would have been approximately \$600.

Discussion and Conclusion: Implementation of an evidence-based intertrochanteric fracture implant selection algorithm effectively reduced costs in our institutions while maintaining quality of care and less complications. These savings are independent of any special pricing arrangements or institutional discounts. This strategy has potential implications in physician “gainsharing” programs.

Notes:

7:12am–7:18am

The Potential Efficacy of an Anesthesiology-Driven Pre-Operative Triage Protocol for Hip Fracture Patients

Catherine J. Fedorka, MD
Sheryl Glassman, DO
Gordon Morewood, MD
Poovedran Saththasivam, MD
Sri Smitha Kanaparthi, MD
Candace Williams, MSc
Kimberly Z. Accardi, MD

Introduction: An ever-increasing requirement for efficiency is an inescapable aspect of the current US healthcare system. Empirical evidence indicates that efficient and effective preoperative management minimizes expense, risk, and delay associated with unnecessary testing or consultation that will not affect perioperative care. We sought to determine whether a defined anesthesiology-driven triage protocol might influence the incidence of consultation and testing and the time to surgery for patients with isolated low energy hip fractures.

Methods: A retrospective review from May 1, 2011 to April 30, 2012 identified 47 patients with 48 hip fractures. Time to incision, all pre-operative consultations, clearance testing, and postoperative complications were recorded. An anesthesiology triage protocol derived from evidence based consensus statements was then applied to determine if each patient could have been “cleared for surgery” at the time of admission.

Results: Forty-one of 48 hip fractures (85%) would have been cleared by the anesthesiology clearance protocol at the time of admission. For these patients, 34 specialty consults had been ordered for clearance (11 cardiology, 5 pulmonary, 1 nephrology, 1 neurology, and 15 medical clearance consults) Twenty-seven physiologic studies were performed (13 Echocardiograms, 12 head CTs, 3 pulmonary function tests). Average time to incision for the cleared group was 2.3 days (8 hrs-11.3 days). The preoperative consultations or testing did not result in significant changes to the patients’ perioperative management or outcome. Three major medical complications occurred in the anesthesiology cleared group (1 NSTEMI, 1 PE, 1 death from respiratory failure).

Discussion and Conclusion: An evidence based anesthesia driven triage protocol applied at the time of admission may have significantly reduced the use of pre-operative consultations, unnecessary advanced imaging or physiological studies, and potentially could have shortened time to surgery in hip fracture patients.

Notes:

7:18am–7:24am

Resident Travel Grant Award Winner

Combat-Related Hemipelvectomy: Fourteen Cases, A Review of the Literature and Lessons Learned

Louis Lewandowski, MD
Jean-Claude D’Alleyrand, MD
Wade T. Gordon, MD
Mark E. Fleming, DO
Romney C. Andersen, MD
Brian H. Mullis, MD
Jonathan A. Forsberg, MD
Benjamin K. Potter, MD

Introduction: Trauma-related hemipelvectomy is a rare, devastating and often fatal injury that poses a number of challenges to the treating orthopaedic traumatologist. Treatment of these injuries typically requires intense effort by providers from multiple services, to include orthopaedics, general surgery, urology, critical care and infectious disease. Approximately seventy cases have been described in the twentieth century. Unfortunately, we have had a unique experience with a number of combat-related hemipelvectomy over the last two and one half years.

Methods: We performed a retrospective review of our prospective trauma registry into which all our combat-injured patients are enrolled, as well as patient medical records, radiologic studies, and clinical photographs.

Results: Hemipelvectomy was generally indicated for insufficient soft tissue coverage complicated by life-threatening local infection and/or a necrotic and dysvascular hemipelvis following early ligation of critical intrapelvic vasculature. Seven of the patients had acquired angioinvasive fungal infection, for which hemipelvectomy was used to treat invasion into the true pelvis. Treatment of these difficult infections involved both debridement of pelvic contents, and topical diluted bleach solutions plus local and systemic antifungals. Associated genitourinary trauma was the norm. Extended hemipelvectomy consisting of partial sacrectomy was required in three patients. Subtotal hemipelvectomy was performed in seven patients in efforts to improve sitting balance and/or prosthetic socket support or to minimize pressure ulcers over the sacrum.

Discussion and Conclusion: Trauma-related hemipelvectomy is a catastrophic injury that leaves little margin for error on the part of the treating surgeon and medical team. The high survival rate in our patients appears to have resulted from initial rapid resuscitation as well as an extremely aggressive surgical approach to gain control of local infections and achieve a viable adjacent soft tissue envelope. Our experience and management techniques may benefit the civilian surgeon confronted with high-energy open injuries to the pelvic girdle.

Notes:

7:24am–7:30am

Resident/Fellow Award Winner

Complications of Hip Fracture Surgery on Patients Receiving Clopidogrel Therapy

Moiz Manaqibwala, MD
*Katherine A. Butler, MD
Carlos A. Sagebien, MD

Introduction: Clopidogrel may influence patient safety during fracture surgery. Our study examines the incidence

of complications for patients undergoing hemiarthroplasty on clopidogrel.

Methods: All hemiarthroplasty patients between 2005 and 2011 were identified in our fracture registry. Patients were placed in two comparative cohorts based on use of clopidogrel anti-platelet therapy. Records were reviewed for patient demographics, American Society of Anesthesiologists score (ASA), pre and post-operative hemoglobin (Hgb), time to surgery, length of stay, bleeding events, transfusions and complications. Comparative statistical analysis was performed using Chi-Square and Student's t-test.

Results: A total of 203 charts were reviewed of which 162 patients met inclusion criteria. 112 females and 50 males with a mean age of 84 years were identified. 15 of the 162 patients that met inclusion criteria were on clopidogrel therapy (9.3%). There were no significant differences between groups with regards to age, aspirin use, or time to surgery. The clopidogrel group had more comorbidities resulting in a significantly higher ASA score (4 vs. 2.8), and lower preoperative hemoglobin (11.3 vs. 12.0) compared to the non-clopidogrel group. Postoperatively, there was no significant difference identified in intraoperative blood loss, hemoglobin on postoperative days 1 to 3, or number of transfusions between groups. Patients on clopidogrel had significantly longer hospital stays (10.6 vs. 7.4 days) and a significantly increased risk of overall complications (26.7% vs. 13.6%). However there was a similar rate of wound related complications (6.7% vs. 6.1%) was seen.

Discussion and Conclusion: The optimal timing for hemiarthroplasty for patients on clopidogrel therapy is unclear. In this study there appears to be no significant difference with regards to bleeding or bleeding related wound complications for patients on clopidogrel therapy

Notes:

7:30am–7:36am

Atypical Femur Fractures and Bisphosphonate Use: A Clinical Study

Ramin Sadeghpour, MD
Maya Culbertson, MS
Eric O. Eisemon, MD
Chris Mileto, MD
Vincent Vigorita, MD

Introduction: Bisphosphonates comprise a class of osteoclast inhibitors that demonstrably decrease fracture rates in women with osteoporosis. However, recent reports have proposed a link between bisphosphonate use and atypical femur fractures. We hypothesize that patients undergoing bisphosphonate treatment will have atypical radiographic fracture features.

Methods: We evaluated radiographs of all operatively-treated femur fractures in women over an 18-month period. Atypical fractures were compared to typical subtrochanteric or diaphyseal femur fractures and examined with respect to age and bisphosphonate use. American Society for Bone and Mineral Research (ASBMR) criteria were used for classifying fractures. Fractures were defined as atypical if they had lateral cortical thickening compared to the rest of the bone, a transverse fracture line on the lateral cortex, and an oblique medial fracture fragment. Patient records were reviewed to determine if bisphosphonates were used.

Results: 435 operatively-treated femur fractures were identified. Of these, 33 fractures (8%) were either subtrochanteric or diaphyseal; all suffered low-energy injuries. Of the 33 fractures, 15 were classified as atypical, 15 as typical, and 3 as impending. The average age in the atypical fracture group was 69 years versus 82 in the typical group. This difference was significant. All patients in the atypical group were taking a bisphosphonate at the time of fracture or within in the preceding year. No patients with typical fractures were taking a bisphosphonate at the time of injury.

Discussion and Conclusion: The link between bisphosphonate use and atypical femur fractures remains controversial. The possible relationship between bisphosphonate use and atypical fractures makes determining the subset of patients for whom there is an increased risk very important. This issue has become more urgent with the aging population in

the United States. When addressing these questions in depth, our work demonstrates that radiographs are an integral component of any subsequent study.

Notes:

7:36am–7:42am

Hemiarthroplasty for Undisplaced and Stable Femoral Neck Fractures

Raveesh D. Richard, MD
Kaan Irgit, MD
Andrew Cornelius, MD
Thomas R. Bowen, MD
Cassandra M. Andreychik
Daniel S. Horwitz, MD

Introduction: The incidence of hip fractures in the United States and Europe is high and continues to increase. The best treatment for femoral neck fractures is still under debate. The purpose of the study was to compare the complication, reoperation and mortality rates of hemiarthroplasty and osteosynthesis in patients with impacted/stable osteoporotic femoral neck fractures.

Methods: We retrospectively compared the complication, reoperation and mortality rates between two groups which were matched in age, gender, BMI and ASA scores. All included patients sustained Garden I or II femur neck fractures. Either hemiarthroplasty or osteosynthesis was performed based on surgeon preference. Osteosynthesis was performed with three parallel cannulated screws. The minimum follow up was 24 months. All patients were over 60 years old. The primary outcomes were complications of surgery and the need for revision surgery. A secondary outcome of the study was the cost of the primary surgery.

Results: The mean age of the 98 patients in the osteosynthesis group was 82 (range, 60-104) and 80 (range, 60-90) in the 38 patients treated with hemiarthroplasty. Mean follow up was 44 ± 1.4 months (range, 24- 92 months). Overall complication,

reoperation and one year mortality rates were similar in both groups. Infection was significantly higher in the hemiarthroplasty group. In a logistic regression model analysis, the complication, reoperation and one year mortality rates were similar between patients over and under 80 years old, in both the hemiarthroplasty and osteosynthesis groups. Intraoperative blood loss and length of stay were significantly lower in the osteosynthesis group. The hemiarthroplasty group had a much higher cost of surgery.

Discussion and Conclusion: Hemiarthroplasty has no benefit in decreasing complications and reoperations for stable femoral neck fractures in the elderly. The costs of surgery and infection rates are higher with hemiarthroplasty as compared to osteosynthesis for these stable fracture patterns.

Notes:

7:42am–7:48am

What Is the Impact of Age on Reoperation Rates for Femoral Neck Fractures Treated with Closed Reduction Percutaneous Pinning and Hemiarthroplasty?

Joshua S. Griffin, MD
Donavan K. Murphy, MD
Michael L. Brennan, MD
Kindyle L. Brennan, PhD
Daniel C. Jupiter, PhD

Introduction: As the prevalence of hip fractures continues to increase, the preferred method of surgical intervention for femoral neck fractures (FNF) based on age remains a topic of debate. The primary aim of the study was to assess the effect of age on reoperation rates following FNF treated with closed reduction percutaneous pinning (CRPP) and hemiarthroplasty (HA).

Methods: A retrospective comparative study was performed at a level 1 trauma center at which electronic medi-

cal records and digital radiographs were reviewed for 949 FNF with minimum 2 year follow up. Age groups of 60-69, 70-79, and greater than or equal to 80 (octogenarians) were created within nondisplaced FNF treated with CRPP and displaced FNF treated with HA. For the primary outcome of reoperation based on age, Kaplan-Meier models were built and analysis applied.

Results: Three hundred thirty-four fractures were nondisplaced treated with CRPP, and 615 were displaced managed with HA. Overall, a total of 98 patients (10.33%) required reoperation. Increasing reoperation rates for CRPP was seen with each subsequent age group. The opposite was seen with HA in which increasing age groups showed lower reoperation rates. The relationship of reoperation rate with surgical choice and age group was found to be significant. In the octogenarian group, CRPP reoperation rates were significantly higher than HA at 6-month, 1-, 2-, and 3-year follow-up.

Discussion and Conclusion: Patients greater than or equal to 80 years old undergoing closed reduction percutaneous pinning showed a high reoperation rate and consideration of primary hemiarthroplasty should be made for nondisplaced femoral neck fractures in the octogenarian population.

Notes:

7:48am–7:54am

Nature’s Wrath – The Effect of Daily Weather Patterns on Postoperative Pain Following Orthopaedic Trauma

Brandon S. Shulman, BA
 Alejandro I. Marciano, MD
 Roy I. Davidovitch, MD
 Raj Karia, MPH
 Kenneth A. Egol, MD

Introduction: The effect of weather on patients’ pain and mobility is a frequent complaint in musculoskeletal care. The aim of our study was to investigate the influence of

daily weather conditions on patient reported pain and functional status.

Methods: We examined 2,369 separate outpatient visits of patients recovering from operative management of an acute tibial plateau fracture (n=332), an acute distal radius fracture (n=1,179), or chronic fracture nonunion (n=858). Pain and functional status were assessed using validated surveys. For each visit date, the mean temperature, difference between mean temperature and expected temperature based on a 17 year average, dew point, mean humidity, amount of rain, amount of snow, and mean barometric pressure were recorded. All weather data was specific to the zip code of the outpatient medical office where patients were seen, and obtained from a publically available almanac. Statistical analysis was run to search for correlations.

Results: There was a significant correlation between low barometric pressure and increased pain for all patient visits (p=0.007) and for patients at 1-year follow-up only (p=0.005). Barometric pressure below one standard atmosphere (29.92 in) was highly associated with increased pain for patients at 1-year follow-up (p=0.006). At one year follow-up, high temperature, high humidity, and high dew point also were significantly associated with increased pain (p=0.021, p=0.030, p=0.033 respectively). Weather conditions were not associated with patient reported functional outcomes.

Discussion and Conclusion: While pain in the immediate postoperative period is most likely dominated by incisional and soft tissue injuries, as time progresses weather clearly impacts patient pain levels. Variation in patient reported pain scores due to weather conditions should be anticipated. Patients may be counseled that their symptoms may worsen in association with weather conditions.

Notes:

Saturday, November 2, 2013

**Concurrent Session 11 — Upper Extremity
(Poinciana 1 & 2)**

**Moderators: Joshua A. Baumfeld, MD
Grant E. Garrigues, MD**

7:00am–7:06am

All-Metal Distal Radius Hemiarthroplasty Combined with Proximal Row Carpectomy

Abdo Bachoura, MD
*Mark Elzik, MD
Sidney M. Jacoby, MD
A. Lee Osterman, MD
Randall W. Culp, MD

Introduction: Patients who desire more motion during physical activity but would otherwise undergo total wrist fusion or total wrist arthroplasty may be appropriate candidates for distal radius hemiarthroplasty combined with proximal row carpectomy (PRC). In this report, we present our outcomes using an all-metal distal radius component.

Methods: A retrospective chart review was completed for 28 patients who underwent primary wrist hemiarthroplasty combined with PRC or revision hemiarthroplasty using the metallic distal radial component of a prosthesis. There were 11 females and 17 males, with a mean age of 61 years (range, 42-81) at the time of surgery. Specific diagnoses of patients undergoing this procedure included scapholunate advanced collapse, scaphoid non-union advanced collapse and inflammatory arthritis, post-traumatic arthritis. The mean number of previous procedures was 1 (range, 0-3). Preoperative wrist flexion, extension and grip strength were compared to the postoperative values. Complications were noted.

Results: Mean clinical follow up duration was 0.9 years (range, 0.1-2.0). The wrist flexion-extension arc was 71° preoperatively and became 53° post-operatively, $p=0.005$, $n=25$. Grip strength of the affected side was 57% of the opposite hand preoperatively and became 65% postoperatively, $p=0.354$, $n=14$. One patient had total wrist arthrodesis, 3 patients developed painful ulnar positive variance, painful impingement of the implant on the capitate and hamate developed in 5 patients, this lead to erosions or cysts

in 2 patients. Complex regional pain syndrome developed in 2 patients.

Discussion and Conclusion: Short-term outcomes of the all-metal distal radius hemiarthroplasty combined with PRC reveal the maintenance of a functional arc of wrist motion and a trend towards improved grip strength. However, persistent pain and complications occurred in a relatively high proportion of patients. Longer follow up and subgroup analysis may help to better define the most appropriate candidates for this procedure.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

7:06am–7:12am

Does the Use of an Inferiorly Offset Glenosphere in Reverse Shoulder Arthroplasty Reduce Scapular Notching? A Radiographic and Functional Outcome Analysis

Xinning Li, MD
Joshua S. Dines, MD
Russell F. Warren, MD
Edward V. Craig, MD
David M. Dines, MD

Introduction: Scapular notching is a common complication after reverse shoulder arthroplasty (RSA) and has been associated with poor clinical outcomes. Factors associated with notching include neck-shaft angle and glenosphere position. Recently, we began using a reverse shoulder prosthesis with an eccentric glenosphere that allows for inferior offset. The purpose of this study is to evaluate the incidence of notching with this prosthesis and its effect on clinical outcome.

Methods: We retrospectively reviewed the charts of the first 100 patients who underwent RSA with the eccentric

glenosphere. 82 were available for follow up and radiographic analysis. Scapular notching was assessed using standard AP radiographs of the glenohumeral joint according to the Nerot classification system. Two independent observers evaluated all radiographs. The presence of radiolucent lines was also evaluated. Both range of motion (ROM) and constant scores were obtained on all patients with > 2yrs of follow-up.

Results: Average age (74: range 61-91) and average follow-up (18.3 months: range 12-35mos). According to the Nerot Classification, 73 or 89% had no notching, 5 or 6% had grade I, 2 or 2% had grade II; and 2 or 2% had grade III. Overall presence of notching was 10% and correlated to the amount of inferior offset. There were no radiolucent lines around the prosthesis. Furthermore, no intraoperative complications occurred with the eccentric glenosphere. Both range of motion and constant scores significantly improved in all patients from pre-op to final follow-up (31.3 to 74.2). No significant differences in ROM and functional outcome were seen between the notching and no notching groups.

Discussion and Conclusion: Inferior offset glenosphere will reduce the incidence of scapular notching in RSA. This was particularly true when the glenosphere was maximally offset inferiorly. In the short term, notching does not influence ROM or functional outcome.

Notes:

7:12am–7:18am

Complication Rates in Elbow Arthroscopy

Raghuveer Muppavarapu, MD
 Peter Hutchinson, MD
 Hervey L. Kimball III, MD
 Charles Cassidy, MD

Introduction: Elbow arthroscopy has traditionally been regarded as having a relatively high complication rate when compared to knee or shoulder arthroscopy. This is based

largely on a landmark study by Kelly et al. from the Mayo clinic. That study reviewed the elbow arthroscopies performed at that institution from 1980-1998. Since that time, elbow arthroscopy has become a more common procedure. Our study is designed to determine if complication rates have changed as the procedure has become more common.

Methods: We performed a retrospective review of elbow arthroscopies performed by a two surgeons at two hospitals from January 1st, 2001 to December 31st, 2011. 363 patients were identified and adequate data was available for 336. Average follow up was 145 days. The most common diagnoses included epicondylitis, osteoarthritis, inflammatory arthritis, synovitis, plica, loose bodies, OCD lesions, and contractures.

Results: Serious complications occurred after 2% of arthroscopies (two patients with loss of motion greater than 30 degrees and three patients with neurologic injury). Minor complications occurred after 21% of arthroscopies (42 with motion loss of 30 degrees or less, four portal related seromas, one portal site with drainage, one superficial infection treated with antibiotics, and six temporary paresthesias). In the 42 patients with a motion loss of 30 degrees or less, the average loss was 10.6 degrees.

Conclusions: The complication rates for elbow arthroscopy in this study were found to be higher than in the study by Kelly et al. However the types of complications have shifted. We experienced no joint infections, minimal portal drainage problems and minimal nerve related complications. The majority of our complications were related to post-operative motion loss. This suggests that while the arthroscopic techniques may have become safer and more popular, surgery about the elbow still carries significant risks.

Notes:

7:18am–7:24am

Arthroscopic Trapeziectomy with Suture Button Suspensoplasty: Moving from an Open to an Arthroscopic Surgery for All Stages of Symptomatic Carpo-Metacarpal Arthritis

Genevieve Landes, MD
Abdo Bachoura, MD
Sidney M. Jacoby, MD
A. Lee Osterman, MD
Randall W. Culp, MD

Introduction: The hypothesis is that arthroscopic trapeziectomy with button suspensoplasty (ATBS) for all stages of symptomatic thumb osteoarthritis is a safe, minimally invasive technique that achieves acceptable results in terms of pain relief and post-operative pinch strength.

Methods: All charts of patients consecutively treated with partial or complete ATBS at one surgical center, from January 2010 to December 2012, were retrospectively reviewed. One senior hand surgeon performed all cases.

Results: One hundred fifty-seven cases of ATBS were performed in 145 patients. Ninety-seven cases involved arthroscopic hemitrapeziectomies and 60 involved complete arthroscopic trapeziectomies. There were 41 males and 104 females with a mean age of 60. Thirty seven percent of the cases were graded as stage IV, 50% as stage III, and 13% as stage II base of thumb arthritis. Means for tourniquet and operation room times were respectively 32 minutes and 48 minutes. The median follow-up duration was 14 weeks. The mean preoperative key pinch strength of the affected over the unaffected side was 92 % pre-operatively compared to 95% post-operatively. The median of the delay between the 2 procedures was 6 months. Revision arthroplasty was required in 4 out of 157 cases due to the progression of disease with involvement of the triscaphe joint. All other patients experienced improvements in pain and were satisfied with treatment. No post-operative carpo-metacarpal (CMC) instability was noticed. Two post-operative complications developed (1.3%): one patient presented with osteomyelitis of the 1st and 2nd metacarpal bones and the device was removed 6 weeks post-operatively. In the 2nd case, the button was found to be too prominent over her 2nd metacarpal dorsally and the device was removed.

Discussion and Conclusion: ATBS is a novel minimally invasive procedure used to treat symptomatic thumb CMC arthritis of all stages. ATBS is associated with maintenance of pinch strength, joint stability, pain relief and satisfaction.

Notes:

7:24am–7:30am

Posterior Interosseous Nerve Localization in the Proximal Forearm — A Patient Normalized Localizing Parameter

Crystal Norgren, MD
*Jeremy Burnham, MD
Evan Davidson
Andrew Deane
Srinath Kamineni, MD

Introduction: Accurately localizing the posterior interosseous nerve in the proximal forearm has diagnostic, therapeutic, and safety implications. However, there are significant variations in individual anatomy, which have traditionally posed problematic for defining useable parameters. We attempt to provide a non-invasive, patient-normalized localizing parameter of the posterior interosseous nerve in the proximal forearm.

Methods: Sixty-three cadaveric upper extremities were studied, with minimally disruptive dissection techniques. We measured the transepicondylar distance (TED), posterior interosseous nerve distance from the lateral epicondyle in three forearm positions (neutral, pronation, and supination), and the posterior interosseous nerve width. Two individuals performed the measurements using a digital caliper on two separate occasions, with inter-observer and inter-occasion blinding. The results were analyzed with Wilcoxon-Mann-Whitney test for paired samples as well as a significance test (with normal distribution). This parameter has also been utilized in seven patients during a two year period, for clinical validation.

Results: In a pronated forearm, the posterior interosseous nerve was identified within two confidence intervals of 1

TED in 95% of cases (range 0.7-1.3 TED). In a neutral position, it was within two confidence intervals of 0.84 TED in 95% of cases (range 0.5-1.1 TED). In the supinated position, it was within two confidence intervals of 0.72 TED in 95% of cases (range 0.5-0.9 TED). Significant differences existed between TEDs comparing left to right side of the same person, p-value 0.03, but no differences existed between observers. During clinical decompression of the PIN in seven patients, an incision length of 0.5-1.1 TED centered over the 84% TED in a neutral forearm was always able to locate the nerve within the extent of the surgical incision.

Conclusions: We present a normalizing parameter that allows localization of the crossing point of the posterior interosseous nerve with a line interconnecting the lateral epicondyle and the radial styloid. The mean posterior interosseous nerve distance from the lateral epicondyle was 100% of the transepicondylar distance (TED) in a pronated forearm, 84% in neutral, and 72% in supination. Predictive accuracy was highest when the arm was in a supinated position, and in all cases the majority of specimens (90.47% – 95.23%) are within 2 cm of the forearm position-specific percentage of TED. The non-invasive and accurate localization of the posterior interosseous nerve in the proximal forearm will aid in diagnosis, injections, surgical approaches, and understanding neurological symptoms in the forearm.

Notes:

7:30am–7:36am

Factors Affecting Hospital Charges After Shoulder Arthroplasty: An Evaluation of the National Inpatient Sample Database

Daniel E. Davis, MD, MS
 E. Scott Paxton, MD
 Mitchell Maltenfort, PhD
 Joseph A. Abboud, MD

Introduction: The number of shoulder arthroplasties (SA) performed in the United States increases yearly, with a

larger rate increase experienced since the FDA approval of the reverse shoulder arthroplasty in 2003. As reimbursements for healthcare decline, it is imperative to identify specific variables that increase the costs associated with these procedures.

Methods: The National Inpatient Sample (NIS) Database was queried (1993 – 2010) to evaluate total hospital charges for SA. Using a multivariate analysis, the effect of comorbidities, peri-operative complications, patient demographics, hospital type, and location were examined. Patient demographics included gender and race. Hospital types were defined by the NIS database by setting (urban or rural) and size (small, medium, and large). The outcome measured was total inpatient hospital charges.

Results: Hospital charges for total shoulder arthroplasty were fairly consistent from 1993 to 2001 (1.97% increase per year) but then increased steadily through 2010 (7.84% increase per year). Gender, race, and obesity were not associated with differences in hospital charges. However, diabetics who underwent SA did demonstrate significantly increased hospital charges by 3.16% (1.84% - 4.50%, 95% CI). In addition, peri-operative complications did cause a significant increase in total inpatient hospital charges for SA 62.89% (40.61%-88.71%, 95% CI). Regionally, the West and South had the highest increase in charges, 52.13% (45.83% - 58.71%, 95% CI) and 7.37% (3.52% - 11.36%, 95% CI), respectively. Larger hospitals and private urban hospitals also showed higher charges (7.72% (3.59% - 12.03%, 95% CI) and 7.49% (4.65% - 10.41%, 95% CI), respectively), than small, urban academic hospitals.

Discussion and Conclusion: There is variability in the hospital charges for patients undergoing SA. The different factors related to these variable costs are multifactorial and include medical comorbidities, patient demographics, and regionalization. As the future of healthcare continues to evolve, being aware of factors which increase cost are important to note by practitioners, legislators, insurance administrators, and hospitals.

Notes:

7:36am–7:42am

Radiation Exposure to the Hand Surgeon's Hands: A Practical Analysis

Michael M. Vosbikian, MD
Asif M. Ilyas, MD
Derek Watson, RT
Charles F. Leinberry, MD

Introduction: With imaging advances in orthopaedics and the advent of surgical centers, surgeons often utilize fluoroscopy units from different manufacturers, which have different specifications. In hand surgery, mini C-arm fluoroscopy has become increasingly common, decreasing use of the standard C-arm. In addition, hand surgeons operate in close proximity to the unit. Current literature shows disagreement with respect to which unit is safer. Our goal was to look at the difference in exposure to the hand surgeon's hands.

Methods: Two surgeons wore ring dosimeters on their non-dominant ring finger during operative cases of the wrist, hand, and fingers. One surgeon used the standard C-arm, while the other used mini C-arm fluoroscopy. The data collected included type of case, fluoroscopy time, radiation emitted, fluoroscopy time per case, dose per case, and dose by time. We also looked at surface dose exposure reports from the rings.

Results: On preliminary analysis, we examined 30 cases (15 per cohort) for which we had received the ring dosimeter exposure data, thus completing the data for those cases. Our results show that the mean radiation dose for the mini C-arm was 38.53-mGy/case, while the mean for the standard C-arm was 0.90-mGy/case. This shows a statistically significant difference. There was also a significant difference in fluoroscopy time, with the mini C-arm being used for roughly twice the time of the standard C-arm.

Discussion and Conclusion: In our practical model, our preliminary analysis shows that the mini C-arm is associated with a significantly higher radiation dose per case than the standard C-arm. This increased exposure is more than can be accounted for by the time difference between cases. Looking forward, we will analyze the dose delivered to the dosimeters themselves. In the interim, due to the non-trivial radiation exposure noted, we recommend using techniques to minimize intraoperative radiation exposure.

Notes:

7:42am–7:48am

Large Hill-Sachs Lesion: A Comparative Study of Patients Treated with Remplissage or Isolated Bankart Repair

Grant H. Garcia, MD
Min Jung Park, MD, MMSc
Clare Zhang, MD
John D. Kelly IV, MD
G. Russell Huffman, MD, MPH

Introduction: While biomechanical data supports the role of Remplissage augmenting a Bankart repair with large Hill-Sachs lesions, there is little comparative clinical data comparing Bankart repair alone to the addition of a Remplissage in this population of instability patients. The purpose of our study was to compare patients whom all had significant humeral head lesions diagnosed on MRI who underwent either isolated Arthroscopic Bankart repair or Remplissage based on two different surgeons' operative protocols.

Methods: Of our initial 289 instability patients treated surgically from 2006-2011, we performed a retrospective comparison study of 15 isolated Arthroscopic Bankart repairs and 10 Remplissage patients all with identified large Hill-Sachs lesions. The average follow up was 41.99 months (26.3-59.8) in the isolated Bankart repair group and 31.55 months (24.1-39.9) in the Remplissage group. We used MRI for measurements and selection criteria, which were all done by a musculoskeletal radiologist. Both WOSI and DASH scores were obtained at follow-up.

Results: The average Hill-Sachs lesion volume was 306.19 mm³ in the Bankart repair group and 283.79 mm³ in the Remplissage group. All patients had a glenoid deficiency of less than 20%. The failure rate for the isolated Bankart repair group was 8 out of 15 patients (53.3%) with 3 dislocations and 5 subjective subluxations. For the Remplissage group the failure rate was 2 out of 10 patients (20.0%) with 1 dislocation and 1 subjective subluxation. Average WOSI scores were 73.61 in the Bankart repair group and 79.54 in the Remplissage group. For DASH scores the average Disability/Symptoms Scores were 15.76 for Bankart repair group and 12.05 for Remplissage patients.

Discussion and Conclusion: In our cohort of patients, in comparison to isolated Bankart repair, Remplissage was a superior option for recurrent instability patients with large

Hill-Sachs lesions as seen by diminished failure rates and improved outcome scores.

Notes:

7:48am–7:54am

Cost Effectiveness of Reverse Total Shoulder Arthroplasty Versus Hemiarthroplasty for Proximal Humerus Fractures

Shahin Sheibani-Rad, MD
A. George Dass, 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±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±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 (±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:

Saturday, November 2, 2013

Concurrent Session 12 — Infection
(Americana Ballroom Salon 4)

Moderator: Matthew S. Austin, MD

8:10am–8:16am

Resident/Fellow Award Winner

Risk Factors of Surgical Site Infection Following Total Joint Arthroplasty

Mohammad R. Rasouli, MD
Camilo Restrepo, MD
Mitchell Maltenfort, PhD
Javad Parvizi, MD, FRCS

Background: Surgical site infection (SSI) is a major complication following total joint arthroplasty (TJA) with substantial morbidity and huge economic burden on health care system. The present study aims to identify some predictors of SSI following TJA.

Methods: Between April 2010 and June 2012, 2718 total hip arthroplasty (THA), 2549 total knee arthroplasty (TKA), 516 revision THA and 328 revision TKA were performed at our institution. Patients developing SSI were identified using the infection control database of our hospital. SSI cases were captured by infection control nurses based on the

CDC definition. SSI cases with index surgery out of our center were excluded.

Results: Of all performed TJA, SSI developed in 80 cases. The highest rate of SSI was observed in revision TKA (4.57%) followed by revision THA (1.94%). Multivariate logistic regression was used to examine potential predictors of SSI, including age, gender, body mass index, unadjusted Charlson comorbidity index, month of surgery, type of surgery, and pre-operative measurements of serum albumin, serum glucose and hemoglobin. Among these, the predictive factors were found to be higher Charlson Index (OR = 1.21/point, 95% CI = 0.71-0.98), lower preoperative hemoglobin (OR = 0.84/point, 95% CI = 0.71-0.98), male gender (OR = 1.94, 95% CI = 1.17-3.21) and performance of a revision TKA (OR = 3.53; 95% CI = 1.22-10.21). The C-statistic of the model was found to be 0.6851 after bootstrap correction for model optimism.

Conclusions: This study identified some risk factors of SSI that can be used to prevent or reduce rate of SSI. Low pre-operative hemoglobin level is one of the modifiable risk factor of SSI that should be corrected before surgery to reduce likelihood of postoperative SSI.

Notes:

8:16am–8:22am

Risk Factors for Nasal Colonization by *Staphylococcus Aureus* in Patients Undergoing Spinal Fusion or Joint Arthroplasty

Kirk A. Campbell, MD
Colleen Cunningham, BS
Saqib Hasan, MD
Lorraine Hutzler, BS
Michael Phillips, MD
Joseph A. Bosco III, MD

Introduction: *Staphylococcus aureus* nasal colonization is a risk factor for surgical site infection. We conducted a retro-

spective case-control study to identify criteria that identify patients at risk for nasal colonization by MRSA and MSSA.

Methods: The study consisted 1699 consecutive patients who underwent a spinal fusion or total joint arthroplasty surgery at our institution from March 1, 2011 through March 1, 2012 and who attended our preadmission testing clinic. Each patient's anterior nares were swabbed and cultured for *S. aureus*. A case-control study was performed in which our case subjects were patients with positive culture for MSSA or MRSA, and controls were patients with negative culture. Univariate and multivariate logistic regression estimated odds ratios were used to determine potential predictive risk factors for colonization.

Results: Of 1699 patients, 314 (18.5%) had positive cultures, of which 268 (15.8%) had MSSA and 46 (2.7%) had MRSA. Univariate analysis showed Caucasian males with asthma were at risk for colonization. Males had a 2-fold greater risk of both MRSA and MSSA colonization compared to females. Multivariate analysis showed obesity (BMI above 30) combined with male gender or asthma is a significant risk factor for both MRSA and MSSA colonization. Obese to morbidly obese (BMI above 30) patients with asthma had a 2.6-fold greater risk of colonization with MRSA.

Discussion and Conclusion: Our study is the first to examine potential risk factors for staphylococcus nasal colonization in orthopaedic surgery patients undergoing spine and total joint surgery. Multivariate analysis showed obese patients with asthma had a 2.6-fold increase in MRSA colonization. A small (0.5-fold increase), albeit statistically significant, increase in risk of MSSA colonization was found for males with BMI above 30. The identification of obesity and asthma as risk factors for MRSA colonization may help decolonization programs target patients with these risk factors for treatment prior to surgery.

Notes:

8:22am–8:28am

The Potential Role of Urinary Tract Colonization on the Development of Periprosthetic Infection. An Observational Study

Jeffrey Muenzer, BS
 *Camilo Restrepo, MD
 Claudio Diaz-Ledezma, MD
 Ari Brandsdorfer, MS
 Glenn J. Kerr, MD
 Javad Parvizi, MD, FRCS

Introduction: Although urinary tract infections have been proposed as a risk factor for periprosthetic joint infection (PJI), the evidence is still controversial. In this observational study, we sought to evaluate the possible link between pathological bacterial colonization of the urinary tract and development of subsequent PJI.

Patients and Methods: Utilizing a cohort of 608 patients with PJI revised at our institution, we retrospectively analyzed urine cultures performed prior to index surgery as well as those performed in proximity to the diagnosis of PJI. Correspondence between the infecting bacteria was considered when the same organism strain was isolated both in the urine sample and in the periprosthetic tissues.

Results: We identified 55 patients (9%) with urinary culture done at the time of diagnosis of PJI as well as cultures isolating the PJI causative organism. Six cases (10.9%) had correspondence between the infecting bacteria. The responsible organisms were: *Escherichia coli* (2 cases), *Pseudomonaaeruginosa* (1 case), *Methicillin resistant Staphylococcus aureus* (MRSA) (1 case), *Staphylococcus Coagulase Negative* (1 case) and *Staphylococcus aureus* (1 case). A multivariate analysis showed that female gender (OR: 4.7 [CI: 2.5-8.6], $p < 0.01$) was the only factor found to be associated with colonization of the urinary tract that may have led to subsequent PJI. Interestingly, none of the patients with pathological urinary tract colonization before the primary arthroplasty had correspondence to the PJI organism.

Discussion: We found observational proof to propose urinary tract colonization as an additional pathophysiological factor that may contribute to development of PJI. Our data suggest that urinary tract colonization, when diagnosed in the proximity of PJI diagnosis, may play a role in the development of culture-positive PJI in one over ten cases.

Apparently, a positive urine culture prior to the primary arthroplasty does not have any role in the development of future PJI.

Notes:

8:28am–8:34am

Optimal Irrigation and Debridement of Infected Total Joint Implants with Chlorhexidine Gluconate Solution

Daniel C. Smith, MD
 Richard A. Maiman, BA
 Evan M. Schwechter, MD
 Sun Jin Kim, MD
 David M. Hirsh, MD

Introduction: Acute periprosthetic joint infections (PJI) have been treated with irrigation and debridement (I+D) and polyethylene exchange with varying success. A previous study at our institution demonstrated that scrubbing an MRSA-coated titanium disk with chlorhexidinegluconate solution achieved superior biofilm eradication compared to scrubbing with alternative solutions. However, available literature suggests potential soft tissue damage using standard 4% chlorhexidinegluconate solution. The current study aimed to identify a minimum chlorhexidinegluconate concentration for effective bacteria eradication of an in vitro PJI model.

Methods: MRSA biofilm was grown on titanium disks using a clinically isolated MRSA strain in a liquid culture. Groups of disks underwent standardized irrigation with normal saline and scrubbing with either a control dry scrub brush or with a 4%, 2%, 1%, 0.5%, or 0.25% chlorhexidine gluconate solution-soaked brush. MRSA colonies were counted using the colony-forming units (CFUs) remaining on the disks following simulated I+D. The procedure was repeated with a 24-hour reincubation period prior to CFU counting.

Results: A significant decrease in CFU was noted in all disks prior to reincubation when compared to the control group. After reincubation, a significant decrease in CFUs from the control group was found in the 4% and 2% groups only. The 2% concentration chlorhexidine gluconate solution was the lowest effective concentration to eradicate MRSA colonies prior to and following reincubation.

Conclusion: This study demonstrated that I+D of infected titanium disks simulating PJI with 4% chlorhexidine gluconate solution was more effective at treating MRSA bio-film than dry scrubbing alone. Moreover, we were able to decrease the chlorhexidine gluconate concentration to a 2% solution while still maintaining a significant decrease in CFUs from the control group. The theoretical benefit of using a lower concentration chlorhexidine gluconate solution on local tissues favors progressing with further studies utilizing 2% chlorhexidine gluconate solution.

Notes:

8:34am–8:40am

Changes in Mechanical Properties of Hand Mixed Chemotherapy Bone Cements After Drug Elution

Nathan C. Tiedeken, MD
John A. Handal, MD
Steve DeFroda, BS
Jeffrey Kushner
Solomon P. Samuel

Introduction: Chemotherapeutic bone cements can potentially prevent tumor recurrence after resection. Other benefits include a lower systemic side effect profile and a decreased dosage of synergistic radiation therapy. Currently there are no commercially available chemotherapeutic bone cements. Cements can be combined with soluble fillers such as polyethylene glycol (PEG) to optimize drug elution. Previous studies have investigated the mechanical properties of bone cement in its dry state, but the exact change in the mechanical properties of bone cement after drug/soluble filler elution is largely unknown. This study investigated the change in mechanical properties of these hand mixed bone cements after one year of storage in a drug elution medium.

Methods: Three cements were customized with varying amounts (0–50%) of PEG and chemotherapy agents (methotrexate or doxorubicin). Bone cement specimens were molded in the form of cylinders and were stored in a saline solution for one year. After one year, the samples were tested in compression at a cross head speed of 1 mm/min until failure.

Results: The modulus and compression strength of bone cements decreased as the percentage of soluble filler increased. Although soluble filler elution weakened the mechanical properties of these customized bone cements, Cement 2 and Cement 3 retained their original mechanical properties better than Cement 1.

Discussion and Conclusion: The combination of chemotherapeutic bone cements with soluble fillers enhances drug elution but at the expense of mechanical properties. The mechanical properties of three commercially available bone cements each behaved differently despite having the same combination of soluble filler and drug. This variation between commercially available bone cements makes it difficult to predict the rate of drug elution or changes in mechanical properties of hand mixed chemotherapy bone cements. This elucidates the need for well characterized commercially available bone cement optimized for chemotherapy drug delivery.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

8:40am–8:46am

Effects of Articulating and Static Spacers on Mental Health During Interim Period in Two Staged Revision Total Knee Arthroplasty for Periprosthetic Joint Infection

Kwang Am Jung, MD
Alvin Ong, MD
Jong Won Kim, MD
Su Chan Lee, MD
Hye-Sun Ahn, MS

Introduction: Although two-stage revision knee arthroplasty with antibiotic spacer has become the gold standard

for treating periprosthetic joint infection (PJI), there is still controversy regarding the use of articulating versus static spacer. This study investigate whether patients treated with articulating spacer will have better mental health scores than patients treated with static spacer

Methods: From February 2011 to March 2012, Fourteen knees were treated with articulating spacer and twenty-one knees with static spacer. There were 31 of females and 3 of males in each group. Hospital anxiety and depression scale (HADS, HADS-A: Anxiety subscale of HADS, HADS-D: Depression subscale of HADS), Visual Analogue Scale (VAS), Short-form-36(SF-36, only surveys of mental health component) were compared between 2 groups.

Results: In the articulating spacer group, HADS-A and HADS-D significantly improved from 15.0 and 14.0 at the pre-implant removal to 8.4 and 7.8 at 4 weeks post-implant removal. In the static spacer group, HADS-A and HADS-D at pre-implant removal was 14.2, 12.8 and significantly improved to 9.0, 9.1 at 4 weeks post-implant removal, respectively. HADS of static spacer group at 4 weeks post-implant removal was higher than in the articulating spacer group, but statistical significant differences was not observed.

Discussion and Conclusion: Although articulating spacer group and static spacer group all showed remarkable psychological improvement at 4 weeks post-implant removal, both groups still showed nearly the same anxiety and depression symptoms during the interim period regardless of the type of cement spacer utilized. The results appear to suggest that that the temporal nature of spacer treatment and the need for further definitive surgery seem to affect mental health scores equally in all patients irrespective of the type of spacer utilized.

Notes:

8:46am–8:52am

Diagnosis of Periprosthetic Joint Infection in Medicare Patients: The Role of Multicriteria Decision Analysis

Claudio Diaz-Ledezma, MD
Paul M. Lichstein, MD, MS
James G. Dolan, MD
Javad Parvizi, MD, FRCS

Introduction: In the setting of finite healthcare resources, developing cost-efficient strategies for diagnosis of periprosthetic joint infection (PJI) is paramount. The aim of this study is to determine the best diagnostic strategy for knee and hip PJI among Medicare patients, considering benefits, opportunities, costs and risks (BOCR) through multicriteria decision analysis (MCDA).

Methods: The Musculoskeletal Infection Society (MSIS) definition of PJI was employed for our study. Four diagnostic strategies comprising eight different tests were evaluated. MCDA was conducted in two stages: creation of a balance sheet followed by an analytic hierarchy process (AHP) that involved only the efficient diagnostic strategies. They were compared in terms of BOCR utilizing a preclinical model that involved a Medicare patient seen in the ambulatory setting.

Results: The efficient strategies for the diagnosis of PJI in both hip and knee models were: 1) Screening with serum markers (ESR/CRP) followed by arthrocentesis in those positive cases, 2) immediate arthrocentesis, and 3) serum markers requested simultaneously with arthrocentesis. The AHP model showed that screening strategy with serum markers followed by arthrocentesis in those positive cases is the best diagnostic strategy in hip (normalized priority value: 0.487) and knee (normalized priority value: 0.490). Sensitivity analysis revealed that regardless of the importance allocated to the criterion benefits, opportunities or risks, the order in which the diagnostic strategies were ranked is not affected. However, if the priority allocated to costs is > 55% in knees or >54% in hips, the ranking is modified.

Conclusion: The categorical PJI diagnostic criteria issued by the MSIS allow the use of MCDA to prioritize different diagnostic strategies. After considering the BOCR of the efficient strategies, our preclinical model supports the AAOS recommendations regarding the use of serum ESR/

CRP before arthrocentesis as the best diagnostic strategy for PJI among Medicare patients.

Notes:

8:52am–8:58am

Transfer of Patient Care Between Stages of a Two-Stage Exchange for Chronic Periprosthetic Joint Infection Leads to Inferior Outcomes

Matthew J. Dietz, MD
Ho-Rim Choi, MD
Andrew A. Freiberg, MD
Hany Bedair, MD

Introduction: The two-stage exchange algorithm is the current gold standard for the management of chronic PPJI. The purpose of the study was to evaluate the impact of having the first stage (resection arthroplasty +/- spacer) and second stage (re-implantation) performed at different institutions.

Methods: Patients having received their initial resection at an outside hospital and their subsequent care at our institution were identified. These patients were then matched (2:1) with a similar cohort that had received both stages at our institution. We compared patient characteristics, microorganism profile, total number of procedures performed, duration of treatment and final outcome between groups. Student's T-tests and chi-square tests were used for continuous and categorical variable, respectively, with a p-value less than 0.05 considered as significant.

Results: Eighteen patients (6 THA, 12 TKA) were identified as having undergone the first debridement/implant removal stage at an outside hospital and then subsequent care at our institution (study group) were compared to 36 matched controls that had received both stages at our institution (control group). Age, comorbidities, BMI and infecting organisms were similar between groups. There were a significantly higher number of procedures in the study compared to the control group (3.94 vs. 2.94), with the largest difference seen in the number of procedures performed between stages. There was a significant difference in the overall treatment time in the study group (16.6 vs 8.41 months). Fewer patients in the study group successfully

completed the two-stage procedure with the re-implantation and retention of a functional arthroplasty compared to the control group (44.4% vs. 77.8).

Discussion and Conclusions: The management of chronic PPJI is complex. This study suggests that patients' receiving all of their care for chronic PPJI at a single institution leads to fewer surgeries, shorter treatment times, and more favorable outcomes.

Notes:

8:58am–9:04am

Acute Periprosthetic Infection in TKA: Keep the Implant or Take It Out?

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

Introduction: Periprosthetic joint infection (PJI) is a feared complication that affects approximately 1-2% of patients undergoing total knee arthroplasty (TKA). Irrigation and debridement with implant retention (I&D), immediate implant exchange, and two-stage revision TKA have all been utilized to treat this condition. Recent reports have condemned the use of liner exchange in early infections. Our objective was to assess the results of I&D in a single surgeon's hands after an early infection.

Methods: 28 patients (13 women) who underwent I&D for early infection were retrospectively studied. The mean age was 67 years (range, 32–87). Patient perceived outcomes, clinical scores and range of motion were assessed during follow-up. Success was defined as implant retention accompanied by pain relief and adequate function. The mean follow-up was 4 years (range: 20–104 months).

Results: 18 patients (64%) were successfully treated after aggressive I&D; additional I&Ds (range, 1–2) were required in 5 of them. All postoperative outcomes improved at the latest follow-up in the successfully treated patients. Seven patients had to undergo resection and reimplantation due to persistent pain and/or functional impairment, and 67% had a successful outcome after it.

Discussion and Conclusion: Implant retention with aggressive I&D is a reasonable treatment option for acute TKA infections, it yields good relief of pain and acceptable functional outcomes. However, the results of a two stage procedure are inferior after doing a liner swap.

Notes:

Saturday, November 2, 2013
Concurrent Session 13 — Spine and Trauma <i>(Poinciana 1 & 2)</i>
Moderators: Linda D’Andrea, MD Derek J. Donegan, MD

8:10am–8:16am

Selection Criteria and Early Peri-Operative Outcomes of Minimally Invasive Transforaminal Interbody Fusion in the Outpatient Setting

Eiman Shafa, MD
 Michael Faloon, MD
 Sina Pourtaheri, MD
 Arash Emami, MD

Introduction: Minimally invasive transforaminal lumbar interbody fusion is a novel, safe and effective technique for achieving arthrodesis in treating lumbar degenerative disorders. This procedure is gaining popularity as an outpatient procedure due to decreases in blood loss, infection, surgical time, length of stay, and overall cost. The purpose of this study is to assess the early peri-operative outcomes and overall safety of this procedure in an outpatient setting.

Methods: This is a retrospective comparative cohort study of consecutive patients undergoing MIS-TLIF. Patients with clinical and radiographic records from the 6 week peri-operatively were included. Patients were divided into two groups; Group 1: MIS-TLIF in outpatient facility, Group 2: MIS-TLIF post-operative hospital observation. Early post-operative complications were quantified and stratified into categories: 1.wound related 2.infection 3.neurologic injury

4. Implant related and 5. Vascular injury. Multiple regression analysis was performed to determine the independent predictors of post-operative complications.

Results: Ninety-two patients were included in the analysis. Fifty-three patients were males and 39 were females, with mean age of 50 years (range 21-76). Seventy-six patients underwent single level procedures, 17 underwent two levels procedures. 73 patients underwent an index procedure (79%); 19 patients had revision surgery (21%). No patients from group 1 were transferred to an in-patient facility post-operatively. Overall post-operative complications between the study groups were not statistically different. Six (6.5%) required surgical revision; 4 (66%) were implant-related, one infection, one durotomy. Revision rates were similar for both groups (outpatient 1/19; inpatient 5/73). Increased surgical time, history of diabetes mellitus and revision surgery trended towards increased peri-operative morbidity. Patient age was not correlated with post-operative complications.

Conclusion: MIS-TLIF is a safe and reliable procedure with a low complication rate in the in and out-patient setting. With proper pt selection, MIS-TLIF is a safe and feasibility procedure in the outpatient setting.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

8:16am–8:22am

Effect of DEXA Scan and Patient Education on Osteoporosis Treatment Compliance

James T. Monica, MD
 Carlos A. Sagebien, MD
 Charles J. Gatt Jr., MD
 Patricia Seuffert, MS
 Dorene A. O'Hara, MD, MSE

Introduction: The Physician Quality Reporting Initiative (PQRI) is mandated by federal legislation to ensure evidence-based care. In an attempt to prevent secondary fractures, PQRI measures include reporting on communication,

management and patient counseling following fracture. The purpose of this study was to determine whether a focused patient education program by an osteoporosis nurse practitioner within a private orthopaedic practice would impact the initiation of pharmacotherapy in osteoporotic patients identified by PQRI measures.

Methods: Data on all Medicare eligible patients with DXA scans performed in 2011 and 2012 were analyzed in this retrospective cohort study. Starting in April 2012, all patients diagnosed with osteoporosis by DXA screening were seen by an osteoporosis nurse practitioner for standardized patient education at the time of diagnosis. Education included printed materials as well as verbal reinforcement regarding the importance of exercise as well as calcium and Vitamin D supplementation. Newly diagnosed patients with osteoporosis were referred to a dedicated endocrinologist available to the orthopaedic practice. Follow up phone calls were made to all osteoporotic patients to determine compliance with medical treatment. Outcomes were compared between groups using Chi-Square with Yates correction for small samples or Fisher's exact test.

Results: Significantly more females were taking supplements in 2012 vs. 2011 after patient education was instituted. Among males, supplement use over the same time period trended positively but did not reach statistical significance. Despite thorough patient education and referral to an endocrinologist, bisphosphonate or teriparatide use by patients did not significantly increase. Compliance with bisphosphonate therapy was not affected by fracture history.

Discussion and Conclusion: Our study shows that the PQRI office initiative and a patient education program can successfully improve identification of osteoporotic patients. However, treatment compliance is suboptimal and further studies are required to investigate barriers to osteoporosis treatment following diagnosis and/or fracture.

Notes:

8:22am–8:28am

Midterm Self-Reported Quality of Life Outcomes After Spine Surgery for Lumbar Radiculopathy

Stelios Koutsoumbelis, MD
Alex Richter, MD, MS
Sara Merwin, MPH
Matthew Wolfson, BS
Jeff Silber, MD

Introduction: Lumbar radiculopathy (LR) is a source of significant morbidity and economic burden, with U.S. prevalence estimated between at between 3-5%, resulting in over 80,000 surgeries per year.

Methods: IRB approval was obtained for a follow-up survey with a validated instrument (Oswestry Disability Index — ODI) and 9 questions devised by the surgeon. Questionnaires were mailed to patients meeting inclusion criteria. Variables include: surgery type (discectomy, microdiscectomy and laminectomy), pre-surgical symptoms (back pain, leg pain, muscle weakness, numbness, claudication), pain medications, subsequent surgeries and demographics (age at surgery, sex, years since surgery).

Results: Of 264 subjects meeting inclusion, addresses were located for 214 (81.1%). 60 (28%) completed surveys were returned within 6 weeks, with 2 (0.9%) electing to withdraw. The patient population was 59% male with a mean age of 41.1 years (SD=12.0). The mean follow up time was 6.5 years (SD=2.1). Pre-operatively 56 (91.8%) and 52 (85.2%) of patients rated back and leg pain as 7 out of 10 or greater, respectively. Postoperatively this improved to 6 (9.8%) and 3 (4.9 %) respectively. 3 (4.9%) of patients required additional surgery and 11 (18.0%) continued to use analgesic medication, of those, 5 (45.4%) used NSAIDs with 3 (27.2%) using narcotic medications. The ODI score averaged 13%, corresponding to mild disability.

Discussion and Conclusion: The majority of this operative cohort reported a substantial decrease in pain after surgery and stated that disability was in the mild range. Less than 5% of patients required further surgery. These preliminary findings suggest that operative treatment for LR by this surgeon resulted in favorable outcomes. Positive response from initial mailing may over-represent patients with the best outcomes whereas patients lost to follow up may mask a proportion with poor outcomes.

Notes:

8:28am–8:34am

The Effect of Non-Steroidal Anti-Inflammatory Drug (Indomethacin) and External Beam Radiation on the Development of Heterotopic Ossification Following Extremity Blast Amputation in a Rat Model

Astor D. Robertson, MBBS
 Stephen Zhao, BS
 Joseph Stains, PhD
 Juong G. Rhee, PhD
 William L. Fourney, PhD
 Vincent D. Pellegrini Jr., MD

Introduction: Heterotopic ossification (HO) in the residual limb has been a common morbidity in soldiers who survived extremity amputation via blast mechanisms during recent war conflicts. Definitive preventative treatment of the resulting complications of HO is lacking. This study was aimed at investigating the effectiveness of indomethacin and irradiation, in the prevention of HO formation following blast amputation in a rat model.

Methods: Twenty-four Sprague-Dawley rats were subjected to blast amputation of a hind limb via a column of propelled water following detonation of a submerged explosive. The amputated stump was treated with bulb syringe irrigation, minimal debridement of skin edges, and primary closure of fascia and skin. Twelve animals received an oral suspension of indomethacin at a dose of 3mg/kg for 10 days starting on operative day, while another 12 received a single dose 8Gy of irradiation to the amputated stump on the third post-operative day. A control group of twelve Sprague-Dawley rats underwent similar blasting procedure with no treatment intervention in our pilot study. Serial radiographs were done until euthanasia at 24 weeks, at which time HO severity was quantified, and HO type qualified using a grading scale previously developed in this model.

Results: One animal in the irradiation group died two weeks post-op and was not replaced. Two animals (16%) in the indomethacin group versus five (of 11, 45%) in the irradiation group developed HO contiguous to the residual stump, and no ectopic bony islands. All twelve animals in the control group had radiographic evidence of HO, either contiguous to the stump or as a bony island.

Discussion and Conclusion: While indomethacin or irradiation used prophylactically post extremity blast amputation

both decreased the incidence of HO development, the effect of indomethacin was more profound. The effect of both treatment modalities combined warrants further study.

Notes:

8:34am–8:40am

Treating Elderly Patients with Surgical Spinal Decompression and Fusion with Multiple Comorbidities

David Eidelson, BA, JD
 *Stewart G. Eidelson, MD
 Sarah Eidelson, BS

Introduction: Degenerative lumbar spinal stenosis due to narrowing of spinal canal is the most frequent cause of back and leg pain in the elderly population. The purpose of this study was to assess the improvement in postoperative pain using the analogue pain scale. In particular, this study seeks to correlate the relationship between improvement in analogue pain as a function of comorbidities such as cardiac disease, hypertension, diabetes, pulmonary and GI disease.

Methods: A chart review was conducted of thirty patients 67 to 87 years of age who underwent spinal decompression with fusion. This study focused on the frequency of comorbidities such as hypertension, cardiac, diabetes, pulmonary and GI disease. Blood loss, length of stay, decline of neurological function and wound infection were also reviewed in the current study.

Results: All patients 65 to 88 years of age had at least 2 comorbidities including hypertension, cardiac disease, pulmonary disease and GI disease. This study suggests that there is a correlation between cardiac and hypertension with decreased analogue pain improvement in the postoperative period. The highest number of comorbidities were cardiac and hypertensive disease. There were no findings of postoperative wound infection or cardiac events in this subset of patients.

Discussion and Conclusion: Results of this pilot study suggest the importance of correlating multiple comorbidities with pain reduction when considering complex spinal sur-

gerly in the elderly population. Comorbidities such as cardiac or hypertension are less likely to have as much improvement in pain relief. In the continuum of care involving spinal decompression and fusion procedures, patients with cardiac and hypertension should be counseled that their outcomes for pain control may be less optimal. Infection and decline in neurologic function was not evident in this postoperative group of elderly patients.

Notes:

8:40am–8:46am

That Resident Sutured in the Drain...Now What? — A Biomechanical Evaluation of Sutured and Retained Surgical Drains

Michael Rivlin, MD
*Olga Zielinska, BA
Irene Jimenez, BS
Paul M. Lichstein, MD, MS
Daniel W. MacDonald, MS
Steven M. Kurtz, MD
Javad Parvizi, MD, FRCS

Background: Inadvertently captured drains during wound closure may pose serious clinical dilemmas. Bedside extraction may lead to retained drain necessitating exploration; whereas, no bedside attempt may lead to unnecessary surgery. We investigated the biomechanical behavior of sutured drains.

Methods: Properties tested were: 1) Material (Silicone, plastic) 2) Shape (round, flat), 3) Perforation design (fluted, holed) 4) Needle design (cutting, taper) 5) Suture (size, braided, smooth), 6) perforation (depth, location). 372 drain/suture combinations were tested using a mechanical testing frame. Failure categories were: cut out (suture cuts through the drain), suture failure (suture breakage), and drain failure (drain split into two). Cut out and suture failures translate to a successfully extracted drain; whereas, drain failure occurred when a piece of the drain broke off.

Results: Monofilament sutures had higher occurrence of drain failure ($p=0.004$) and higher ultimate load ($p = 0.01$) than braided sutures. Needle type had no effect. Deep suture penetration withstood higher loads and lead to increased

rupture rate ($p < 0.002$). Drain material influenced drain failure. The round perforated silicone drain group had the highest frequency of drain failure followed by flat, then fluted silicone drains. Plastic (PVC) drains did not fail but associated suture failure occurred in many instances.

Conclusion: Knowing drain type and sutures used may help direct clinicians in attempting bedside extraction of drains. The risk of drain rupture may be minimized by using drains made of silicone, using longitudinally fluted drains, making sure that minimal proximal tubing (non-perforated region) is within the wound, and braided suture is used near a drain. Caution is advised during attempted bedside drain extraction of sutured drains as even in ideal situations drain rupture may occur.

Notes:

8:46am–8:52am

Split-Thickness Skin Grafts for Residual Limb Coverage and Preservation of Amputation Length

Elizabeth Polfer, MD
*Gregory Van Blarcum, MD
Scott M. Tintle, MD
Jonathan A. Forsberg, MD
Benjamin K. Potter, MD

Introduction: Due to concerns regarding durability and complication rates, split thickness skin grafts (STSG) have historically been utilized sparingly for amputation coverage when primary closure is not feasible without substantial loss of length. We hypothesized that amputations with STSG would result in an increased rate of wound complications, reoperations, and heterotopic ossification requiring excision as compared to residual limbs that were closed primarily with either conventional or atypical fasciocutaneous flaps. We further hypothesized that although the complication rate may be higher, the STSG would ultimately facilitate length and level preservation as anticipated.

Methods: We performed a retrospective review of 300 consecutive lower and 100 consecutive upper extremity amputations treated at our facility from 2005- and 2003 – 2009 respectively comparing patients treated with STSG to those treated with delayed primary closure (DPC). Principle out-

comes measured included early (wound failure) and late (HO requiring excision and soft tissue revisions) complications requiring operative treatment.

Results: Statically significant differences were seen with the STSG group having an increased incidence of wound failure, HO requiring excision, and soft tissue revisions as compared to controls. The risks of revision were higher for lower than upper extremity amputations undergoing STSG. However, amputation level salvage was successful for all residual limbs with STSG.

Discussion and Conclusion: STSG for closure of amputations results in significantly increased reoperation rates, but is ultimately successful in salvaging residual limb length and amputation levels. STSG in carefully selected patients may be a successful means of achieving definitive coverage when performed over robust, healthy muscle. In many patients, however, STSG should be viewed as a staging procedure in order to maintain length and amputation level until swelling decreases and revision surgery for STSG excision with or without concurrent procedures can be performed without the need to substantially shorten the residual limb.

Notes:

8:52am–8:58am

Distal Tibia Fractures: Locking or Non-Locking Plate?

Nader Toossi, MD
 Douglas L. Cerynik
 Loni P. Tabb
 Amrit Khalsa
 Nirav H. Amin

Introduction: Distal tibia fractures are among the most common, yet most difficult fractures to treat. Plating is considered to be the treatment of choice in these fractures. Controversies abound regarding the type of plating for optimal fixation. We conducted a systematic review to evaluate and compare the outcomes of locking versus non-locking plates in distal tibia fracture treatments.

Methods: A systematic review was conducted using the PubMed database to identify articles reporting on the out-

comes of plating in distal tibia fractures up to June 2012. We included English language articles on adult patients with a minimum of ten cases reporting acute fractures treated by single-plate, minimally invasive techniques. The demographic and outcome data of all studies was retrieved and pooled. Study-level binomial regression on the pooled data was conducted to determine the effect of locking status on different outcomes, adjusted for age, gender and other independent variables.

Results: 28 studies met the inclusion criteria for a total of 764 cases (499 locking, 265 non-locking). Delayed union was reported in 6% of cases using locked plating and 4.2% of cases with non-locked plating. Non-union was reported in 2.2% and 3.4 % of locking and non-locking plates, respectively. An odds ratio of 0.13 for reoperation after locked plating versus non-locked plating was statistically significant. A statistically significant odds ratio of 0.10 was found for malalignment when using locking versus non-locking plating.

Discussion and Conclusion: This study is unique in systematically reviewing the outcomes of locked versus non-locked plating in distal tibia fracture treatment. This study demonstrated that locked plating significantly reduces the rate of reoperation and malalignment after acute distal tibia fracture treatment. Future studies are needed to translate these differences into meaningful financial figures in this era of budget-focused health care systems.

Notes:

8:58am–9:04am

The Effects of End Stage Renal Disease on Hospital Course and Readmission Rates in Hip Fracture Patients

Matthew Reuter, MD
 Christian Athanassios, MD
 Jason Cohen, MD
 Steve Paragioudakis, MD
 Marc S. Menkowitz, MD
 Anthony Avery, MD
 Dante Marconi, MS3

Introduction: End-stage renal disease (ESRD) patients face a significantly increased risk of hip fractures, a longer

recovery from them, and a shorter life expectancy after hip fracture than their counterparts with functioning kidneys. This retrospective review of 36 hip fracture patients with ESRD compares them to a control group of 36 patients from the general hip fracture population at our hospital to assess whether differences of in-hospital management are responsible for the inferior outcomes of ESRD patients in hip fracture recovery.

Methods: Thirty-six hip fracture patients with ESRD who underwent surgical fixation between 2004 and 2011 were identified by cross-referencing ICD-9 codes for hip fracture and stage III or greater chronic kidney disease. Another 36 patients with hip fractures who underwent surgical fixation were randomly selected from a list of all 488 patients with surgically fixed hip fractures admitted to our hospital between 2007 and 2011. Charts were then reviewed and compared on five parameters: length of hospital stay, time to surgery, average change in hemoglobin, 90-day readmission rates, and 180-day readmission rates.

Results: Hip fracture patients with ESRD performed worse on three of the five parameters measured. They stayed in the hospital an average of 10.20 days compared to 6.06 days for the controls. Surgery occurred an average of 3.32 days after admission for study patients compared to 1.72 days for those with normal renal function. More than half (51.40%) of the ESRD patients were readmitted within 90 days of discharge, compared to 27.78% of controls. The difference in 180-day readmissions was not statistically significant (54.10% ESRD vs. 38.89% controls) and the controls had a larger average decrease in hemoglobin (3.15 mg/dL) than the study patients (2.20 mg/dL)

Discussion and Conclusion: ESRD patients are at increased risk of short-term complications from hip fracture and should undergo surgical fixation of their fractures as soon as possible. Delaying surgery increases the risk of complications such as deep venous thrombosis and decubitus ulcers. Pre-operative medical management should focus on optimizing the ESRD patient's medical condition for surgery as quickly as possible.

Notes:

Saturday, November 2, 2013

**Concurrent Session 15 — Total Joint Arthroplasty
(Americana Ballroom Salon 4)**

**Moderators: Joshua J. Jacobs, MD
Henry A. Backe Jr., MD**

12:00pm–12:06pm

Diabetic Control in Total Joint Arthroplasty Outcomes

Carlos J. Lavernia, MD, FAAOS
Jesus M. Villa, MD
David A. Iacobelli, MD

Introduction: Low and high HbA1c values have been associated with increased mortality and cardiovascular complications in diabetic patients. Our objective was to study the effects of diabetic control in the outcomes after total joint arthroplasty (TJA).

Methods: 121 consecutive primary TJA's were performed in type 2 diabetic patients. Patients were stratified into quartiles based on their preoperative HbA1c levels. Patient oriented outcomes (QWB-7, SF-36, and WOMAC), complications, length of stay (LOS), and hospital costs were compared between quartile groups. ANOVA and independent t-test were used to compare outcomes. A p-value of less than 0.05 was considered significant.

Results: At 2.7 years (range: 2-5 years) there were no significant differences between quartiles. A trend for worse scores in the lowest 25% and highest 25% quartiles was identified for the QWB-7 (LQ25%: 0.627; IQ50%: 0.637; HQ25%: 0.627); SF-36 role physical (LQ25%: 71; IQ50%: 78; HQ25%: 77), SF-36 social functioning (LQ25%: 72; IQ50%: 78; HQ25%: 76), and SF-36 mental health component (LQ25%: 55; IQ50%: 57; HQ25%: 55); WOMAC function (LQ25%: 7; IQ50%: 3; HQ25%: 5) and WOMAC total (LQ25%: 8; IQ50%: 4; HQ25%: 7). Hospital length of stay and costs were higher in both the lowest 25% and the highest 25% quartiles. After controlling for all confounders, this inverted U-shaped pattern was still observed and was statistically valid. There were no significant differences in complications between quartiles. All perceived outcomes improved significantly two years after surgery.

Discussion and Conclusion: We found that type 2 diabetic patients with hypoglycemia and hyperglycemia, as mea-

sured by preoperative HbA1c levels, have a tendency towards worse outcomes after TJA. Poor glucose control in diabetic patients undergoing total joint arthroplasty may play a key role in outcomes postoperatively. There may be an optimal range for the HbA1c in arthroplasty patients.

Notes:

12:06pm–12:12pm

Vitamin D Deficiency in Total Knee Replacement Surgery

Jesus M. Villa, MD
David A. Iacobelli, MD

Introduction: Adverse outcomes have been reported in patients with subnormal Vitamin-D (vit-D) levels. Our main objective was to investigate the relationship between preoperative vit-D levels and outcomes in patients with end-stage OA who underwent primary TKR, and to determine the effects of vit-D supplementation on outcomes in patients with low-levels.

Methods: 180 consecutive patients (196 knees) were studied. Patients were divided into two groups (normal or low) based on preoperative plasma 25-hydroxyvitamin-D3 levels. Demographics and preoperative BMI, ASA, Charlson, albumin, transferrin, calcium, total lymphocyte count (TLC); preoperative and postoperative QWB-7, SF-36, WOMAC, Knee Society (KS) and HSS knee scores were compared between groups. Based on internist preferences, some of the deficient patients received vit-D supplementation. We further stratified deficient patients into those who received supplementation and those who did not. Alpha was set at 0.05.

Results: Overall prevalence of low vit-D levels was 66% using the standard threshold (30 ng/mL). Patients with deficiency had higher mean BMI (31.8±S.E.0.83) compared to normal-level patients (29.9±0.42). 26% of females had deficiency before surgery in contrast to 12% of males. Compared to normal patients, those with low-levels had significantly worse mean pre-operative WOMAC function (40.1±0.78 vs. 44.4±1.34), WOMAC total (53.8±1.05 vs. 59.7±1.80), SF-36 function (11.6±1.18 vs. 4.8±1.34), and SF-36 physical-component scores (22.7±0.42 vs. 20.4±0.56). Postoperatively, normal-level patients had bet-

ter SF-36 mental-health scores than patients with deficiency (74.1±0.97 vs. 69.6±2.46). The remaining laboratory values were not different between groups. There were no significant improvements in outcomes in vit-D deficient patients who received supplementation while in the hospital.

Discussion and Conclusion: Vitamin D deficiency is fairly prevalent in patients who undergo TKR even in sunny cities like Miami. Obese patients and females were deficient when compared to males and patients with normal BMI. Patients with low-levels had poor preoperative WOMAC, SF-36, and worse postoperative SF-36. Preintervention supplementation is safe, inexpensive, and could positively affect outcomes in patients who undergo primary TKR.

Notes:

12:12pm – 12:18pm

Resident Travel Grant Award Winner

Effects of Steroids on Thrombogenic Markers in Patients Undergoing Unilateral Total Knee Arthroplasty

Alexander S. McLawhorn, MD, MBA
Kethy Jules-Elysée, MD
Thomas P. Sculco, MD
Jonathan Beathe, MD
Jacques YaDeau, MD, PhD
P. Edward Purdue, PhD
Yan Ma, PhD

Introduction: Despite thromboprophylaxis therapy, venous thromboembolism (VTE) remains an important complication for patients receiving total knee arthroplasty (TKA). Systemic thrombin generation starts in the perioperative period, with a demonstrable rise in thrombogenic markers 4 hours post-surgery. Inflammation, characterized by a rise in interleukin-6 (IL6), initiates the coagulation cascade via expression of tissue factor. Low-dose steroids have been shown reduce post-TKA IL6 levels and to stimulate tissue plasminogen activation, leading to fibrinolysis. In this study, we assessed the effect of perioperative steroids on the release of plasmin antiplasmin (PAP), a marker of fibrinolysis, and prothrombin fragment (PF1.2), a marker of thrombin generation.

Methods: This triple blinded placebo-controlled study was IRB approved. 24 patients undergoing unilateral TKA were included (13 placebo, 11 study). The study group received 100 mg of intravenous hydrocortisone 2 hours prior to surgery. The control group received normal saline. Blood samples were drawn pre-incision and at 4 hours post tourniquet (TQ) release, then centrifuged at 3500 rpm. Supernatants were assayed for PAP and PF1.2.

Results: The mean rise in PF1.2 in the control group was significantly greater compared to the study group (674 \pm 260 pMol/L vs. 349 \pm 332 pMol/L). The study group had significantly lower mean PF1.2 at 4 hours compared to controls (615 \pm 357 pMol/L vs. 937 \pm 317 pMol/L). Mean PAP was higher in the study group at 4 hours (1638 \pm 823 mcg/L vs. 1206 \pm 624 mcg/L), but did not reach statistical significance. Baseline means for PF1.2 and PAP were not different between groups.

Conclusion: Pre-operative steroids significantly decrease thrombin generation 4 hours post TKA, without interfering with fibrinolysis. The mechanism is likely due to reduced IL6-mediated activation of the coagulation cascade. These results may have significant clinical implications in terms of post-operative VTE risk and management. Clinical studies are needed for further evaluation.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 54).*

Notes:

12:18pm–12:24pm

Implant Failure Associated with an M2 Macrophage Immunopathology

Jeffrey A. Moore, BS
Pankaj K. Mishra, PhD
Bonnie A. Buechal, MS
Mark J. Palma, MS
Kathleen S. Beebe, MD
Joseph Benevenia, MD
William C. Gause, PhD

Introduction: Total joint arthroplasty is commonly used in Orthopedics to treat symptoms of pathological joint diseases

including osteoarthritis, rheumatoid arthritis, and osteonecrosis. However, implants can loosen and ultimately fail over time, causing pain and ambulatory issues for the patient. This loosening may result from inflammation caused by the release of implant micro particles or “wear debris” into the surrounding tissue. Our previous studies in mice suggest that the micrometer sized titanium particles trigger an innate type 2 response, characterized by alternatively activated (M2) macrophages, neutrophils, and eosinophils. Based on these findings, we hypothesized that wear debris microparticles shed by implants in human subjects that accumulate in the periprosthetic tissue may lead to type 2 inflammation and recruitment of M2 macrophages, ultimately contributing to osteolysis and aseptic loosening.

Methods: After institutional review board approval, 32 patients (27 primary and 5 revision) undergoing total joint arthroplasty were enrolled in the study. We intraoperatively collected either synovial like tissues from primary joint arthroplasties (controls) or periprosthetic tissues from revision arthroplasties. Half of each specimen was embedded in OCT and half was used for RNA isolation. Gene expression of immune cell markers was determined using real-time PCR. Staining was performed on OCT sections using a fluorescent labeled CD68 antibody.

Results: Initial staining with CD68 indicates increased infiltration of macrophages in revision patients. Gene expression analysis of revision patients showed significantly increased expression of Insulin-like Growth Factor-1 (IGF-1), Chitinase-1 (CHIT-1), CCL-18, and Fibronectin (FN2) (77-fold), but no increases in IL-12.

Discussion and Conclusion: Our data suggests that implant wear debris causes inflammation characterized by an infiltration of M2 macrophages, and is associated with aseptic loosening requiring revision surgery. This study may help identify important targets for future therapeutic control of implant failure and may aid in the potential development of prosthetics that limit tissue inflammation.

Notes:

12:24pm–12:30pm

Length of Stay and Day of Surgery in Total Knee Arthroplasty

Antonia F. Chen, MD, MBA
 Susannah G. Cafardi, BA, MPH
 Peter Cohen, MD
 Brian Klatt, MD

Introduction: Previous studies have demonstrated that decreasing hospital length of stay (LOS) increases quality of life and reduces costs. Therefore, it is desirable to implement programs that prepare total knee arthroplasty (TKA) patients for earlier discharges. The purpose of our study was to determine there was a difference in hospital LOS and complications based on the day of surgery for TKA.

Methods: TKA Medicare patients were retrospectively studied from 2009 using a 20% nationally representative sample of Medicare claims data. Procedures were identified using CPT-4 codes in Medicare claims. Patient data was collected using encrypted beneficiary identification identifying day of surgery, LOS, age, race, gender, comorbidities, socioeconomic class (dual status), and complications (emergency department revisits within 30-days, 30-day readmissions, infection, death, and DVT/PE) were collected. Standard descriptive statistics were performed and a Poisson regression model was used to compare LOS between the days of the week, controlling for comorbidities and demographic predictors.

Results: There were 47,337 TKA patients; 14,846 patients on Monday, 14,177 TKAs on Tuesday, 8,587 TKAs on Wednesday, 5,939 TKAs on Thursday, and 3,788 TKAs on Friday. The average LOS was 3.50 days. There was a decrease in LOS of 0.23 days (95% CI 0.16-0.30, $p < 0.001$) for TKAs done on Mondays compared to Fridays and a decrease of 0.35 days (95% CI 0.29-0.41, $p < 0.001$) for TKAs done on Mondays compared to Thursdays. Findings were similar for TKAs performed on Tuesday, compared to Thursday and Friday.

Discussion and Conclusion: Our study demonstrates that undergoing a TKA on Monday or Tuesday results in a shorter hospital LOS compared to undergoing a TKA on Thursday or Friday with no difference in complications. Thus, it is desirable to perform TKAs earlier in the week compared to later in the week.

Notes:

12:30pm–12:36pm

Intraarticular Pain Pump Reduces Opioid Consumption After TKA

Hind Sawan, BS
 Benjamin Hendy, BS
 Amanda C. Gulasarian, BA
 Camilo Restrepo, MD
 Mitchell Maltenfort, PhD
 Javad Parvizi, MD, FRCS

Introduction: Adequate pain management following total knee arthroplasty (TKA) is the most important factor in patient satisfaction. However, management of postoperative pain and complications from pain management techniques remains one of the greatest unmet challenges. The purpose of our study is to evaluate patients receiving the intraarticular pain pump in terms of pain perception, opioid consumption, in hospital complications and length of stay as compared to patients receiving patient-controlled analgesia (PCA).

Methods/Materials: Using a prospectively collected database, we identified 270 consecutive patients undergoing TKA between December 2011 and April 2012 who received intraarticular pain pumps delivering ropivacain following surgery. Using the same database, we identified 234 consecutive patients undergoing TKA between December 2007 and March 2008, who received PCA and did not receive an intraarticular pain pump. Data regarding postoperative pain management was collected and analyzed through visual analog score (VAS), opioid consumption, postoperative complications, and length of stay.

Results: Patients in the intra-articular pain pump group had a lower VAS scores than patients in the PCA group on postoperative day (POD) 1 and POD 2. The PCA group experienced more hematological and gastrointestinal postoperative complications than the pain pump group. Patients receiving pain pump reported a reduction in opioid consumption up to POD 3 and a decreased length of stay.

Discussion: In patients undergoing TKA, pain was effectively controlled in both the pain pump and PCA group. However, patients receiving the pain pump had adequate pain management without the adverse effects and complications associated with opioid consumption.

Notes:

12:36pm–12:42pm

The Reduction of Implant-Related Errors and Waste in Total Knee Arthroplasty Using a Novel, Computer Based, e.Label and Compatibility System

Michael P. Ast, MD
David J. Mayman, MD
Edwin P. Su, MD
Alejandro Gonzalez Della Valle, MD
Michael L. Parks, MD
Mathias P. Bostrom, MD
Steven B. Haas, MD, MPH

Introduction: Wasted implants represent both an increased risk and cost to our healthcare system. In our institution, a sterilely packaged implant that is opened and not implanted is wasted in one out of 20 primary total knee replacement procedures. The cost of these wasted implants exceeds \$1 million per year. We propose the introduction of a novel, computer based, e.Label and compatibility system to reduce implant-related medical errors and waste in total knee arthroplasty. We hypothesize that the implementation of this system will help reduce medical errors and wasted implants by improving and standardizing the visual markers and by ensuring that parts are compatible so that implant mismatches and inappropriate laterality are prevented.

Methods: A software program was implemented which creates an e.Label for all components and checks imbedded, manufacturer provided, compatibility charts to ensure that parts are of appropriate laterality, and are compatible with each other. Upon implementation, the program was studied prospectively for seven months and compared to a retrospective cohort in regards to number, type, and cost of wasted implants. Critical errors that were detected were also recorded.

Results: During the retrospective period there were 83 wasted implants in 1450 surgeries, or an incidence of 5.7%. After implementation of the computer based system, there were two wasted implant in 244 surgeries performed by the study physicians, or an incidence of 0.8%. One critical medical error was identified and prevented during the study period. The annualized cost savings from this decrease in wasted implants was over \$200,000 among our six study surgeons.

Conclusion: The introduction of this system was able to prevent at least one serious medical error, while dramatically decreasing the number and cost of wasted implants in

our institution. Implementation on a larger scale may provide potential for safer, more efficient, and more cost-effective orthopaedic care.

Notes:

12:42pm–12:48pm

Total Joint Arthroplasty in Patients with Inflammatory Bowel Disease

Jeffrey Oliver, BS
Camilo Restrepo, MD
Javad Parvizi, MD, FRCS

Introduction: Total Joint Arthroplasty (TJA) procedures have become a mainstay in orthopaedics, alleviating suffering and providing functionality in many arthritic patients. Identification and optimization of at-risk groups is essential for the success of TJA, serving to prevent severe complications such as infection. One potential at-risk group includes Inflammatory Bowel Disease (IBD) patients, susceptible to osteoarthritis as an extra-intestinal manifestation of their disease and complications due to immunosuppressant therapy.

Methods: We queried our institution's retrospective database for patients undergoing total hip and knee replacements or revisions with concomitant IBD or related irritable bowel and colon diseases. We identified 408 patients (449 procedures) that had been performed on patients with IBD from January 2000 to June 2012. From the database and electronic medical records, detailed data including demographic information and outcomes pertaining to complications, diagnoses, readmission and mortality were collected. There were ten cases of periprosthetic joint infection in the cohort. Mechanical loosening accounted for 15 revisions, with other mechanical malformations, fractures, and dislocation accounting for the rest.

Results: The average age was 62.78 years (range twenty-seven to ninety-one), with 200 knee replacements, 192 hip placements, 24 knee revisions, and 33 hip revisions. A total of 77 complications in 44 patients were detected. Blood-related complications accounted for the majority of these complications (35%), with general (29%), Pulmonary and Gastrointestinal (both 12%), Renal/Urinary (10%), and Cardiac (2.6%) complications to follow.

Discussion and Conclusion: PJI as a cause of revision was not elevated within the cohort, something which can likely be attributed to optimization strategies at our institution, which include halting immunosuppressant therapy four weeks pre and eight weeks post-surgery.

Notes:

Saturday, November 2, 2013
Concurrent Session 16 — Sports Medicine and Oncology (Poinciana 1 & 2)
Moderators: Mark J. Lemos, MD John A. Abraham, MD

12:00pm–12:06pm

Resident Travel Grant Award Winner

Evaluation of Hip Internal and External Rotation Range of Motion as an Injury Risk Factor for Hip, Abdominal and Groin Injuries in Professional Baseball

Richard Ma, MD
 Xinning Li, MD
 Matthew Thompson, MD
 Courtney Dawson, MD
 John J. Steele, BS
 Joseph T. Nguyen, MPH
 Struan H. Coleman, MD, D.Phil
 Hanbing Zhou, MD

Introduction: Normal hip range of motion (ROM) is essential in running, changing directions and transfer of energy from lower to upper extremities during throwing. Dysfunctional hip ROM will alter kinematics and increase risk of injury and disability in athletes. The purpose of this study is to evaluate the effect of hip internal and external ROM (Arc) and risk of injury (hip, hamstring, and groin) in professional baseball players.

Methods: Bilateral hip internal and external ROM was measured on all baseball players (N=209) in one professional organization (major and minor league) during spring training by several fellowship-trained orthopaedic surgeons.

Players were organized according to their respective positions. Specific injury (hip, hamstring, and groin) along with the number of days missed was documented prospectively for an entire season (2010 to 2011). Data was analyzed according to the position and type of injuries during the season. Statistical analysis was performed.

Results: Total number of players is 209 with an average age of 24 +/- 3.6 (range = 17-37). Both pitchers and catchers had significantly decreased mean internal rotation and overall arc of motion compared to the positional players. Players with a history of hip or abdominal injury also had decrease in their hip arc of motion compared to the normal group. Catchers with in-season injuries (N=14) had decreased hip arc compared to catchers without in-season injuries (N=8). Players with hip, hamstring, and groin injury also had decreased hip arc when compared to the normal group (not significant). Based on ANOVA analysis, both younger-aged and positional players have higher relative risk of developing hip/hamstring/groin associated injuries.

Discussion and Conclusion: There is a correlation between decreased hip internal rotation and total arc of motion with hip, hamstring, and groin injuries. Both catchers and pitchers have overall decreased hip arc ROM when compared to the positional players. Players with history of hip injuries also have decreased hip IR and arc of motion compared to normal group. Younger age and positional players have higher relative risk for hip/hamstring/groin injuries.

Notes:

12:06pm–12:12pm

Use of an Emergency Room External Fixator for Initial Stabilization of Pilon Fractures

Philip McClure, MD
 Dale Cassidy, MD
 Stephen A. Klinge, MD
 Christopher W. DiGiovanni, MD
 Roman A. Hayda, MD

Introduction: There is a paucity of data available on placement of an external fixator in the emergency room (ED ex-fix) for provisional stabilization of pilon fractures. It is

unclear if neurovascular injury or infection rates differ versus standard treatment.

Methods: Over a seven year period, 26 patients who had a uniplanar ED ex-fix placed for type 43B or 43C tibia pilon fractures were compared with 16 patients who had delta frame external fixators placed in the operating room (OR ex-fix). Radiographic data was reviewed to evaluate fracture classification, pin placement and reduction. Clinical notes were reviewed to confirm 6-month follow-up, the presence of wound complication, deep infection, nerve injury, and non-union. Co-morbidities (e.g. diabetes and history of tobacco use) were also recorded.

Results: 3/26 (12%) patients in the ED ex-fix group developed deep infection, compared to 2/16 (13%) in the OR ex-fix group. 7/26 (27%) patients in the ED ex-fix group had wound complications compared to 5/16 (31%) in the OR ex-fix group. Each group had 4 nerve injuries, which continued to improve throughout follow up. 42% of ED ex-fixes returned to the OR prior to definitive treatment compared to 19% of OR ex-fixes. On average, 1.6 operations were needed to treat patients in ED ex-fix group in the study period, compared to 2.3 operations for the OR ex-fix group; and includes late removal of hardware and other secondary procedures.

Discussion and Conclusion: Use of the ED ex-fix appears to be a safe and effective alternative to external fixation applied within the operating room. Advantages include decreased trips to the operating room and associated cost, rapid availability, and earlier soft tissue stabilization as well as advanced imaging. It appears that this method did not increase the risk of deep infection or neurovascular injury in our cohort.

Notes:

12:12pm – 12:18pm

Cost Benefit Analysis of Athletic Team Coverage by an Orthopaedic Practice

Brandon Eck, BS
Fotios P. Tjoumakaris, MD
Luke Austin, MD
Matthew D. Pepe, MD
Kevin Freedman, MD3
Katherine Bagnato, ATC
Bradford S. Tucker, MD

Introduction: Coverage of high school athletics by orthopaedic surgeons is considered standard of care in many localities. Time away from an orthopaedic practice to provide on field athletic care has potential advantages and disadvantages. The purpose of this investigation was to perform a cost/benefit analysis of local sports coverage by an orthopaedic sports medicine practice.

Methods: From January 2010 to June 2012, a prospective injury report database was used to collect sports injuries from five high school athletic programs covered by a single orthopaedic practice. Patients referred for orthopaedic care were tracked to determine ultimate cost of care. E&M and CPT codes were obtained to determine the value of physician visits and surgical care, using standardized Medicare reimbursement rates. Direct costs were estimated based on time required for team coverage and hourly reimbursement rates for orthopaedic surgeons, based on previously reported data.

Results: 19,165 athletic trainer evaluations resulted in 473 (2.5%) physician referrals. The covering practice handled 89 (27.9%) of the orthopaedic referrals. Of the orthopaedic referrals, 26 (5.4%) required orthopaedic surgical treatment. The covering practice handled 17/26 (65%) surgical cases. The total cost of orthopaedic care for athletes requiring treatment was \$44,239.94. The total revenue collected by the covering practice was \$26,226.14. Cost of an orthopaedic physician for the required hours of coverage was \$12,627.81. Overall profit of visits and treatment for the covering practice was \$13,598.33 (43% of possible profit). Total possible profit during the study period was \$31,612.13. Calculated hourly rate of reimbursement for a covering orthopaedic surgeon was \$116.23/hour.

Conclusion: A potentially profitable and personally beneficial engagement with local athletes can lead to a symbiotic relationship between physicians and their local communi-

ties. The hourly rate of reimbursement based on this revenue for the covering orthopaedic surgeon is only slightly higher than found in a prior study.

Notes:

12:18pm–12:24pm

Female Athlete Triad Awareness Among Residents and Attending Across Specialties

Catherine Logan, MD, MBA, MSPT
 Emily J. Curry, BA
 Kathryn E. Ackerman, MD, MPH
 Kelly C. McInnis, DO
 Elizabeth G. Matzkin, MD

Introduction: Female athlete triad is a debilitating disorder that can have lifelong consequences for the female athlete, if left undiagnosed. Prior studies assessed female athlete triad education among coaches/athletic trainers reported surprisingly low awareness results. We assessed 1)how many physicians/residents had heard of the female athlete triad and 2)how many can properly diagnose or refer patients to appropriate specialists.

Methods: We recruited MD faculty and residents at one institution across specialties to answer an 8-item test on triad awareness and knowledge. A total of 416 responses were recorded.

Results: There were 41% male and 59% female responses(33% resident and 66% attending). Average number of years in practice for attendings was 15.2+/-10.6 and years in residency was 2.7+/-1.2. Overall, 29% of residents and attendings had heard of the female athlete triad. Of these respondents, an average of 1.6+/-0.8 of the 3 components were properly identified with an overall average score on the triad awareness test of 66+/-16%. 53% felt comfortable treating or referring a patient with the triad, while 47% did not. More residents had heard of the triad than attendings (35%vs.26%); however, both groups had similar overall scores (65%vs.67%). Attendings report feeling more comfortable than residents in treating/referring patients with the triad (56%vs.47%). When assessing awareness between specialties, the three with highest awareness were orthopaedics(78%),

pediatrics(62%), and PM&R/Rheumatology(59%). The three with lowest awareness were pathology(0%), surgery(7%) and anesthesiology (8%)/radiology(8%).

Discussion and Conclusion: Our findings suggest that less than a third of the residents/attendings have heard of the female athlete triad. Those aware of the triads scored 66+/-16% on the overall knowledge to properly treat/refer. Increased awareness through education to properly identify and manage the female triad is needed in orthopaedics.

Notes:

12:24pm–12:30pm

Epiphyseal and Growth Plate Sparing in Children with Malignant Bone Tumors. Segmental Resection and Reconstruction Using Allograft Vascularized Fibular Graft. The Biological Solution

Samuel Kenan

Introduction: Limb length discrepancy following wide resection of distal femur or proximal tibia in young children presents a major challenge. Attempt to overcome this problem using the expandable prosthesis has been associated with high morbidity related to multiple revisions. In an attempt to save the knee joint and growth plate, in selected patients in whom the tumor is away from the growth plate, transmetaphyseal or transepiphyseal resection has been performed successfully. The outcome in twelve patients is presented.

Material and Methods: From 1990-2012, twelve patients with malignant bone tumors were treated. 10- osteosarcoma, 2-Ewing’s sarcoma. Age: 5 to 18 years. 7-male, 5- female. All received chemotherapy. 8-distal femur, 4-proximal tibia. In ten patient’s transmetaphyseal resection and in two, transepiphyseal resection was performed. In four with distal femur, combined allograft vascularized fibula was used, all other had segmental allograft.

Results: Follow-up period was from 6 months to 22 years. In four patients, follow-up was 18 to 22 years. All patients are disease free. There were no immediate complications. In two patients allograft fracture has to be treated by improved fixation. In one patient with distal femur allograft after three

years, fracture required revision using vascularized fibular graft. In one patient, revision using prosthesis was performed. The growth plate was preserved in ten patients, all continued growth without significant limb length discrepancy. All patients regained full active range of motion of the knee and returned to normal lifestyle activity. Based on the M.S.T.S functional evaluation, excellent results were achieved in 10 patients.

Discussion: In the last decade better understanding of the biological behavior and improved radiographic imaging and at the same time effective chemotherapy treatment has enabled us to measure accurately the tumor extension. These advances made it possible to come closer to the tumor with adequate surgical margins. In patients in whom the tumor is away from the growth plate, transmetaphyseal or transepiphyseal resection could be performed successfully, saving the knee joint and growth plate allowing continues growth and minimizing limb length discrepancy. The surgical defect could be restore by an intercalary allograft combined with vascularized fibular graft. In twelve selected patients with malignant bone tumor about the knee joint such procedure was performed successfully. This Biological solution proven to be effective, all patients continued growth without significant limb length discrepancy. All patients regained full active range of motion of the knee and returned to normal lifestyle activity. Based on the M.S.T.S functional evaluation, excellent results were achieved in 10 patients.

Notes:

12:30pm–12:36pm

Does Age Affect Healing Time and Functional Outcomes After Fracture Nonunion Surgery

David P. Taormina, MS
Brandon S. Shulman, BA
Raj Karia, MPH
Allison B. Spitzer, MD
Sanjit R. Konda, MD
Kenneth A. Egol, MD

Introduction: Due to the setting of medical co-morbidities, poor vascularization, osteopenia, and diminished osteogenic

potential, age is a risk factor for fracture nonunion. The multiplicity of risk factors predicting fracture nonunion compound the success of nonunion revision surgery in the elderly. The purpose of this study was to investigate the effect of patient age on clinical and functional outcome following long bone nonunion surgical repair.

Methods: Two-hundred and eighty-eight patients with fracture nonunion were prospectively enrolled in a research registry. Patients were all treated irrespective of age by experienced surgeons. Length of hospital stay after surgery and medical co-morbidities were documented. Patients were tracked for a year with follow-up at regular intervals. Elderly patients >65 years of age were compared with non-elderly for wound complications, SMFA scores, healing, and surgical revision. Regression modeling analysis for associations between continuous age, smoking status, and history of previous nonunion surgery with healing was performed.

Results: Follow-up data was available on 278 patients ranging 18-91 years (mean=48.0). Forty-five patients were >65years. The elderly included significantly more females and mean number of medical co-morbidities, particularly osteopenia. Significantly fewer elderly reported smoking. Number of previous nonunion surgeries and BMI did not differ. Rates of post-operative wound complications were similar. Surgical revision, progression to union, and union time were similar. Similar levels of functioning were reported up to 12 months after surgery. Regression model analyses failed to show association between age and healing. However, it did show strong associations between smoking status and previous nonunion surgeries with healing time.

Discussion and Conclusion: Patient modifiable risk factors, such as smoking, and failure of previous surgery were more associated with nonunion revision success than age in this study. Advancing age may be less strongly associated with nonunion surgery outcome than the risk factor milieu predisposing to baseline fracture nonunion

Notes:

12:36pm–12:42pm

Intramedullary Nail Stabilization with Adjuvant Bisphosphonate and Radiation Use for Impending Pathologic Fractures: A Retrospective Review

Alexandria Starks, BA
John A. Abraham, MD
Brandon Shallop, BS

Introduction: Metastatic bone disease causes pain, pathological fractures, limited mobility, and metabolic irregularities that dramatically affect quality of life. The goal of prophylactic surgical fixation is to prevent fracture, reduce pain, and provide rapid recovery and weight bearing without significant interruption of treatment. In the past, it was thought that certain lesions required more extensive treatment than intramedullary (IM) nailing, such as curettage and cementation. However, with improvements in radiation and bisphosphonate therapy, this may not be the case. The purpose of this paper is to describe outcomes of IM nail stabilization with adjuvant bisphosphonate and radiation therapy without intralesional curettage and cementation for impending pathological fracture.

Methods: Retrospective review of surgical database identified patients with impending or pathologic long bone fractures. Intervention in these patients included IM nails, bisphosphonates, and radiation between August 2010 and January 2013. Outcomes include failure, defined as: completion of fracture, or reoperation for mechanical problem, removal of implant, or implant conversion.

Results: We identified 24 lesions treated with IM nail fixation coupled with bisphosphonate and radiation therapy for impending fracture. Of these lesions, 17 were femoral and 7 humeral. Lesion histologies included breast cancer, multiple myeloma, hepatocellular carcinoma, renal cell carcinoma, cholangiocarcinoma, pancreatic, lung, and colon cancer. Follow-up ranged from 11 to 653 days, with a mean of 139 days. We observed no failures.

Conclusion: We present a series of consecutive patients treated with IM nailing, bisphosphonate therapy, and postoperative radiation for impending fractures from metastatic cancer to bone. In this series, no patients experienced failure, regardless of histology, or needed a reoperation. Although a small series, this suggests that traditional approach to lesions including curettage and cementation

may be unnecessary with the addition of bisphosphonate and radiation therapy. Further study will be needed to prove this hypothesis.

Notes:

12:42pm–12:48pm

Preoperative Predictors of Postoperative Opioid Usage and Referral to a Pain Management Service in Total Knee Arthroplasty

Geoffrey H. Westrich, MD
Trevor Banka, MD
Allison Ruel, BA
Michael P. Ast, MD
Kara Fields, BA
Jaques YaDeau, MD

Introduction: Postoperative pain after total knee arthroplasty (TKA) can adversely affect patients' ability to mobilize, participate in therapy and satisfaction with the procedure. Narcotics are commonly used in the postoperative period and when postoperative analgesia protocols fail, it is common to refer patients to a pain management service. The goal of this study was to identify patient specific preoperative predictors of postoperative pain management referral and predictors of postoperative narcotic usage.

Methods: One hundred consecutive TKA patients from a single surgeon were followed prospectively. Pre- and 6-week post-operative narcotic usage was recorded as morphine equivalents and catastrophizing pain scores were collected. Multivariate logistic regression analysis was used to determine the likelihood of each preoperative variable on postoperative referral to a pain management service and narcotic usage, reported as odds ratios (OR).

Results: Adjusting for all other variables, increasing age and BMI were associated with lower odds of being referred to pain management. One unit increase in BMI was associated with an OR of 0.87 (CI 0.73, 0.98) and a one-year increase in age was associated with an OR of 0.85 (CI 0.78, 0.98). After adjusting for all other variables, higher age, catastrophizing, rumination, and helplessness score were associated with lower odds of using opioids postoperatively.

One unit increase in catastrophizing score was associated with an OR of 0.96 (CI 0.87-0.99), one-year increase in age had an OR 0.95 (CI 0.87-0.99), one unit increase in rumination had an OR 0.89 (CI 0.74, 0.97), and one unit increase in helplessness had an OR 0.92 (CI 0.87, 0.99).

Conclusion: Increasing age, BMI, and higher catastrophizing pain scale scores show slightly lower odds of postoperative opioid usage and referral to a pain management after TKA. This can help surgeons console their patients preoperatively and set expectations during the recovery period.

Notes:



Eastern Orthopaedic Association

Scientific Poster Exhibits

October 31-November 2, 2013

Poster presenters will have an opportunity to report their findings at designated times indicated on the Meeting-at-a-Glance Schedule

Scientific Posters will be on display during the Scientific Program on Thursday, Friday and Saturday.

Please plan to visit the Scientific Posters.

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2013 Poster Abstracts

Thursday-Saturday

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Poster 1

A Systematic Review of Treatment Outcomes for Enchondroma of the Hand

Abdo Bachoura, MD
*John D. Lubahn, MD

Introduction: A systematic review was conducted on the management of hand enchondromas by curettage alone, curettage followed by packing of the residual defect with cancellous bone graft, and curettage followed by packing with materials that provide structural support.

Methods: We reviewed articles retrieved from MEDLINE using the search query “enchondroma*[TI] AND (hand OR Wrist OR carpus OR phalanges OR fingers OR metacarpals OR thumb) NOT Review” and applied limitations to include English language articles and humans. Reports with less than 5 patients were excluded. Secondary selection required the studies to report data with at least 1 month of clinical follow up. Outcomes of interest included qualitative or quantitative post-operative range of motion. Clinical outcomes were categorized into 2 categories: 1) no functional restrictions or 2) functional limitations. Post-operative fracture and tumor recurrence were also compared in the 3 groups. The complication rate of patients who presented with pathological fractures and were treated within 10 days of injury were compared to patients who presented with a pathological fracture and were allowed more than 10 days to heal prior to treatment. The chi square test was used for statistical analysis.

Results: 91 manuscripts were identified and 17 selected after applying the inclusion and exclusion criteria. A total of 298 patients were identified: 119 underwent curettage alone, 121 underwent curettage followed by bone grafting, and 58 underwent curettage followed by replacement with synthetic bone fillers. There were no significant differences in the functional outcomes, incidence of post-operative fracture, recurrence or complications in any group.

Discussion and Conclusion: Considerable variation exists in the reporting of clinical outcomes for the treatment of hand

enchondromas. Curettage alone avoids donor site morbidity and appears to be as effective as curettage followed by various types of filling when considering post-operative function, risk of post-operative fracture and recurrence.

Poster 2

The Role of Corticosteroid Injection in Open Fasciectomy for Dupuytren's Contracture

Abdo Bachoura, MD
*Matthew S. Zimmerman, MD
Praveen G. Murthy, AB
Sidney M. Jacoby, MD
Susan Blackmore, MS, OTR/L, CHT
Stephanie Sweet

Introduction: We hypothesize that the injection of lidocaine and betamethasone into the wound bed immediately following fasciectomy would result in fewer soft tissue complications than open fasciectomy alone for patients with Dupuytren's disease.

Methods: We retrospectively reviewed the records of patients with Dupuytren's disease that underwent fasciectomy by 2 surgeons at one surgical center. Following cord excision, one surgeon injected the wounds of all patients with lidocaine and betamethasone (Group 1 patients), while the second surgeon did not (Group 2). Exclusion criteria consisted of follow-up less than 1 month. In Group 1, 56 patients with a mean age of 65 years (range, 40-83) underwent 62 procedures to treat 113 joints (52 proximal interphalangeal (PIP) joints and 51 metacarpophalangeal (MCP) joints). In Group 2, 53 patients with a mean age of 65 years (range, 43-88) underwent 55 procedures to treat 106 joints (54 PIP joints and 52 MCP joints). An independent t-test was used to compare numerical data, while chi-square analysis was used to compare categorical data.

Results: There were no differences in both groups relative to gender, age at surgery, diabetic status and duration of follow up. There were no differences in the mean duration of follow up: 15 ± 21 months in Group 1, and 11 ± 17 months in Group 2. Mean preoperative and final postoperative contractures

were significantly less in Group 1 patients as compared to Group 2 patients: 44° versus 51°, $p=0.038$, preoperatively; and 11° versus 17°, $p=0.039$, postoperatively. Soft tissue complication rates were not significantly different.

Discussion and Conclusion: The effects of steroid injection on soft tissue complications immediately following fasciectomy in Dupuytren's disease have been investigated and no significant differences were noted between the 2 described techniques. The effects of steroid injection on postoperative recovery, return to function and recurrence is currently under investigation.

Poster 3

Recovery of Range of Motion, Pain and Function Similar in Revision and Primary Single Radius Knees

Manoshi Bhowmik-Stoker, PhD

*Michael Howard

Danielle Anthony

Kirby Hitt, MD

David Jacofsky, MD

Eric B. Smith, MD

Introduction: Total knee arthroplasty (TKA) is one of the most common orthopaedic procedures performed, and is projected to exponentially increase over the next 20 years. As primary TKA cases increase, so does the frequency of revisions. The primary goals for all TKA cases include alleviating pain and improving overall knee function. The objective of this study was to evaluate the change in outcomes as measured by the Knee Society Score (KSS) between primary and revision TKA systems.

Methods: This data was collected as part of three prospective, post-market, multicenter studies comparing preoperative to 6-week data. Patients were stratified into two groups based on type of single radius knee device; Posteriorly Stabilized (PS) group and Total Stabilizer (TS) group. Early clinical outcomes based on the KSS and operative data were used to compare groups.

Results: The KSS was compared to determine the amount of improvement in revision vs. primary cases. Within the KSS Pain/Motion section, the improvement in range of motion was greatest in the TS revision group (change of 8°) in comparison to the primary PS group (change of 3°), as well as a significant decrease in pain classification. The KSS Functional scores

improved significantly more in the revision group compared to the primary group.

Discussion and Conclusion: Studies have determined that revision TKAs have lower rates of functional outcomes, leading to a decreasing trend in KSS. This trend can be correlated to increased difficulty of the surgical technique due to increased bone loss and anatomical changes, as well as a higher constraint in revision TKA devices. The design of a single radius knee revision system addresses these issues with revision TKA and has been shown to have comparable KSS evaluations to patients receiving primary single radius TKAs.

Poster 4

Patient Satisfaction Associated with Either Mupirocin or Povidone-Iodine Nasal Decolonization: Results of a Randomized Controlled Trial

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Background: Led by the Federal government, the payers of healthcare are enacting policies designed to base provider reimbursement on the quality of care they render. Payers now consider the patient's perception of their care as a quality indicator, thus increasing the impact that patient-reported experiences have on provider payment. Efforts to reduce hospital-acquired conditions such as surgical site infections (SSI's) and improve patient satisfaction have become paramount to ensuring full reimbursement and positive clinical outcomes. Our SSI prevention program is based on pre-operative *Staphylococcus aureus* (SA) decolonization of patients using topical and intranasal treatments. Several studies have shown povidone-iodine (PI) solution and nasal mupirocin ointment (MO) to be effective in decreasing SA colonization of the nares, but few have compared the two antiseptic interventions with respect to patient experience.

Objective: This study evaluated and compared patient experiences and satisfaction with nasal MO and to PI solution.

Methods: One-thousand-nine-hundred-three patients were randomized to receive either nasal MO or PI solution prior to surgery. All randomized patients were also given 2% chlo-

rhexadine gluconate (CHG) topical wipes. Patients were interviewed prior to discharge in order to assess adverse events and patient experience with their assigned pre-surgical antiseptic protocol. Analysis was performed with descriptive statistics.

Results: Of the 1903 randomized patients, 1679 were interviewed prior to discharge (88.1%). In patients receiving PI, 3.4% reported an unpleasant or very unpleasant experience compared to 38.8% of those administering nasal MO (P-value <0.0001). Sixty-seven percent of patients administering nasal MO believed it to be somewhat or very helpful in reducing SSI, compared to 71% of patients receiving PI. Being recruited as an active participant in SSI prevention was a positive experience in 87.2% of MO patients and 86.3% of PI patients (P-value 0.652). Those assigned to receive PI solution pre-operatively reported significantly less adverse events including headache, rhinorrhea, lung or throat congestion, and sore throat than the nasal MO group. All adverse events but pruritis were less frequently reported in patients assigned to PI solution.

Conclusion: Pre-operative nasal decolonization with either nasal povidone-iodine or mupirocin nasal ointment was considered somewhat or very helpful by over two thirds of patients. However, those patients receiving PI reported one tenth of the amount of unpleasant or very unpleasant experiences compared to those receiving MO. In combination with CHG wipes and education about proper behavior strategies, nasal decolonization is well accepted by healthcare consumers.

Poster 5

The Reliability of the Thoracolumbar Injury Classification and Severity Score Among Orthopaedic Surgeons at Different Levels of Training

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Background: Led by the Federal government, the payers of healthcare are enacting policies designed to base provider reimbursement on the quality of care they render. Payers now consider the patient's perception of their care as a quality indi-

cator, thus increasing the impact that patient-reported experiences have on provider payment. Efforts to reduce hospital-acquired conditions such as surgical site infections (SSI's) and improve patient satisfaction have become paramount to ensuring full reimbursement and positive clinical outcomes. Our SSI prevention program is based on pre-operative *Staphylococcus aureus* (SA) decolonization of patients using topical and intranasal treatments. Several studies have shown povidone-iodine (PI) solution and nasal mupirocin ointment (MO) to be effective in decreasing SA colonization of the nares, but few have compared the two antiseptic interventions with respect to patient experience.

Objective: This study evaluated and compared patient experiences and satisfaction with nasal MO and to PI solution.

Methods: One-thousand-nine-hundred-three patients were randomized to receive either nasal MO or PI solution prior to surgery. All randomized patients were also given 2% chlorhexadine gluconate (CHG) topical wipes. Patients were interviewed prior to discharge in order to assess adverse events and patient experience with their assigned pre-surgical antiseptic protocol. Analysis was performed with descriptive statistics.

Results: Of the 1903 randomized patients, 1679 were interviewed prior to discharge (88.1%). In patients receiving PI, 3.4% reported an unpleasant or very unpleasant experience compared to 38.8% of those administering nasal MO (P-value <0.0001). Sixty-seven percent of patients administering nasal MO believed it to be somewhat or very helpful in reducing SSI, compared to 71% of patients receiving PI. Being recruited as an active participant in SSI prevention was a positive experience in 87.2% of MO patients and 86.3% of PI patients (P-value 0.652). Those assigned to receive PI solution pre-operatively reported significantly less adverse events including headache, rhinorrhea, lung or throat congestion, and sore throat than the nasal MO group. All adverse events but pruritis were less frequently reported in patients assigned to PI solution.

Conclusion: Pre-operative nasal decolonization with either nasal povidone-iodine or mupirocin nasal ointment was considered somewhat or very helpful by over two thirds of patients. However, those patients receiving PI reported one tenth of the amount of unpleasant or very unpleasant experiences compared to those receiving MO. In combination with CHG wipes and education about proper behavior strategies, nasal decolonization is well accepted by healthcare consumers.

Poster 6

Three-Dimensional Mapping of the Soft Tissue Anatomy of the Elbow

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Introduction: The purpose of this study was to provide a more precise and comprehensive mapping of the anatomic footprints of the ligaments and tendons surrounding the elbow using new 3-dimensional mapping technology.

Methods: Six fresh frozen cadaver upper extremities were dissected exposing the insertions of the triceps, biceps, and brachialis tendons as well as the origins and insertions of the anterior bundle of the medial collateral ligament (AMCL) and the lateral ulnar collateral ligament (LUCL). A 3D motion capture system with an attached digitizing pen was used to map the surface area of these structures as well as the adjacent joint surfaces.

Results: The insertion of the triceps was broad based with considerable variation in both length and width between specimens with a mean surface area of 810.3 mm². Mean surface area for the biceps insertion was 255.0 mm². Mean distance between the center of the insertion and the radial head joint margin was 34.3 mm. The insertion of the brachialis tendon was broad based and in some specimens found to be confluent with the distal portion of the insertion of the AMCL with a mean surface area of 457.0 mm². The AMCL was found to have mean surface areas of 295.6 mm² for the origin and 202.2 mm² for the insertion. The mean distance between the center of the origin and the trochlear joint margin was 16.8 mm while the mean distance between the center of the insertion and ulnar joint margin was 9.4 mm. Mean surface area for the origin of LUCL was 167.8 mm² while the insertion was found to have a significantly variable footprint with a mean surface area of 177.8 mm². The mean distance between the center of the origin and the capitellar joint margin was 7.3 mm.

Discussion and Conclusion: This is the first study to provide a comprehensive detailed understanding of the anatomic origins and footprints of the ligaments and tendons around the elbow using a 3D motion capture system. Previous efforts using similar technology have focused specifically on the

anterior bundle of the medial collateral ligament and found similar results. These more accurate quantitative measurements will be of significant value to surgeons repairing or reconstructing structures around the elbow.

Poster 7

The Use of Platelet-Rich Plasma and Wound-Healing Complications After Total Ankle Arthroplasty: A Retrospective Chart Review

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Introduction: Many studies report beneficial wound-healing effects of platelet-rich plasma (PRP) in a variety of clinical scenarios. Few are performed at a high enough level to promote its widespread acceptance as an adjunct to wound healing. Despite improvements in implants and techniques, incision-healing complications present a significant problem in total ankle arthroplasty (TAA). In this study, the authors aimed to study the role of PRP in reducing wound healing complications in TAA.

Methods: A retrospective review of 133 consecutive TAA performed by a single surgeon at a single institution was conducted. 78 patients' incisions were sprayed with PRP prior to and following closure, while 55 had closure without PRP application. Analysis of patient characteristics, preoperative diagnosis, and operative factors showed no significant difference between the groups. Postoperative documentation was reviewed to identify wound healing complications or delays. Patients were followed until they either had complete healing of their wound or had to undergo a surgical procedure addressing the wound complication. Wound healing complications were divided into "None"; "Minor" (responded to local care); "Major" (return to operating room).

Results: The incidence of major wound complications in the PRP group was 10.25% (8/78). When compared to the group who did not receive PRP (5.45%; 3/55) there was no significant difference. The incidence of minor wound complications in the PRP group was 32.9% (23/70). Compared to the incidence in the group who did not receive PRP (26.9%; 14/52) there was no significant difference. 55% (47/85) of patients who experienced no wound healing complications had received PRP.

Discussion and Conclusion: In this study, the use of intraoperative PRP did not protect patients from wound healing complications resulting in delayed healing or in returning to the operating room. PRP is no longer routinely used at our institution when performing TAA.

Poster 8

A Retrospective Review Of Patients With Chronic Exertional Compartment Syndrome

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Introduction: Chronic exertional compartment syndrome (CECS) is a condition that causes reversible ischemia and lower extremity pain during exercise. To date there is minimal data regarding characteristics of patients who develop CECS. More information is needed regarding gender and sports predilection. This study characterizes patients with confirmed diagnosis of CECS.

Methods: An IRB approved, retrospective review was undertaken of patients with a suspected diagnosis of CECS who had compartment pressure testing between 2000 and 2012. Pressures were considered elevated according to the Pedowitz criteria. Cases of acute compartment syndrome were excluded. The remaining patients were evaluated for gender, age, duration of symptoms, pain level, specific compartments involved, and participation and type of athletics.

Results: Elevated compartment pressures were observed in 153 of 226 (67.7%) patients and 250 of 393 (63.6%) legs, with an average patient age of 24 (13-69). Females accounted for 60.1% of those with elevated pressures. Anterior and lateral compartment pressures were elevated most frequently with 200 (42.5%) and 167 (35.5%) compartments, respectively. Deep and superficial posterior compartments were elevated in 89 (18.9%) and 15 (3.2%) compartments, respectively. The anterior and lateral compartments were elevated simultaneously in 72 (29.2%) legs. Sports participation was reported by 141 patients (92.2%) with running as the most common individual sport and soccer the most common team sport. Duration of pain prior to diagnosis averaged 28 months with an average pain score of 8/10 with exercise and an average onset of 11 minutes within starting activity.

Discussion and Conclusion: CECS of the leg is a common cause of leg pain in young athletes, yet there is little published on the characteristics of these patients. This is the largest known case series to define those most likely to develop CECS when presenting with leg pain on exertion. This information could help decrease the delay in diagnosis seen with this disease.

Poster 9

Diagnosing Periprosthetic Joint Infection: The Era of the Biomarker Has Arrived

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Introduction: Diagnosis of periprosthetic joint infection remains a real challenge. Based on previous work, we believe that biomarker(s) will become the mainstay of diagnosing PJI in the future. In this study we report on our comprehensive biomarker program, evaluating the diagnostic profile of 15 most promising synovial fluid biomarkers.

Methods: Synovial fluid was prospectively collected from 99 patients being evaluated for infection in the setting of revision hip or knee arthroplasty. All synovial fluid samples were tested by immunoassay for 15 putative biomarkers that were developed and optimized specifically for use in synovial fluid. Sensitivity, specificity and Receiver Operating Characteristic (ROC) Curve Analysis were performed for all biomarkers.

Results: Based on the MSIS criteria, 30 patients had PJI while 69 patients were being revised for aseptic failure. Four synovial fluid biomarkers (alpha defensin, bactericidal/permeability increasing protein, neutrophil gelatinase-associated lipocalin, and resistin) correctly predicted the MSIS classification of all patients in this study, exhibiting an AUC of 1.0 with >98% sensitivity and specificity for the diagnosis of PJI. Eight other biomarkers exhibited an AUC of >0.9. These results outperformed the tests for serum CRP (specificity 87%, sensitivity 96%) and ESR (specificity 80%, sensitivity 93%). Interestingly, the Pearson correlation comparing the biomarkers to each other and to the synovial fluid WBC count revealed only weak correlations, demon-

strating that these biomarkers are not simply inflammatory biomarkers.

Discussion: A comprehensive biomarker program conducted over 8 years has led to the identification of several synovial fluid biomarkers that appear to be diagnostic for PJI. The four top biomarkers are proteins that have known functional roles in the cellular response to pathogens. These biomarkers outperform our currently utilized serum tests and can be used to develop rapid bedside immunoassays for PJI.

Poster 10

Chronic Renal Failure Patients Have a Higher Complication Rate After Total Joint Arthroplasty: A Case-Controlled Study

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Introduction: Patients with chronic renal failure (CRF) may require total joint arthroplasty (TJA) because of degenerative joint disease, fractures, and osteonecrosis, due to amyloid arthropathy or renal osteodystrophy. There has been conflicting results regarding the outcome of TJA in patients with renal disease. In this study, we determined the outcome of TJA in patients with CRF and compared the outcome with a matched-paired group of patients with normal renal function.

Methods: Using ICD-9 code, among 29,376 patients in our institutional TJA database, 359 patients were identified with CRF who had undergone TJA between January 2000 and June 2012. Patients were matched with 718 patients with normal renal function according to surgical procedure, gender, age (± 4 year), date of surgery, and body mass index (± 5 kg/m). Of 359 patients with renal failure, there were 66 dialysis patients and 72 renal-transplant recipients.

Results: Complications were higher in patients with CRF, especially those undergoing hemodialysis, compared to patients with intact renal function. Hemodialysis was associated with periprosthetic joint infection (PJI), bone necrosis, and femoral neck fracture in chronic renal failure patients. Lower BMI was associated with bone necrosis and femoral neck fracture while higher BMI was associated with PJI. Bone

necrosis was associated with lower age and femoral neck fracture was associated with higher age.

Discussion and Conclusion: Patients with chronic renal failure, especially those requiring hemodialysis, who receive TJA are at higher risk of complications compared to their matched cohort who have normal renal function. It appears that CRF as a comorbidity adversely affects outcome of TJA.

Poster 11

Predictors of Total Hip Arthroplasty Dislocation on AP Pelvis Radiographs: A Case-Control Study

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Introduction: The primary goal of total hip arthroplasty (THA) is to provide a stable, pain-free hip by restoring hip biomechanics with well-fixed components. THA biomechanics are determined by component orientation, leg-length, and offset, which can be evaluated on AP pelvis radiographs. The contribution of each of these factors to THA stability is unknown. Our aim was to determine if acetabular component abduction angle, femoral offset, or leg-length measured on AP pelvis radiographs are predictors of THA dislocation.

Methods: A matched case-control design was used to examine risk factors for dislocation among THA patients at our institution from 2002 to 2012. Controls (n=264) were matched at a ratio of 4 controls per case (THA dislocation, n=75) by surgeon, type of surgery (primary versus revision), and year performed. Risk factors of interest were acetabular component abduction angle, femoral offset, and leg-length measured on digital AP pelvis radiographs. The risk of dislocation was assessed utilizing conditional logistic regression models, where outcome was case versus control status. Models were adjusted for age, gender, and BMI.

Results: Measured on an AP pelvis radiograph, acetabular component abduction angle greater than 45 degrees and femoral offset less than that of the contralateral hip were predictors of THA dislocation. Leg-length was not a predictor of dislocation.

Discussion and Conclusion: Our data suggest that efforts should be made during THA to place the acetabular component at less than 45 degrees of abduction and restore femoral offset to that of the contralateral hip. Lengthening the operative leg to increase tissue tension may not be effective in preventing THA dislocation.

Poster 12

A Predictive Model of Outcomes After Anterior Cruciate Ligament Reconstruction — What Graft and Technique for My Patient?

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Introduction: Anterior cruciate ligament reconstruction (ACLR) is one of the most commonly performed procedures in orthopedics. We hypothesize that predictive modeling of the outcomes after ACLR can improve the quality of information available for treatment discussions. In this study, we describe a model that provides detailed outcome predictions based on patient demographics, graft choice, and reconstructive technique.

Methods: A Markov decision model of the natural history after ACLR was constructed. Patients were divided into four therapeutic categories – 1. Single-bundle, autologous hamstring reconstruction; 2. Single-bundle, autologous patellar tendon reconstruction; 3. Single-bundle, allograft reconstruction; and 4. Double-bundle reconstruction. The primary outcomes were graft failure requiring revision surgery and IKDC overall grade. Outcome probabilities and utilities were derived from the highest-level evidence available in the literature. Utilities range from 0 (failure) to 1 (normal knee).

Results: 45 studies (Level I-III), 24 of which were Level I, were used to build the model. Monte Carlo micro-simulation on a population of 200,000 – the estimated yearly incidence of ACL rupture – was performed. The mean utilities were 0.88 for double-bundle reconstruction, 0.78 for single-bundle autologous hamstring reconstruction, 0.76 for allograft reconstruction and 0.75 for single-bundle autologous patellar tendon reconstruction. Re-rupture rates were higher in patients < 20 years, those returning to IKDC Level I/II activity, and those with a contact mechanism of injury. The probability of attaining an excellent (IKDC grade A) outcome was 66.1% for dou-

ble-bundle reconstruction, 43.5% for single-bundle autologous hamstring reconstruction, 38.1% for single-bundle, autologous patellar tendon reconstruction, and 37.7% for single-bundle allograft reconstruction.

Discussion and Conclusion: Our model can predict risk of graft rupture, as well as expected IKDC grade for each of the common ACLR techniques. This information can be used to assist patients and surge

Poster 13

The Effect of Post-Operative KT-1000 Score on Long-Term Outcome in Anterior Cruciate Ligament Reconstruction

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Introduction: The purpose of this study was to evaluate the effect of post-operative graft laxity on long-term clinical knee scores in transtibial anterior cruciate ligament (ACL) reconstruction.

Methods: Between 1992 and 1998, a cohort study of 171 consecutive patients undergoing transtibial bone-patellar-tendon-bone ACL reconstruction was performed. At 6, 12 and 24 months postoperatively, patients were evaluated by clinical examination, subjective and objective scoring systems, and KT-1000 arthrometry. Patients with a side to side difference of less than 3mm as measured by KT-1000 were considered ‘tight grafts’ and patients with a side to side difference of greater than 5mm were considered ‘loose’. At long-term follow-up patients completed subjective outcomes scores as well as questionnaires regarding their knee function. Differences within and between groups were then compared.

Results: Sixty-five ‘tight’ and twenty ‘loose’ patients met inclusion criteria. 71% of ‘tight’, and 75% of ‘loose’ patients were available for follow-up at an average of 17 years. Lysholm scores improved significantly from pre-operative levels in both ‘tight’ and ‘loose’ reconstructions at both 2-year and long-term follow-up; 65.8 to 93.8 and 90.4 in ‘tight’ grafts, and 74.2 to 94.4 and 90.0 in ‘loose’ grafts respectively. In addition, Lysholm scores were not statistically different at 2 or 17 years in either group and there was no significant difference between ‘tight’ or

'loose' reconstructions in any activity outcome measure at long-term follow-up. There was no statistical difference in the number of additional surgical procedures required in either group at 17 years.

Discussion and Conclusion: A side to side difference of greater than 5mm as measured by KT-1000 arthrometry has historically been considered a failure of ACL reconstruction. Our study suggests that a clinically loose post-operative result may not correlate with clinical failure at 17-year follow-up, and that transtibial ACL reconstruction provides excellent long-term clinical results.

Poster 14

Combined Medial Patellofemoral Ligament Reconstruction and Anterior Cruciate Ligament Reconstruction

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Background: Studies have confirmed that medial patellofemoral ligament (MPFL) reconstruction is an acceptable surgical technique to restore patellofemoral stability. In Patients with torn anterior cruciate ligaments (ACL) and instability, reconstruction of the ACL is the standard treatment. To date, no studies have evaluated the efficacy of a combined technique to restore patellar stability and ACL insufficiency when present concomitantly. The purpose of the present study was to determine the outcomes and safety of a combined MPFL and ACL reconstruction procedure.

Methods: 6 patients were identified from a surgical database with a combined MPFL and ACL reconstruction from 2008-2011. All patients were treated by a fellowship trained sports medicine physician utilizing identical surgical technique. Minimum follow-up was 24 months for inclusion in the study. Patients were evaluated for recurrence of instability, complications, and functional outcome (Kujala and Lysholm outcome scores).

Results: Of the 6 patients who underwent this procedure during the time period studied, 4 met our inclusion criteria and are included in this analysis. All patients prior to sur-

gery had complete ACL tears or graft failure with concomitant patella instability. 4 patients (100.0%) had prior ACL reconstruction or MPFL repair surgery on their knee. The average length of follow up was 43 (range 39 to 49) months. There were 4 female patient(s), with an average age of 28. Average Kujala and Lysholm scores at final follow-up were 85.00 and 79.75, respectively. 0 patients sustained recurrence of patella instability. 0 patients reported subjective ACL instability. 1 (25%) patient required arthroscopic anterior interval release. There were no infections in this series.

Conclusion: The patient population studied presented with very complex cases; however, the risk of recurrence observed was low (0%). Therefore MFPL and ACL reconstruction, performed simultaneously, is an effective surgical technique to restore patellar stability and ACL deficiency.

Poster 15

The Result of Isolated Arthroscopic Meniscal Repairs: Evaluation of Return to Function and Incidence of Failure

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Introduction: Preservation of the meniscus prevents the earlier onset of arthrosis of the knee associated with meniscectomy. In an effort to preserve the meniscus and newer generation devices, surgical indications for meniscal repair have expanded to include tears once thought irreparable. Few studies have evaluated functional scores, healing rates and return to function of meniscal repairs with newer generation all-inside devices in isolated meniscus tears.

Methods: Fifty-four patients were identified retrospectively over a 5-year period (2005-2010) as having an isolated arthroscopic meniscus repair with a minimum of 2-year follow-up. Follow up consisted of completion of the International Knee Document Committee (IKDC) questionnaire, examination for re-tear or incomplete healing, and determination of satisfaction rate. Patients with associated ligament repair were excluded.

Results: The average age of the 54 patients was 23.2 years. The average time from injury to surgery was 9.3 months. The average follow-up was 4.4 years. There were 26 inside-out, 19 all-inside, 8 hybrid and 1 outside-in repair. Eleven patients (20.4%) reported inability to return to full function. For the remaining 43 patients (79.6%), the average time from surgery to return to function was 5.1 months. The total satisfaction rate was 83.3%. The overall clinical healing rate was 66.7% with 18 (33.3%) re-tears. Of the 18 repairs that failed, males, younger patients, and patients with lower IKDC were more likely to fail. When analyzed by type of repair, there was no difference in IKDC, healing rate or return to function.

Discussion and Conclusion: Successful arthroscopic meniscus repair depends on many factors including size of tear, location of tear, chronicity, status of anterior cruciate ligament (ACL), and repair technique. Based on our results, near similar healing rates, functional scores, and return to function occurred with the newer generation all-inside devices compared to inside-out or outside-in techniques in isolated meniscal tears.

Poster 16

The Expression Patterns of Collagen Isoforms in Posttraumatic Elbow Contracture Capsule

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Background: Posttraumatic elbow joint (EJ) contracture produces severe functional limitations on the performance of daily living after elbow injury, such as fractures and/or dislocation. Post-traumatic stiffness is one of the most frequent causes of this kind of contracture. However, despite the critical role it plays in the pathogenesis of EJ contracture, very little is known about the structural properties of the EJ contracture capsule. The type of collagen (notably I and III, facit collagens II, V, VI and X) and its organization in extracellular matrices plays a critical role in determining the properties (structural stiffness) of biological structures. In order to determine whether they were changes in the type of lesser collagen following trauma duration, between normal and contracted post-traumatic EJ capsules (n=8), we performed western blot analysis.

Hypothesis: We hypothesized that several facit collagens are expressed in response to capsular injury, other than the well documented collagens I and III.

Methods: We removed the anterior capsules of five post-traumatically injured and stiff patients' elbow joints, with two control anterior elbow capsular biopsies from non-injured, non-stiff patients undergoing therapeutic surgery for tennis elbow. Histological and western blot analysis was performed on the samples.

Results: The results indicated that type-I and type-III collagen levels as well as lesser collagens II, V, VI and X were detected notably in western blot analysis. All showed maximum expression around 4 months of trauma duration. After 4 months trauma, the levels of collagen type II, V and X were consistently weaker than collagen VI in the contracture specimens. Collagen VI showed consistent expression throughout the trauma duration from 1 to 18 months. The results demonstrate a relative down-regulation of collagen II, V and X, which progresses with higher time of contracture formation.

Discussion and Conclusion: There appears to be a specific, time-ordered collagen expression sequence, from the time of injury to a mature stable state. The results may be useful for definition of elbow contracture at the molecular level, with potential for therapeutic intervention. A more comprehensive study is necessary to better understand the sequential collagen response to traumatic joint injury. The expression of collagen isoforms in capsular injury is not documented well in the literature. Defining the relationship between collagens isoforms and contracture time may improve joint capsule healing.

Poster 17

The Educational Value of Common Orthopaedic In-Training Exam Review Sources

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Introduction: Comprehensive reviews are available to prepare for the Orthopaedic In-Training Exam (OITE). Enthusi-

asm has increased since one resource was reported to have 99% of the needed information for past OITE questions (Orthobullets –OB). OB performed better than the Miller Review of Orthopaedics (MRO) and the American Academy of Orthopaedic Surgery Comprehensive Orthopaedic Review (COR). We compared the performance of each resource related to recently published OITE questions (2012 exam).

Methods: Four residents independently reviewed each resource (OB, MRO, COR) for information related to each of the 259 items on the 2012 OITE. Reviewers determined whether resources provided sufficient detail to answer questions. To determine whether these resources could function as stand-alone study sources, prior orthopaedic knowledge was not assumed and no time limit was used. Determinations were made by consensus in cases of disagreement.

Results: OB provided material to answer 178/259 (68.7%), MRO 182/259 (70.3%) and COR 169/259 (65.3%) of 2012 OITE items. There was no statistical differences overall. In an analysis of item sub-sections (e.g. Basic Science, Foot/Ankle, etc), there were no significant differences between resources, though differences of up to 23% of correct answers were found (shoulder – OB 40%, Miller 73%, COR 60%).

Discussion and Conclusion: Overall, no resource out-performed another in providing information to answer novel OITE items. Furthermore, each source lacked data needed to answer 30-35% of included questions. There may be limits to the use of comprehensive reviews as primary educational resources and OITE study sources. Significant gaps in understanding may result if other sources including standard texts and journals are not used as the primary resource for orthopaedic education. It is the opinion of the authors that even though 70% of questions could be answered, this did not necessarily indicate that a thorough understanding of core concepts could be garnered from these sources.

Poster 18

Self-Perceived Severity of Illness and Hospital Expenditures in Arthroplasty

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Introduction: Patient perceived outcomes have been widely accepted as a quality standard in TJR. A number of different algorithms exist to classify the medical severity of illness

before surgery. The purpose of this study was to determine the association of self-perceived general health and hospital expenditures in patients who underwent primary TJR.

Methods: 763 consecutive TJR (621 patients) performed in a single institution by a single surgeon were studied. Patients were divided into two groups based on the results of a very simple preoperative self-assessment of general health. Hospital costs, Charlson score, ASA, patient perceived outcomes (QWB-7, WOMAC, and SF-36) were compared between groups. Chi-square and t-tests were used. A p-value of less than 0.01 was considered significant.

Results: Patients with poor or fair general health had significantly higher direct costs (\$14,917 vs. \$17,060), indirect costs (\$5,367 vs. \$6,306), and operating costs (\$20,285 vs. \$23,366) than patients who rated it good or excellent. Self-perceived poor or fair general health was associated with higher Charlson score (1.83 vs. 1.24) but it was not associated with higher ASA score. Patients in group 2 had significantly worse QWB-7 total (0.508 vs. 0.537); WOMAC total (60.6 vs. 52.6); and SF-36 physical component (23.5 vs. 27.7).

Discussion and Conclusion: In our study, self-perceived “Severity of Illness” was associated with higher resource consumption. Patients own perception of general health is a simple and useful tool that could be used to stratify the outcomes of interventions.

Poster 19

Intraoperative Proximal Femur Fracture with a Second-Generation Tapered Hip Stem

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Background: Proximally coated tapered-wedge stems are frequently used in primary total hip arthroplasty (THA). Recent investigations into the three-dimensional morphology of the proximal femur have been utilized for the development of a second-generation stem with tapers that better accommodate the native geometry to establish a bone-implant interface in multiple dimensions. Although intraoperative fracture of the proximal femur is an infrequent occurrence during primary THA, increased fit and fill with this stem design may incur an

increased risk of fracture during implantation. The purpose of this study was to investigate the incidence of intraoperative proximal femur fracture with a first- and second-generation proximally coated tapered-wedge femoral stem.

Materials and Methods: The medical records and postoperative radiographs of 344 THAs utilizing a first-generation stem and 369 THAs with a second-generation stem implanted between 1/5/2009 and 9/18/2012 were reviewed. Intraoperative fracture was determined by description in the operative report or by the presence of a non-prophylactic cerclage cable to prevent fracture propagation. Patient demographics and baseline characteristics were recorded, and the proximal femoral morphology was evaluated by the canal flare index (CFI).

Results: There were 166 males and 178 females who received a first-generation stem with average BMI 28.3 (range 16.8-45.5) and average age 63.0 (range 29-88). There were 190 males and 158 females who received a second-generation stem with average BMI 27.8 (range 16.1 – 47.5) and average age 62.3 years (range 39-87). There were 7 (2.03%, 95% CI 0.82-4.15) calcar fractures in the first-generation cohort with average CFI 3.31 (range 2.31-4.78) and 8 (2.17%, 95% CI 0.94-4.23) fractures in the second-generation cohort with average CFI 3.37 (range 2.5- 4.5). There was no statistical difference between groups.

Conclusion: Despite the increased geometric volume of a second-generation tapered-wedge femoral stem, there is not an increased incidence of fracture of the proximal femur during implantation.

Poster 20

Union Rates of First Tarsometatarsal Arthrodesis (Lapidus Procedure) Using Calcaneal Bone Graft

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Introduction: The Lapidus procedure allows for an effective correction of a hallux valgus deformity with stabilization of a hypermobile first ray. Current criticism of the Lapidus procedure is its published high rates of nonunion (4%-12%). Previous literature has not evaluated large cohorts of subjects or the effects of calcaneal bone graft as an adjuvant. Our study tested

the hypothesis that calcaneal bone graft and meticulous technique during the Lapidus procedure would decrease the potential drawback of nonunion.

Methods: A retrospective review was performed of patients undergoing a Lapidus procedure with calcaneal bone graft for hallux valgus deformity between January 2003 and January 2011 with a minimum of six months follow-up. All patients were aged 18-65 and had identical postoperative care and nonweightbearing protocols. IRB approval was obtained. Clinical determination of union was made through chart analysis. Radiographic determination of union was made by a foot and ankle attending uninvolved in the patient's surgical care.

Results: A total of 409 Lapidus procedures were reviewed revealing 193 patients who met inclusion criteria. There were 172 women and 21 men of average age 58.2 years old. Three clinical nonunions were discovered. Fifteen radiographic nonunions were identified. Clinical nonunion of a Lapidus fusion for hallux valgus was 1.5% and radiographic nonunion after a lapidus procedure was 7.7%.

Discussion and Conclusion: Our results indicate only a 1.5% rate of clinical nonunion. Radiographic evidence of nonunion was found in fifteen subjects, though 12 were asymptomatic and likely fibrous unions. Weaknesses in this study include the lack of a CT scan for radiographic nonunions and lack of contact of these subjects to evaluate current status of symptoms. Strength is the large cohort number. We believe careful technique ensuring proper preparation of fusion surfaces and the addition of calcaneal bone graft provide encourages fusion site healing.

Poster 21

Reliability of Templating with Patient-Specific Total Knee Arthroplasty

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Introduction: MRI- or CT-based patient-specific instrumentation (PSI) for total knee arthroplasty (TKA) may result in reliable alignment when compared to conventional instrumen-

tation. However, some authors have suggested that frequent intra-operative changes may still be necessary. This study evaluated the accuracy of PSI templating to predict component size and alignment during TKA.

Methods: Eighty-nine knees in 84 patients who underwent TKA using a PSI system were evaluated. An MRI-based pre-operative plan of every knee was developed for and approved by the surgeons. Each plan demonstrated the proposed alignment, size, and position of the femoral, tibial, and polyethylene components. Intra-operative changes to these components were recorded. Major changes were defined as any modification in size or position of the femoral or tibial component, as well as any adjustment in bone resection. Minor changes were defined as any modification of the polyethylene bearing size.

Results: The pre-operative plan was able to correctly predict the size of the implanted tibial and femoral component in 93% and 95.5% of the knees, respectively. Thirteen major intra-operative changes were made. In one knee, the proposed femoral resection was not acceptable, due to the presence of large osteophytes, so a manual cutting guide was utilized. In another patient, the predetermined femoral and tibial component sizes were increased. Two knees required downsizing of the femoral components, five knees required changing of the tibial component size, and three knees required repositioning of the tibial component. There were 16 minor changes, including a 2 mm upsizing of the polyethylene component in 13 knees and a 4 mm increase in 3 knees.

Discussion and Conclusion: Although surgical experience is necessary to identify any potential modifications, the use of templating with patient-specific instrumentation resulted in excellent intra-operative concordance with the pre-operative plan.

Poster 22

Long-Term Quality of Total Knee Arthroplasty in Young and Active Patients Using Extension First Gap Balancing Technique

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Introduction: Proper component orientation and soft tissue balancing are essential for longevity of total knee arthroplasty

(TKA), especially in young and active patients. The aim of this study was to evaluate long-term results and quality of TKA in young and active patients with parallel to the tibial cut technique gap balancing, extension gap first, in 2 Posterior-Stabilized (PS) total knee designs with identical femoral component.

Methods: 43 consecutive Rotating-Platform (RP-PS, 33 patients) and 38 Fixed-Bearing (FB-PS, 29 patients) with University of California Los Angeles (UCLA) activity score of 5 or above and mean age was 56 ± 4.5 years were followed prospectively for a minimum of 10 years. 18 random TKAs were analyzed for component rotation using MRI.

Results: The majority of patients (77%, 24 patients in RP-PS and 65%, 25 patients in FB-PS) were still participating in recreational activities at final follow-up. There was no case of early or late mid flexion instability causing spinout. There was no malalignment, patellofemoral maltracking, aseptic loosening or osteolysis at final follow-up. Non-progressive radiolucency was seen at the tibial zone 1 in one of the RP-PS and 3 of the FB-PS knees. The mean femoral rotation was 2 and 3 degrees of external in relation to the transepicondylar axis in RP-PS and in FB-PS, respectively. Two patients in the FB-PS were revised (one for per-prosthetic fracture and one for osteolysis and loosening). Kaplan-Meier survivorship at 10 years for wear related revision was 100% and 97% in RP-PS and in FB-PS, respectively.

Discussion and Conclusion: Extension first gap balancing technique is a safe, accurate, and reproducible with excellent alignment and long-term durability and high quality of function in young, active patients.

Poster 23

Distal Interphalangeal Joint Bony Dimensions and Headless Compression Screw Sizes: A Mismatch

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Introduction: Currently available headless compression screws may be oversized for use in distal interphalangeal joint (DIPJ) arthrodesis. To our knowledge this is the only study

which compares calibrated measurements of the bony anatomy about the DIPJ to commercially available headless compression screw implants.

Methods: Standard PA and lateral radiographs of the hand were obtained in 78 patients, corrected for magnification, and analyzed using digital imaging software. After the exclusion of poor quality radiographs, measurements of the anatomic dimensions of the distal and middle phalanges were performed in 56 small fingers, 56 ring fingers, 46 long fingers, and 46 index fingers. These dimensions were then compared to the diameters and lengths of several commercially available headless compression screws commonly used to perform DIPJ arthrodesis.

Results: Interobserver reliability analysis revealed excellent bony measurement correlation between observers. Overall, commercially available screw diameters overestimated the bony dimensions of the DIPJ. When all fixation devices were combined, screws were oversized relative to the bony anatomy in 72% of small fingers, 49% of ring fingers, 52% of long fingers, and 65% of index fingers. This mismatch was worse in women compared to men. For the small finger, only one compression screw implant demonstrated a compatibility rate greater than 90%.

Conclusion: 1. A significant size mismatch exists between the anatomic dimensions of the middle and distal phalanges and commercially available headless compression screws. 2. This mismatch was greater in the small finger and in women. 3. Caution must be used when considering these screws for DIPJ arthrodesis to avoid problems related to screw prominence in the narrow aspects of the distal and middle phalange

Poster 24

Corrosion and Fretting of Modular Taper Junctions in Total Hip Arthroplasty

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Introduction: In Total Hip Replacement (THR), it has been documented that Metal-on-Metal (MoM) articulations have three times the failure rate of Metal-on-Polyethylene (MoP) components. Moreover, it has been suggested that this observation is related to fretting and release of corrosion products at the head taper junction. This study tested the hypothesis that (i) MoM implants exhibit higher rates of corrosion and

fretting than MoP implants, and that (ii) the severity of corrosion and fretting is greater in components of larger head diameter.

Methods: Our study included 41 MoM and 49 MoP implants (with modular head diameter >32mm) retrieved from revision hip arthroplasty. Taper surfaces were examined and scored for both corrosion (using modified Goldberg scoring system) and fretting (using standard Goldberg scoring system).

Results: Overall, there was no difference between the severity of corrosion or fretting damage of the femoral head taper surface, or fretting of the stem trunnions of the implants examined as a function of (i) MoM vs MoP articulation, or (ii) head size. However, corrosion damage of the trunnions did vary with the type of articulation, and with head size. MoP trunnions were found to have significantly more corrosion damage at head diameters greater than 40mm.

Discussion and Conclusion: This result contradicts our first hypothesis above, regarding articulation types. Conversely, the finding that trunnion corrosion correlates with head size alone supports the second hypothesis. These results are preliminary, and further research is needed. Future investigation may include a chart review to gather, for each implant, the indications for revision, length of time in-vivo, and manufacturer. It may also be worthwhile to investigate third-body abrasion as a possible source of friction.

Poster 25

Comparison of Acute Care Cost for Patients 65 Years or Older Who Underwent Total Knee Arthroplasty

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Introduction: Total knee arthroplasty (TKA) makes up a majority of surgical patients in US who require rehabilitation beyond the acute care hospital. Post-acute care can be provided in a multitude of settings including skilled nursing facilities (SNF). To qualify for a SNF under Medicare,

patients must stay 3 days in an acute care hospital. Patients over 65 years may have additional, non-Medicare health insurance coverage as their primary insurance; these patients are not subject to the 3-day rule and can be discharged from the hospital to SNF no matter the acute care length of stay (LOS). This study compares LOS and cost per day based on primary medical insurance coverage among patients 65 years or older referred to a SNF for rehabilitation after TKA.

Methods: A retrospective electronic file review was conducted for patients (n=938) discharged to a SNF in 2010 and 2011.

Results: Differences in acute care LOS and cost between Medicare and non-Medicare primary insurance groups both approached significance. Combined acute care and SNF LOS was significantly higher for the Medicare group. A linear regression model of age, gender, and type of insurance found that age was the sole significant factor in acute care cost.

Discussion and Conclusion: Results suggest the Medicare 3-day rule may not be necessary or cost effective for an orthopedic patient population. A randomized, prospective study of these two groups is recommended in the future.

Poster 26

Compliance with AAOS Clinical Practice Guidelines: An Analysis of ASES Members

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Introduction: The American Academy of Orthopaedic Surgeons (AAOS) has developed clinical practice guidelines (CPGs) involving upper extremity conditions, but the compliance with these recommendations is unknown.

Methods: An online survey was sent to 340 members of the ASES containing 40 questions relating to the 2 existing AAOS CPGs pertaining specifically to the shoulder: Optimizing the Management of Rotator Cuff (RTC) Problems and the Treatment of Glenohumeral Joint Arthritis (GHA).

Results: Overall, 98 responses were obtained (29% response rate). A majority (>50%) of surgeons agreed with 17 of the 19 (out of 47) of the AAOS recommendations that

were not inconclusive. There were 4 consensus recommendations and the majority of shoulder surgeons agreed with them: 80.4% of surgeons do not offer patients surgery for full thickness RTC tears in the absence of symptoms, 69.4% use cold therapy routinely after RTC repair, 79.3% do not believe that an anatomic total shoulder arthroplasty is a treatment option for patients with GHA and an irreparable RTC tear, and 77.8% use mechanical and/or chemical venous thromboembolism prophylaxis after TSA. There were 5 moderate recommendations and the majority of surgeons agree with 4 of them. Only 46.9% of surgeons discuss Worker's Compensation status as correlating with a less favorable outcome after RTC repair. There were 10 weak recommendations and the majority of surgeons agree with 9 of them. Only 26.7% of surgeons use injectable visco-supplementation to treat GHA. Other interesting findings were that 40.8% of surgeons allow patients to take non-steroidal anti-inflammatories (NSAIDs) immediately after RTC repair, 73.1% of surgeons will treat GHA arthroscopically, and 74.4% of surgeons use uncemented humeral fixation almost exclusively.

Conclusion: Despite the majority of the AAOS CPG recommendations for RTC problems and GHA being inconclusive, most surgeons agree with the CPG recommendations that the AAOS was able to make.

Poster 27

Unicompartmental Knee Replacement in the ACL-Deficient, Arthritic Knee

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Introduction: Management of medial unicompartment knee osteoarthritis (OA) in an anterior cruciate ligament-(ACL) deficient knee has remained a topic of controversy with arthritis in lateral compartment of ACL-deficient knee often being considered an absolute contraindication for unicompartmental knee arthroplasty (UKA). Recent advances in surgical technique and prosthesis design have made UKA a viable treatment option. The purpose of this study was to assess outcomes of UKA in the ACL-deficient population.

Methods: Patients with single compartment OA and ACL-deficiency that underwent fixed-bearing UKA by a single orthopaedic surgeon were matched for age, gender, surgery leg and compartment with patients who had a UKA in an

ACL-intact knee. Physical examination included complete history, 3-foot standing films, and MRI preoperatively and at yearly postoperative intervals. Outcome measures included Tegner, Lysholm, and HSS scores, patient satisfaction, and knee flexion and extension range of motion. Data were analyzed using independent samples t-test with significance level of 0.05.

Results: Ten patients in each group were available for average 3.2 year follow-up (max 8 years). The ACL-deficient and ACL-intact groups performed similarly on all outcome measures with mean postoperative Lysholm 94.5±9.1, Tegner (4.2±1.8), HSS 95.6±5.4, patient satisfaction 9.6±0.82, flexion ROM 130±9, and extension ROM 0.2±0.7.

Discussion and Conclusion: Most surgeons consider the ACL-deficient knee an absolute contraindication for UKA. These preliminary data suggest that UKA is a viable option for the patient that would like to return to an active lifestyle including activities such as skiing and karate. We believe proper patient selection and education are the keys to success with this procedure. New surgical techniques have arisen which may prove to be successful over time; however, long term follow-up is still required before it can be determined what and who has all the answers.

Poster 28

Impaired Neurocognitive Performance in Professional Lacrosse Players

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Introduction: Baseline neurocognitive performance can aid decision making in post-concussion recovery and return-to-play for athletes sustaining sports-related concussions. The purpose of this study was to present baseline neurocognitive performance for Major League Lacrosse (MLL) players and to determine if differences exist between athletes with and without a prior history of concussion.

Methods: We conducted a retrospective review of Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT®) scores from MLL players who completed baseline testing from June 2010 to June 2011. Inclusion required a valid baseline test and no history of concussion in the last 3 months. Mean ± standard deviation age of athletes was 25.1±3.0 years. Independent samples t-tests were used to determine differences between athletes with and without a

prior history of concussion. All testing was required for any athlete to participate in the 2011 season.

Results: Valid baseline ImPACT® testing was available for 235 MLL athletes. The verbal memory average was 85.6% (9.9), visual memory was 74.5% (13.4), and visual motor/processing speed was 38.6 (6.4). MLL athletes with a prior history of concussion had lower ImPACT® composite scores than those without a history of concussion although only Verbal Memory Composite was found to be statistically significant ($p=0.008$).

Discussion and Conclusion: There is mounting evidence that head trauma is a risk factor for various forms of neurodegenerative diseases that present later in life including Alzheimers, Chronic Traumatic Encephalopathy, ALS, and Parkinson Disease. The need to prevent progressive disease processes and the second impact syndrome due to repeat injury is essential. This study establishes baseline ImPACT® scores for MLL. These data can serve as normative values for subsequent testing following injury to assess neurocognitive recovery. It is the intention and hope that ImPACT and similar neurocognitive post-injury tests can confirm recovery rather than predict it.

Poster 29

Aspirin Just May Be Enough: Prevention of Venous Thromboembolic Events Following Femoroacetabular Osteoplasty

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Introduction: As hip-preservation surgery is performed in a particularly young and active group of patients, the knowledge accrued in the field of hip arthroplasty and hip fractures regarding postoperative thromboprophylaxis cannot be extrapolated to this patient population. Recommendations based on the evidence for each particular surgical procedure and population is desirable. For these reasons, the purpose of our study is to describe the rate of clinically relevant venous thromboembolism (VTE) and anticoagulation-related complications observed in patients undergoing hip-preservation surgery through mini-open femoroacetabular osteoplasty (FAO) with a formal protocol of postoperative thromboprophylaxis using aspirin.

Methods: A prospective case series of 407 consecutive procedures (375 patients, mean age 34.5 ± 11.1 years old [range, 15 to 62]) undergoing FAO were followed 6 weeks postoperatively to document the presence of clinically relevant VTE as well as major bleeding, as defined by the most recent American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. All patients were given aspirin 325mg PO daily for two to 4 weeks.

Results: There was one case of distal DVT in a 31 years-old male with no specific risk factors. No cases of pulmonary embolism were observed. No events major bleeding or reoperations due to postsurgical hematoma were presented. There were no deaths. The crude incidence of clinically relevant VTE was 1 per 407 procedures (0.25%).

Discussion and Conclusion: Aspirin is a safe and effective modality to provide thromboprophylaxis in patients undergoing hip-preservation surgery. The rate of VTE that we observed is thus far, the lowest when compared to other published series of hip preservation surgery that specifically focused on this complication.

Poster 30

Risk Factors for a Delay in Diagnosis of Vertebral Osteomyelitis

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Introduction: The purpose of this study was to identify clear risk factors for a delay in diagnosis for vertebral osteomyelitis.

Methods: A retrospective review of 920 patients who had spinal osteomyelitis from 2001 to 2011 from one institution was performed. Inclusion criteria included appropriate initial imaging, lab results, and no treatment done prior to admission. A delay of diagnosis was defined as greater than 8 weeks from first ER visit to diagnosis.

Results: One-hundred six patients met the inclusion criteria: 62 men (58%), 44 women (42%), mean age 54 yrs.. The risk factors for delay in diagnosis were HIV (Odd's ratio, OR: 2.0, $n = 14$), hepatitis C (OR: 2.06, $n = 26$), intravenous drug abuse (IVDA, OR 2.11, $n = 36$), and tuberculosis (TB, OR: 2.75, $n = 25$). In patients with a delayed diagnosis, the mean time to

diagnosis was 2.3 months ($SD \pm 2.4$). The early diagnosis cohort (ED) tended to clear the infection more often than the delayed diagnosis cohort (DD) and trended toward significance [OR 2.6, 95% CI: 0.96 to 7.07, $p = 0.057$]. The Oswestry scores from initial presentation to final follow-up respectively: ED= 62.9 ($SD \pm 16.9$) and 49.2 ($SD \pm 14.8$), DD= 67.4 ($SD \pm 18$) and 45.2 ($SD \pm 21$). The mean cost of hospital admission was less in the ED group (\$158,294) compared to DD group (\$190,286).

Conclusion: Risk factors for a delay in diagnosis for vertebral osteomyelitis are HIV, hepatitis C, IVDA, and TB. An increased level of suspicion for vertebral osteomyelitis is need in these populations. These cases of delayed diagnosis progressed to chronic osteomyelitis that was refractory to non-operative care and accrued higher hospital costs, however long-term improvement in Oswestry scores was not affected by a delayed diagnosis.

Poster 31

Osteoporosis Affects Vertebral Collapse with Osteomyelitis of the Spine

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Introduction: The purpose of the study is to evaluate of the outcomes of mechanically unstable vertebral osteomyelitis.

Methods: A retrospective review of 920 spinal osteomyelitis cases from 2001-2010 from one institution was performed. Inclusion criteria included appropriate initial imaging, lab results, and no treatment done prior to admission. Chi-squared statistic, Fisher's exact, and single sample t tests were used to examine the data. Mechanically instability was determined by 3 spine surgeons' evaluation of the imaging studies: severe anterior column collapse or segmental kyphosis.

Results: One-hundred six patients meet the inclusion criteria specifically for the management of spinal osteomyelitis: 62 men (58%), 44 women (42%), mean age 54 years. There were 74 mechanically stable cases (MS), 23 mechanically unstable ones (MU), and 9 indeterminate cases. Significant differences between the MS and MU groups were seen with age, Charlson comorbidity index, and clearance of the osteomyelitis. Mean age = 52.5 years MS vs. 60.5 years MU. The

MU group had higher Charlston comorbidity index scores (4.2 vs. 2.9 points). The rate osteomyelitis cleared was higher in the MS (74%, n=55) than the MU group (43%, n=10) [OR 3.5, p=0.01]. The MU group had a higher mortality rate (directly related to the osteomyelitis) compared to the MS group (17% vs. 7%), which trended toward statistical significance [p=0.2]. Oswestry scores from initial presentation to final follow-up were similar between MS and MU groups. The mean cost of hospital admission for MS and MU were \$237,675 and \$261,032, respectively. The rates of cord compression and neurologic deficits were similar between the two groups.

Conclusion: Patients with mechanically unstable vertebral osteomyelitis were older with more medical comorbidities. It appears that osteoporosis affects the level of vertebral collapse in osteomyelitis. Lastly, patients with mechanical unstable vertebral osteomyelitis have higher mortality rates and increased hospital costs.

Poster 32

Blood Transfusion Increases Mortality Following Total Joint Arthroplasty: A Population Based Study

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Background: The adverse consequences of blood transfusion is well known. Various blood conservation strategies have been employed to reduce rate of allogenic blood transfusion following total joint arthroplasty (TJA). This population based study was conducted to determine the factors that resulted in an increase in blood transfusion following TJA and also determine the effect of transfusion on mortality.

Methods: The Nationwide Inpatient Sample (NIS) from 1993 to 2010 was the source of data for this study. The ICD-9 diagnosis and procedure codes were used to identify elective TJA and any type of blood conservation strategy such as intraoperative blood salvage, autologous blood transfusion (collected preoperatively) or postoperative transfusion using packed red cell (PRC). Multivariate analysis was performed to determine predictors of PRC transfusion and effect of PRC transfusion on in-hospital mortality following TJA.

Results: A total of 2,021,688 elective TJA were identified. Of these cases, 410,214 (20.3%) needed at least one type of transfusion and in 258,127 cases (12.8%), PRC was transfused. Logistic regression confirmed that the use of PRC increased in all types of TJA over the period at a rate of approximately 5.5% per year. Bilateral patients generally had the highest rates of transfusion (35.8% versus 23.1% for unilateral or 19.2% for revision). Female gender, African-American race, and increased comorbidities were identified to be risk factors for PRC transfusion. A total of 3,042 (0.2%) intra-hospital deaths were recorded, among whom 687 (26.0%) had received PRC. Using multivariate analysis, PRC was independently associated with in-hospital mortality following elective TJA (Odds ratio: 1.65; 95% CI 1.49-1.83).

Discussion: The present study indicated that in spite of introducing blood conservation strategies, the rate of PRC transfusion following TJA has increased over the last decade. Our study also indicated that PRC transfusion is associated with an increased risk of in-hospital mortality following TJA, even when controlling for patient factors such as comorbidities and age.

Poster 33

Surgical Treatment of Navicular Stress Fractures with Bone Graft and Biological Adjunct

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Introduction: There is persistent debate over treatment for navicular stress fractures (NSF), with emphasis on return to activity. But there is little data specifically regarding internal fixation with supplementary cancellous autograft and/or biological adjuncts. The objective of this study was to evaluate NSFs treated with internal fixation and an adjuvant and compare results with previously reported outcomes. Our hypothesis was that internal fixation with autograft and/or biological adjuncts would increase union rate.

Methods: Patient charts, radiographs, and CT scans were retrospectively reviewed. All patients underwent internal fixation combined with either cancellous autograft, bone marrow aspirate concentrate (BMAC), cancellous autograft plus

BMAC, or allograft plus BMAC or cancellous autograft. Data included presence of bony union and return to weight bearing.

Results: 21 cases met inclusion criteria. Average age was 37 years, 72.7% were female, and average follow-up was 17.3 months. 18 (85.7%) fractures united. Return to weight bearing was 2.2 ± 1.1 months. Union was achieved in all three fractures treated with allograft plus BMAC or autograft, six of seven (85.7%) with autograft alone, five of six (83.3%) with BMAC and autograft, and four of five (80%) with BMAC alone.

Conclusion: This is the largest NSF series and union rates were comparable to those previously published. Combining our results with those previously reported using graft and fixation indicated union in 43 of 49 cases (87.7%). This rate was higher than previously reported rates treated with ossicle excision, graft, or fixation alone (73.8%) and when all surgical treatments are grouped together (82%). Return time to weight bearing was decreased but addition of cancellous autograft or biological adjuncts did not improve union rates as expected. The central third of the navicular is relatively avascular and sustains large shear forces, thus, future research should focus on neovascularization and defining factors leading to union.

Poster 34

The Effect of the Medicare Physician Quality Reporting Initiative on Bone Density Screening

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Introduction: Osteoporosis screening is an expanding role for the orthopaedic surgeon as orthopaedists treat large numbers of patients with fragility fractures. Orthopaedic surgeons must include osteoporosis screening and treatment as part of their daily practice and the Physician Quality Reporting Initiative (PQRI) is a Medicare driven program to promote screening and treatment. The goal of this study is to determine if PQRI implementation in a private orthopaedic practice would increase bone density screening (DXA) and treatment.

Methods: All female patients 65 or older and all male patients 70 years or older were eligible for DXA screening between

March 2010 and December 2011. In March 2011, a standardized PQRI osteoporosis screening protocol was initiated to promote DXA screening. All eligible patients were screened with a standardized PQRI questionnaire regarding DXA history. A DXA was scheduled for all positively screened patients. Osteoporotic patients were referred to their internist or endocrinologist for medical management. Patient compliance with calcium, vitamin D, bisphosphonate or teriparatide use was determined via follow-up phone calls. Outcomes were compared between groups using Chi-Square and Fisher's exact test.

Results: For the 10 months of March through December 2010, a total of 96 patients had DXA scans. For the corresponding months in 2011, there was a statistically significant 3-fold increase in DXA screening after PQRI institution. Post-PQRI, 185 patients with osteoporosis or osteopenia were identified compared with 64 patients in 2010 prior to PQRI implementation. Despite referral to an internist or endocrinologist, fewer than 50% of patients were compliant with treatment.

Discussion and Conclusion: PQRI implementation aided in the recognition of osteoporotic patients through increased bone density testing however the designation of another physician to manage the disease resulted in poor compliance with treatment. Factors regarding poor patient compliance with osteoporosis treatment need to be investigated.

Poster 35

Genome-Wide Linkage Analysis and Whole Exome Sequencing in a Large Multi-Generation Family Reveal Deleterious Mutations in Severely Affected Individuals with Developmental Dysplasia of the Hip

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Introduction: Developmental Dysplasia of the Hip (DDH) is characterized by incomplete formation of the acetabulum, suboptimal joint function, and accelerated wear of the articular cartilage resulting in arthritis. DDH affects 1 in 1000 newborns in the United States with well defined "pockets" of high prevalence in Japan, Italy and other Mediterranean countries. Although reasonably accurate for detecting gross forms of hip dysplasia, existing techniques fail to find milder forms of dys-

plasia. Undetected hip dysplasia is the leading cause of osteoarthritis of the hip in young individuals causing over 40% of cases in this age group.

Methods: A 72 member, four generation affected family has been recruited, DNA from its members retrieved. Genome-wide linkage analysis and whole exome sequencing were performed.

Results: Linkage analysis revealed a 2.61 Mb candidate region (38.7-41.31 Mb from the p term of chromosome 3) co-inherited by all affected members with a maximum LOD score of 3.31. Whole exome sequencing and analysis of this candidate region in four severely affected family members revealed one shared variant, rs3732378, which causes a threonine (polar) to methionine (non-polar) alteration at position 280 in the trans-membrane domain of CX3CR1. This variant was validated in all affected members of the family and obligate heterozygotes. Other possibly deleterious mutations shared by 4 severely affected members were found.

Discussion and Conclusion: This CX3CR1 variant is predicted to have a deleterious effect on its encoded protein which functions as a receptor for the ligand fractalkine. CX3CR1 mediates cellular adhesive and migratory functions and is known to be expressed in mesenchymal stem cells destined to become chondrocytes. A genetic risk factor that is very likely to be among the etiologic factors for the family in this study has been identified, laying the foundation for a predictive genetic test for newborns.

Poster 36

Outcomes of Anconeus Interposition for Proximal Radioulnar Synostosis

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Introduction: Proximal radioulnar synostosis following elbow injuries can produce debilitating contractures. The range of motion required for performing many activities of daily living is 100 degrees of elbow flexion, along with 50 degrees of both pronation and supination. We hypothesized that excision of heterotopic bone and anconeus flap interposition could restore functional motion in patients with proximal radioulnar synostosis.

Methods: A retrospective database review from 1997 to 2011 was performed to identify patients treated for proximal radioulnar synostoses. Patients were subdivided into two main categories based on etiology; following biceps tendon repair or repair of complex proximal forearm trauma. All patients underwent an excision of the synostosis through a posterior approach with interposition of an anconeus flap. Minimum clinical follow-up of 12 months was required for inclusion. Student's t-test was utilized to compare mean motion pre- and post-operatively.

Results: Thirty patients (20 male, 10 female) were included with a mean age of 46 years and mean clinical follow-up of 27 months. Significant increases in elbow motion included the flexion arc improving from 25 to 126 degrees, pronation increasing from 15 to 64 degrees, and supination from 10 to 63 degrees. Patients with biceps tendon rupture (n=11) had greater improvements than those with a traumatic etiology (n=19). Complications were all in the trauma subset and included hematoma requiring re-operation (n=2) and continued stiffness requiring a manipulation under anesthesia (n=1).

Conclusion: Anconeus interposition flap for management of proximal radioulnar synostosis produces significant and reliable clinical improvement in elbow flexion, pronation and supination. Patients with biceps tendon rupture etiology had a trend towards greater motion improvements than those with a traumatic etiology, while having a lower incidence of complications. The degree of improvement seen would provide near full restoration of functional motion and minimal limitations in activities of daily living.

Poster 37

The Effects of ASA Class on THA Patient Readmission Rates in an Academic Hospital

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Introduction: Total hip arthroplasty (THA) is a common surgical procedure with an aggregate cost of over \$12 billion per year in the United States. Despite the increasing cost of caring for THA patients, little research has focused on the effect of

American Society of Anesthesiologists (ASA) class on readmission rate in this patient population.

Methods: Retrospective data for all THA patients discharged between July 2011 through November 2012 was collected from a single academic hospital. The data was analyzed to assess ASA status and thirty-day readmission rates.

Results: Of the 229 patients discharged over a 17-month period of time with an ASA score of 2, only four (1.7%) were readmitted. In contrast, of the 270 patients with an ASA score of 3, thirteen (4.8%) were readmitted within 30 days. The average readmission rate for all 595 patients, regardless of ASA score, was 2.9% (17 patients). Thus, patients with an ASA score of 3 have a statistically significantly higher rate of readmission (2.9 times) than patients with an ASA score of 2.

Discussion and Conclusion: THA patients with an ASA score of 3 have a statistically significantly increased risk (4.8% versus 1.7%) of readmission compared to those patients with an ASA score of 2. ASA score may serve as a tool to more easily identify patients that are at an increased risk of readmission following THA.

Poster 38

Synovial Chondromatosis of the Pes Anserine Bursa Secondary to an Underlying Osteochondroma: A Case Report

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Introduction: Osteochondromas are common benign bone tumors. Synovial chondromatosis is a benign cartilaginous metaplasia that occurs in synovium. We describe a unique case of synovial chondromatosis developing in the pes anserine bursa secondary to repeated trauma from an underlying osteochondroma of the proximal medial tibia. It is unique to see both these processes occurring simultaneously in one location.

Methods: A 17-year-old male presented with a painless mass in the medial aspect of his right leg. On exam there was a mobile mass that protrudes from the medial aspect of the proximal tibia. Initial imaging of the right leg showed a cartilaginous appearing lesion arising from the tibia and sharing a cortex, and several distinct additional cartilaginous masses in the pes anserine bursa. After 16 months of observation, the

patient began having increasing pain in the region of the lesion. On exam the mass appeared larger than previous examination. Imaging during the follow-up visit again showed the tibial mass and overlying cartilaginous lesions. The patient underwent surgery for excision of synovial chondromatosis of the right pes anserine bursa and osteochondroma of the proximal right tibia.

Results: Post operatively the patient had complete resolution of symptoms and regained full range of motion of the knee. He was able to return to full activities including walking and running.

Conclusion: Osteochondromas are common benign bone tumors. Synovial chondromatosis is a benign synovial metaplastic cartilaginous proliferation that occurs primarily in joints, but can occur in any synovial-lined space. In this case report, we describe a unique occurrence of both of these lesions simultaneously. The treatment was excision of osteochondroma and resection of the chondromatosis lesions, which resulted in an excellent outcome.

Poster 39

Sexual Function Is Impaired Following Common Orthopaedic Trauma

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Introduction: The purpose of this study was to investigate the incidence and longitudinal improvement of patient reported sexual dysfunction following five common orthopaedic traumatic conditions. To our knowledge no study has examined sexual dysfunction following non-pelvic orthopaedic trauma.

Methods: 1,359 orthopaedic trauma patients were identified following five different orthopaedic fracture conditions. The functional status of patients with 4 acute traumatic conditions: proximal humerus fractures (n=127), distal radius fractures (n=391), tibial plateau fractures (n=135) and ankle fractures (n=434), as well as chronic long bone fracture nonunions (n=272), were followed with validated functional outcome measures at three, six, and twelve months post-treatment. Patient reported sexual dysfunction scores, acquired prospec-

tively from validated functional outcome surveys, were compared to overall functional outcome scores and demographic information for both men and women.

Results: Sexual dysfunction at three months follow-up was reported in 43% of tibial plateau patients, 30% of proximal humerus fracture patients, 29% of distal radius fracture patients, 11% of ankle fracture patients, and 26% of long bone nonunions. By six months, greater than 80% of patients in all five fracture groups returned to baseline sexual activity levels. Women reported a significantly higher degree of sexual dysfunction than men at three months ($p=0.02$) and six months follow-up ($p=0.01$). While sexual dysfunction is highly correlated to functionality, women reported equivalent or better overall functional statuses than men at all intervals.

Discussion and Conclusion: In the first three months following treatment of acute and chronic orthopaedic trauma conditions, a considerable number of patients experience sexual dysfunction. Women have a higher degree of postoperative sexual dysfunction than men, and functional status alone does not account for the gender disparity in postoperative sexual dysfunction. The results of this study should allow orthopaedic trauma surgeons to counsel patients regarding expectations of sexual function following traumatic orthopaedic conditions.

Poster 40

The Effect of Liquid Versus Dough Phase Cementation on Cement Penetration in the Tibial Component in Total Knee Arthroplasty

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Introduction: Aseptic tibial loosening is an important complication in modern total knee arthroplasty (TKA). We retrospectively reviewed patients undergoing primary TKA to determine whether dough phase cement versus early (often liquid) phase cement is associated with improved cement penetration.

Methods: In response to an increased rate of aseptic tibial loosening, an experienced orthopedic surgeon practicing at a single institution changed from using early phase cement to late phase cement in primary TKA. The 50 consecutive TKA

cases before and the 50 consecutive TKA cases after the switch in cementation technique were reviewed for cement penetration on routine post-operative radiographs across anterior-posterior (AP) zones 1 to 4 and lateral zones 1 to 2. A penetration depth of 3 mm was defined as acceptable. Groups were compared using generalized linear mixed models.

Results: Late phase cementation was associated with deeper cement penetration compared to early phase by the following amounts (1.34mm in AP zone 1, 1.19mm in AP zone 2, 0.90mm in AP zone 3, 0.56mm in AP zone 4, 1.02mm in lateral zone 1, and 0.86mm in lateral zone 2). Dough phase cementation also more commonly achieved acceptable penetration depth compared to early phase (69% vs. 37% in AP zone 1, 97% vs. 84% in AP zone 2; 97% vs. 86% in AP zone 3, 94% vs. 84% in AP zone 4, 92% vs. 53% in lateral zone 1, and 89% vs. 70% in lateral zone 2).

Discussion and Conclusion: We found increased cement penetration in all 6 zones using dough phase cement. Cement penetration has been correlated with increased strength of the cement-bone interface. Though further study is needed to more completely define the optimal method of cement preparation, we would caution against the routine use of cement in early (liquid) phase for primary TKA.

Poster 41

Positive Culture from the Liquid Medium Only After Total Joint Arthroplasty: Is It Reliable?

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Background: During revision total joint arthroplasty (TJA), infection may be the root cause for implant failure or pain. Therefore, routine intraoperative cultures are obtained. Culture results may not be finalized for several days after surgery and have a significant impact on the postoperative care for these patients. Typically, if a positive culture is obtained, long-term intravenous antibiotics are started. However, when cultures are analyzed, a portion of the specimen is treated in a broth or liquid medium prior to being applied to the agar medium. This technique may subject the specimen to contamination. We sought to determine the reliability of positive cul-

tures from only the broth or liquid medium after revision TJA.

Methods: A single-institution retrospective chart review was performed on 257 consecutive revision TJA cases from 2009 through 2010. 190 (74%) of cases had cultures for review. All culture results, as well as treatment, if any, were recorded and patients were followed for a minimum of one year for evidence of periprosthetic joint infection. Cultures were measured as positive, positive broth-only, or negative.

Results: Positive broth-only cultures occurred in 22 cases (11.6%). The most common organism identified was coagulase-negative staphylococcus (CNS) in 14 (64%) of these cases. Only 2 of the 22 cases (9.1%) developed a clinical infection requiring additional surgery. Interestingly, one of the true positive cultures grew a different organism (*E. coli*) at the time of irrigation and debridement than what was identified from the positive broth-only specimen at the index procedure (CNS). The sensitivity, specificity, positive predictive value, and negative predictive value were 20%, 87%, 9%, and 94%, respectively.

Conclusion: A positive culture from only the broth (liquid medium) obtained during revision TJA is a poor indicator of actual periprosthetic infection. Thus, it may not be necessary to subject these patients to antibiotic therapy.

Poster 42

Hindfoot Arthroscopy for Posterior Ankle Impingement: A Systematic Surgical Approach and Case Series

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Background: Hindfoot arthroscopy has been described as a minimally invasive surgical treatment for posterior ankle impingement syndrome. The current article describes a systematic approach for identifying relevant hindfoot structures as well as the clinical results of a case series. Purpose: To present a structured systematic surgical approach for identifying relevant anatomical structures and pathology during hindfoot arthroscopy. In addition, we report the clinical results of a case series.

Methods: The systematic surgical approach divides the extra-articular structures of the hindfoot into quadrants as defined by the intermalleolar ligament. Twenty-two patients underwent hindfoot arthroscopy for the treatment of posterior ankle impingement syndrome. The mean follow-up time was 25 months (range, 14 – 35 months). Standard patient reported outcome questionnaires, FAOS and SF-12, were administered at standard time points after surgery. Return to sporting activities was also calculated as the time period from the date of surgery until the patient was able to participate at their previous level of activity.

Results: The mean FAOS score improved from 59 points (range 22 – 94) preoperatively to 86 points (range 47 – 100) postoperatively. The mean SF-12 scores showed similar improvement with a mean of 66 points (range 42 – 96) preoperatively to 86 points (range 56 – 98) postoperatively. 19 patients reported competing at some level of athletic sport prior to surgery. All patients returned to their previous level of competition after surgery. The mean time to return to sporting activities was 12 weeks (range 6 – 16 weeks). Two complications were reported post-operatively; one wound infection and one case of dyesthesia of the deep peroneal nerve.

Conclusion: Hindfoot arthroscopy is a safe and effective treatment strategy for posterior ankle impingement syndrome. In addition, it allows the patients a rapid return to sporting activities.

Poster 43

Low Grade Chondrosarcoma: A Retrospective Analysis of Treatment Outcomes Using the SEER Database

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Introduction: In this retrospective review of 695 patients we found that patients with low-grade chondrosarcoma treated nonoperatively had inferior oncologic outcomes to those who were managed with surgery.

Methods: Using the SEER database, we reviewed 695 patients diagnosed with low-grade chondrosarcoma of the axial or appendicular skeleton between 1988 and 2008. Evaluation included surgical treatment, radiation treatment, age at diagnosis, and survival information, including cause of death

and time from diagnosis to death or last known follow-up. Overall survival and cause specific survival were estimated using the product-limit method.

Results: Significant differences in overall and cause-specific survival were seen based upon age, surgical treatment, and radiation treatment. Age greater than 70 years had worse cause-specific survival than those in younger strata resulting in a hazard ratio (HR) of 4.21 for cause-specific survival. The HR of non-surgical treatment for cause-specific survival was 5.03, which did not appreciably differ with stratification by age.

Discussion and Conclusion: Despite questions regarding the metastatic potential of low-grade chondrosarcoma, the present database review found that patients with low-grade chondrosarcoma treated surgically had improved survival over those who were treated non-operatively. The factors that influenced the decision to treat surgically, however, may also have affected survival. In addition to an increase in all-cause mortality, patients older than 70 years have an inferior cause-specific survival than those younger.

Poster 44

Carpal Tunnel Syndrome: Current Trends in Diagnosis, Treatment, and Prognosis

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Introduction: In 2007 and 2009 the AAOS released guidelines for the workup and treatment of Carpal Tunnel Syndrome (CTS). Although the AAOS reviewed appropriate available literature to create the guidelines, the lack of high-level evidence studies concerning CTS resulted in weak recommendations, some of which were controversial. The investigators postulated that a survey of ASSH members would provide insight into:

1. Practice patterns among surgeons treating CTS
2. The extent to which concern about medico-legal ramifications resulting from the guidelines influences practice behavior.

Methods: A questionnaire including detailed commonly observed clinical scenarios (demographic: 6, workup/indications: 15, prognosis: 7), was developed, pre-tested, and approved by IRB and ASSH website chair. An anonymous

electronic survey was emailed to ASSH members. Comparisons between demographic factors and responses were made using the chi-square test or Fisher's exact test, as appropriate.

Results: Of 2650 surveys emailed, 5 declined. 448 responded within 3 weeks.

Primary specialty: Orthopaedics: 80.3%, Plastics: 12.7%, Other: 7%. 74.3% of respondents would indicate a patient for carpal tunnel release (CTR) if patient had classic history/exam and complete relief after a cortisone injection. 48.4% of respondents believed that in the above scenario electrodiagnostic testing (EDX) is not necessary to indicate a CTR. 64.4% of respondents were more likely to order EDX based on AAOS Guidelines. 58.7% responded that this is because of potential medico-legal ramifications.

Discussion and Conclusion: Despite guidelines recommending EDX before surgery, a majority reported:

- Positive response to cortisone injection is sufficient indication for CTR,
- EDX not necessary in these cases,
- Would perform CTR in face of normal EDX, if cortisone helped completely.

A majority of respondents were more likely to order EDX based on AAOS Guidelines,
-58.7% because of potential medico-legal ramifications.

Poster 45

Comparison of Range of Motion in Hip Resurfacing Arthroplasty: Restrictions Versus No Restrictions

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Introduction: Hip resurfacing arthroplasty (HRA) has emerged as a popular alternative in younger, active patients with symptomatic hip osteoarthritis. In contrast to traditional total hip arthroplasty, hip resurfacing utilizes a large diameter metal-on-metal bearing and therefore should have greater stability. Due to the posterior surgical approach used in both procedures, most surgeons place their patients on hip precautions to prevent dislocation during the post-operative period. Consequently, adherence to these precautions can also lead to stiffness, which may be undesirable in more active patients.

Methods: Two groups were investigated retrospectively: one with movement restrictions (n=61) and one without

movement restrictions (n=42). These groups had similar mean age and Harris Hip scores prior to surgery. Individual as well as total arc of range of motion (ROM) were measured at baseline, 1 month, and 4 months post-op. The difference in ROM (post-op ROM minus baseline ROM) was also compared. Statistical comparison was accomplished using Student's t-tests.

Results: Post-operatively, there were no dislocations noted in the group without movement restrictions. At both post-op timepoints, the group without restrictions showed statistically significant gains in ROM compared to baseline. In comparison, the group with restrictions only had a significant gain in total arc ROM at 4 months. In terms of difference in total arc ROM compared to baseline, the group without restrictions had a gain of 42 degrees compared to 27 degrees in the group with restrictions (at 4 months). This difference was noted to be significant across the groups.

Discussion and Conclusion: In this study of HRA patients, the group with no hip precautions saw greater gains in total arc range of motion without any incidents of post-op dislocation. These findings outline that hip precautions may be safely discontinued in HRA and may allow for more rapid return to function in the immediate post-op period.

Poster 46

Provisional Plating as Temporary Stabilization in Open Tibial Shaft Fractures

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Introduction: The purpose of this study is to evaluate provisional plating of open tibial shaft fractures. While provisional plating has been described as a tool to maintain reduction during intramedullary fixation, plating has not been described as a modality for temporary stabilization. Given the direct access to the fracture during irrigation and debridement, provisional plating allows for efficient and cost effective stabilization. We hypothesized that the outcomes with provisional plating of open tibial shaft fractures is comparable to the outcomes with external fixation.

Methods: Forty-three patients were included in a retrospective study performed at a level-1 trauma center and were fol-

lowed for an average of 4 years. All patients underwent urgent irrigation and debridement. During the initial operation, sixteen patients underwent provisional external fixation (EXT), 7 had provisional unicortical plating (PLT) and 20 underwent definitive intramedullary fixation (IMN). Provisionally stabilized groups were later converted to definitive intramedullary or plate fixation. Patient's outcomes including complications and subsequent operative procedures were analyzed.

Results: The overall complication rate was 37% (n=16). Provisional fixation had a higher complication rate than the IMN group (43% vs. 30%). The PLT group had a higher complication rate compared to the EXT group (58% vs. 38%). The PLT group had 4 deep infections and 2 nonunions compared to the 2 infections and 3 nonunions in the EXT group. Also, provisional fixation required soft tissue coverage more frequently than the IMN group (31% vs 20%).

Conclusion: Provisional fixation of open tibial shaft fractures had a higher complication rate compared to initial intramedullary fixation. Provisional plating had a higher complication rate compared to external fixation with a greater rate of deep infections, though samples were too small to determine significance. Despite the apparent ease of provisional plating, prospective studies are needed to evaluate its overall utility and long-term financial feasibility.

Poster 47

Distal Peripheral Neuropathy After Open and Arthroscopic Shoulder Surgery: An Under-Recognized Complication

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Introduction: We hypothesized that distal peripheral neuropathy (DPN) is a prevalent, yet often overlooked, complication following anatomic total shoulder arthroplasty (TSA), reverse shoulder arthroplasty (RSA), and arthroscopic rotator cuff repair (RCR).

Methods: A retrospective case series was performed over a two-year period. Four fellowship-trained shoulder surgeons performed 57 TSA, 87 RSA, and 758 RCR. The primary outcome measure was the diagnosis of DPN, defined as carpal

tunnel syndrome (CTS), cubital tunnel syndrome (CubTS), ulnar tunnel syndrome, and distal radial sensory neuropathy. The diagnosis of DPN was made based on subjective symptoms with confirmatory physical examination and/or nerve conduction velocity studies. Patient demographics and clinical course were recorded. Mean follow-up was 21 months for TSA, 15 months for RSA, and 12 months for RCR. Descriptive statistics were calculated.

Results: Post-operatively, 10.5% of TSA, 9.2% of RSA, and 3.4% of RCR patients were diagnosed with DPN. The incidence of DPN was significantly higher for shoulder arthroplasty (TSA/RSA) compared to RCR, but there was no difference between the types of arthroplasty. Patient age, sex, and workers compensation claim did not correlate with DPN. The most common form of neuropathy was CubTS/CTS for TSA, CubTS for RSA and CTS for RCR. After non-surgical treatment, complete symptom resolution occurred in 50% of TSA patients (mean 197 days), 50% of RSA (mean 255 days), and 65% of RCR (mean 129 days). However, 17% of TSA with DPN, 13% of RSA with DPN, and 12% of RCR with DPN required surgical treatment of their neuropathy. 80% of the patients undergoing surgical decompression had complete resolution of symptoms.

Discussion and Conclusion: Patients undergoing TSA, RSA, or RCR are at risk for postoperative DPN and should be counseled about DPN as a potential complication of surgery. While the majority of DPN resolves post-operatively, a subset of patients will require surgical decompression.

Poster 48

Pulmonary Function Following Adult Spinal Deformity Surgery: Minimum Two Year Follow-Up

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Introduction: Pulmonary function following adult spinal deformity remains uncertain. We hypothesized patients with pre-op PFT impairment (<65%pred FEV1) and those undergoing revision surgery may be at risk for exacerbated decline in pulmonary function.

Methods: PFTs were prospectively collected on 164 adult spinal deformity patients (150F, 14M, avg age 45.9) undergoing

surgical treatment at a single institution, with minimum 2 yr follow-up (avg 2.81). There were 100 (61%) primary and 64 (39%) revision surgery patients, and the majority had posterior only surgery (77%). Radiographs for 154 patients were analyzed for main thoracic (MT) and sagittal T5-T12 (Sag) curve magnitude/correction.

Results: For all patients, there was a significant change in MT Cobb from 47.4 to 24.9 deg (avg -22.5, p=0.00), and Sag Cobb from 35.5 to 30.0 deg (avg -5.41, p=0.00). We also found a significant decline in absolute and %pred PFT, with %pred FEV1 and %pred FVC decreasing 5.26% (p=0.00) and 5.74% (p=0.00), respectively. A clinically significant decline ($\geq 10\%$ pred FEV1) was observed in 27% of patients. PFT impairment increased from 14 (8%) patients pre-op to 23 (14%) patients after surgery, but was not statistically significant (p=0.31). Interestingly, patients with pre-op PFT impairment had a significant improvement in absolute and %pred FEV1 after surgery compared to those without pre-op impairment (2.8% v -6.19%, p=0.03), with no significant differences in MT/Sag curve correction between the two groups. Revision surgery patients had no difference in post-op %pred PFTs, however there were significantly more patients with a clinically significant decline in PFTs [23 (35%) v 22 (22%), p=0.03].

Discussion and Conclusion: We performed the largest study to date evaluating pulmonary function tests in adult deformity patients, and found a significant decline in all measures of pulmonary function at 2 years following surgical correction. Surprisingly, patients with pre-op PFT impairment had improvement in absolute and %pred PFTs postoperatively. Revision surgery more frequently results in a clinically significant decline in PFTs.

Poster 49

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

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Introduction: During pedicle screw instrumentation, a low current reading (<6-10mA) with intraoperative evoked elec-

tromyogram (EMG) stimulation of a pedicle screw warrants complete removal in order to palpate the tract to reassess for pedicle wall violation. On many occasions no violation is found, and the same screw is re-inserted along the same trajectory without additional redirection. Previous studies have reported significantly decreased insertional torque during this reinsertion, however fixation strength has never been evaluated biomechanically.

Methods: Thirty-one (n=31) thoracic and nine (n=9) lumbar individual fresh-frozen human cadaveric vertebral levels were evaluated. Each level was instrumented bilaterally with 5.5mm (thoracic) and 6.5mm (lumbar) titanium polyaxial pedicle screws. A paired comparison was performed for each level, and randomized between control and the test group with screw re-insertion, which was performed by completely removing the pedicle screw, palpating the tract, and then re-inserting along the same trajectory. Screw insertional torque (IT) was measured with each revolution, 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: *Thoracic Re-insertion:* There was no significant difference detected for pedicle screw POS between re-inserted (RI) and control screws (732±307 N versus 742±320 N, respectively; p=0.78). We also found no significant difference in IT between the initial test screw (INI) (7.28±3.51 in-lb) and control (7.69±4.45 in-lb) (p=0.33). However, IT for RI screws (5.14±4.18 in-lb) was significantly decreased compared to INI and control screws (29% decrease, p=0.00; 33% decrease, p=0.00, respectively).

Lumbar Re-insertion: There were similar findings for lumbar pedicle screws, with no significant difference for pedicle screw POS between RI and control screws (943±344N versus 803±422N; p=0.09), as well as a significant IT decrease between RI and control screws (6.38±4.61 in-lb versus 9.56±3.84 in-lb; p=0.04).

Correlation Analysis: Test group screws in both the thoracic and lumbar spine had significant, strong correlations between initial screw IT and pullout strength (r=0.79, p=0.00; r=0.93, p=0.00). There was a moderate correlation between re-insertion IT and pullout strength in the thoracic spine (r=0.56, p=0.00), but no significant correlation for the lumbar spine (r=0.218; p=0.57).

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

Poster 50

Combined MPFL Reconstruction and Tibial Tubercle Transfer for Patellofemoral Instability

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Background: Both medial patellofemoral ligament (MPFL) reconstruction and Tibial Tubercle Transfer (TTT) are established procedures for patients suffering from patellofemoral instability. In patients with a heightened Q angle, MPFL reconstruction performed in isolation may increase contact forces across the patellofemoral joint and not restore medial patellar tracking. The purpose of the present study is to determine the outcomes of combined MPFL and TTT for patellar instability with elevated Q angle.

Methods: 32 patients were identified from a surgical database of having received combined MPFL reconstruction and TTT from 2008-2010. All patients were treated by one of four fellowship trained sports medicine physicians utilizing an identical surgical technique. Minimum follow-up was 24 months for inclusion in the study. Patients were evaluated for recurrence of instability, complications, and functional outcome (Kujala and Lysholm outcome scores).

Results: Of the 32 patients (35 knees) that underwent this procedure during the time period studied, 16 patients (17 knees) met our inclusion criteria and are included in this analysis. The average length of follow-up was 38 months (range 28 to 50). There were 1 male(s) and 15 females in this analysis, with an average age of 27. The average Kujala and Lysholm scores at final follow-up were 78.35 and 74.24, respectively. One patient(s) (6.3%) sustained a recurrence of dislocation. There

were 3 (18.8%) patients with complications: wound complications requiring repeat surgery (3/18.8%), stiffness (1/6.3%) and lysis of adhesions (1/6.3%). There were no infections in this series. 3 (18.8%) patients required a secondary procedure to remove painful hardware.

Conclusion: MPFL reconstruction combined with tibial tubercle transfer has a high rate of success for patients presenting with patellar instability and extensor mechanism malalignment. The risk of recurrence with this technique was low (6.3%), and the risk of complications is equivalent to other techniques previously reported in the literature.

Poster 51

Inter and Intra-Observer Reliability of the Simplified Skeletal Scoring System: An Analysis of 277 Patients

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Introduction: The simplified skeletal maturity score (SSMS) has been utilized to predict curve progression in idiopathic scoliosis. Using a large sample of patients, this study aims to validate the intra and inter observer reliability of the SSMS for each stage and for the overall cohort.

Methods: Retrospective review from 2005 to 2011 of idiopathic scoliosis patients age 8-16. A new introduced orthopedic surgery resident (OSR), a research fellow (RF) familiar with the system, and two attending physicians (AP1, and AP2) using the system for several years were asked to independently score hand x-rays using the SMSS. Inter and Intra-observer accuracy rates were calculated for each stage (1-8) and for the entire cohort.

Results: A total of 277 hand x-rays were evaluated. The distribution of patients within SMSS 1 - 8 by AP1 was: 32(11%), 35(12%), 49(18%), 44(16%), 10(4%), 45(16%), 56(20%), 8(2%). The distribution by AP2 was: 19 (7%), 17(6%), 93(34%), 30(11%), 7(3%), 51(18%), 52(19%), 8(3%). The discrepancies occurring in SMSS 1-8: 13(16%), 27(34%), 2(2.5%), 18(22.5%), 7 (9%), 5 (6%), 8 (10%), 0 (0%). The agreement of OSR vs. AP1 and vs. AP2 was 193/277 and 195/277 (70%) respectively. The discrepancies for OSR vs. AP1 (SMSS1-8) was: 17(20%), 9(11%), 8(10%), 16(19%), 5(6%), 20(24%), 9(11%), 0 (0%). Mismatches for

OSR vs. AP2 were: 5(6%), 2(2%), 33(40%), 4(5%), 4(5%), 27(33%), 8(10%), 0(0%). The senior authors agreed on 197 out of 277 hand x-rays (71%). The intra-observer agreement by a senior author was 99% while intra-observer agreement for senior OSR was 68%.

Conclusion: The inter-observer agreement for the SMSS among senior authors is 71% with 99% intra-observer agreement. The intra and inter-observer agreement may also be lower (68-70%) for persons newly introduced to the classification system. Discrepancies seem to occur most when classifying a stage 2 vs. a stage 3.

Poster 52

Failed Ulnar Nerve Transposition: Does Size Matter?

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Introduction: Cubital tunnel syndrome is the second most common peripheral nerve entrapment in the upper extremity. Furthermore, controversy exists regarding optimal surgical management. For postoperative patients who are still symptomatic, ultrasound is commonly utilized. While there are established characteristics of the native ulnar nerve, there is a paucity of data analyzing the postoperative ulnar nerve. We examined ultrasounds of the ulnar nerve in patients who failed decompression or transposition and compared them to a control group of patients with symptomatic cubital tunnel syndrome who have had no surgical intervention.

Methods: We performed retrospective review of 71 patients' ultrasounds who failed surgical management. Failure was defined as persistent or recurrent postoperative symptoms. We investigated potential sites of compression and differences in cross-sectional area of the nerve. Fifty patients with cubital tunnel syndrome in native ulnar nerves served as our control group. The groups were compared using a t-test.

Results: Our data show that the group that failed surgical management had a mean cross sectional area of 17.08±9.76-mm², while the control group had a mean CSA of 13.55±1.03-mm². This was statistically significant. No statistically significant ultrasonographic difference was found with respect to the echogenicity of the nerve or sites of compression.

Discussion and Conclusion: We have demonstrated that the symptomatic ulnar nerve is enlarged when compared to the measured normal CSA of 5.6 ± 0.9 -mm² at the cubital tunnel. Moreover, the patients that have failed surgery show a significantly enlarged CSA when compared to symptomatic nerves in situ. Although a specific etiology for this difference cannot be determined, our data suggest that the reference ranges for the CSA of the ulnar nerve may need to be revised for those who have undergone surgery. This may assist in the interpretation of ultrasounds for this symptomatic postoperative patient population.

Poster 53

Risk Versus Reward: Elective Total Knee Arthroplasty in Solid Organ Transplant Recipients

Tyler S. Watters, MD
Cameron K. Ledford, MD
Samuel S. Wellman, MD
David E. Attarian, MD, FACS
Michael P. Bolognesi, MD

Introduction: Solid organ transplant patients have historically presented to orthopaedic surgeons for treatment of osteonecrosis of the hip secondary to immunosuppression with steroids. But with improved survival, more patients can be expected to present for degenerative knee arthritis. Few studies have evaluated the outcomes of total knee arthroplasty (TKA) in this unique high-risk population. This study examines the relative safety and functional outcomes of elective TKA following kidney, liver, and lung transplantation at a single institution.

Methods: TKA outcomes for transplant recipients at a tertiary referral institution were retrospectively reviewed. Perioperative course, clinical follow-up data, and validated outcome measures such as Knee Society Score (KSS) were obtained through standard chart reviews. Basic descriptive statistics and paired t-tests were used when applicable.

Results: 21 primary TKAs were performed after various organ transplantation including kidney (12), liver (4), and lung (5) with average clinical follow-up of 41.2 months. Overall, perioperative medical complication rate was 33%. Anemia requiring transfusion was highest in the lung group (80%). 3 patients (14%) developed chronic infection requiring two-stage revision, including one in each transplant group. There were two other reoperations, one for patellar maltracking and

one for hematoma. One lung transplant patient died 2 years after surgery from respiratory failure. Despite the high complication rates, all groups demonstrated significant increases in Knee Society Scores (KKS) and patient-reported outcomes were good or excellent in 92-100%.

Discussion and Conclusion: The results of this study suggest that elective TKA in organ transplant recipients carries a relatively high risk of perioperative medical complications and infection. Nonetheless, clinical outcome measures and patient-reported satisfaction were high, perhaps suggesting that this unique patient population is willing to accept higher risks of surgery than non-transplant patients. Collaboration between the orthopaedic surgeon and the medical transplant team is essential for patient safety.

Individual Orthopaedic Instruction/ Multimedia Education

Schedule:

Thursday, October 31, 2013	2:00pm-4:00pm
Friday, November 1, 2013	2:00pm-4:00pm
Saturday, November 2, 2013	2:00pm-4:00pm

The following AAOS DVDs are available for individual viewing at the above times in the Speaker Ready Room:

1. **Anatomy of the Knee** (25 minutes)
Stephen L. Brown, MD; Patrick M. Connor, MD; Donald F. D'Alessandro, MD; and James E. Fleischli, MD
2. **Pectoralis Major Transfer for Irreparable Rotator Cuff Tears** (11 minutes)
Sumant G. Krishnan, MD and Kenneth C. Lin, MD
3. **Surgical Dislocation and Debridement for Femoro-Acetabular 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 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; and David A. Koppersmith, 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 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 P. 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 Nogler, MD; Javad Parvizi, MD; 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 Briggs, 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, MD; 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 Repair of the Shoulder: Biomechanics and Technique** (7 minutes)
Matthew T. Provencher, MD 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. Chmielecki, 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. Petruccelli, 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 Hayden, BA; Camilo E. Villalobos, MD; and James C. Wittig, MD

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Eastern Orthopaedic Association

44th Annual Meeting

October 31-November 2, 2013

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Please indicate any comments or suggestions that you have regarding the Multimedia Presentations.



Eastern Orthopaedic Association

44th Annual Meeting

October 31-November 2, 2013

Loews Miami Beach
Miami Beach, Florida

2013 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 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.

2013 CME Credit Record Scientific Program

Please rate by checking the box corresponding to the appropriate number. 5 = Excellent 4 = Good 3 = Satisfactory 2 = Fair 1 = Poor

Thursday, October 31, 2013

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>Concurrent Session 1</i> or <i>Concurrent Session 2</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>General Session 3</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent Session 4</i> or <i>Concurrent Session 5</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Case Presentations 1</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Friday, November 1, 2013

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>Concurrent Session 6</i> or <i>Concurrent 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>Symposium 4</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>Concurrent Session 8</i> or <i>Concurrent Session 9</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Case Presentations 2</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Saturday, November 2, 2013

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>Concurrent Session 10</i> or <i>Concurrent Session 11</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent Session 12</i> or <i>Concurrent Session 13</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 14</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>Concurrent Session 15</i> or <i>Concurrent Session 16</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1



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2013 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 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.

2013 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 6 CME credits available during the course of the meeting for viewing posters (or a total of 36 posters).

Poster Sessions attended:

(Please check the boxes of the poster sessions you attended).

- | | | | | | |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 10 | <input type="checkbox"/> 19 | <input type="checkbox"/> 28 | <input type="checkbox"/> 37 | <input type="checkbox"/> 46 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 11 | <input type="checkbox"/> 20 | <input type="checkbox"/> 29 | <input type="checkbox"/> 38 | <input type="checkbox"/> 47 |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 12 | <input type="checkbox"/> 21 | <input type="checkbox"/> 30 | <input type="checkbox"/> 39 | <input type="checkbox"/> 48 |
| <input type="checkbox"/> 4 | <input type="checkbox"/> 13 | <input type="checkbox"/> 22 | <input type="checkbox"/> 31 | <input type="checkbox"/> 40 | <input type="checkbox"/> 49 |
| <input type="checkbox"/> 5 | <input type="checkbox"/> 14 | <input type="checkbox"/> 23 | <input type="checkbox"/> 32 | <input type="checkbox"/> 41 | <input type="checkbox"/> 50 |
| <input type="checkbox"/> 6 | <input type="checkbox"/> 15 | <input type="checkbox"/> 24 | <input type="checkbox"/> 33 | <input type="checkbox"/> 42 | <input type="checkbox"/> 51 |
| <input type="checkbox"/> 7 | <input type="checkbox"/> 16 | <input type="checkbox"/> 25 | <input type="checkbox"/> 34 | <input type="checkbox"/> 43 | <input type="checkbox"/> 52 |
| <input type="checkbox"/> 8 | <input type="checkbox"/> 17 | <input type="checkbox"/> 26 | <input type="checkbox"/> 35 | <input type="checkbox"/> 44 | <input type="checkbox"/> 53 |
| <input type="checkbox"/> 9 | <input type="checkbox"/> 18 | <input type="checkbox"/> 27 | <input type="checkbox"/> 36 | <input type="checkbox"/> 45 | |

Please indicate the poster(s) you found to be most meaningful and any comments. Begin with the poster number.

Please indicate any feedback that you may have concerning other posters. Begin with the poster number.

Please indicate any comments or suggestions that you have regarding the Poster Presentations.

2013 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.

Why did you choose to attend this Meeting?	High Importance	Some Importance	Little Importance	No Importance
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"/>
How did we do overall?	Excellent	Good	Fair	Poor
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"/>
How did we do on Poster Presentations?	Excellent	Good	Fair	Poor
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"/>
How did we do on Multimedia?	Excellent	Good	Fair	Poor
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"/>



2014 Needs Assessment Survey

Please list any medical topics that you would like included in future programs planned by EOA.

Please list any Office Management Topics that you would like included in the program.
