



Eastern Orthopaedic Association

42nd Annual Meeting

October 19–22, 2011

Kingsmill

Williamsburg, Virginia

2011

Meeting Program

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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 31 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

EOA President's Message

Dear EOA Colleagues:



John C. Richmond, MD

Greetings and welcome to the Kingsmill Resort in historic Williamsburg, Virginia. Chris and I would like to welcome you and your family to the 42nd Annual Meeting of the Eastern Orthopaedic Association. This year's meeting promises to be truly exceptional at this historic venue.

Dr. Geoffrey Westrich and his Program Committee have organized an outstanding scientific program. For the fourth year in a row, we have received a record number of abstracts, leading to a superb selection of scientific papers and posters. Please be sure to visit the posters during the course of the meeting.

Dr. Westrich and the Program Committee have also put together a number of interesting symposia. These cover a wide range of topics including: non-arthroplasty alternatives for knee arthritis, the state-of-the-art treatment of wrist fractures, practice management topics, bearing surfaces for total joint arthroplasty, computer-assisted total joint arthroplasty, pain management, and lower extremity limb lengthening techniques.

As a treat for all residents and fellows attending this year's meeting, there will be a special mini program on Thursday afternoon. This promises to be both an educational and entertaining afternoon.

The Presidential Guest Speaker this year is Dr. Brian Day from Vancouver, British Columbia in Canada. Brian is a unique individual, being the spokesman for the private practice of orthopaedic surgery in Canada. He has an exceptional leadership record, having been the President of the Arthroscopy Association of North America and of the Canadian Medical Association. He will speak to us on the very timely subject of health care reform in his talk entitled "Lessons Learned from Canada."

The Howard Steel Lecture will be given this year by David L. Kaplan, PhD. Dr. Kaplan is the Professor and Chair of Biomedical Engineering at Tufts University. He is a world leader in tissue engineering and an expert of silk as a bio-material. His lecture on silk-based orthopedic devices will give us a peek into the future of how tissue engineering may change medicine in the future.

Emerging technology sessions (non-CME) sponsored by industry partners will be offered during lunch on Thursday, Friday, and Saturday.

The Kingsmill Resort on the banks of the historic James River offers a huge variety of recreational activities. There is fabulous golf with the EOA Golf Tournament being held on the Plantation Course on Friday afternoon. Two other championship courses and a par 3 complete the golf facilities. A tennis round robin is also scheduled for Friday afternoon. There is boating available daily. Tours of historic Williamsburg and the Jamestown/Yorktown historic sites are available. The Kingsmill Resort is located adjacent to Busch Gardens in Williamsburg. The park will be open Friday, Saturday, and Sunday. Please see our registration booth for discounted tickets.

Social events include the Welcome Reception at Busch Gardens on Thursday evening with a private buffet dinner with a Bavarian theme. There will also be private access to several theme park rides. The EOA jazz band will be playing on Saturday evening just prior to the Founders' Dinner Dance. Come and enjoy an evening of dining and dancing as we introduce our 43rd President, Dr. Henry Backe and his wife, Tara.

Welcome back to the Eastern Orthopedic Association. My wife, Chris, and I thank you for attending this year's meeting. We know you will have an excellent educational and social experience. We look forward to seeing you all back at the 43rd Annual Meeting of the EOA to be held June 20-23, 2012 at The Sagamore on Lake George in Bolton Landing, New York.

Warm Regards,

John and Chris Richmond

John C. Richmond, MD

President, Eastern Orthopaedic Association

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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.

WEDNESDAY, OCTOBER 19, 2011

6:30am–8:00am	President’s Council Meeting (<i>Randolph Room</i>)
8:00am–12:00pm	Board of Directors Meeting (<i>Randolph Room</i>)
9:00am–10:00am	Spouse’s Board Meeting (<i>Fairfax Room</i>)
12:00pm–5:00pm	Meeting Registration (<i>Ballroom Foyer</i>)
12:00pm–5:00pm	Sponsor/Exhibit Setup (<i>Ballrooms A, B, and Foyer</i>)
12:00pm–5:00pm	Speaker Ready Room (<i>Fairfax Room</i>)
12:00pm–5:00pm	Scientific Poster Setup (<i>Plantation Room</i>)

THURSDAY, OCTOBER 20, 2011

6:00am–7:00am	Scientific Poster Session (<i>Plantation Room</i>) Note: Presenters will be available to answer questions.
6:00am–1:00pm	Meeting Registration (<i>Ballroom Foyer</i>)
6:00am–2:00pm	Speaker Ready Room (<i>Fairfax Room</i>)
6:30am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Ballrooms A, B, and Foyer</i>) The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
7:00am–7:15am	First Business Meeting (<i>Ballrooms C & D</i>)
7:15am–1:00pm	Scientific Program (<i>Ballrooms C & D</i>)
8:00am	Morning Walk* (<i>Meet in the Lobby</i>)
9:00am–10:30am	Spouse/Children’s Hospitality* (<i>Bray’s</i>)
10:00am–5:00pm	Water Activities on Wareham’s Pond* (<i>Meet at Wareham’s Pond</i>)
11:30am–12:24pm	Howard Steel Lecture (<i>Ballrooms C & D</i>)
12:30pm–1:00pm	Presidential Address (<i>Ballrooms C & D</i>)
1:00pm–2:00pm	Industry Workshop — Salient Surgical* (<i>Ballrooms C & D</i>) CME credit not available (lunch included)
2:00pm–3:00pm	Scientific Poster Session (<i>Plantation Room</i>) Note: Presenters will be available to answer questions.
2:00pm–4:00pm	Resident/Fellow “Mini” Program (<i>Randolph Room</i>)
3:00pm–5:00pm	Multimedia Education Session (<i>Fairfax Room</i>)
5:45pm–6:30pm	New Member Reception* (<i>Moody’s Tavern/Main Resort</i>)
6:40pm–9:30pm	Welcome Reception at Busch Gardens* (<i>Festhaus — Meet at Resort Circle/Main Resort Lobby</i>)

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

FRIDAY, OCTOBER 21, 2011

6:00am–7:00am	Regional and AAOS President’s Breakfast Meeting with State Presidents and Board of Councilors* <i>(Randolph Room)</i>
6:00am–7:00am	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
6:00am–1:00pm	Scientific Program <i>(Ballrooms C & D)</i>
6:00am–1:00pm	Meeting Registration <i>(Ballroom Foyer)</i>
6:00am–1:00pm	Speaker Ready Room <i>(Fairfax Room)</i>
6:30am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks and Daily Drawing <i>(Ballrooms A, B, and Foyer)</i> The drawing will take place at the end of the second break in the exhibit area. You must be present to win!
8:00am	MorningWalk* <i>(Meet in the Lobby)</i>
8:00am–10:00am	Enjoy Breakfast with Other Spouses* <i>(Eagles Dining Room)</i>
9:00am	Party Bridge and Book Discussion* <i>(Bray’s Landing)</i>
10:00am–5:00pm	Water Activities on Wareham’s Pond* <i>(Meet at Wareham’s Pond)</i>
10:25am–11:10am	Presidential Guest Speaker <i>(Ballrooms C & D)</i>
12:30pm –4:30pm	Williamsburg Tour* <i>(Meet at Resort Circle/Main Resort Lobby)</i>
12:30pm–5:30pm	Golf Tournament* <i>(Meet at the Golf Course)</i>
1:00pm–2:00pm	Industry Workshop — ConvaTec* <i>(Ballrooms C & D)</i> CME credit not available (lunch included)
1:30pm–4:30pm	Tennis Round Robin* <i>(Meet at the Tennis Court)</i>
2:00pm–3:30pm	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session <i>(Fairfax Room)</i>
5:30pm–7:30pm	Exhibitor and Poster Reception* <i>(Ballrooms A, B, and Foyer)</i>
5:30pm–7:30pm	Kids’ Movie and Arts & Crafts* <i>(Tazewell Room)</i>

SATURDAY, OCTOBER 22, 2011

6:00am–7:00am	Board of Directors Meeting <i>(Randolph Room)</i>
6:00am–7:00am	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
6:00am–1:00pm	Scientific Program <i>(Ballrooms C & D)</i>
6:00am–1:00pm	Meeting Registration <i>(Ballroom Foyer)</i>
6:00am–1:00pm	Speaker Ready Room <i>(Fairfax Room)</i>
6:30am–1:00pm	Technical Exhibits, Continental Breakfast, Coffee Breaks and Daily Drawing <i>(Ballrooms A, B and Foyer)</i> The drawing will take place at the end of the first break in the exhibit area. You must be present to win!

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

7:00am–7:15am	Second Business Meeting (<i>Ballrooms C & D</i>)
8:00am	Morning Walk* (<i>Meet in the Lobby</i>)
8:00am–10:00am	Enjoy Breakfast with Other Spouses* (<i>Eagles Dining Room</i>)
9:00am	Party Bridge* (<i>Bray’s Landing</i>)
10:00am–5:00pm	Water Activities on Wareham’s Pond* (<i>Meet at the Wareham’s Pond</i>)
1:15pm–5:45pm	Jamestown/Yorktown Tour* (<i>Meet at Resort Circle/Main Resort Lobby</i>)
2:00pm–3:30pm	Scientific Poster Session (<i>Plantation Room</i>) Note: Presenters will be available to answer questions.
3:30pm–4:30pm	Multimedia Education Session (<i>Fairfax Room</i>)
7:00pm–8:00pm	Jazz Band Reception* (<i>James River Terrace</i>)
7:00pm–11:00pm	Kids’ Movie and Arts & Crafts* (<i>Tazewell Room</i>)
8:00pm–11:00pm	Founders’ Dinner Dance* (<i>Ballrooms C & D</i>)

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

Scientific Program Agenda

Presenters and times are subject to change.

THURSDAY, OCTOBER 20, 2011

- 6:00am–7:00am **Scientific Poster Session** (*Plantation Room*)
Note: Presenters will be available to answer questions.
- 7:18am–8:50am **CONCURRENT GENERAL SESSION I — Total Knee** (*Ballrooms C & D*)
- 7:18am–8:50am **CONCURRENT GENERAL SESSION II — Trauma** (*Burwell Room*)
- 8:50am–9:10am **Break — Please visit exhibitors and posters** (*Ballrooms A, B, and Foyer*)
- 9:10am–10:15am **CONCURRENT GENERAL SESSION III — Sports Medicine** (*Ballrooms C & D*)
- 9:10am–10:15am **CONCURRENT GENERAL SESSION IV — Upper Extremity** (*Burwell Room*)
- 10:20am–11:10am **CONCURRENT SYMPOSIUM I — Knee Arthritis – Non-Arthroplasty Treatment Alternatives** (*Ballrooms C & D*)
- 10:20am–11:10am **CONCURRENT SYMPOSIUM II — Wrist Fractures – State of the Art Treatment** (*Burwell Room*)
- 11:10am–11:30am **Break — Please visit exhibitors and posters** (*Ballrooms A, B, and Foyer*)
The drawing will take place in the exhibit area at the end of the break.
- 11:30am–1:00pm **GENERAL SESSION V — Howard Steel Lecturer & Presidential Address** (*Ballrooms C & D*)
- 2:00pm–3:00pm **Scientific Poster Session** (*Plantation Room*)
Note: Presenters will be available to answer questions.
- 2:00pm–4:00pm **Resident/Fellow “Mini” Program** (*Randolph Room*)
- 3:00pm–5:00pm **Multimedia Education Session** (*Fairfax Room*)
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FRIDAY, OCTOBER 21, 2011

- 6:00am–7:00am **Scientific Poster Session** (*Plantation Room*)
Note: Presenters will be available to answer questions.
- 6:00am–7:00am **GENERAL SESSION VI — Case Reviews Upper Extremity** (*Ballrooms C & D*)
- 7:00am–7:55am **CONCURRENT GENERAL SESSION VII — Hip Preservation** (*Ballrooms C & D*)
- 7:00am–7:55am **CONCURRENT GENERAL SESSION VIII — Foot & Ankle** (*Burwell Room*)
- 7:55am–8:15am **Break — Please visit exhibitors and posters** (*Ballrooms A, B, and Foyer*)
- 8:15am–9:55am **CONCURRENT GENERAL SESSION IX — Total Hip** (*Ballrooms C & D*)
- 8:15am–9:55am **CONCURRENT GENERAL SESSION X — Spine/Pediatrics** (*Burwell Room*)
- 9:55am–10:15am **Break — Please visit exhibitors and posters** (*Ballrooms A, B, and Foyer*)
The drawing will take place in the exhibit area at the end of the break.
- 10:15am–11:10am **GENERAL SESSION XI — AAOS Report & Presidential Guest Speaker** (*Ballrooms C & D*)

11:10am–12:00pm	SYMPOSIUM III — Update on Bearing Surfaces in Total Joint Replacement <i>(Ballrooms C & D)</i>
12:00pm–1:00pm	SYMPOSIUM IV — Practice Management <i>(Ballrooms C & D)</i>
2:00pm–3:30pm	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session <i>(Fairfax Room)</i>

SATURDAY, OCTOBER 22, 2011

6:00am–7:00am	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
6:00am–7:00am	GENERAL SESSION XII — Case Reviews Lower Extremity <i>(Ballrooms C & D)</i>
7:20am–8:10am	CONCURRENT GENERAL SESSION XIII — Infection <i>(Ballrooms C & D)</i>
7:20am–8:10am	CONCURRENT GENERAL SESSION XIV — Sports <i>(Burwell Room)</i>
8:15am–9:05am	CONCURRENT GENERAL SESSION XV — Pain Management <i>(Ballrooms C & D)</i>
8:15am–9:05am	CONCURRENT GENERAL SESSION XVI — General Orthopedics/Tumors <i>(Burwell Room)</i>
9:05am–9:30am	Break — Please visit exhibitors and posters <i>(Ballrooms A, B, and Foyer)</i> The drawing will take place in the exhibit area at the end of the break.
9:30am–10:30am	SYMPOSIUM V — Computer Assisted Surgery in Total Joint Arthroplasty – Current Concepts and New Techniques <i>(Ballrooms C & D)</i>
10:30am–10:50am	GENERAL SESSION XVII — Reports <i>(Ballrooms C & D)</i>
10:50am–11:05am	Refreshment Break <i>(Foyer)</i>
11:05am–11:45am	CONCURRENT SYMPOSIUM VI — Pain Management <i>(Ballrooms C & D)</i>
11:05am–11:45am	CONCURRENT SYMPOSIUM VII — Lower Extremity Applications of Limb Lengthening and Reconstruction Surgery <i>(Burwell Room)</i>
11:50am–1:00pm	CONCURRENT GENERAL SESSION XVIII — Knee <i>(Ballrooms C & D)</i>
11:50am–1:00pm	CONCURRENT GENERAL SESSION XIX — General Orthopaedics <i>(Burwell Room)</i>
2:00pm–3:30pm	Scientific Poster Session <i>(Plantation Room)</i> Note: Presenters will be available to answer questions.
3:30pm–4:30pm	Multimedia Education Session <i>(Fairfax Room)</i>

Activities Information

Badges or wristbands are required for admittance to all events.

Thursday, October 20, 2011

Morning Walk

8:00am (*Meet in the Lobby*)

Price: *Included in Registration Fee*

Spouse/Children Hospitality

9:00am–10:30am (*Bray's*)

Join your friends and meet new spouses while enjoying a continental breakfast. "According to the Ladies" will take you back to the 18th century from a woman's perspective.

Price: *Included in Registration Fee or \$40 per Unregistered Guest; \$20 per Unregistered Child*

Water Activities on Wareham's Pond

10:00am–5:00pm (*Meet at Wareham's Pond*)

Spouses and children will have an opportunity to enjoy kayaks, paddle boats, and jon boats.

Price: *Included in Registration Fee*

Industry Workshop — Salient Surgical

1:00pm–2:00pm (*Ballrooms C & D*)

Join us for a presentation addressing two key areas of advancement in total knee arthroplasty and the impact on patient outcomes.

The Benefits of Adopting a Tourniquetless TKA

Presented by Harold Delano Schutte Jr., MD

Modern Trends in Hip and Knee Arthroplasty

Presented by Anthony Carter, MD

CME credit not available

Price: *Included in Registration Fee; lunch included*

New Member Reception

5:45pm–6:30pm (*Moody's Tavern/Main Resort*)

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

Price: *Included in Registration Fee*

Welcome Reception at Busch Gardens

6:40pm–9:30pm (*Festhaus – Meet at Resort Circle/Main Resort Lobby*)

6:40pm Leave Kingsmill Resort

7:30pm Musical program

7:45pm–9:00pm Rides open

Join us for some fall fun for the whole family at Busch Gardens with several thrilling rides, an entertaining show, and a wide variety of authentic foods. Busch Gardens is the ticket to world-class adventure at this meeting.

Begin the evening with *Festhaus*, a high-energy Bavarian song and dance number alive with the spirit of this centuries-old celebration. Load up a plate with some traditional German fare and join in on the fun!

The fun continues with the Curse of DarKastle. This Busch Gardens adventure ride sends passengers careening through a castle frozen in time. Integrating state-of-the-art ride engineering with the latest in image projection and 4-D technology, Curse of DarKastle produces a profoundly moving and unique thrill ride experience. Next, try Alpegeist a ride built around the legend of a snow monster notorious for once stalking the French and German Alps. Alpegeist is rumored to be lurking in the shadows of Busch Gardens' Germany. Marks of its mischief are evident as the ski-lift-style steel roller coaster winds through treacherous territory, propelling riders on a dynamic journey. Transportation to Busch Gardens will be provided (no cars allowed).

Attire: Casual

Price: *Included in Registration Fee or \$100 per Unregistered Guest; \$50 per Unregistered Child*

Friday, October 21, 2011

Regional Breakfast Meeting with AAOS State Presidents and Board of Councilors

6:00am–7:00am (*Randolph Room*)

Price: *Included in Registration Fee*

Morning Walk

8:00am (*Meet in the Lobby*)

Price: *Included in Registration Fee*

Enjoy Breakfast with Other Spouses

8:00am–10:00am (*Eagles Dining Room*)

Price: *On Your Own*

Party Bridge and Book Discussion

9:00am (*Bray's Landing*)

Same Kind of Different As Me by Ron Hall and Denver Moore

Price: *Included in Registration Fee*

Water Activities on Wareham's Pond

10:00am–5:00pm (*Meet at Wareham's Pond*)

Spouses and children will have an opportunity to enjoy kayaks, paddle boats, and jon boats.

Price: *Included in Registration Fee*

Williamsburg Tour

12:30pm–4:30pm (*Meet at Resort Circle/Main Resort Lobby*)

Upon arrival to Colonial Williamsburg, you will walk through the historic streets of Williamsburg and learn how Colonial Williamsburg has become what it is today. You will get a first-hand look at life in 18th-century America. The guided tour will highlight the history of the restoration of Williamsburg and the lifestyles of its people in colonial America. A host of entertainment waits as you become enveloped in the sights and sounds of an era past. Observe items produced by craftspeople that still implement colonial techniques for fashioning everyday garments, delicate musical instruments, solid-wood furniture, hats, wigs, tools, and other wares typical of the eighteenth-century marketplace. As you walk through these historic streets and exhibits, you will be given an in-depth narration of the beginning of Williamsburg and the work that continues today.

The tour will include such historical buildings as the Governor's Palace, Bruton Parish Church, The Courthouse of 1776, and the Colonial Capital. (Lunch is not included.)

Price: \$59 per Adult (18 years and over); \$36 per Child (6-17 years); Minimum 20 participants

Golf Tournament

12:30pm–5:30pm (Meet at the Golf Course)

The EOA Golf Tournament will be on Plantation Course which is an Arnold Palmer and Ed Seay design that challenges players of all skill levels. The 6,432-yard, par-72 course favors accurate iron play and good putting. Fairway landing areas are generous, but water comes into play on eight holes, and there's no shortage of deep woods or yawning ravines. Greens are large and provide inviting targets for approach shots. Once on the putting surface, undulations and swales make getting down in two a satisfying accomplishment. Tournament will be a shotgun start with scramble format.

Price: \$150 per person (Included in price are greens fees, lunch, beverage cart, and an EOA hat.)

Industry Workshop — ConvaTec

1:00pm–2:00pm (Ballrooms C & D)

Risk Mitigation of Infection in Total Joint Arthroplasty and Post-operative Wound Management

Moderator: Javad Parvizi, MD, FRCS

The following topics will be discussed by the faculty below:

Changing Incidence of Arthroplasty and the Burden of Infection

Javad Parvizi, MD, FRCS

Risk Factors for Infection in total Joint Arthroplasty

Amar S. Ranawat, MD

Wound Management in Total Joint Arthroplasty

Bryan Springer, MD

CME credit not available

Price: Included in Registration Fee; lunch included

Tennis Round Robin

1:30pm–4:30pm (Meet at the Tennis Court)

Price: \$38 per person

Exhibitor and Poster Reception

5:30pm–7:30pm (Ballrooms A, B, and Foyer)

This is an opportunity to visit with the Exhibitors and view the Scientific Posters. Enjoy your favorite beverage and delicious fruits and cheeses.

Attire: Business Casual

Price: Included in Registration Fee or \$75 per Unregistered Adult Guest

Kids' Movie and Arts & Crafts

5:30pm–7:30pm (Tazewell Room)

Dinner and a movie—fun! Watch a great movie and nibble on snacks and treats with your friends.

Children younger than 5 years old must be accompanied by an adult.

Price: Included in Registration Fee or \$25 per Unregistered Child (5-12 years)

Saturday, October 22, 2011

Morning Walk

8:00am (Meet in the Lobby)

Price: Included in Registration Fee

Enjoy Breakfast with Other Spouses

8:00am–10:00am (Eagles Dining Room)

Price: On Your Own

Party Bridge

9:00am (Bray's Landing)

Price: Included in Registration Fee

Water Activities on Wareham's Pond

10:00am–5:00pm (Meet at Wareham's Pond)

Spouses and children will have an opportunity to enjoy kayaks, paddle boats, and jon boats.

Price: Included in Registration Fee

Jamestown/Yorktown Tour

1:15pm–5:45pm (Meet at Resort Circle/Main Resort Lobby)

Upon arrival to Jamestown Settlement, a guide will escort you to the newly-opened exhibit of The World of 1607. Here you will see iconic artifacts from museums, libraries, and private collections from more than ten countries. You will continue touring Jamestown Settlement, which was originally built fifty years ago to commemorate the 350th anniversary of the first permanent English settlement at Jamestown. It was to be a temporary exhibit, but was so successful, it still remains fifty years later. You will see replicas of the three ships that arrived in 1607, the Susan Constant, Godspeed, and Discovery. You are welcome to climb aboard and imagine the living conditions experienced by the

settlers. Then we travel to Yorktown. Upon arrival, you will visit and tour the Yorktown Victory Center. Here, America's evolution from colonial status to nationhood is chronicled through a unique blend of timeline, film, thematic exhibits, and outdoor living history. An outdoor exhibit walkway details events that led the American colonies to declare independence from Britain. Transportation is included in the price. (Lunch is not included.)

Price: *\$58 per Adult (12 years and over); \$48 per Child (6-11 years); \$25 per Child (0-5 years), Minimum 30 participants*

Jazz Band Reception

7:00pm–8:00pm (*James River Terrace*)

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.

Founders' Dinner Dance

8:00pm–11:00pm (*Ballrooms C & D*)

Dinner will also be an event to remember with a delicious meal, good company, and dancing music.

Attire: Black Tie Preferred

Price: *Included in Registration Fee or \$150 per Unregistered Guest*

Kids' Movie and Arts & Crafts

7:00pm–11:00pm (*Tazewell Room*)

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

Price: *Included in Registration Fee*

Meeting Information

FORMAT

The educational sessions will be held October 20-22, 2011, from approximately 6:00am until 3:00pm, allowing free time in the afternoons.

TARGET AUDIENCE

The 42nd 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 31 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- *19.5 CME Credits for Scientific Program
- *7 CME Credits for Scientific Poster Sessions
- *4.5 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 2011 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.

2011 President

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David L. Kaplan, PhD
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EOA is pleased to have David L. Kaplan, PhD as the 2011 Howard Steel Lecturer. Dr. Kaplan holds an endowed chair, the Stern Family Professor of Engineering, at Tufts University. He is Professor & Chair of the Department of Biomedical Engineering and also holds faculty appointments in the School of Medicine, the School of Dental Medicine, Department of Chemistry, and the Department of Chemical and Biological Engineering.

Dr. Kaplan's research focus is on biopolymer engineering to understand structure-function relationships, with emphasis on self-assembly, biomaterials engineering, and functional tissue engineering. He has written over 400 published papers and edited eight books. He directs the NIH P41 Tissue Engineering Resource Center (TERC) that involves Tufts University and Columbia University.

Dr. Kaplan serves on the editorial boards of numerous journals and is Associate Editor for the journal *Biomacromolecules*. He has received a number of awards for teaching, was Elected Fellow, American Institute of Medical and Biological Engineering (2003) and received the Society for Biomaterials Clemson Award for contributions to the literature in 2007. Please join us for his exciting and interesting presentation.

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Nimbic Systems recently received FDA clearance for the Air Barrier System™ (ABS) technology which will be showcased at EOA. The Air Barrier System creates a protective cocoon of air immediately surrounding an arthroplasty surgical incision that reduces the presence of colony-forming units by >84%. The ABS consists of two components: a non-sterile, reusable filter unit that provides ultra-clean air; and the ABS Nozzle, a sterile, disposable assembly which delivers the ultra-clean air directly over the surgical incision site.

Practice Partners in Healthcare

1 Chase Corporate Drive, Suite 200
Birmingham, AL 35244
888-310-1311
www.practicepartners.org

Practice Partners in Healthcare is a developer, manager, and minority equity partner of ambulatory surgery centers. We deliver success-proven expertise in new and existing

surgery centers, with a focus on orthopedics and pain management.

Positive Physicians Insurance Exchange

850 Cassatt Road
100 Berwyn Park, Suite 220
Berwyn, PA 19312
888-335-5335
www.positivephysicians.com

Positive Physicians is one of the only physician driven medical mal-practice insurance companies in Pennsylvania and New Jersey.

ProScan Reading Services

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

ProScan: World Leader in MSK MRI Interpretations. ProScan combines our unparalleled radiologic expertise; educational heritage and vast MRI center development to bring you the performance and responsiveness that breeds trust and satisfaction. Quality reads by board certified fellowship trained MSK Radiologists. ProScan: Getting the quality and economics right!

RA Services, Inc.

2602 Buford Road
Richmond, VA 23235
855-439-6929
dmorrison@raservicesbilling.com

RA Services, Inc. — Billing medical services for over 33 years. We also provide I.T. consulting and PACS Archival. Our staff consists of certified coders and billers located in Richmond, Virginia.

Riverside Health System

701 Town Center Drive, Suite 1000
Newport News, VA 23606
757-534-7026
www.rivhs.com

Riverside Medical Group, a division of Riverside Health System, is located in southeastern Virginia and encompasses 440 + providers in all major specialties. Historically dominated by acute and long-term care facility investments, Riverside is now a working model of the physician-directed transition of healthcare: resilient and flexible enough to face inevitable changes.

Roll-A-Bout Corp

3240 Barratts Chapel Road
Frederica, DE 19946
888-736-6151
www.roll-a-bout.com

The Original Roll-A-Bout is the SAFE, 4-wheeled crutch-substitute for lower leg injuries. The Roll-A-Bout keeps your patients 100% non-weight bearing while safely granting mobility. The Roll-A-Bout Corporation rents and sells 14 different models including our very popular All-Terrain models.

Salient Surgical Technologies

180 International Drive
Portsmouth, NH 03801
800-354-2808
www.salientsurgical.com

Salient Surgical Technologies develops and manufactures advanced energy devices that deliver proprietary TRANSCOLLATION® technology, a combination of radiofrequency (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.

Smith & Nephew, Inc

7135 Goodlett Farms Parkway
Cordova, TN 38016
901-396-2121
www.smith-nephew.com

Smith & Nephew, Inc. is a global provider of leading-edge joint replacement systems for knees and hips, trauma products to help repair broken bones and other medical devices to help alleviate pain in joints and promote healing.

SRSsoft

155 Chestnut Ridge Road
Montvale, NJ 07645
201-802-1300
www.srssoft.com

SRS is the recognized leader in productivity-enhancing EHR technology for orthopaedic practices, with an unparalleled adoption rate. The SRS EHR, SRS CareTracker PM, and SRS PACS enhance patient care and increase revenue. Prominent orthopaedic groups overwhelmingly choose SRS because of its unique fit with the demands of their specialty.

Stryker Orthopaedics

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

Stryker Orthopaedics is a global leader in the development of orthopaedic technology that helps to improve the quality of life of patients around the world.

Synthes

1301 Goshen Parkway
West Chester, PA 19380
610-719-6500
www.synthes.com

Synthes is a leading global medical device company. We develop, produce and market instruments, implants and biomaterials for the surgical fixation, correction and regeneration of the skeleton and its soft tissues.

Synvasive Technology, Inc.

8690 Technology Way
Reno, NV 89521
916-939-3913
www.synvasive.com

Located in Reno, Nevada, Synvasive Technology, Inc. develops, manufactures and distributes patented and proprietary instruments enhancing reconstructive Orthopaedic surgery.

Tiemann Surgical

25 Plant Avenue
Hauppauge, NY 11788
800-Tiemann
www.georgetiemann.com

Tiemann Surgical will display the many custom/unique styled instruments many designed by surgeons to make surgery just a bit faster or easier. Please stop to see if one of our exclusive instruments would benefit you, plus see our new affordable surgical loops.

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 West Center Street
Warsaw, IN 46581
800-631-6131
www.zimmer.com

Zimmer is the world leader in musculoskeletal health. We're creators of innovative and personalized joint replacement technologies. After nearly a century, we remain true to our purpose of restoring mobility, alleviating pain, and helping millions of people around the world find renewed vitality.

EOA Business Meetings

Eastern Orthopaedic Association

Kingsmill
Williamsburg, Virginia
Ballrooms C & D

Thursday, October 20, 2011
7:00am–7:15am

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 John C. Richmond, MD
- III. Report of the Immediate Past President Robert N. Richards Jr., MD
- IV. Report of the First Vice President Henry A. Backe, MD
- V. Report of the Second Vice President David S. Zelouf, MD
- VI. Report of the Treasurer David W. Romness, MD
- VII. Report of the Historian Robert P. Boran, MD
- VIII. Report of the Program/Professional Education Committee Geoffrey H. Westrich, MD
- IX. Report of the Membership Committee James C. Vailas, MD
- X. Report of the Managing Director E. Anthony Rankin, MD
- XI. Report of Member at Large (1 yr) Mark J. Lemos, MD
- XII. Report of Member at Large (2 yr) Javad Parvizi, MD, FRCS
- XIII. Report of Member at Large (3 yr) Michael P. Bolognesi, MD
- XIV. Report of the Bylaws Committee David S. Zelouf, MD
- XV. Report of the Technical Exhibit Committee Amar S. Ranawat, MD
- XVI. Report of Finance Committee David W. Romness, MD
- XVII. Report of Audit Committee Henry A. Backe, MD
- XVIII. Report of Nominating Committee/Presentation of Slate Robert N. Richards Jr., MD
2011-2012 Nominating Committee:
John D. Lubahn, MD (Elected)
Marc J. Levine, MD (Elected)
Marc E. Rankin, MD (Elected)
Richard J. Bowen, MD (Appointed by Dr. Richmond)
- 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:

Scott D. Boden, MD (2010-2012) (Appointed)

Jose A. Rodriguez, MD (2009-2011) (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

2010 Eastern Orthopaedic Association Annual First Business Meeting Minutes

Naples, Florida
Thursday, October 14, 2010

The meeting was called to order at 6:40 AM by President Robert N. Richards Jr., MD. He determined that a quorum was present to appropriately conduct the business of the Association.

Report of the Secretary, David S. Zelouf, MD: The minutes from the previous First Business Meeting from Atlantis, 2009, were approved as submitted.

Report of the President, Robert N. Richards, MD: Dr. Richards welcomed everyone to Naples for the 41st annual EOA meeting. He reported that the meeting will be highly educational with 94 podium presentations and several symposia. He commended Dr. Guille and the Program Committee for putting together an excellent meeting.

Report of the Immediate Past President, Judith F. Baumhauer, MD: No report.

Report of the 1st Vice President, John C. Richmond, MD: Dr. Richmond reported that he looks forward to the 42nd annual meeting to be held on October 19-22, 2011, at the Kingsmill resort in Williamsburg, Virginia. Dr. Geoffrey Westrich will be the Program Chair.

Report of the 2nd Vice President, Henry A. Backe, MD: Dr. Backe reported that the 43rd annual meeting will be held at the Sagamore Resort, Bolton Landing on Lake George, NY on June 20-23, 2012. Dr. John Kelly will serve as the Program Chair.

Report of the Treasurer, David W. Romness, MD: Dr. Romness 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: No report.

Report of the Program Chair, James T. Guille, MD: Dr. Guille reported that 228 abstracts were received for review and there are 94 abstract presentations with 32 poster presentations.

Report of the Membership Committee, John D. Kelly, MD: Dr. Kelly reported that as of the meeting there were 87 new members and 788 active members. He encouraged the new members to attend the new member reception.

Report of the Managing Director, E. Anthony Rankin, MD: Dr. Rankin reported that a new contract has been negotiated with Data Trace.

Report of the Member at Large (1 yr), Geoffrey H. Westrich, MD: No report

Report of the Member at Large (2 yr), Mark J. Lemos, MD: No report.

Report of the Member at Large (3 yr), Javad Parvizi, MD: No report.

Report of the Bylaws Committee, David S. Zelouf, MD: No bylaws changes, no report.

Report of the Technical Exhibit Committee, Amar S. Ranawat, MD: Dr. Ranawat reported that at this meeting there are 46 exhibitors. He encouraged all to visit and thank the exhibitors for supporting our meeting.

Report of the Finance Committee, David W. Romness, MD: Dr. Romness reported the net assets and liabilities are well balanced at this time. The EOA investment portfolio has improved significantly and is up 5.5% YTD. He also reported that our investment strategy remains conservative at this time.

Report of the Audit Committee, John C. Richmond, MD: No report.

Report of the Nominating Committee/Presentation of Slate, Judith F. Baumhauer, MD, Chairman: Dr. Baumhauer presented the slate of officers to the membership. These include:

President: John C. Richmond, MD
First Vice President: Henry A. Backe, MD
Second Vice President: David S. Zelouf, MD
Secretary: James T. Guille, MD
Member at Large: Michael P. Bolognesi, MD

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

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

1. John D. Lubahn, MD
2. Marc J. Levine, MD
3. Brian J. Galinat, MD
4. Marc E. Rankin, MD

Nominations were then closed and a ballot will take place at the Second Business Meeting on Saturday. Members in attendance will be asked to vote for three individuals out of the four nominated to serve on the nominating committee.

There being no further new business, Dr. Richards adjourned the meeting at 6:50 AM.

Respectfully submitted,
David S. Zelouf, MD
Secretary, EOA

Eastern Orthopaedic Association

Kingsmill
Williamsburg, Virginia
Ballrooms C & D

Saturday, October 22, 2011
7:00am–7:15am

Second Business Meeting Agenda

ELECTIONS

- I. Reading of the Minutes of the previous meeting
by the Secretary (and their approval) James T. Guille, MD
- II. Report of Telecommunications Committee Marc J. Levine, MD
- III. Report on CME Accreditation Judith F. Baumhauer, MD, MPH
- 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 Nominating Committee
- IX. Election of the Slate of Officers
- X. Installation of First Vice President as President
- XI. Adjourn

2010 Eastern Orthopaedic Association Second Business Meeting Minutes

Naples, Florida
Saturday, October 16, 2010

The meeting was called to order at 11:45 AM by President Robert N. Richards Jr., MD. He determined that a quorum was present to appropriately conduct the business of the Association.

Reading of the Secretary, David S. Zelouf, MD: The minutes from the previous Second Business Meeting from Atlantis, 2009, were approved as submitted.

Report of the Telecommunications Committee, Marc J. Levine, MD: Dr. Levine reported that BOC information will be posted on our web site.

Report of the CME Committee, E. Anthony Rankin, MD: Dr. Rankin reported that the AAOS CME Committee has approved the EOA annual meeting for a total of 29.25 (4 credits for Practice Management) 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 2010 meeting and will be led by Dr. Richards Sr.

Report of the EOEF, Chitranjan S. Ranawat, MD: Dr. Ranawat reported that there is ~\$500,000 in the EOEF fund. This year, the EOEF donated \$35,000 to the EOA to support the educational activities of the meeting. Stryker continues to support the EOEF. Dr. Ranawat reported that his trust will be donating \$250,000 to the EOEF. There are six individuals who have committed to the "Living Legacy Plan" and this will ultimately add significant funds to the EOEF. He urged all to donate \$50 to the EOEF to be involved in the drawing to be held during the dinner Saturday night.

Unfinished Business: None.

2010 Proposed Nominating Committee: Dr. Richards presented the previously nominated four candidates for three open positions on the 2011 Nominating Committee. The candidates include Dr. John D. Lubahn, MD; Dr. Marc J. Levine, MD; Dr. Brian J. Galinat, MD; and Dr. Marc E. Rankin, MD. Those present voted for three EOA members to serve on the Nominating Committee. After tabulating the ballots, the nominated committee members include Drs. Lubahn, Levine, and

Rankin. These EOA members will join Dr. Robert Richards and his appointee on the committee.

Action Item: It was moved and seconded that the Nominating Committee be approved as presented. The motion carried.

Report of the Nominating Committee/Presentation of Slate, Robert N. Richards, MD, Chairman: Dr. Richards presented the slate of officers to the membership for approval:

President:	John C. Richmond, MD
First Vice President:	Henry A. Backe, MD
Second Vice President:	David S. Zelouf, MD
Secretary:	James T. Guille, MD
Member at Large:	Michael P. Bolognesi, MD

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

New Business: Dr. Robert Richards performed the installation ceremony for the incoming president, Dr. John C. Richmond. He presented him with the EOA Medallion. Dr. Richmond then acknowledged Dr. Richards 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. Richards adjourned the meeting at 12:08 PM.

Respectfully submitted,
David S. Zelouf, MD
Secretary, EOA

Past Annual Meetings of the Eastern Orthopaedic Association 1970–2010

First Annual Meeting

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

Second Annual Meeting

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

Third Annual Meeting

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

Fourth Annual Meeting

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

Fifth Annual Meeting

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

Sixth Annual Meeting

President: James D. Fisher, MD
Dates: October 15-19, 1975
Location: Cerromar Beach Hotel
Dorado Beach, Puerto Rico
Attendance: 319 physicians / 283 spouses
Guest Speaker: Professor Pier Giorgio Marchetti
Pisa, Italy

Seventh Annual Meeting

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

Eighth Annual Meeting

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

Ninth Annual Meeting

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

Tenth Anniversary Meeting

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

Eleventh Annual Meeting

President: Wallace E. Miller, MD
 Dates: October 15-19, 1980
 Location: Cerromar Beach Hotel
 Dorado Beach, Puerto Rico
 Attendance: 354 physicians / 309 spouses
 Guest Speaker: John C. Kennedy, MD, FRCS
London, Ontario, Canada

Twelfth Annual Meeting

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

Thirteenth Annual Meeting

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

Fourteenth Annual Meeting

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

Fifteenth Annual Meeting

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

Sixteenth Annual Meeting

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

Seventeenth Annual Meeting

President: B. David Grant, MD
 Dates: October 15-19, 1986
 Location: The Southampton Princess Hotel
 Southampton, Bermuda
 Attendance: 389 physicians / 353 spouses
 Guest Speaker: Richard J. Hawkins, MD
London, Ontario, Canada

Eighteenth Annual Meeting

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

Nineteenth Annual Meeting

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

Twentieth Anniversary Meeting

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

Twenty-first Annual Meeting

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

Twenty-second Annual Meeting

President: Edward E. Kimbrough III, MD
 Dates: October 16-21, 1991
 Location: Melia Castilla Hotel
 Madrid, Spain
 Attendance: 300 physicians / 239 spouses

Guest Speakers: Augusto Sarmiento, MD
Los Angeles, California
Mr. R. Lew Bennett

Twenty-third Annual Meeting

President: George P. Bogumill, MD, PhD
Dates: October 14-18, 1992
Location: Hyatt Regency Cerromar Beach Hotel
Dorado, Puerto Rico
Attendance: 429 physicians / 285 spouses
Guest Speaker: Murray K. Dalinka, MD
Philadelphia, Pennsylvania

Twenty-fourth Annual Meeting

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

Twenty-fifth Annual Meeting

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

Twenty-sixth Annual Meeting

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

Twenty-seventh Annual Meeting

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

Twenty-eighth Annual Meeting

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

Twenty-ninth Annual Meeting

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

Thirtieth Anniversary Meeting

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

Thirty-first Annual Meeting

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

Thirty-second Annual Meeting

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

Thirty-third Annual Meeting

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

Thirty-fourth Annual Meeting

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

Thirty-fifth Annual Meeting

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

Thirty-sixth Annual Meeting

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

Thirty-seventh Annual Meeting

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

Thirty-eighth Annual Meeting

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

Thirty-ninth Annual Meeting

President: Robert V. Dawe, MD
 Dates: October 22-25, 2008
 Location: The Ritz-Carlton
 Lake Las Vegas, Nevada
 Attendance: 160 physicians/55 spouses
 Guest Speaker: Chitranjan S. Ranawat, MD
New York, New York

Fortieth Annual Meeting

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

Forty-first Annual Meeting

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



Eastern Orthopaedic Association

Scientific Program

42nd Annual Meeting

October 20-22, 2011

Kingsmill

Williamsburg, Virginia

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

2011 Program Chair



Geoffrey H. Westrich, MD
New York, New York

Dr. Geoffrey Westrich is an Associate Attending Orthopaedic Surgeon and Associate Professor of Orthopaedic Surgery at the Hospital for Special Surgery/Weill Cornell Medical College. He is also the Director of Research for the Adult Reconstruction and Joint Replacement Service. He did his orthopaedic surgery training at the Hospital for Special Surgery and pursued two fellowships: an AO Fellowship in Bern, Switzerland in Adult Reconstruction and Trauma and an Arthroplasty fellowship in Adult Reconstruction of the Hip and Knee at the Hospital for Special Surgery. Dr. Westrich's research interests include improving outcomes and preventing complications following hip and knee surgery, with a specific interest in preventing thromboembolic complications. Dr. Westrich has been an active member of the Eastern Orthopedic Association, serving on multiple committees and is now very honored to be the Program Chairman for this year's meeting.

EOA Honorary Members

Theodore R. Lammot III, MD	Incorporator
Mr. John Wells Sharrard, FRCS	Guest Speaker 1970
Professor J. I. P. James, FRCS	Guest Speaker 1972
Professor Pier Giorgio Marchetti	Guest Speaker 1975
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James N. Weinstein, MS, DO	Guest Speaker 2009
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2011 Presidential Guest Speaker



Brian Day, MD
Vancouver, Canada

EOA is pleased that Dr. Brian Day will be the Presidential Guest Speaker for the 2011 Annual Meeting in Williamsburg. Dr. Day was born in Liverpool, England and graduated in medicine at the University of Manchester in 1970. He obtained specialist qualifications in both internal medicine and general surgery before moving to Canada, where he completed his orthopaedic training. Dr. Day is a Fellow of the Royal Colleges of Surgeons of Canada and England and the American Academy of Orthopaedic Surgeons. After further training in Switzerland, he practiced in the field of orthopaedic trauma and introduced some of the minimally invasive techniques for fracture treatment to Canada. In 1979, Dr. Day received the Canadian Orthopaedic Association's Samson Award, for outstanding orthopaedic research in Canada. He was a leader in the early teaching of arthroscopic surgical techniques and in 2003 he served as President of the Arthroscopy Association of North America.

Dr. Day is a former vice president of the Canadian Orthopaedic Foundation, and in that role, he helped launch the national Hip-Hip Hooray walks that helped raise \$20 million for orthopaedic research in Canada. He is a past chair of the Royal College of Surgeons of Canada Test Committee in Orthopaedics and an associate professor in orthopaedics at the University of British Columbia. He has been a visiting professor and lecturer at many universities and learned societies and has written over 150 published scientific articles and book chapters. In 1984, Dr. Day's collaborative work with a group of biomedical engineers resulted in the development of "Arthrobot," the world's first surgical robot. This received world-wide acclaim and was featured by *National Geographic*.

Dr. Day has specialized in the surgical treatment of sports injuries and has treated many international and national elite athletes. He is the founder, President and CEO of Cambie Surgeries Corporation, a company that in 1995 opened the first private, for-profit hospital of its type in Canada. *MacLean's*, Canada's leading news magazine, described Dr. Day as "an iconoclast, whose time is now." In August 2007, Dr. Day became the only orthopaedic surgeon in the 143-year history of the Canadian Medical Association to assume the role of President.

2011 EOA Resident/Fellow Award Recipients

Founders' Award

The Role of ApoE ϵ Intervertebral Disc Degeneration

X. Joshua Li, MD, PhD, University of Virginia, Charlottesville, VA
(Friday, October 21, 8:30am–8:35am)

Ranawat Award

“Same Day” Ex-Vivo Regional Gene Therapy: A Novel Strategy to Enhance Bone Repair

Mandeep Virk, MD, New England Musculoskeletal Institute, Farmington, CT
(Thursday, October 20, 8:30am–8:35am)

Resident Awards

Efficacy of Popliteal Block in Post-Operative Pain Control After Ankle Fracture Fixation: A Prospective Randomized Study

Rachel Y. Goldstein, MD, MPH, NYU Hospital for Joint Diseases, New York, NY
(Friday, October 21, 7:35am–7:40am)

Long-Term Survivorship and Wear Analysis in Young, Active Patients: A Matched Pair Analysis of Ceramic and Metal on Polyethylene

Morteza Meftah, MD, Hospital for Special Surgery, New York, NY
(Friday, October 21, 8:25am–8:30am)

Efficacy of Postoperative Intraarticular Analgesia Following Total Knee Arthroplasty: A Randomized, Double-Blinded, Prospective Study

Nitin Goyal, MD, The Rothman Institute, Philadelphia, PA
(Saturday, October 22, 8:15am–8:20am)

Resident Travel Grant Awards

Identification of the Radial Nerve During the Posterior Approach to the Humerus: A Cadaveric Study

Daniel A. Seigerman, MD, University of Medicine and Dentistry New Jersey Medical School, Newark, NJ
(Thursday, October 20, 7:18am–7:23am)

Determining a Safe INR Cut-Off Value for Total Joint Arthroplasty: A Retrospective Evaluation of Perioperative Complications Based on Preoperative INR Levels

Timothy DiIorio, MD, The Rothman Institute, Philadelphia, PA
(Thursday, October 20, 7:23am–7:28am)

Revision Total Knee Arthroplasty: Are All Aseptic Cases Truly Aseptic?

Mohammad R. Rasouli, MD, The Rothman Institute, Philadelphia, PA
(Thursday, October 20, 7:33am–7:38am)

A Level 1, Randomized, Controlled Prospective Study Evaluating the Effect of Patellar Eversion on Functional Outcomes in Primary Total Knee Arthroplasty

Derek Jenkins, MD, Lenox Hill Hospital, New York, NY
(Thursday, October 20, 8:03am–8:08am)

Results of Non-Cemented Semi-Constrained Total Elbow Arthroplasty for Inflammatory Arthritis: A Minimum Fifteen Year Follow-up

Michael B. Cross, MD, Hospital for Special Surgery, New York, NY
(Thursday, October 20, 9:10am–9:15am)

Intercondylar Notch Size and Non-Contact ACL Injuries at the United States Naval Academy

Kelly Kilcoyne, MD, United States Naval Academy, Annapolis, MD
(Thursday, October 20, 2011, 9:10am–9:15am)

Evaluation of Sterilization Methods Following Contamination of ACL Hamstring Autografts

Xinning Li, MD, University of Massachusetts Medical Center, Worcester, MA
(Thursday, October 20, 9:47am–9:52am)

CLX Intercarpal Arthrodesis for the Treatment of the SLAC Wrist

Mark L. Wang, MD, PhD, Thomas Jefferson University Hospital, Philadelphia, PA
(Thursday, October 20, 10:02am–10:07am)

Comparison of MRI and Physical Exam Accuracy in Diagnosing Acute Achilles Tendon Ruptures

David N. Garras, MD, Thomas Jefferson University Hospital, Philadelphia, PA
(Friday, October 21, 7:00am–7:05am)

Utility of Magnetic Resonance Arthrograms of the Hip in Diagnosis of Labral and Chondral Pathology

Fiona Carty, MD, The Rothman Institute, Philadelphia, PA
(Friday, October 21, 7:05am–7:10am)

The Twist Test: A New Test for Hip Labral Pathology

Farshad Adib, MD, Nirschl Orthopaedic Center, Arlington, VA
(Friday, October 21, 7:35am–7:40am)

The Ventral Lamina and Superior Facet Rule: The Key to Accurate Placement for Thoracic Pedicle Screws

Daniel G. Kang, MD, Walter Reed Army Medical Center, Washington, DC
(Friday, October 21, 8:15am–8:20am)

Spinal Anesthesia: Should Everyone Receive a Urinary Catheter? A Randomized-Prospective Study in Patients Undergoing Total Hip Arthroplasty

Adam G. Miller, MD, The Rothman Institute, Philadelphia, PA
(Friday, October 21, 8:15am–8:20am)

Is There Faster Recovery After Direct Anterior Than Posterior Approach Total Hip Arthroplasty?

Ajit J. Deshmukh, MD, North-Shore LIJ-Lenox Hill Hospital, New York, NY
(Friday, October 21, 8:20am–8:25am)

Celebrex & Heterotopic Bone Formation After Total Hip Arthroplasty

Juan S. Contreras, MD, Orthopaedic Institute at Mercy Hospital, Miami, FL
(Friday, October 21, 8:30am–8:35am)

Measurement of the Distance Between the Transverse Acetabular Ligament and the Radiographic Teardrop

Matthew Harris, MD, MBA, Westchester Medical Center/New York Medical College, Valhalla, NY
(Friday, October 21, 8:53am–8:58am)

Socioeconomic Factors Influence the Incidence of Repeat Emergency Department Visits in Pediatric Patients with Closed Fractures

Christopher J. Dy, MD, MSPH, Hospital for Special Surgery, New York, NY
(Friday, October 21, 9:21am–9:26am)

The Location of Medial Patellofemoral Ligament Tears in Adolescents and Children

Scott A. Putney, MD, Nemours Children's Clinic, Jacksonville, FL

(Friday, October 21, 9:26am–9:31am)

Serum White Blood Cell Count and Differential Does Not Have a Role in the Diagnosis of Periprosthetic Joint Infection

Nader Toossi, MD, The Rothman Institute, Philadelphia, PA

(Saturday, October 22, 7:50am–7:55am)

Inpatient Pulmonary Embolism in US Elective Primary Hip and Knee Arthroplasty Patients

Usman Zahir, MD, University of Maryland Medical Center, Baltimore, MD

(Saturday, October 22, 8:25am–8:30am)

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Accreditation Information for the Scientific Program

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MISSION

The Eastern Orthopaedic Association (EOA) was established in 1970 under the leadership of Howard H. Steel, MD and 12 prominent orthopaedic surgeons. Its purpose is to promote, encourage, foster, and advance the art and science of orthopaedic surgery and matters related thereto, and to establish a forum for free discussion and teaching orthopaedic methods and principles.

PURPOSE

1. Provide the participants with an educational experience, in an unbiased forum, that will enable them to remain current in the general practice of orthopaedic surgery.
2. Provide the participants with an in-depth exposure to selected specific clinical areas of orthopaedic surgery.
3. Allow participants to identify areas in which they need to obtain more information on orthopaedic advances.
4. Present a forum for an open exchange of ideas between the presenters, the faculty and the participants through paper presentations, case reviews, 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 allowing open discussion with

the lecturers and paper presenters. The following objectives will be addressed during the Scientific Program, such that, at the conclusion of this course, the attendees should be able to:

1. Enhance and maximize clinical and operative skills in the management of new and advancing technology in orthopaedic disorders.
2. Critically evaluate orthopaedic treatments through evidence-based outcome presentations.
3. Discuss basic science and clinical study advances and their implications pertaining to the diagnosis and treatment of orthopaedic problems.
4. Understand some of the basic principals in practice management.

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 20-22.

MULTIMEDIA EDUCATION

Multimedia education materials will be offered on Thursday, Friday, and Saturday, October, 20-22, at the designated times. A comprehensive selection of AAOS DVDs will be available for your individual education.

CME ACCREDITATION

This activity has been planned and implemented in accordance with the 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 31 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- * 19.5 CME credits for Scientific Program
- * 7 CME credits for Poster Sessions
- * 4.5 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 2011 Annual Meeting CME Credit Records. CME Certificates will be awarded to all registered participants.

CEC CREDIT

Physician's Assistants can receive up to 31 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; otherwise, your CME credit hours cannot be certified. **(CME Credit Record, Needs Assessment and Course Evaluation Forms can be found in the back of this program on pages 185-190.)**

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.

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Some drugs 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 each drug or medical device he or she wishes to use in clinical practice.

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

2011 Scientific Program

Thursday, October 20, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

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

7:00am–7:15am **First Business Meeting**

7:15am–7:18am **Welcome to EOA's 42nd Annual Meeting**
John C. Richmond, MD, President
(Ballrooms C & D)
Geoffrey H. Westrich, MD, Program Chair (Burwell Room)

Concurrent General Session I — Total Knee (Ballrooms C & D)

Moderators: James J. Purtill, MD
David W. Romness, MD

- 7:18am–7:23am “Re-Learning” Curve of Conventional Total Knee Arthroplasties Following 30 Consecutive Computer-Assisted Total Knee Arthroplasties
David Trofa, BA, Tufts University School of Medicine, Boston, MA
**Presented by Eric L. Smith, MD*
- 7:23am–7:28am **Resident Travel Grant Award**
Determining a Safe INR Cut-Off Value for Total Joint Arthroplasty: A Retrospective Evaluation of Perioperative Complications Based on Preoperative INR Levels
Timothy DiIorio, MD, The Rothman Institute, Philadelphia, PA
- 7:28am–7:33am A Multi-Center, Randomized Trial to Evaluate the Effect of a Cryopneumatic Device During TKR Recovery
Michelle Perna, BA, Hospital for Special Surgery, New York, NY
- 7:33am–7:38am **Resident Travel Grant Award**
Revision Total Knee Arthroplasty: Are All Aseptic Cases Truly Aseptic?
Mohammad R. Rasouli, MD, The Rothman Institute, Philadelphia, PA
- 7:38am–7:43am Cadaveric Results of a Hand-Held, Pinless Navigation System for the Tibial Resection in Total Knee Arthroplasty
Denis Nam, MD, Hospital for Special Surgery, New York, NY

Concurrent General Session II — Trauma (Burwell Room)

Moderators: Fotios P. Tjoumakaris, MD
W. Fred Hess, MD

- 7:18am–7:23am **Resident Travel Grant Award**
Identification of the Radial Nerve During the Posterior Approach to the Humerus: A Cadaveric Study
Daniel A. Seigerman, MD, University of Medicine and Dentistry New Jersey Medical School, Newark, NJ
- 7:23am–7:28am Results of Proximal Ulna Fractures Treated with a Multiplanar, Locked Intramedullary Nail: First Multicenter Experience
Scott G. Edwards, MD, Georgetown University Hospital, Washington, DC/Rush University Medical Center, Chicago, IL/University of Maryland, Shock Trauma, Baltimore, MD
- 7:28am–7:33am Dual Mini-Fragmentation Plating of Displaced Midshaft Clavicle Fractures: Biomechanical and Outcomes Report
Dirk Leu, MD, Hospital for Special Surgery, New York, NY
- 7:33am–7:38am Comparison of Functional Outcome Between Bony and Ligamentous Injuries in Supination External Rotational Type Four (SER IV) Ankle Fractures
Marschall B. Berkes, MD, Hospital for Special Surgery, New York, NY
**Presented by Peter K. Sculco, MD*

Thursday, October 20, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

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| <p>7:43am–7:53am Discussion</p> <p>7:53am–7:58am Indwelling Femoral Nerve Catheters: Reducing the Need for Manipulation Following Total Knee Arthroplasty?
<i>Carl T. Talmo, MD, New England Baptist Hospital, Boston, MA</i></p> <p>7:58am–8:03am Diagnosing Periprosthetic Infection with C-Reactive Protein in Joint Fluid
<i>James Cashman, MD, The Rothman Institute, Philadelphia, PA</i></p> <p>8:03am–8:08am Resident Travel Grant Award
A Level 1, Randomized, Controlled Prospective Study Evaluating the Effect of Patellar Eversion on Functional Outcomes in Primary Total Knee Arthroplasty
<i>Derek Jenkins, MD, Lenox Hill Hospital, New York, NY</i></p> <p>8:08am–8:13am Accuracy of Pre-Operative Planning in Robot-Assisted Unicompartamental Knee Arthroplasty
<i>Maria S. Goddard, MD, Wake Forest University Baptist Medical Center, Winston-Salem, NC</i>
<i>*Presented by Riyaz H. Jinnah, MD</i></p> <p>8:13am–8:21am Discussion</p> <p>8:21am–8:26am Is Inferior Vena Cava Filter Effective at Preventing Pulmonary Embolism?
<i>Benjamin Zmistowski, BS, The Rothman Institute, Philadelphia, PA</i>
<i>*Presented by Camilo Restrepo, MD</i></p> <p>8:26am–8:31am A Novel Protocol to Improve Hemostasis in Total Knee Arthroplasty
<i>Carlos A. Sagebien, MD, UMDNJ-Robert Wood Johnson University Hospital, New Brunswick, NJ</i>
<i>*Presented by David A. Harwood, MD</i></p> <p>8:31am–8:36am Intraoperative Periprosthetic Fractures During Primary TKA: The Importance of Box Cut Size
<i>Lawrence Delasotta, MD, MPH, The Rothman Institute, Philadelphia, PA</i></p> | <p>7:38am–7:49am Discussion</p> <p>7:49am–7:54am Re-Operation Following Combat Related Major Lower Extremity Amputations
<i>LT Scott Tittle, MD, Walter Reed Army Medical Center, Washington, DC</i></p> <p>7:54am–7:59am Functional Outcomes of Supination External Rotation Type IV Ankle Fracture Dislocations
<i>Lionel E. Lazaro, MD, Hospital for Special Surgery, New York, NY</i></p> <p>7:59am–8:04am Acute Operative Complications of Open Distal Radius Fractures: A Retrospective Cohort Study
<i>Jaehon M. Kim, MD, Massachusetts General Hospital/Brigham and Women's Hospital, Brookline, MA</i></p> <p>8:04am–8:09am Acute Hospital Resource Utilization in Combat Wounded Multiple Extremity Amputees from Operation Iraqi Freedom and Operation Enduring Freedom
<i>CDR Mark E. Fleming, DO, National Naval Medical Center, Bethesda, MD</i></p> <p>8:09am–8:20am Discussion</p> <p>8:20am–8:25am Fixation of Unstable Inter-Trochanteric Hip Fractures in Internal Rotation: An Important Predictor of Fracture Union
<i>Parthiv A. Rathod, MD, Lenox Hill Hospital, New York, NY</i></p> <p>8:25am–8:30am Rockwood Pin Fixation in the Management of Midshaft Clavicle Fractures: A Retrospective Review
<i>Timothy B. Larson, MD, Carolinas Medical Center, Charlotte, NC</i></p> <p>8:30am–8:35am Ranawat Award
“Same Day” Ex-Vivo Regional Gene Therapy: A Novel Strategy to Enhance Bone Repair
<i>Mandeep Virk, MD, New England Musculoskeletal Institute, Farmington, CT</i></p> |
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*Institution by abstract presenter's name is the location where the research took place.

Thursday, October 20, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

8:36am–8:41am Preoperative Risk Stratification Reduces the Incidence of Perioperative Delirium, Renal Failure, and Pulmonary Failure After Total Knee Arthroplasty
Kris Radcliff, MD, The Rothman Institute, Philadelphia, PA
**Presented by Alvin Ong, MD*

8:41am–8:50am **Discussion**

8:50am–9:10am **Break — Please visit with exhibitors**

8:35am–8:40am Fracture Fixation Determines the Pathway of Osseous Repair: A Bilateral Femur Fracture Model in the Rat
David E. Jaffe, MD, University of Maryland School of Medicine, Baltimore, MD

8:40am–8:50am **Discussion**

8:50am–9:10am **Break — Please visit with exhibitors**

Concurrent General Session III — Sports Medicine (Ballrooms C & D)

Moderators: Mark J. Lemos, MD
 Fotios P. Tjoumakaris, MD

9:10am–9:15am Synovial Inflammation in Patients Undergoing Arthroscopic Meniscectomy: Does Histological Inflammation Affect Clinical Outcomes in Patients with Traumatic Meniscal Tears
Anthony Albert, MD, New England Baptist Hospital, Boston, MA

9:15am–9:20am **Resident Travel Grant Award**
 Intercondylar Notch Size and Non-Contact ACL Injuries at the United States Naval Academy
Kelly Kilcoyne, MD, United States Naval Academy, Annapolis, MD
**Presented by James H. Flint, MD*

9:20am–9:25am Open Subpectoral Biceps Tenodesis: An Anatomical Evaluation of At-Risk Structures
Jonathan F. Dickens, MD, Walter Reed National Military Medical Center, Bethesda, MD
**Presented by LT Reed M. Heckert*

Concurrent General Session IV — Upper Extremity (Burwell Rooms)

Moderators: David S. Zelouf, MD
 Henry A. Backe, MD

9:10am–9:15am **Resident Travel Grant Award**
 Results of Non-Cemented Semi-Constrained Total Elbow Arthroplasty for Inflammatory Arthritis: A Minimum Fifteen Year Follow-up
Michael B. Cross, MD, Hospital for Special Surgery, New York, NY

9:15am–9:20am Accuracy of Intra-Articular Injections of the Glenohumeral Joint Through an Anterior Approach: Arthroscopic Correlation
Matthew J. Kraeutler, BS, The Rothman Institute, Philadelphia, PA
**Presented by Christopher C. Dodson, MD*

9:20am–9:25am Ulnar Variance as a Predictor of Persistent Instability Following Galeazzi Fracture Dislocations
Richelle Takemoto, MD, NYU Hospital for Joint Diseases, New York, NY
**Presented by Igor Immerman, MD*

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

Thursday, October 20, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

<p>9:25am–9:30am Chronic Distal Biceps Tendon Repair Using Tibialis Anterior Allograft and Suture Anchors Through a Single Incision Approach <i>Claus Egidy, MD, Hospital for Special Surgery, New York, NY</i></p>	<p>9:25am–9:30am Understanding Proximal Ulna Anatomy on Static Fluoroscopic Images <i>Anna Babushkina, MD, Georgetown University Hospital, Washington, DC</i></p>
<p>9:30am–9:35am Age-Related Changes Affect Rotator Cuff Muscle Function <i>Christopher J. Tuohy, MD, Wake Forest University School of Medicine, Winston-Salem, NC</i></p>	<p>9:30am–9:40am Discussion</p>
<p>9:35am–9:42am Discussion</p>	<p>9:40am–9:45am Ninety-seven Percent Accuracy of Intra-Articular Glenohumeral Injection with a Modified Posterior Bone Touch Technique <i>Jeremie M. Axe, MD, First State Orthopaedics, Newark, DE</i></p>
<p>9:42am–9:47am Human Osteoarthritic and Degenerative Monkey Menisci Have Differential Increases of Matrix Metalloproteases Compared to Both Osteoarthritic Chondrocytes and Healthy Monkey Menisci <i>Austin V. Stone, MD, Wake Forest University School of Medicine, Winston-Salem, NC</i></p>	<p>9:45am–9:50am The Epidemiology of Finger Dislocations in the United States <i>Kevin Kang, MD, Maimonides Medical Center, Brooklyn, NY</i></p>
<p>9:47am–9:52am Resident Travel Grant Award Evaluation of Sterilization Methods Following Contamination of ACL Hamstring Autografts <i>Xinning Li, MD, University of Massachusetts Medical Center, Worcester, MA</i></p>	<p>9:50am–9:55am Incidence of Post-Traumatic Elbow Contractures <i>Mark Schrupf, MD, Hospital for Special Surgery, New York, NY</i></p>
<p>9:52am–9:57am Clinical Measurement of the Patellar Tendon: Its Accuracy and Relationship to Actual Tendon Dimensions <i>Chad C. Zooker, MD, The Rothman Institute, Philadelphia, PA</i></p>	<p>9:55am–10:00am Prospective Evaluation Following Arthroscopic Treatment of Anterior Shoulder Instability <i>Kevin D. Plancher, MD, Orthopaedic Foundation for Active Lifestyles, Cos Cob, CT</i></p>
<p>9:57am–10:02am The Role of Physical Therapy in the Treatment of Shoulder Impingement Syndrome <i>Purab Viswanath, MD, Hamot Medical Center, Erie, PA</i></p>	<p>10:00am–10:05am Resident Travel Grant Award CLX Intercarpal Arthrodesis for the Treatment of the SLAC Wrist <i>Mark L. Wang, MD, PhD, Thomas Jefferson University Hospital, Philadelphia, PA</i></p>
<p>10:02am–10:07am Effect of rhPDGF-BB-Coated Sutures on Tendon Healing in a Rat Model: A Histological and Biomechanical Study <i>Stephen Cummings, MD, Manhasset, NY</i></p>	<p>10:05am–10:15am Discussion</p>
<p>10:07am–10:15am Discussion</p>	<p>10:15am–10:20am Change Rooms</p>
<p>10:15am–10:20am Change Rooms</p>	

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Thursday, October 20, 2011

(Presenters and times are subject to change.)
 Disclosure Information is listed on pages 47-52.

Concurrent Symposium I — Knee Arthritis – Non-Arthroplasty Treatment Alternatives (Ballrooms C & D)

Moderator: Paul P. Weitzel, MD

- 10:20am–10:30am The Proper Microfracture Technique
Claude T. Moorman III, MD, Duke University Medical Center, Durham, NC
- 10:30am–10:40am Osteochondral Autografts
Paul P. Weitzel, MD, New England Baptist Hospital, Boston, MA
- 10:40am–10:50am Osteochondral Allograft Plug Transfer
Richard M. Wilk, MD, Lahey Clinic, Burlington, MA
- 10:50am–11:00am Autologous Chondrocyte Implantation
John C. Richmond, MD, New England Baptist Hospital, Boston, MA
- 11:00am–11:10am **Discussion**
- 11:10am–11:30am **Break — Please visit with exhibitors**

Concurrent Symposium II — Wrist Fractures: State of the Art Treatment (Burwell Room)

Moderator: John M. Bednar, MD

- 10:20am–10:30am Percutaneous Fixation Techniques — When Is Less Surgery Better?
John S. Taras, MD, Philadelphia Hand Center, Philadelphia, PA
- 10:30am–10:40am Spanning Plates — External Fixation Without the Pin Track Problems
Leonid I. Katolik, MD, Philadelphia Hand Center, Philadelphia, PA
- 10:40am–10:50am ORIF — Volar Plating: Tips and Tricks to Improve Results
Michael S. Bednar, MD, Loyola University School of Medicine, Chicago, IL
- 10:50am–11:00am ORIF — Dorsal Plating: Indications, Technical Pearls and Tips to Avoid Tendon Complications
John M. Bednar, MD, Philadelphia Hand Center, Philadelphia, PA
- 11:00am–11:10am **Discussion**
- 11:10am–11:30am **Break — Please visit with exhibitors**

General Session V — Howard Steel Lecturer & Presidential Address (Ballrooms C & D)

Moderator: John C. Richmond, MD

- 11:30am–11:35am Introduction of Howard Steel Lecturer
John C. Richmond, MD
- 11:35am–12:24pm **Howard Steel Lecture**
Silk-Based Orthopaedic Devices
David L. Kaplan, PhD, Tufts University, Boston, MA

12:24pm–12:30pm Introduction of President
Henry A. Backe, MD

12:30pm–1:00pm **Presidential Address**
Health Care Reform: Ahead of the Curve in Massachusetts
John C. Richmond, MD, New England Baptist Hospital, Boston, MA

1:00pm–2:00pm **Industry Workshop — Salient Surgical** (lunch included)
***Not for CME credit**

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(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

2:00pm–3:00pm **Scientific Poster Session**
(Poster Presenters Available)

3:00pm–5:00pm **Multimedia Session**

Resident/Fellow “Mini” Program (*Randolph Room*)

2:00pm–2:15pm Total Hip Replacement — Hip Pain Young Adults
Javad Parvizi, MD, FRCS, The Rothman Institute, Philadelphia, PA

2:15pm–2:30pm Revision Total Knee Replacement
Steven B. Zelicof, MD, PhD, Specialty Orthopaedics, Harrison, NY

2:30pm–2:45pm New Bearing Options — The Anatomic of Dual Mobility Total Hip Replacement
Geoffrey H. Westrich, MD, Hospital for Special Surgery, New York, NY

2:45pm–3:00pm **Discussion**

Saw Bone Workshops

3:00pm–3:20pm Total Hip Replacements Table

3:20pm–3:40pm Total Knee Replacement Table

3:40pm–4:00pm Unicompartamental Knee Table

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Friday, October 21, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

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

General Session VI — Case Reviews Upper Extremity (Ballrooms C & D)

Moderators: David S. Zelouf, MD
Edward R. McDevitt, MD

6:00am–7:00am **Case Presentations**

Concurrent General Session VII — Hip Preservation (Ballrooms C & D)

Moderators: James C. Vailas, MD
Richard M. Wilk, MD

- 7:00am–7:05am Labral Tears Seen in MRI: What Is the Significance?
Ronald Huang, BS, The Rothman Institute, Philadelphia, PA
- 7:05am–7:10am **Resident Travel Grant Award**
Utility of Magnetic Resonance Arthrograms of the Hip in Diagnosis of Labral and Chondral Pathology
Fiona Carty, MD, The Rothman Institute, Philadelphia, PA
- 7:10am–7:15am Mini-Open Femoroacetabular Osteoplasty: How Do These Patients Do?
Javad Parvizi, MD, FRCS, The Rothman Institute, Philadelphia, PA
- 7:15am–7:20am Defining the Origins of the Iliofemoral, Ischiofemoral, and Pubofemoral Ligaments of the Hip Capsuloligamentous Complex Utilizing Computer Navigation
Daniel Choi, BA, Hospital for Special Surgery, New York, NY
- 7:20am–7:30am **Discussion**
- 7:30am–7:35am Arthroscopic Treatment of Femoroacetabular Impingement in the Adolescent Athlete
Peter D. Fabricant, MD, Hospital for Special Surgery, New York, NY

Concurrent General Session VIII — Foot & Ankle (Burwell Room)

Moderators: Judith F. Baumhauer, MD, MPH
Michael M. Romash, MD

- 7:00am–7:05am **Resident Travel Grant Award**
Comparison of MRI and Physical Exam Accuracy in Diagnosing Acute Achilles Tendon Ruptures
David N. Garras, MD, Thomas Jefferson University Hospital, Philadelphia, PA
- 7:05am–7:10am Functional and T2-Mapping MRI Results of Autologous Osteochondral Transplantation of the Talus in 72 Patients
Christopher D. Murawski, Hospital for Special Surgery, New York, NY
- 7:10am–7:15am Functional Outcome, Complications and Radiographic Comparison of Supination External Rotation Type IV Ankle Fractures in Geriatric Versus Non-Geriatric Populations
Milton T. M. Little, MD, Hospital for Special Surgery, New York, NY
- 7:15am–7:20am Complications Following Open Reduction Internal Fixation of Ankle Fractures in Patients with a Positive Urine Drug Screen
Vilas Saldanha, MD, Albert Einstein Medical Center, Philadelphia, PA
- 7:20am–7:30am **Discussion**

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(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

- 7:35am–7:40am **Resident Travel Grant Award**
The Twist Test: A New Test for Hip Labral Pathology
Farshad Adib, MD, Nirschl Orthopaedic Center, Arlington, VA
- 7:40am–7:45am Diagnostic Accuracy of Intra-Articular Anesthetic Hip Injection in Hip Arthroscopy Patients
Kevin W. Wilson, MD, Walter Reed National Military Medical Center, Bethesda, MD
**Presented by Emily Shin*
- 7:45am–7:50am A Novel Approach to Assess Dynamic Function in the Non-Arthritic Hip
Travis G. Maak, MD, Hospital for Special Surgery, New York, NY
- 7:50am–7:55am **Discussion**
- 7:55am–8:15am **Break — Please visit with exhibitors**

- 7:30am–7:35am Surgical Treatment of Nonunion Following Rotational Ankle Fractures
Sonya Khurana, BS, NYU Hospital for Joint Diseases, New York, NY
- 7:35am–7:40am **Resident Award**
Efficacy of Popliteal Block in Post-Operative Pain Control After Ankle Fracture Fixation: A Prospective Randomized Study
Rachel Y. Goldstein, MD, MPH, NYU Hospital for Joint Diseases, New York, NY
- 7:40am–7:45am Quality of Research and Level of Evidence in Foot and Ankle Publications
Heather Barske, MD, University of Rochester, Rochester, NY
**Presented by Judith F. Baumhauer, MD, MPH*
- 7:45am–7:55am **Discussion**
- 7:55am–8:15am **Break — Please visit with exhibitors**

Concurrent General Session IX — Total Hip (Ballrooms C & D)

Moderators: Stephen B. Murphy, MD
William G. Hamilton, MD

- 8:15am–8:20am **Resident Travel Grant Award**
Spinal Anesthesia: Should Everyone Receive a Urinary Catheter? A Randomized-Prospective Study in Patients Undergoing Total Hip Arthroplasty
Adam G. Miller, MD, The Rothman Institute, Philadelphia, PA
- 8:20am–8:25am **Resident Travel Grant Award**
Is There Faster Recovery After Direct Anterior than Posterior Approach Total Hip Arthroplasty?
Ajit J. Deshmukh, MD, North-Shore LIJ-Lenox Hill Hospital, New York, NY

Concurrent General Session X — Spine/Pediatrics (Burwell Room)

Moderators: James T. Guille, MD
Marc J. Levine, MD

- 8:15am–8:20am **Resident Travel Grant Award**
The Ventral Lamina and Superior Facet Rule: The Key to Accurate Placement for Thoracic Pedicle Screws
Daniel G. Kang, MD, Walter Reed Army Medical Center, Washington, DC
- 8:20am–8:25am Does A Multilevel Lumbar Laminectomy with a Single Level PLF Increase the Risk of Adjacent Segment Disease? A Comparative Analysis
Brian Neuman, MD, Walter Reed Army Medical Center, Washington, DC

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| <p>8:25am–8:30am Resident Award
Long-Term Survivorship and Wear Analysis in Young, Active Patients: A Matched Pair Analysis of Ceramic and Metal-on-Polyethylene
<i>Morteza Meftah, MD, Hospital for Special Surgery, New York, NY</i></p> | <p>8:25am–8:30am Incidence of Adjacent Segment Degeneration in the Cervical Spine
<i>John M. Olsewski, MD, Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY</i></p> |
| <p>8:30am–8:35am Resident Travel Grant Award
Celebrex & Heterotopic Bone Formation After Total Hip Arthroplasty
<i>Juan S. Contreras, MD, Orthopaedic Institute at Mercy Hospital, Miami, FL</i></p> | <p>8:30am–8:35am Founders' Award
The Role of ApoE in Intervertebral Disc Degeneration
<i>X. Joshua Li, MD, PhD, University of Virginia, Charlottesville, VA</i></p> |
| <p>8:35am–8:40am Relative Head Size Increase Using an Anatomic Dual Mobility Hip Prosthesis Compared to Traditional Hip Arthroplasty: Impact on Hip Stability
<i>Geoffrey H. Westrich, MD, Hospital for Special Surgery, New York, NY</i></p> | <p>8:35am–8:40am The Impact of Preventable Spinal Imaging
<i>Mark F. Kurd, MD, The Rothman Institute, Philadelphia, PA</i>
<i>*Presented by Edward S. Chang, MD</i></p> |
| <p>8:40am–8:48am Discussion</p> | <p>8:40am–8:48am Discussion</p> |
| <p>8:48am–8:53am Survivorship of Revision Hip Arthroplasty in Patients Under the Age of 50
<i>Gregory K. Deirmengian, MD, The Rothman Institute, Philadelphia, PA</i></p> | <p>8:48am–8:53am Utility of 3D-Isotropic MRI in Routine Lumbar Spine Imaging
<i>Daniel J. Blizzard, BS, Yale University/ Yale-New Haven Hospital, New Haven, CT</i>
<i>*Presented by Jonathan N. Grauer, MD</i></p> |
| <p>8:53am–8:58am Resident Travel Grant Award
Measurement of the Distance Between the Transverse Acetabular Ligament and the Radiographic Teardrop
<i>Matthew Harris, MD, MBA, Westchester Medical Center/New York Medical College, Valhalla, NY</i></p> | <p>8:53am–8:58am Effect of Implantation Type on Instrumentation Fracture Rate in Adult Spinal Deformity Surgery
<i>Lloyd A. Hey, MD, MS, Hey Clinic/Duke Raleigh Hospital, Raleigh, NC</i></p> |
| <p>8:58am–9:03am Incidence and Indication for Readmission Following Total Joint Arthroplasty
<i>Jordan A. Hess, BA, The Rothman Institute, Philadelphia, PA</i></p> | <p>8:58am–9:03am Early Results of Radiofrequency Assisted Lumbar Endoscopic Discectomy: A Retrospective Clinical Study of 33 Consecutive Patients
<i>Robert C. Nucci, MD, Citrus Park Surgery Center, Tampa, FL</i></p> |
| <p>9:03am–9:08am Total Joint Arthroplasty: Should Patients Have Preoperative Dental Clearance?
<i>Alexander Lampley, BS, The Rothman Institute, Philadelphia, PA</i></p> | <p>9:03am–9:08am The Duplication of Buckling Mechanisms in Varus Deformities of the Knee and Adolescent Idiopathic Scoliosis
<i>Edward B. MacMahon, MD, Fairfax Hospital, Falls Church, VA</i></p> |
| <p>9:08am–9:13am Nine Year Followup: Comparative Study of Highly Cross-Linked and Traditional Polyethylene in Total Hip Arthroplasty
<i>Mark J. Jo, MD, Westchester Medical Center and Sound Shore Hospital, New York, NY</i>
<i>*Presented by Santiago Lozano-Calderon, MD</i></p> | <p>9:08am–9:13am Characterization of Bone Marrow Aspirates from the Vertebral Body in Order to Optimize Potential Utility as a Bone Graft Option
<i>Joshua W. Hustedt, BA, Yale University, New Haven, CT</i></p> |

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9:13am–9:21am **Discussion**

9:21am–9:26am Range of Motion Analysis Following Computerized Virtual Surgery of Total Hip Arthroplasty, Hip Resurfacing, and Anatomic Dual Mobility THA
Gregory G. Klingenstein, MD, Hospital for Special Surgery, New York, NY

9:26am–9:31am The Increased Utilization of Operating Room Time in Patients with Obesity During Primary Total Hip Arthroplasty
John Wang, MD, Hospital for Special Surgery, New York, NY

9:31am–9:36am Peri-Operative Plavix and Post-Operative Events After Hip and Knee Arthroplasty
Sumon Nandi, MD, New England Baptist Hospital, Boston, MA

9:36am–9:41am Autologous Blood Donation and Utilization in Total Hip Arthroplasty: A Comparison Between Genders
Vivek Sahai, MD, New England Baptist Hospital, Boston, MA
**Presented by Vivek M. Shah, MD*

9:41am–9:46am Radiographic and Clinical Measurements of Limb Length Discrepancy Do Not Correlate
David Lunardini, MD, University of Pittsburgh Medical Center, Pittsburgh, PA

9:46am–9:55am **Discussion**

9:55am–10:15am **Break — Please visit with exhibitors**

9:13am–9:21am **Discussion**

9:21am–9:26am **Resident Travel Grant Award**
Socioeconomic Factors Influence the Incidence of Repeat Emergency Department Visits in Pediatric Patients with Closed Fractures
Christopher J. Dy, MD, MSPH, Hospital for Special Surgery, New York, NY

9:26am–9:31am **Resident Travel Grant Award**
The Location of Medial Patellofemoral Ligament Tears in Adolescents and Children
Scott A. Putney, MD, Nemours Children's Clinic, Jacksonville, FL

9:31am–9:36am Pediatric Patellar Osteochondral Fracture Following Dislocation
Byung J. Lee, MD, Warren Alpert Medical School of Brown University/Hasbro Children's Hospital, Providence, RI
**Presented by Melissa Christino, MD*

9:36am–9:41am The Role of the Small AO External Fixator in Proximal Tibial Osteotomies in Children
John E. Handelsman, MD, Cohen's Children's Medical Center, New Hyde Park, NY

9:41am–9:46am Incidence and Etiology of Unplanned Cast Changes
Joshua Abzug, MD, St. Christopher's Hospital for Children, Philadelphia, PA

9:46am–9:55am **Discussion**

9:55am–10:15am **Break — Please visit with exhibitors**

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General Session XI — AAOS Report & Presidential Guest Speaker (*Ballrooms C & D*)

Moderator: John C. Richmond, MD

10:15pm–10:25pm AAOS Report

Daniel J. Berry, MD, President

10:25pm–11:10pm Presidential Guest Speaker

Health Care Reform: Lessons from Canada

Brian Day, MD, President, Cambie Surgeries Corporation

Symposium III — Update on Bearing Surfaces in Total Joint Replacement (*Ballrooms C & D*)

Moderator: Geoffrey H. Westrich, MD

11:10am–11:20am Highly Cross-Linked Polyethylene

Daniel J. Berry, MD, Mayo Clinic Rochester, Rochester, MN

11:20am–11:30am Ceramic On Ceramic — Forte

Stephen B. Murphy, MD, New England Baptist Hospital, Boston, MA

11:30am–11:40am Ceramic On Ceramic — Delta

William G. Hamilton, MD, Anderson Orthopaedic Clinic, Arlington, VA

11:40am–11:50am Metal On Metal

David J. Mayman, MD, Hospital for Special Surgery, New York, NY

11:50am–12:00pm Discussion

Symposium IV — Practice Management (*Ballrooms C & D*)

12:00pm–12:01pm Introduction

John C. Richmond, MD

12:01pm–12:46pm The Patient Protection and Affordable

Care Act (PPACA): Opportunities, Challenges, and Implications

Graham Newson, American Association of Orthopaedic Surgeons, Washington, DC

12:46pm–1:00pm Discussion

1:00pm–2:00pm Industry Workshop — ConvaTec

(lunch included)

** Not for CME credit*

2:00pm–3:30pm Scientific Poster Session

(Poster Presenters Available)

3:30pm–5:00pm Multimedia Session

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

Saturday, October 22, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

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

General Session XII — Case Reviews Lower Extremity (Ballrooms C & D)

Moderators: David J. Mayman, MD
Michael M. Romash, MD

6:00am–7:00am **Case Presentations**

7:00am–7:15am **Second Business Meeting**

7:15am–7:20am **Change Rooms**

Concurrent General Session XIII — Infection (Ballrooms C & D)

Moderators: Javad Parvizi, MD, FRCS
Michael P. Bolognesi, MD

- 7:20am–7:25am Diagnosis of Periprosthetic Joint Infection: The Role of a Simple, Yet Unrecognized, Enzyme
Elie Ghanem, MD, The Rothman Institute, Philadelphia, PA
- 7:25am–7:30am ESR and CRP Serology in Infected Inflammatory and Non-Inflammatory Arthritis Patients Undergoing Joint Revision Surgery
Ismar Dizdarevic, MD, The Rothman Institute, Philadelphia, PA
- 7:30am–7:35am Is Repetitive Intraoperative Splash Basin Use a Source of Bacterial Contamination in Total Joint Replacement Surgery?
Sergio Glait, MD, NYU Hospital for Joint Diseases, New York, NY
- 7:35am–7:45am **Discussion**
- 7:45am–7:50am Efficacy and Cost Analysis of Saline-Coupled Bipolar Sealing in Infected Total Knee Arthroplasty
Peter B. Derman, BS, University of Pennsylvania, Philadelphia, PA

Concurrent General Session XIV — Sports (Burwell Room)

Moderators: James C. Vailas, MD
Mark J. Lemos, MD

- 7:20am–7:25am Biceps Tenotomy Versus Tenodesis: A Comprehensive Review of Clinical Outcomes
Nicholas Slenker, MD, Thomas Jefferson University Hospital, Philadelphia, PA
- 7:25am–7:30am Outcomes for Arthroscopic Repair of Type II SLAP Lesions in the Worker's Compensation Population
Randall Murphy, MD, The Hand Center/ Greenville Hospital System, Greenville, SC
- 7:30am–7:35am Helmet Characteristics as Profile Elements Identifying Susceptibility to Mild Traumatic Brain Injury (Concussion) in Tackle Football
Joseph Torg, MD, Temple University, Philadelphia, PA
**Presented by Hank Hirsch, ATC*
- 7:35am–7:45am **Discussion**
- 7:45am–7:50am Pain Causes Inhibition of the Infraspina-tus During Isometric External Rotation
Thomas K. John, MD, Arcadia University, Philadelphia, PA
**Presented by Brett A. Sweitzer, MD*

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7:50am–7:55am	<p>Resident Travel Grant Award Serum White Blood Cell Count and Differential Does Not Have a Role in the Diagnosis of Periprosthetic Joint Infection <i>Nader Toossi, MD, The Rothman Institute, Philadelphia, PA</i></p>	7:50am–7:55am	<p>The Prevalence of Articular Cartilage Changes in the Knee Joint with Increasing Age in Patients Undergoing Arthroscopy for Meniscal Pathology <i>Michael C. Ciccotti, BA, The Rothman Institute, Philadelphia, PA</i> <i>*Presented by Luke S. Austin, MD</i></p>
7:55am–8:00am	<p>Can Blood Culture Be Used to Diagnose Periprosthetic Joint Infection? <i>Bahar Adeli, BA, The Rothman Institute, Philadelphia, PA</i></p>	7:55am–8:00am	<p>Complete Triceps Tendon Ruptures Requiring Surgical Repair in Professional Football Players <i>Steven B. Cohen, MD, The Rothman Institute, Philadelphia, PA</i></p>
8:00am–8:10am	<p>Discussion</p>	8:00am–8:10am	<p>Discussion</p>
8:10am–8:15am	<p>Change Rooms</p>	8:10am–8:15am	<p>Change Rooms</p>

Concurrent General Session XV — Pain Management (*Ballrooms C & D*)

Moderators: Amar S. Ranawat, MD
Brian S. Parsley, MD

8:15am–8:20am	<p>Resident Award Efficacy of Postoperative Intraarticular Analgesia Following Total Knee Arthroplasty: A Randomized, Double-Blinded, Prospective Study <i>Nitin Goyal, MD, The Rothman Institute, Philadelphia, PA</i></p>
8:20am–8:25am	<p>Lumbar Plexus Block for Pain Control After Hip Arthroscopy: A Randomized Controlled Trial <i>Anil S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i></p>
8:25am–8:30am	<p>Preoperative Narcotic Medication Has Minimal Postoperative Effect in Total Joint Arthroplasty (TJA) <i>Antonia F. Chen, MD, MBA, University of Pittsburgh Medical Center, Pittsburgh, PA</i></p>
8:30am–8:40am	<p>Discussion</p>

Concurrent General Session XVI — General Orthopedics/Tumors (*Burwell Room*)

Moderators: Robert N. Richards Jr., MD
Colin Couper, MD

8:15am–8:20am	<p>Use of a Novel Wide-Field Imaging Device for Real-Time, Intra-Operative Assessment of Microscopic Residual Cancer in the Tumor Bed <i>Jessica E. Carter, BS, MSIII, Duke University, Durham, NC</i></p>
8:20am–8:25am	<p>The Intra-Observer and Inter-Observer Reliability of a Magnetic Resonance Imaging Based Scoring System for Post-Traumatic Osteoarthritis <i>Ethan W. Blackburn, MD, University of Vermont, Burlington, VT</i></p>
8:25am–8:30am	<p>Resident Travel Grant Award Inpatient Pulmonary Embolism in US Elective Primary Hip and Knee Arthroplasty Patients <i>Usman Zahir, MD, University of Maryland Medical Center, Baltimore, MD</i></p>
8:30am–8:40am	<p>Discussion</p>

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8:40am–8:45am	Monopolar Capacitive Coupled Radiofrequency (mcRF) and Platelet Rich Plasma (PRP) for the Treatment of Common Orthopaedic Conditions <i>Joseph Cronkey, MD, Dunmore, PA</i>	8:40am–8:45am	Surgical Treatment Improves Clinical and Functional Outcomes for Patients Who Sustain Incomplete Bisphosphonate Induced Femur Fractures <i>Colin Prensley, BA, NYU Hospital for Joint Diseases, New York, NY</i>
8:45am–8:50am	Are Femoral Nerve Blocks Effective for Post-Op Pain Management After Hip Arthroscopy <i>James P. Ward, MD, NYU Hospital for Joint Diseases, New York, NY</i>	8:45am–8:50am	Surface Area Across Osteosynthesis Site in Bulk Allograft Reconstruction <i>Ajay Lall, MS, MD, Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY</i>
8:50am–8:55am	Current Trends in Perioperative Pain Management for the Hip Fracture Patient <i>Micah Lissy, MD, MS, PT, ATC, Montefiore Medical Center, Bronx, NY</i>	8:50am–8:55am	Enchondromas Treated By Curettage Alone <i>Oliver P. Loeffler, MD, Hamot Medical Center, Erie, PA</i>
8:55am–9:05am	Discussion	8:55am–9:05am	Discussion
9:05am–9:30am	Break — Please visit with exhibitors	9:05am–9:30am	Break — Please visit with exhibitors

Symposium V — Computer Assisted Surgery in Total Joint Arthroplasty: Current Concepts and New Techniques (Ballrooms C & D)

Moderator: David J. Mayman, MD

9:30am–9:40am	Robotic Navigation for Hip Replacement <i>Amar S. Ranawat, MD, Hospital for Special Surgery, New York, NY</i>
9:40am–9:50am	Mechanical Navigation for Hip Replacement <i>Stephen B. Murphy, MD, New England Baptist Hospital, Boston, MA</i>
9:50am–10:00am	Navigation in Total Knee Arthroplasty <i>Fabio Orozco, MD, The Rothman Institute, Egg Harbor Township, NJ</i>
10:00am–10:10am	Limited Navigation in Knee Replacement <i>David J. Mayman, MD, Hospital for Special Surgery, New York, NY</i>
10:10am–10:20am	Custom Jigs and Cutting Blocks <i>Brian S. Parsley, MD, Greater Houston Orthopaedic Specialists, Bellaire, TX</i>
10:20am–10:30am	Discussion

General Session XVII — Reports (Ballrooms C & D)

Moderator: Geoffrey H. Westrich, MD

10:30am–10:40am	Report of BOC Representative Robert V. Dawe, MD, Orthopaedic Specialty Group, Fairfield, CT
10:40am–10:50am	OREF Report <i>Shepard R. Hurwitz, MD</i>
10:50am–11:05am	Break — Refreshments

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Concurrent Symposium VI — Pain Management (Ballrooms C & D)

Moderator: Amar S. Ranawat, MD

11:05am–11:45am Panelists:

Carlos J. Lavernia, MD, Orthopaedic Institute at Mercy Hospital, Miami, FL

William G. Hamilton, MD, Anderson Orthopaedic Clinic, Arlington, VA

Stephen B. Murphy, MD, New England Baptist Hospital, Boston, MA

Geoffrey H. Westrich, MD, Hospital for Special Surgery, New York, NY

11:45am–11:50am **Change Rooms**

Concurrent Symposium VII — Lower Extremity Applications of Limb Lengthening and Reconstruction Surgery (Burwell Room)

Moderator: S. Robert Rozbruch, MD

11:05am–11:15am Post-Traumatic

Austin Fragomen, MD, Hospital for Special Surgery, New York, NY

11:15am–11:25am Salvage of Failed Arthroplasty (Knee and Ankle)

S. Robert Rozbruch, MD, Hospital for Special Surgery, New York, NY

11:25am–11:35am Children

J. Richard Bowen, MD, Nemours, Wilmington, DE

11:35am–11:45am **Discussion**

11:45am–11:50am **Change Rooms**

Concurrent General Session XVIII — Knee (Ballrooms C & D)

Moderators: David W. Romness, MD
Jose A. Rodriquez, MD

11:50am–11:55am Metaphyseal Sleeves in Revision TKA with Bone Loss — Does Cementation Have a Role?

Prashant P. Deshmane, MD, Lenox Hill Hospital, New York, NY

11:55am–12:00pm UKA Improves Physical Function More than TKA

William Macaulay, MD, Center for Hip and Knee Replacement New York-Presbyterian at Columbia University, New York, NY
**Presented by Jeffrey A. Geller, MD*

Concurrent General Session XIX — General Orthopedics (Burwell Room)

Moderators: Richard M. Wilk, MD
Bernie Pfeifer, MD

11:50am–11:55am Gloving Technique and Intraoperative Bacterial Contamination

Kevin A. Shamburg, BS, Wake Forest University School of Medicine, Winston-Salem, NC

11:55am–12:00pm Medical Student Musculoskeletal Education: An Institutional Review Following the Bone and Joint Decade

Nathan W. Skelley, MD, The Johns Hopkins University, Baltimore, MD
**Presented by Logan M. Skelley, BS*

12:00pm–12:05pm Length of Stay After Total Joint Replacement: Does Day of Surgery Matter?

Raghuveer Muppavarapu, MD, Tufts Medical Center, Boston, MA

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

Saturday, October 22, 2011

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 47-52.

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| <p>12:00pm–12:05pm A Comparison of Post-Operative Blood Loss in Total Knee Arthroplasty Using Epinephrine Pain Cocktail Injection, Platelet Rich Plasma, and a Fibrin Sealant
<i>Brandon Burris, MD, Florida Orthopedic Institute, Tampa, FL</i></p> <p>12:05pm–12:10pm Is Perception Reality? Can Surgeons Predict Patient Satisfaction After Total Knee Arthroplasty?
<i>Manny Porat, MD, The Rothman Institute, Philadelphia, PA</i></p> <p>12:10pm–12:15pm Preoperative Anemia in Total Joint Arthroplasty: Prevalence, Mortality
<i>Max Greenky, BA, The Rothman Institute, Philadelphia, PA</i></p> <p>12:15pm–12:25pm Discussion</p> <p>12:25pm–12:30pm Assessment of Accuracy of Robotically Assisted Unicompartamental Arthroplasty (Makoplasty)
<i>Ali Mofidi, MD, Wake Forest University Baptist Medical Center, Winston-Salem, NC</i></p> <p>12:30pm–12:35pm Sexual Function Before and After Primary Total Hip and Knee Arthroplasty
<i>Ajit J. Deshmukh, MD, North-Shore LLJ-Lenox Hill Hospital, New York, NY</i>
<i>*Presented by Amar S. Ranawat, MD</i></p> <p>12:35pm–12:40pm Intra- and Inter-Observer Variability of Jig Placement in Shape Match Technique of Total Knee Arthroplasty — A Cadaver Study
<i>William J. Hozack, MD, The Rothman Institute, Philadelphia, PA</i>
<i>*Presented By Michael Nogler, MD</i></p> <p>12:40pm–12:45pm The Effect of 5mm Osteochondral Defects on Coronal Plane Knee Stability — A Cadaveric Study
<i>Christopher Plaskos, PhD, Hospital for Special Surgery, New York, NY</i>
<i>*Presented By Mahmoud Michael Khair, MD</i></p> <p>12:45pm–12:50pm What Makes a Perfect Knee?
<i>Bryan A. Hozack, BA, The Rothman Institute, Philadelphia, PA</i></p> <p>12:50pm–1:00pm Discussion</p> | <p>12:05pm–12:10pm Combating Fatigue Within Orthopedic Surgery Residency
<i>Frank McCormick, MD, Harvard Combined Orthopedic Residency Program, Boston, MA</i></p> <p>12:10pm–12:15pm Addressing the Shortage of Academic Orthopaedic Surgeons: Evaluation of an Innovative Seven-Year Physician Scientist Residency Training Program
<i>L. Andrew Koman, MD, Wake Forest University School of Medicine, Winston-Salem, NC</i></p> <p>12:15pm–12:25pm Discussion</p> <p>12:25pm–12:30pm Hazardous Attitudes in Surgeons
<i>John Kadzielski, MD, Harvard Combined Orthopaedic Residency Program, Boston, MA</i></p> <p>12:30pm–12:35pm Analysis of Operating Room Traffic During Primary and Revision Total Joint Arthroplasty
<i>Mitchell Stroh, BS, The Rothman Institute, Philadelphia, PA</i></p> <p>12:35pm–12:40pm Metal-On-Metal Hip Resurfacing in the Severely Obese
<i>Matthew I. Stein, MD, University of South Florida, Tampa, FL</i></p> <p>12:40pm–12:45pm Recovery Room Radiographs Following Total Hip Arthroplasty: Tradition vs. Utility?
<i>Anthony Ndu, MD, Yale University, New Haven, CT</i></p> <p>12:45pm–12:50pm Closure Time Analysis of Traditional Suture Methods Versus Barbed Suture in Total Joint Arthroplasty
<i>Elizabeth Matzkin, MD, Tufts Medical Center, Boston, MA</i>
<i>*Presented by Pinak Shukla, MD</i></p> <p>12:50pm–1:00pm Discussion</p> <p>2:00pm–3:30pm Scientific Poster Session
(Poster Presenters Available)</p> <p>3:30pm–4:30pm Multimedia Session</p> |
|--|--|

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

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2011 Scientific Program Abstracts — Thursday

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

Thursday, October 20, 2011

**Concurrent General Session I — Total Knee
(Ballrooms C & D)**

**Moderators: James J. Purtill, MD
David W. Romness, MD**

7:18am–7:23am

“Re-Learning” Curve of Conventional Total Knee Arthroplasties Following 30 Consecutive Computer-Assisted Total Knee Arthroplasties

David Trofa, BA
*Eric L. Smith, MD
Luke Nicholson, BS

Introduction: While the success of a total knee arthroplasty (TKA) depends on many factors, neutral alignment of the mechanical axis (MA) is considered one of the most important parameters. To help achieve optimal postoperative alignment, computer-assisted navigation systems (CAS) have been developed. In the current study we compare the postoperative MA alignment of the first 30 computer assisted total knee arthroplasties performed by a single surgeon, with no previous experience using the technology, with a subsequent cohort of 120 conventionally performed TKA's. Our primary goals were to determine the success of CAS for a surgeon at the beginning of his practice and to determine the learning curve a surgeon can expect after returning to conventional (CON) TKA.

Methods: Postoperative MA were measured by two blinded observers from the long-standing radiographs of 150 consecutive patients who underwent primary TKA by a single surgeon.

Results: The average postoperative MA for the study was 2.85 degrees (1.99 CAS, 3.06 CON). The CON group was subdivided into 4 groups of 30 consecutive patients to assess the surgeon's learning curve upon returning to CON TKA following the use of CAS for 30 consecutive TKAs. The average

MA of the first 30 CON patients was 3.55 degrees, followed by 3.08, 2.97, and 2.64. Only the MA from the first 30 CON TKA's was significantly different than the CAS group.

Discussion and Conclusion: Based on our findings, a surgeon new to CAS can expect optimal postoperative MA, under 3.00 degrees varus or valgus, even without prior experience. However, our data suggest that surgeons who use CAS on a consistent basis should expect a “re-learning” curve upon returning to CON procedures. In our study, it took the surgeon 30 consecutive patients to re-establish a postoperative MA statistically similar to those obtained using CAS.

Notes:

7:23am–7:28am

Resident Travel Grant Award

Determining a Safe INR Cut-Off Value for Total Joint Arthroplasty: A Retrospective Evaluation of Perioperative Complications Based on Preoperative INR Levels

Timothy DiIorio, MD
Javad Parvizi, MD, FRCS
Camilo Restrepo, MD

Introduction: INR is consistently used as a factor in determining the safety level of performing total joint arthroplasty, yet there is no general consensus as to what range of INR values are safe for performing an elective procedure.

Materials and Methods: 3,600 patients who underwent total joint arthroplasty at a single institution were recruited for this study. Detailed chart review was conducted to determine the values for preoperative INR levels, calculated blood loss as determined by the OSTHEO blood loss formula, and multiple

other variables. Multivariate analysis was performed to determine the influence of each factor in blood loss during TJA. A receiver operator characteristic test was performed to identify an INR threshold predictive of excessive bleeding (defined by the need for postoperative transfusion).

Results: Multivariate analysis indicated that preoperative INR level was an independent factor influencing intraoperative blood loss. Every unit change in the INR correlated with 0.07 units of calculated blood loss. Another independent risk factor for excessive bleeding was patient comorbidity as determined by American Society of Anesthesiology (ASA) score. An INR cut-off of 1.05 (AUC=0.65) provided a sensitivity and specificity of 57% and 66%, respectively. 38% of patients above this threshold had excessive blood loss compared to 18% in the remaining population.

Discussion: This study, first of its kind to our knowledge, has demonstrated that preoperative INR is an important factor influencing blood loss during total joint arthroplasty. We believe we have been able to define the cut-off value for preoperative INR that is strongly predictive of excessive blood loss leading to a need for transfusion. Because of the immense risks associated with allogenic transfusion, this “cut-off” value may be used to determine whether a patient should or should not undergo elective surgery.

Notes:

7:28am–7:33am

A Multi-Center, Randomized Trial to Evaluate the Effect of a Cryopneumatic Device During TKR Recovery

Michelle Perna, BA
Edward D. Arrington, MD
Wael K. Barsoum, MD
Tad L. Gerlinger, MD
Joseph C. Randolph, MD
Edwin P. Su, MD

Introduction: The use of cryotherapy with compression for orthopedic post-operative recovery has not been fully investigated. A single system device that combines cold and dynamic pneumatic compression has been in use since 2002; however, a well-controlled randomized trial is necessary to evaluate its clinical effectiveness.

Methods: Patients 18 to 85 with osteoarthritis undergoing unilateral TKR were randomized to the test group (cryopneumatic device with intermittent pressure) or control group (a standard icepack and wrap). Functional assessments at baseline and two and six weeks post-operative included a 6-minute walk test (6MWT), timed up and go test (TUG), visual analogue scale (VAS), flexion, extension, and girth 10cm above and below the knee and at mid-patella. Functional milestones included transitioning from sit to stand without assistance, 0° extension, 110° flexion, and ambulation without analgia.

Results: 168 patients were enrolled. Test and control groups were comparable with respect to gender, ethnicity, TKA in the non-study knee, and mean age and BMI. At two weeks post-operative the control group did better than the test group in the 6MWT (walking 91.4m vs. 115.9m less than baseline) and TUG (3.47s vs. 4.43s longer than baseline) respectively. Both groups reported less pain and demonstrated more girth. On average the test group demonstrated less loss of flexion at two and six weeks and extension at two weeks than the control group (29.0° vs. 31.9° and 9.0° vs. 10.6° less flexion and 1.3° vs. 1.6° less extension respectively). By six weeks postoperative, the test group outperformed the control group in the 6MWT and extension (30.m farther than baseline vs. 4.3m less than baseline and 2.7° vs. 2.5° more extension than baseline respectively). The test group also reported less pain than the control group. The control group demonstrated less swelling below the patella compared to the preoperative measurement. Three out of four functional milestones were reached by a greater proportion of the test group compared to the control

group at six weeks (67 vs. 62% for sit to stand, 47 vs. 32% for 110° flexion, and 53 vs. 46% for ambulate without antalgia).

Discussion and Conclusion: These trends suggest patients treated with a cryopneumatic device delivering intermittent pressure may demonstrate greater improvement in five out of eight functional assessments and three out of four functional milestones compared to patients treated with ice at six weeks postoperative.

Notes:

7:33am–7:38am

Resident Travel Grant Award

Revision Total Knee Arthroplasty: Are All Aseptic Cases Truly Aseptic?

Mohammad R. Rasouli, MD
Bahar Adeli, BA
Javad Parvizi, MD, FRCS
James J. Purtill, MD

Introduction: The hypothesis of this study was that all patients undergoing revision knee arthroplasty for aseptic failure are not “truly aseptic” and may be occult infections that are missed or inadequately investigated.

Methods: This prospective study recruited 65 patients (32 males) undergoing revision TKA between March 2008 to December 2009. Synovial fluid was collected and analyzed for cell count, neutrophil differential, and most importantly by IBIS 5000 biosensor (a multiplex PCR technology). Previously validated institutional criteria for periprosthetic joint infections (PJI) were used. Cases were then considered as infected or aseptic based on the original reason for revision (surgeon’s judgment), IBIS findings, and institutional definition for PJI.

Results: The mean age of the patients was 65±11 years and mean follow-up period was 14 months (range: 7-21). Of 65 patients, 21 were being revised for infection (surgeon’s judgment). If institutional criteria for PJI had been used, two additional cases would have been categorized as PJI, making total number of infected failures 23. IBIS identified a pathogen in

total of 36 cases while it failed to isolate a pathogen in 3 cases had been diagnosed as septic. Based on IBIS biosensor, 16 aseptic cases were indeed infected that had been inadequately investigated or erroneously categorized as aseptic. Of these 16 cases, 3 developed infection following the index revision surgery.

Discussion: If isolation of a pathogen by IBIS biosensor to be considered as “gold standard” for PJI, it appears that 38% of so called aseptic are occult infections who were not adequately investigated and/or miss-categorized as aseptic failure. This may explain the relatively high incidence of infection following revision arthroplasty, compared to primary, and also the high rate of early failure of revision cases. Based on our findings, we recommend that all patients undergoing revision arthroplasty need to be investigated for PJI.

Notes:

7:38am–7:43am

Cadaveric Results of a Hand-Held, Pinless Navigation System for the Tibial Resection in Total Knee Arthroplasty

Denis Nam, MD
Michael B. Cross, MD
Christopher J. Dy, MD, MSPH
Stephen Kim, MD
Jonathan H. Lee, MD
David J. Mayman, MD

Introduction: In total knee arthroplasty (TKA), convention intramedullary (IM) and extramedullary (EM) tibial alignment guides have only been shown to be 72% and 88% accurate, respectively, in obtaining a varus/valgus tibial component alignment within 2° of perpendicular to the mechanical axis. The objective of this study was to determine the efficacy and the time associated with the use of a hand-held, surgical navigation system in obtaining a specific alignment of the tibial resection in both the coronal and sagittal planes.

Methods: 20 cadaveric specimens (hip-to-toe) with a mean BMI of 23.9 kg/m² (range: 18-36 kg/m²) were included in this study. 4 orthopaedic surgeons performed a tibial resection utilizing a hand-held, accelerometer based console attached to

an EM tibial jig system on 5 separate tibiae. Prior to each resection, the surgeon was assigned a specific “goal” of tibial-varus/valgus (1° of valgus to 4° of varus) and posterior slope (2° to 5°) to achieve. After calibration, the tibial jig is used to register the medial and lateral malleoli, to establish the tibial mechanical axis. The display console then provides real-time feedback of both the tibial cutting block’s varus/valgus alignment and posterior slope prior to performing the tibial resection. For each procedure, the time from which the surgeon was handed the device, to the point immediately prior to cutting the tibia, was recorded (in seconds). Varus/valgus alignment relative to the mechanical axis in the coronal plane, and posterior slope relative to the mechanical axis in the sagittal plane, were measured (in degrees) on both plain radiographs and computed tomography (CT) from the knee to ankle.

Results: With regards to varus/valgus alignment, CT evaluation demonstrated 95% of the tibial resections to be within 2° of the pre-operative “goal.” The mean difference between the final varus/valgus position of the tibial resection and the pre-operative “goal” was $0.68^\circ + 0.46^\circ$ using CT, and $0.20^\circ + 0.99^\circ$ using plain radiographs. The mean difference between the posterior slope of the tibial resection and the pre-operative “goal” was measured to be $0.7^\circ + 0.47^\circ$ using CT, and $0.43^\circ + 1.16^\circ$ using plain radiographs, with 95% of the tibial resections within 2° of the pre-operative “goal.” The time required to use the hand-held, accelerometer based console attached to an EM tibial jig was less than 450s for the first specimen, and less than 300s for the fifth specimen, for all 4 surgeons.

Discussion and Conclusion: The hand-held, accelerometer based console attached to an EM tibial jig system provides intraoperative, real-time feedback to the surgeon hand-held, accelerometer based console attached to an EM tibial jig. It is compatible with all TKA systems, making it user-friendly for surgeons acclimated to the use of EM alignment guides. Most importantly, the KneeAlign™ system is highly accurate in obtaining a specific varus/valgus alignment and posterior slope of a tibial resection.

Notes:

7:53am–7:58am

Indwelling Femoral Nerve Catheters: Reducing the Need for Manipulation Following Total Knee Arthroplasty?

Carl T. Talmo, MD
Claire E. Robbins, DPT
Pinak Shukla, MD

Introduction: Despite the success of total knee arthroplasty (TKA), postoperative pain control and improved range of motion (ROM) remain areas of earnest investigation. Multimodal pain control and regional anesthesia including indwelling femoral nerve catheters are increasingly popular with few studies available to document their effectiveness. Therefore, we sought to determine the impact of catheters on postoperative ROM and need for manipulation.

Methods: We retrospectively reviewed a consecutive series of 1091 TKA performed by 2 surgeons using an identical surgical technique, prosthesis and postoperative rehabilitation protocol before and after the introduction of a continuous femoral nerve catheter. Catheters were placed preoperatively by an anesthesiologist and continued for 24-36 hours postoperatively. All patients who demonstrated less than 90 degrees of flexion 6 weeks postoperatively were routinely treated with manipulation under anesthesia.

Results: Of 1091 consecutive patients undergoing TKA, there was a significant reduction in the need for postoperative manipulation in those treated with the femoral nerve catheter. The rate of manipulation decreased from 12% in those not receiving a catheter to 6% after their routine use. This decrease was independent of the surgeon, with a 50% decrease in the rate of manipulation for each surgeon with the use of the catheter.

Discussion and Conclusion: These results support the use of femoral nerve catheters in TKA. Continuous anesthetic infusion via an indwelling femoral nerve catheter following TKA improved early ROM and reduced the need for postoperative manipulation independent of the operative surgeon.

Notes:

7:58am–8:03am

Diagnosing Periprosthetic Infection with C-Reactive Protein in Joint Fluid

James Cashman, MD
James McKenzie, BS
Javad Parvizi, MD, FRCS

Introduction: The diagnosis of Periprosthetic Joint Infection (PJI) is a considerable challenge in total joint arthroplasty. The mainstay for diagnosis of PJI is a combination of serological markers, including C-reactive protein (CRP), along with joint aspirate for white cell count, differential and culture. The aim of this study was to examine the role of CRP in the synovial fluid for diagnosis of PJI.

Methods: Synovial fluid samples were collected prospectively from patients undergoing primary and revision knee arthroplasty. Samples were assessed for CRP, cell count and differential. Three groups were analyzed; those undergoing primary knee arthroplasty, revision knee arthroplasties for aseptic failures and revision knee arthroplasty for infection. Demographic data, along with associated medical co-morbidities, were collected. Statistical analyses using receiver operator characteristic curves were performed. Synovial fluid CRP was correlated with serum CRP values. Sensitivity and specificity were calculated.

Results: 52 synovial fluid samples have been collected from 52 patients thus far which includes 17 primary knee arthroplasty, 22 aseptic knee arthroplasty, and 13 septic knee arthroplasty. Synovial fluid CRP was 0.3 +/- 0.4 mg/dL in native knees, 0.2 +/- 0.5 mg/dL in aseptic knee arthroplasties, 4.7 +/- 3.5 mg/dL in patients with infected knee arthroplasties. Synovial fluid CRP was significantly higher in infected total knee arthroplasties by comparison to both aseptic total knees and native knees. The specificity was 100% and the sensitivity was 94.9% at a CRP threshold of 0.95 mg/dL.

Discussion: We believe synovial CRP assay holds great promise as a new, potentially low-cost, diagnostic marker for PJI. Synovial fluid CRP was found to be significantly elevated in patients with infected total knee arthroplasties. This test is easily performed under routine hospital laboratory conditions without specific, expensive assays. Furthermore, the test provides excellent sensitivity and specificity with results available on the same day as sample collection.

Notes:

8:03am–8:08am

Resident Travel Grant Award

A Level 1, Randomized, Controlled Prospective Study Evaluating the Effect of Patellar Eversion on Functional Outcomes in Primary Total Knee Arthroplasty

Derek Jenkins, MD
Ajit Deshmukh, MD
Amar S. Ranawat, MD
Parthiv A. Rathod, MD
Jose A. Rodriguez, MD

Introduction: With the advent of minimally invasive total knee arthroplasty techniques, reports of decreased post-operative pain, earlier return of extensor mechanism function as evaluated by straight leg raise, decreased length of hospital stay, and increased postoperative range of motion at the knee have been reported. The possibility of these improved results being predicated on less stress applied to the extensor mechanism secondary to lateral retraction rather than eversion of the patella during these procedures has been proposed in the literature. Reviewers have questioned the clinical relevance of these reported results, as the differences reported between outcome measures may be clinically inconsequential. It is our hypothesis that by using randomized, prospective, blinded study methods, there will be no significant difference in clinical outcome measures based solely on eversion of the patella during total knee arthroplasty.

Methods: All-comers for primary total knee replacement indicated for degenerative joint disease were considered for inclusion in the study. Once informed consent was obtained, patients were randomized to one of two patella exposure techniques: lateral retraction or eversion. Pre-operative data including age, sex, body mass index, and primary disease was obtained, and outcome values were recorded preop and at 2 weeks, 6 weeks, 3 months, and 1 year post-op: leg extensor strength measurements, knee flexibility, pain at range of motion extremes, visual analog score of pain level, circumferential thigh measurements, and SF-36 outcome survey. Time to return of straight leg raise, ambulation distance at time of SLR return, and length of hospital stay were also recorded for each patient. All collaborating investigators were blinded to each other's data until the conclusion of the data acquisition period of the study. Surgical techniques and perioperative arthroplasty management protocols used in our study were

those routinely and currently used during total knee replacement surgery at our Institution.

Results and Discussion: Based on previous power analyses reported in the literature, in order to achieve a power of 90% with an α of 0.5, 56 patients in each study group were needed. 112 total patients underwent surgery using one of the two exposure methods, and results were available for evaluation to at least 6 weeks postop. No Statistically Significant differences were found between the two groups with respect to return of straight leg raise, length of stay, postoperative pain, ambulation distance, or SF-36 outcomes.

Notes:

8:08am–8:13am

Accuracy of Pre-Operative Planning in Robot-Assisted Unicompartmental Knee Arthroplasty

Maria S. Goddard, MD
*Riyaz H. Jinnah, MD
Michael Conditt, PhD
Jason E. Lang, MD
Gary G. Poehling, MD

Introduction: Unicompartmental knee arthroplasty (UKA) allows replacement of a single compartment in patients who have isolated osteoarthritis. However, UKA is more technically challenging than total knee arthroplasty. Many failures of early UKA systems were attributed to a failure to adequately balance the knee. The use of a robotic-assisted system allows the orthopaedic surgeon to verify that balancing sought pre-operatively correlates with that obtained at surgery. The aim of this study was to examine the variation in pre-operative planned ligament balance and that obtained with the components in situ.

Methods: Data were prospectively collected on 52 patients (51 knees) undergoing robot-assisted unicompartmental knee arthroplasty by a single surgeon. For pre-operative planning, dynamic ligament balancing was obtained of the operative knee under valgus stress, prior to any bony cuts. Final intra-operative images with the prosthesis in place were taken with-

out valgus stress. Positive values denoted loose ligamentous balancing while negative values indicated ligament tightness.

Results: A small variation of less than 1 mm was measured between the pre-operative plan and the final image with the implant in place. At 0 degrees the mean change was -0.26 mm (range, -4.40 to 2.20 mm), at 30 degrees -0.53 mm (range, -5.30 to 1.80 mm), at 60 degrees -0.04 mm (range, -3.10 to 2.30 mm) and at 90 degrees 0.16 mm (range, -2.70 to 2.00 mm). These results show that planned dynamic ligament balancing is accurate to within 0.52 mm.

Conclusion: With proper planning prior to surgery, the use of a robot in UKA can improve ligament balancing. This can be done at various angles, ensuring excellent ligament balancing throughout the entire range of motion. Correct component alignment reduces the risk of prosthetic failure and may increase the length of implant survival.

Notes:

8:21am–8:26am

Is Inferior Vena Cava Filter Effective at Preventing Pulmonary Embolism?

Benjamin Zmistowski, BS
*Camilo Restrepo, MD
Javad Parvizi, MD, FRCS

Introduction: Venous thromboembolism (VTE) is a common complication following total joint arthroplasty, ranging from the frequently benign deep vein thrombosis (DVT) to the distressing and at times fatal pulmonary embolism (PE). The aim for prophylactic treatment of VTE is prevention of PE. However, it has often been assumed that DVT is a proxy for PE. Based on this assumption, aggressive DVT prophylaxis is currently recommended at the expense of a higher proportion of bleeding complications. This study investigates whether inferior vena cava (IVC) filter protects against PE.

Methods and Materials: We identified 209 patients undergoing IVC filter placement following diagnosis of DVT to prevent “migration” of thrombus to the lungs and formation of PE. These patients had an average age of 66.7 years and 130 (62%) were female. All patients had undergone orthopedic

procedures at a single institution between January 2004 and December 2008. These patients were investigated for presence of DVT and PE.

Results: Ten patients (4.7%) receiving IVC filter developed PE after placement of the filter. There were no fatal PE in this cohort. Two of these patients had concomitant atrial fibrillation.

Conclusion: This study identifies a high rate of PE despite IVC filter placement. This finding, once again, brings to question the “propagation theory” that assumes that PE arise from a thrombus in the extremity. Considering the fact that IVC filter has been shown to be very effective in prevention of migration of thrombus, our study demonstrates that a portion of PE may arise independently and as part of a hypercoagulable state. Thus, strategies that are aimed at reducing DVT, by assuming DVT is a proxy for PE, needs to be reexamined. We believe patients are placed at high risk of bleeding with administration of aggressive anticoagulation for treatment of DVT and attempts to prevent its “propagation.”

Notes:

8:26am–8:31am

A Novel Protocol to Improve Hemostasis in Total Knee Arthroplasty

Carlos A. Sagebien, MD
*David A. Harwood, MD
Dorene O’Hara, MD, MSE
Patricia Seuffert, MS, APN

Introduction: Optimizing hemostasis for total knee arthroplasty (TKA) is an ongoing challenge. Bleeding during TKA may result in anemia and postoperative blood transfusion. Here we present an effective protocol combining multiple hemostatic modalities and TKA.

Methods: Thirty-nine patients undergoing TKA using a novel surgical technique were included in this retrospective, IRB-approved, cohort study. Study patients were compared to a control group of 37 patients who underwent standard TKA. All study patients underwent TKA with a harmonic scalpel, extramedullary computer-assisted surgery, a hemostatic matrix to all cut surfaces after cementation, and injection of local anesthetic with epinephrine. The control group under-

went standard TKA with intramedullary femoral guides and no adjuvant hemostatic techniques. Drains were not used in either cohort. Tourniquets and post-operative warfarin were used in all patients. Hospital records were reviewed for patient demographics, pre- and postoperative hemoglobin (Hgb), operative time and visual analog scale (VAS) for pain at discharge. Means were compared with Student’s t test.

Results: Patient demographics including age, body mass index (BMI), operative time and VAS scores were not different between groups. Preoperative Hgb was statistically the same between cohorts. However, the study group had a significantly smaller decrease in Hgb from preoperative values to discharge values as compared to the control group (-3.27 ± 1.1 vs. -3.88 ± 1.3), and a significantly higher Hgb each postoperative day. In addition, 5 of 37 controls had a Hgb drop of more than 5.0 g/dl, while none of the study patients had a Hgb drop of that magnitude.

Discussion and Conclusion: This novel technique significantly improves hemostasis after TKA. Study patients had decreased blood loss and higher Hgb at discharge as compared to controls. We recommend this protocol for all patients undergoing TKA.

Notes:

8:31am–8:36am

Intraoperative Periprosthetic Fractures During Primary TKA: The Importance of Box Cut Size

Lawrence Delasotta, MD, MPH
Adam G. Miller, MD
Alvin Ong, MD
Fabio Orozco, MD
Ashwin Rangavajjula, BS

Introduction: Incidence of intraoperative distal femur fractures during total knee arthroplasty (TKA) are unknown. Different treatment options exist to stabilize these fractures. The purpose of this case series is to report the incidence, time of diagnosis and treatment of intraoperative periprosthetic fractures using a TKA system.

Methods: From 2008-2010, two surgeons completed 1,469 primary TKAs using the system (PS, TS, and CR); all intraoperative fractures were identified. Validated outcome scores were collected for fractured and 2:1 patient-matched primary TKA cases. Medial/Lateral prosthesis dimension and Medial/Lateral box cut dimension were obtained and compared for six competing distal femur prostheses. Radiographs were used to classify intraoperative periprosthetic fractures.

Results: Five females and one male, mean age of 73.3 (\pm 7.2), experienced an intraoperative fracture during primary TKA. Inclusion criteria: osteoarthritis diagnosis, system prosthesis. The average BMI was 31.55 (\pm 9.577; range: 50.1-23.7). Average follow-up was 12.33 months (Range 2-39 months). Intraoperative fracture during posterior-stabilized arthroplasty was 0.323% (1,240 primary tka cases); for total-stabilized knees, 3.13% (64 primary tka cases). Females fractured 0.514% during posterior-stabilized total knee arthroplasty and 7.69% during total-stabilized knee arthroplasty. Relative risk for a female to develop an intraoperative periprosthetic fracture was 5.68 (trending) relative to men for size 3, 4, or 5 prostheses used (posterior-stabilized, total-stabilized, and cruciate-retaining). Postoperative patient satisfaction and outcome scores were no different than a patient-matched cohort of primary TKA patients.

Conclusions: Femoral condyle fractures can occur with the use of posterior stabilized TKA systems that require cutting “the box” of the distal femur. Systems that preserved the middle portion of the femur with special tibial inserts configurations will decrease the incidence of these fractures. For small female femurs, one possible option is the use of a device that preserves the middle portion of the distal femur to decrease the incidence of femoral condyle fractures.

Notes:

8:36am–8:41am

Preoperative Risk Stratification Reduces the Incidence of Perioperative Delirium, Renal Failure, and Pulmonary Failure After Total Knee Arthroplasty

Kristen Radcliff, MD

*Alvin Ong, MD

Jamie Blair, BS

Fabio Orozco, MD

Introduction: Perioperative risk stratification has traditionally focused on reduction of cardiac complications. The purpose of this study was to report the results of a novel screening and management protocol to identify and optimize risk of renal, pulmonary, and mental complications.

Methods: Retrospective case-control study comparing incidence of perioperative complications before and after initiation of a novel screening and management protocol. The study cohort was evaluated preoperatively with an algorithm to preoperatively identify risk factors for delirium, pulmonary complications, and renal failure. Patients who were deemed at risk were managed differently in the perioperative period to reduce the incidence of complications. The control population was consecutive patients who underwent total knee arthroplasty prior to development of the screening protocol. Administrative records were reviewed for pulmonary, renal, cardiac, and mental perioperative complications during the hospital stay. The incidence of complications was compared between groups using Fisher’s Exact test.

Results: There were 357 patients in the study cohort and 768 patients in the control population. There was a significant decrease in the screened patients in the incidence of delirium (screening 1.4% vs control 5.6%, $p=0.001$), renal failure (screening 0.28% vs control 2.5%, $p=0.007$), and pulmonary complications (screening 2.2% vs control 7.6%, $p=0.0005$). There was a significant decreased in the screened patients in the incidence of total complications (screening 5.6% vs control 24%, $p=0.0001$) between groups. There was also a significant decrease in the incidence of cardiac complications in the screened patients (screening 1.7% vs control 12.2%, $p=0.0001$).

Discussion: Preoperative screening and management for non-cardiac, medical complications resulted in a significant decrease in renal, pulmonary, delirium, cardiac, and total complications. Further studies are indicated to identify and further reduce preventable causes of perioperative medical complications.

Notes:

Thursday, October 20, 2011

Concurrent General Session II — Trauma
(Burwell Room)

Moderators: Fotios P. Tjoumakaris, MD
W. Fred Hess, MD

7:18am–7:23am

Resident Travel Grant Award

Identification of the Radial Nerve During the Posterior Approach to the Humerus: A Cadaveric Study

Daniel A. Seigerman, MD
Edward Choung, DO
Matthew A. Frank, MD
Frank A. Liporace, MD
Michael Lu, MD
Richard S. Yoon, BS

Objective: Identification of the radial nerve is necessary during the posterior approach to the humerus in an effort to maintain its integrity. Other than anatomic descriptions of the radial nerve with respect to osseous structures, there are few intra-operative landmarks along the course of the traditional triceps splitting approach to provide facile nerve identification. The objective of this study was to determine the reliability of utilizing the anatomic intersection of the long and lateral heads of the triceps and the triceps aponeurosis. This will serve as a definitive reference point for radial nerve identification during the posterior approach to the humerus.

Methods: Thirty adult human cadaver upper extremities, as fifteen matched pairs were utilized. Systematic identification and measurement from the point of intersection between the long and lateral heads of the triceps and the triceps aponeurosis, to the distal most aspect of the radial nerve as it coursed the posterior humerus at its midaxial point was performed and recorded.

Results: Mean distance was found to measure 39.0 ± 2.1 mm (range, 36-44mm), approximating a fixed distance, two finger breadths proximal to our identified point of intersection. Statistical analysis between the two matched pair groups yielded no significant difference in measured distances indicating consistent and reliable measurements among specimens.

Discussion/Conclusion: Our group has identified the point of intersection between three landmarks forming a point of intersection. This reliable point is the confluence of the long and lateral heads of the triceps, and the triceps aponeurosis. This serves as an easily visualized anatomic reference point during the posterior surgical exposure to the humerus, and can be utilized to identify the radial nerve as it courses the posterior humerus.

Notes:

7:23am–7:28am

Results of Proximal Ulna Fractures Treated with a Multiplanar, Locked Intramedullary Nail: First Multicenter Experience

Scott G. Edwards, MD

Introduction: Hardware irritation and removal has been a common complication of traditional olecranon fixation¹⁻³. The theoretical advantages of intramedullary nailing for olecranon fractures are less risk of soft-tissue irritation and resulting hardware removal. The purpose of this study is to evaluate a new multiplanar, locked intramedullary implant indicated for both transverse and comminuted olecranon fractures. This is the first clinical report of this particular type of implant.

Methods: 28 consecutive patients with displaced olecranon fractures underwent open reduction and internal fixation using a multiplanar, locked intramedullary implant and were followed for a minimum of 12 months (range: 12-18 months). Of the 28 fractures, 18 were transverse or oblique (AO/OTA 21-B1.1), 10 were comminuted (AO/OTA 21-B1.2; B1.3), 4 of which also involved the coronoid, and 7 were nonunions. Average patient age was 45 years (range: 25 to 65 years). Patient clinical outcome measures were monitored at approximately six weeks, twelve weeks, and one year following the surgery. Included in this evaluation was range of motion, visual analog pain score, and strength. Patients were immobilized for 3-5 days postoperatively, after which motion was allowed. Strengthening was initiated at 6 weeks. Radiographs

were taken at each follow up visit until union. Complications and subjective complaints were noted.

Results: At 4 weeks, patients demonstrated average extension of 20° (range: 0° to 40°) and flexion of 115° (range: 100° to 130°) with full supination and pronation compared to the contralateral side. Patient pain scores averaged 5 out of 10, with a range of 2 to 8. One patient developed an ulna neuropathy 6 weeks after surgery that eventually required ulnar nerve transposition. At 8 weeks, all patients were within 10° of full extension-flexion and were able to extend 82% of weight compared to the contralateral side. All fractures progressed to radiographic union by 8 weeks. At 12 months, patient pain scores averaged 2 out of 10, with a range of 0 to 4, motion remained the same, and all patients had resumed normal work, athletic, and leisure activities. Average extension strength was 94% of weight compared to the contralateral side. There were no incidences of nonunion, infection, triceps extension problems, or hardware failure or irritation. No patients were lost to follow up.

Discussion and Conclusion: This new multiplanar, locked intramedullary implant appears to be a safe and effective method to treat transverse and comminuted proximal ulna fractures and nonunions. It allows for early motion for both stable and unstable fracture patterns without loss of fixation. Excellent outcomes in terms of motion, strength, and union may be expected within 8 weeks after surgery and continue for at least one year.

Notes:

7:28am–7:33am

Dual Mini-Fragmentation Plating of Displaced Midshaft Clavicle Fractures: Biomechanical and Outcomes Report

Dirk Leu, MD
Rachel M. Cymerman, BA
David L. Helfet, MD
Lionel E. Lazaro, MD
Dean G. Lorich, MD

Introduction: Recent evidence shows improved results with surgical fixation of displaced midshaft clavicle fractures.

Because of plate prominence, a second surgery for removal of plates is required in up to more than 50% of cases. We present biomechanical and outcomes data from the treatment of 28 healthy, active patients with displaced clavicle fractures treated with dual mini-fragmentation plating (DMF). We hypothesize that this technique provides strength equivalent to existing constructs and that its use will decrease the need for implant removal.

Methods: DMF consists of one 2.7mm reconstruction plate placed superiorly and one 2.4mm limited contact plate (LCP) placed anterior-inferiorly on the clavicle. Biomechanical data from plating using sawbones models was compared with respect to small fragmentation superior (SFS), small fragmentation antero-inferior (SFA) and DMF. 28 patients with displaced midshaft clavicle fractures were treated with DMF. Outcomes data from these patients consisting of DASH scores and a custom survey assessing comfort related to the plate was reviewed.

Results: There was no difference between the SFS, SFA, and MFD constructs with respect to axial loading ($p = 0.27$) or torsion ($p = 0.23$). When loaded anteriorly, MFD was significantly more rigid than SFA ($p = 0.021$) but less rigid than a SFS ($p = 0.001$). When loaded superiorly, MFD trended to a higher rigidity compared to SFS ($p = 0.073$) but was less rigid than SFA ($p = 0.034$). All patients healed. 3 of 28 patients (11%) treated with MFD underwent removal of their plates. There was one postoperative infection requiring irrigation. Average DASH score was 7.0.

Discussion and Conclusion: DMF is effective in healthy active patients with displaced midshaft clavicle fractures. Their use may decrease the likelihood of secondary surgery for implant removal and increases the ability to capture comminuted fragments within the construct.

Notes:

7:33am–7:38am

Comparison of Functional Outcome Between Bony and Ligamentous Injuries in Supination External Rotational Type Four (SER IV) Ankle Fractures

Marschall B. Berkes, MD
 *Peter K. Sculco, MD
 Rachel M. Cymerman, BA
 David L. Helfet, MD
 Lionel E. Lazaro, MD
 Milton T. M. Little, MD
 Dean G. Lorch, MD

Introduction: Supination external rotation type IV/type IV equivalent (SER IV) injuries are the most common operative fracture pattern of the Lauge-Hansen classification. It is unclear which configuration of bony and ligamentous injuries portend the worst prognosis. The purpose of this study was to describe and compare outcomes of all possible combinations of fractures and ligamentous injuries within SER IV injuries and identify risk factors for poor outcome.

Methods: From 2004 through 2009, all operative SER IV or equivalent ankle fractures treated by a single surgeon were enrolled in a prospective database. Preoperative MRI was performed to precisely identify and characterize ligament injuries. Postoperative CT was used to evaluate reduction. These Patients with at least 1 year of clinical follow-up were eligible for retrospective analysis. The primary outcome measure was the Foot and Ankle Outcome Score.

Results: 114 SER IV type fractures met inclusion criteria. The average age was 51.8 years. The following number of injury patterns were identified: 51 trimalleolar fractures, 28 bimalleolar fractures involving the fibula and posterior malleolus with a deltoid injury, 27 bimalleolar fractures involving the fibula and medial malleolus with a posterior inferior tibiofibular ligament (PITFL) injury and 27 pure SER IV equivalent fractures (fibula fracture with PITFL and deltoid injury). All fracture patterns had no clinically significant change in reduction at final follow-up. There was no difference in the incidence of articular or syndesmoticmalreductions between groups based on postoperative CT. SER IV equivalent fractures had superior FAOS outcome scores for sports and activity with a trend toward improved scores for symptoms, pain and quality of life compared to trimalleolar fractures. When controlling for the remainder of the fracture pattern and isolating the posterior or medial injury, ligamen-

tous injuries had uniformly higher FAOS scores compared to their fracture counterpart (deltoid tear superior to medial malleolus fracture, PITFL tear superior to posterior malleolus fracture).

Conclusion: In SER IV or SER IV equivalent ankle fractures, the presence of a fracture was associated with a worse clinical outcome compared to its ligamentous injury counterpart. This was true of both the posterior and medial injury, and its effect appeared to be additive, with trimalleolar fracture clinical outcome most severely affected.

Notes:

7:49am–7:54am

Re-Operation Following Combat Related Major Lower Extremity Amputations

LT Scott Tintle, MD
 LTC Romney C. Andersen, MD
 CDR John J. Keeling, MD
 MAJ Benjamin K. Potter, MD

Introduction: Complications rates following trauma related amputations remain ill-defined in the literature, as do the indications for re-operation. We hypothesized that the revision rates following major lower extremity amputation were higher than the existing literature would suggest, and that surgical treatment of lower extremity amputation complications, as well as persistently symptomatic residual limbs, would lead to improved patient outcomes.

Methods: We performed a retrospective analysis of a consecutive series of combat wounded personnel sustaining 300 major lower extremity amputations from Operation Iraqi Freedom and Operation Enduring Freedom. Injury and treatment-related data, complications, and revision amputation data were recorded. Additionally, pre and post-revision outcome measures were identified for all patients to include ambulatory status, need for non-prosthetic assistive devices, and pain medication use. Final military and occupational information was recorded.

Results: At a mean follow-up of 23 months (IQR 16, 32), there were 261 complications in 156 patients leading to a 53% overall re-operation rate. Repeat surgery was performed semi-urgently for post-operative wound infections (27%) and sterile wound dehiscence (3.7%). Revision amputation surgery was also performed electively for persistently symptomatic residual limbs as a result of the following pathologies: heterotopic ossification (24%), symptomatic neuromas (11%), scar revision (8%) and myodesis failure (6%). Compared to transfemoral amputations, transtibial amputations were 1.9 times more likely to be complicated by a wound infection. They were also 3.8 times more likely to be revised due to a symptomatic neuroma. Transfemoral amputations were 3.8 times more likely to require heterotopic ossification excision. Finally, knee disarticulations were 7.9 times less likely to require re-operation when compared to all other amputation levels.

Conclusion: Revision surgery following major lower extremity combat-related amputations is common. In our cohort, revision amputation to address surgical complications and persistently symptomatic residual limbs improved the overall ambulatory status and led to outcomes similar to amputations that did not require a revision. Knee disarticulations significantly decrease the risk of re-operation in combat wounded personnel when proper indications are present.

Notes:

7:54am–7:59am

Functional Outcomes of Supination External Rotation Type IV Ankle Fracture Dislocations

Lionel E. Lazaro, MD
 Marschall B. Berkes, MD
 Rachel M. Cymerman, BA
 David L. Helfet, MD
 Milton T. M. Little, MD
 Dean G. Lorich, MD
 Peter K. Sculco, MD

Purpose/Hypothesis: Ankle fracture dislocation effect on functional outcomes remains unclear. We hypothesize that

supination external rotation (SER) type IV fracture pattern with associated dislocation may result in worst functional outcome and increase morbidity.

Methods: Two hundred fifty four patients, who sustained unstable ankle fractures and who were treated operatively by the same surgeon from 2004 to 2010, where prospectively entered in a surgical database. One hundred seventy six patients sustained supination external rotation (SER) type IV / SER IV equivalent injuries. Of these, 114 patients fulfilled inclusion criteria. Fifty-three (47%) patients had fracture dislocations. All patients had standard 3-view ankle radiographs, followed by magnetic resonance imaging (MRI) to completely assess bone and ligamentous injury. Postoperatively all patients had standard radiographs series followed by computer tomography (CT) scan. The CT images were judged for quality of reduction. The follow-up radiographs were measure to determine tibiofibular relationship and assess for postoperative diastasis over time, up to one-year. We compared clinical and radiographic data between dislocation and no dislocation subgroups. The primary outcome measure was the self-reported FAOS questionnaire.

Results: Average patient age was 52 years. There was no difference in sex distribution, age and co-morbidities. The fracture dislocation subgroup had a significantly longer hospitalization (7.44 days), higher rate of external fixation (24/53), decreased ankle range of motion (dorsi-flexion/plantar-flexion: 16/43 degrees) and lower pain scores on the FAOS (77 points). There where no significant difference in post-operative wound complications, infection rate, fracture reduction and maintenance of tibiofibular relationship. There was no significant difference (radiographic data, clinical data and subjective assessment) when comparing open fracture-dislocation to closed fracture-dislocation.

Discussion and Conclusion: Our data suggested that SER IV/ SER IV equivalent fracture dislocation might result in worst functional outcome (limited range of motion and greater incidence of residual pain) and increased morbidity (longer hospital stay and higher rate of external fixation) even though there was no significant difference in infections, wound complications and the remainder FAOS subsets.

Notes:

7:59am–8:04am

Acute Operative Complications of Open Distal Radius Fractures: A Retrospective Cohort Study

Jaehon M. Kim, MD
 Mitchel B. Harris, MD
 Jesse B. Jupiter, MD
 Wanjun Liu, MD
 Frank M. McCormick, MD
 Mark S. Vrahas, MD
 David Zurakowski, PhD

Introduction: There is a paucity of literature regarding the complications of open distal radius fractures (DRF). The purpose of this investigation is to determine the incidence of infection, identify predictors of complications, and compare the method of fracture fixation.

Methods: This is a retrospective cohort study of 240 DRF prospectively enrolled in the database of two level I trauma centers. All patients with closed DRF who underwent surgery within one day of admission were selected as a control for the open fracture cohort. Acute complications, with primary focus on infection, compartment syndrome, and acute carpal tunnel syndrome (ACTS), were identified based on the necessity for operative intervention. Multivariate logistic regression was performed to identify predictors of complications and determine the odds ratio (OR) as a measure of risk.

Results: There were 118 closed and 122 open DRF (90 grade I, 22 grade II, 10 grade III) which met the inclusion criteria. No differences were observed in regards to the mechanism of injury and fracture pattern. Infections (2% open) and compartment syndrome (3% closed, 2% open) occurred similarly in both groups. Given the low incidences of infection and compartment syndrome, no predictors were identified. The ACTS occurred 12% in closed and 11% in open DRF. Multivariate predictors of ACTS were grade III open fractures (OR=7.3), AO/OTA type C (OR=4.7), age less than 50 years (OR=3.0), and application of external fixation (OR=2.9). In the open fracture cohort, postoperative ACTS was significantly higher among patients with external fixation compared to volar plates (13% versus 2%).

Conclusion: While the urgency for prompt surgery was dictated by the threat of infection, ACTS was more prevailing consequence of open DRF with four identifiable significant predictors. Compared to volar plates, external fixation was

associated with higher incidence of postoperative ACTS in open fracture group.

Notes:

8:04am–8:09am

Acute Hospital Resource Utilization in Combat Wounded Multiple Extremity Amputees from Operation Iraqi Freedom and Operation Enduring Freedom

CDR Mark E. Fleming, DO

Purpose: Current combat operations have resulted in an increase in service members sustaining traumatic multiple extremity amputations. Despite the frequency, severity and disability associated with traumatic multiple extremity amputations, no report exist concerning the resource utilization associated with their care. This study investigates the acute hospital resource utilization of the multiple extremity amputee.

Methods: After IRB approval the combat trauma registry was queried for US service members with major extremity amputations sustained in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) from September 2007 through December 2010. Data analyzed included the extremity(s) amputated, number of associated injuries, blood products utilized, intensive care unit length of stay (LOS), hospital length of stay (LOS) and the Injury Severity Score (ISS).

Results: The records of 113 patients with traumatic amputations were identified. 4 patients had incomplete records and were excluded. Therefore the data of 109 patients were analyzed. Patients were stratified to one of two groups based on the number of amputations sustained. 63 patients comprised the multiple extremity amputation (MEA) group and 46 patients comprised the single extremity amputation (SEA) group. The 63 patients in the MEA group sustained a total of 137 amputations, including 2 patients with 4 extremity amputations, 7 patients with 3 extremity amputations and 54

patients with 2 extremity amputations. All of the MEA patients sustained bilateral lower extremity amputations with 38 of the 63 sustaining bilateral transfemoral amputations or more proximal levels. 3 of the MEA patients underwent a hip disarticulation and three patients underwent a hemipelvectomy. One patient underwent bilateral hip disarticulations. The mean number of associated injuries was similar for both groups: 6.6 injuries for the MEA group versus 6.1 injuries for the SEA group ($P=.25$). The mean ISS of the MEA group was 21 and the mean ISS of the SEA group was 17 ($P=.019$). The MEA group had a longer mean LOS of 33 days versus 28 days for the SEA group ($P=.059$) and a higher number of surgical encounters at a mean of 8.6 versus 3.9 surgical procedures (P less than .000005) for the SEA group. The mean blood product utilization was 19.5 units of packed red blood cells for the MEA group and 6.1 units for the SEA group (p less than .000005). The mean ICU LOS was 9.3 days for the MEA group versus 3.7 days for the SEA group ($p=.004$).

Conclusion: This is the first study exploring resource utilization in caring for the multiple extremity amputee. Multiple extremity amputees utilize more resources including the administration of blood products, ICU days, hospital length of stay and operative interventions.

Notes:

8:20am–8:25am

Fixation of Unstable Inter-Trochanteric Hip Fractures in Internal Rotation: An Important Predictor of Fracture Union

Parthiv A. Rathod, MD
Ajit Deshmukh, MD
Ersno Eromo, MD
Jose A. Rodriguez, MD

Introduction: Inter-trochanteric fractures of the femur are among the most common long bone fractures. Failure of union can be influenced by complexity of the fracture, reduction quality, implant position, and other patient characteristics. We investigated the importance of internal rotation during reduction as a predictive factor in postoperative fracture union.

Methods: 532 consecutive patients with ICD 9 codes of 82020 and 82032 were admitted and surgically treated at a community hospital from 2004 to 2008. 62 of these patients fit strict radiographic and follow up criteria to qualify for inclusion in this study. The fractures were classified on pre-operative radiographs according to the AO/OTA classification system. The quality of reduction (based on objectively defined criteria of Baumgartner et al) and the alignment of the fracture following reduction (internal versus external) were evaluated. The position of the screw, integrity of lateral femoral wall, the presence of distal locker (when applicable) were evaluated. These patients were followed radiographically for one year or up to radiographic union.

Results: 4 out of the 17 patients (23.5%) that were fixed in external rotation had failed to unite before or at the one year follow up period, compared to 1 out of 44 patients (2.2%) fixed in internal rotation in the same time interval. Fisher's exact test showed fixation of AO/OTA 2.1, 2.2, and 2.3 inter-trochanteric fractures in internal rotation to be a significant predictor of union compared to those fixed in external rotation.

Discussion and Conclusion: Intra-operative fracture reduction in internal rotation was found to be the main predictor of union for AO/OTA 2.1, 2.2, and 2.3 inter-trochanteric fractures. This fractures should be fixed in internal rotation with good or acceptable reduction.

Notes:

8:25am–8:30pm

Rockwood Pin Fixation in the Management of Midshaft Clavicle Fractures: A Retrospective Review

Timothy B. Larson, MD
Larry S. Bankston Jr., MD
Donald D'Alessandro, MD
Matthew Gullickson, MD
Shelden Martin, MD
Kevin J. Thompson

Introduction: There has been an evolution toward operative fixation of completely displaced midshaftclavicular fractures.

The purpose of our study is to evaluate the clinical and radiographic outcomes following fixation of acute, midshaft clavicle fractures treated with intramedullary (IM) fixation.

Methods: Medical records were retrospectively reviewed for all patients treated by IM fixation for an acute, midshaft clavicle fracture between March 2007 and October 2009 by four orthopaedic surgeons. Results were assessed by the American Shoulder and Elbow Surgery (ASES) Score, radiographic exam of both clavicles, and physical examination.

Results: 38 Patients (9 female, 29 male) were identified as having Rockwood Pin fixation for acute midshaft clavicle fractures with 100% displacement or more and >2cm shortening. Average age was 23.7 years. Average follow-up was 19.2 months. Of the 38 patients, 36 (94.7%) successfully united their fracture in an average of 3.0 months. 22/38 (57.9%) of patients were available for a final follow-up exam and radiograph. The average ASES score for the injured side was 91.9. Average residual shortening was 7.6mm on the injured clavicle (range 0-19.2mm). Complications included superficial wound complications (9), incomplete removal of hardware (2), one delayed union, one malunion (>15mm shortening) and two nonunions. Wound complications necessitated removal of hardware in three patients prior to radiographic union, but all three went to successful union. All wound complications resolved with hardware removal and a short course of oral antibiotics.

Discussion and Conclusions: Rockwood pin fixation is a viable surgical option for treatment of acute, displaced mid-shaft clavicle fractures in the young, active patient, with high rates of union and shoulder function. Attention must be given to proper pin length in order to minimize irritation and wound complications to the posterior soft tissues.

Notes:

8:30am–8:35am

Ranawat Award

“Same Day” Ex-Vivo Regional Gene Therapy: A Novel Strategy to Enhance Bone Repair

Mandeep Virk, MD

Introduction: We have previously demonstrated that ex vivo regional gene therapy using BMP-2 producing bone marrow cells can heal a critical sized femoral defect in animals. However, the conventional ex vivo gene therapy involves culture expansion of bone marrow cells, which is expensive, time-consuming, carries a risk of infection and can alter the biological characteristics of stem cells. The purpose of this study was to develop a novel “same day” gene therapy strategy in which the cell harvest, viral transduction and implantation will be performed on the same day without culture expansion of bone marrow cells.

Methods: A rat segmental femoral defect (8mm) model was used in this study. In the “same day” strategy buffy coat cells were harvested from the rat bone marrow and transduced with a lentiviral vector expressing BMP-2 for one hour. In order to ensure robust BMP-2 production following short duration viral transduction (1hr), we modified the standard lentiviral vector to two step transcriptional amplification vector system (TSTA). The process of cell harvest and viral transduction was easily completed in less than 3 hours.

Results: The transduced “same day” cells produced similar amount of BMP-2 as cultured bone marrow cells in vitro. All the femoral defects treated with “same day” gene therapy demonstrated complete healing (radiographic and histologic) at 8 weeks. In contrast to femoral defects treated with conventional ex vivo gene therapy, the “same day” strategy induced earlier radiographic bone healing and significantly higher bone volume (plain radiograph, microCT) in the defects.

Discussion and Conclusions: The “same day” strategy represents a significant advance in the field of ex vivo regional gene therapy because it offers a solution to the limitations associated with the culture expansion process required in the traditional ex vivo approach. The “same day” strategy should be cost-effective when adapted for human use.

Notes:

8:35am–8:40am

Fracture Fixation Determines the Pathway of Osseous Repair: A Bilateral Femur Fracture Model in the Rat

David E. Jaffe, MD
Jason Blevins, BA
Gregory Gasbarro, MS
Tyler Hughes
Vincent D. Pellegrini Jr., MD
Joseph P. Stains, PhD
David J. Yoo, MA

Introduction: In human fractures, rigid internal fixation leads to primary bone healing (intramembranous ossification), whereas secondary healing (endochondral ossification) is stimulated by interfragmentary motion and is characterized by cartilaginous callus formation. We sought to investigate factors influencing fracture repair and establish a bilateral femur fracture model that would concurrently induce both repair pathways in one animal.

Methods: On an IACUC-approved protocol, seventeen five-month old, male Sprague-Dawley (SD) rats underwent bilateral open transverse mid-shaft femur fracture. All were treated by rigid internal fixation with plate and screws on one side. On the contralateral side, eight animals underwent fracture fixation with a custom static locked intramedullary nail and eight received a dynamized intramedullary nail. Five animals in each group were survived 24 weeks with serial radiographs. Callus was quantified on lateral radiographs using a ratio of callus width to bone width. One animal from each group was euthanized for histology at 10, 21, and 28 days.

Results: One animal died intraoperatively. Two plated femurs failed and the animals were euthanized (one at 6 weeks and the other at 10 days). Femurs fixed with dynamized nails developed more callus than the locked construct and demonstrated earlier radiographic union. The static locked nail group showed early callus, but never achieved definitive radiographic union. Plated femurs featured minimal radiographic callus. Repair tissue in nailed femurs had histology characterized by chondrocytes and fibrous tissue compared to plated fractures.

Discussion and Conclusion: The method of fracture fixation determines the pathway of fracture healing in SD rats. IM nailing induced endochondral ossification, while plated femurs healed predominantly via intramembranous ossification. The static locked IM nail did not ultimately lead to radiographic union, but rapid union resulted with the dynamized

construct. Controlled axial loading through the fracture site induces endochondral ossification and prompts radiographic union in a SD rat femur fracture.

Notes:

Thursday, October 20, 2011

Concurrent General Session III — Sports Medicine (*Ballrooms C & D*)

Moderators: Mark J. Lemos, MD
Fotios P. Tjoumakaris, MD

9:10am–9:15am

Synovial Inflammation in Patients Undergoing Arthroscopic Meniscectomy: Does Histological Inflammation Affect Clinical Outcomes in Patients with Traumatic Meniscal Tears

Anthony Albert, MD
John C. Richmond, MD
Paul Weitzel, MD

Introduction: Inflammation is associated with negative outcomes in patients with osteoarthritis. Most patients with traumatic meniscal tears show improvement following surgery; however, for those with poorer outcomes, we don't know if inflammation is a predictor. Literature has shown that inflammatory markers such as CCL 19 and CCR7 negatively correlate with preoperative outcomes scores in this patient population. We sought to determine if the presence of synovial inflammation in patients with traumatic meniscal tears without radiographic evidence of osteoarthritis negatively affect clinical outcomes following meniscectomy?

Methods: 33 patients with traumatic meniscal tears who underwent arthroscopic meniscectomy were prospectively followed for 2 years. Suprapatellar synovial biopsies were obtained during surgery and graded histologically. Patients were stratified based on the presence or absence of inflammation on histology. Lysholm, Visual Analog Scale (VAS), and SF-12 outcomes scores were obtained at pre-op, 16 week, 1 year, and 2 year follow-up. Two independent sample t-tests were performed.

Results: 28 patients were available for 2 year follow-up. 12 and 16 patients were in the inflammation and no inflammation group respectively. The inflammation group was on average 11 years older (51 versus 40), and had surgery 8 weeks earlier (10.2 versus 18.5). Low pre-operative Lysholm scores correlated to synovial inflammation at the time of biopsy. Both groups showed improvement of Lysholm scores out to two years with the inflammation group having lower scores at all-time intervals but this was not statistically significant. VAS scores trended lower in the inflammation group at all-time intervals. The SF-12 score showed no correlation.

Discussion and Conclusion: Presence of suprapatellar inflammation on histology for acute traumatic meniscal tears negatively affects pre-operative knee scores and shows a trend to negative outcomes out to 2 years although not statistically significant with this sample size.

Notes:

9:15am-9:20am

Resident Travel Grant Award

Intercondylar Notch Size and Non-Contact ACL Injuries at the United States Naval Academy

Kelly Kilcoyne, MD
 *James H. Flint, MD
 CPT Jonathan F. Dickens, MD
 CDR John-Paul Rue, MD

Introduction: Several potential risk factors for anterior cruciate ligament (ACL) injuries have been proposed. The goal of this study is to document the incidence of ACL injuries at X and to evaluate pre-injury radiographic measurements (notch width) and body mass index (BMI) as possible risk factors for these injuries.

Methods: An IRB-approved, retrospective review of a database from an existing IRB-approved study was performed. The database contained measurements from prospectively obtained standard AP/lateral knee radiographs, as well as baseline height, weight, age, sex and documented ACL injury for 2 consecutive incoming classes at X in 1999 and 2000 and followed prospectively for 4 years. Radiographic measure-

ments including condylar width, notch width, and femoral notch width index (notch width divided by condyle width), were calculated for both the injured and uninjured subjects utilizing standard radiographic measurements. Inclusion criteria for the retrospective review included having initial radiographic measurements, height and weight, no previous ACL injury, and documentation of subsequent injury or lack of injury during the 4 years of observation. Exclusion criteria included missing any of the inclusion criteria.

Results: 1687 study participants met the inclusion criteria and were observed for 4 years. The overall incidence of ACL injury was 2.9% (12 female, 37 male). The average BMI for the ACL injured group was 25.6 kg/m² compared to 24.4 kg/m² overall. While femoral notch width alone was not associated with non-contact ACL injuries, athletes with higher than average BMI in combination with low notch width were at significant risk for an ACL injury.

Conclusions: Several identifiable risk factors to include BMI and notch width may predispose young athletes to non-contact ACL injury. However, larger studies are necessary to elucidate the interactions of these factors and how they may contribute to ACL injury in this patient population.

Notes:

9:20am-9:25am

Open Subpectoral Biceps Tenodesis: An Anatomical Evaluation of At-Risk Structures

CPT Jonathan F. Dickens, MD
 *LT Reed M. Heckert
 Kelly Kilcoyne, MD
 CDR John-Paul Rue, MD
 LT Scott Tintle, MD

Introduction: Few studies evaluate complications associated with open subpectoral biceps tenodesis (OSBT). The purpose of this study is to provide the first description of at-risk structures during OSBT.

Methods: The OSBT approach described by Mazzocca et al (2005) was performed in 17 upper limbs. As originally described, a blunt Chandler was positioned on the medial aspect of the humerus to retract the coracobrachialis and short

head of the biceps. The location of the tenodesis was consistently referenced at the medial border of the biceps and inferior aspect of the pectoralis tendon. All important anatomic structures were carefully dissected and identified. Superficial structures were measured relative to the skin incision and deep structures were measured from the tenodesis site.

Results: Seventeen upper extremity dissections (9 right, 8 left) were performed in 9 cadavers (6 males and 3 females). The cephalic vein was 9.2 mm lateral to the superior margin of the incision. The musculocutaneous nerve was 10.1 mm medial to the tenodesis location and 2.94 mm medial to the medially placed retractor. The musculocutaneous nerve was significantly closer to the tenodesis site in internal versus external rotation. The radial nerve and deep brachial artery were 7.4 mm and 5.7 mm deep and medial to the medially placed retractor.

Discussion and Conclusion: The proximity of the musculocutaneous nerve to the tenodesis site and medial retractor make this a vulnerable structure. External rotation of the arm moves the nerve 11.3 mm away from the tenodesis site and this maneuver should be considered. Additionally, the proximity of the leading edge of the medial retractor to the radial nerve and deep brachial artery is important and should be respected. Adverse outcomes related to damage of surrounding neurovascular structures are plausible but may be prevented by an improved understanding of the applied anatomy.

Notes:

9:25am–9:30am

Chronic Distal Biceps Tendon Repair Using Tibialis Anterior Allograft and Suture Anchors Through a Single Incision Approach

Claus Egidy, MD
Michael B. Cross, MD
Joshua S. Dines, MD
Denis Nam, MD
Daryl C. Osbahr, MD
Ray H. Wu, BD

Introduction: Distal biceps tendon ruptures account for 10% of all biceps ruptures. While it is accepted that acute surgical

treatment is superior to conservative treatment for acute injuries, recommendations for the treatment of chronic injuries is still debated. Several techniques for chronic biceps tendon repair have been reported. Nonetheless, the literature on chronic distal tendon biceps repair is sparse consisting of only anecdotal case series and case reports. We present a new technique for chronic biceps tendon repair, and report our outcomes at one year followup.

Methods: Seven consecutive patients who underwent chronic distal biceps tendon repair through a single incision, using suture anchors and tibialis anterior allograft were retrospectively evaluated. All patients underwent the same postoperative rehabilitation protocol. All patients underwent distal biceps tendon repair greater than 6 weeks from their initial injury, and had at least one year of clinical followup. The primary and secondary outcome measure was the postoperative MAYO elbow scores and elbow range of motion (flexion, extension, pronation, supination). The intraoperative and postoperative complications were also evaluated.

Results: At an average follow-up of 16 months, the average postoperative elbow motion was: extension 4° (0°-12°), flexion 134°(130°-140°), pronation 82° (75°-85°), and supination 80° (70°-85°). The average MAYO clinic elbow score was 94.7 (80-100). There were no intraoperative or postoperative complications to date.

Discussion and Conclusion: Though many reported techniques for chronic distal biceps tendon repair achieve satisfactory outcomes with limited complications, we present a technique with theoretical advantages of a single incision approach, the utilization of suture anchors, the use of a tibialis anterior allograft, and tensioning after attachment of the graft to the radial tuberosity.

Notes:

9:30am–9:35am

Age-Related Changes Affect Rotator Cuff Muscle Function

Christopher J. Tuohy, MD
L. Andrew Koman, MD
Sandeep Mannava, MD
Lauren A. Pace, BS
Johannes F. Plate, MD
Katherine R. Saul, PhD
Thomas L. Smith, PhD

Introduction: Rotator cuff tears are a common cause of upper-extremity disability in the elderly. Advanced age has been associated with decreased muscle function and difficulty in performing activities of daily living. The purpose of this study was to characterize how normal aging influences rotator cuff muscle-tendon unit structure and function.

Methods: A total of 26 young (2 months old), middle-aged (12 months old), and old (28 months old) rat supraspinatus muscles, from the National Institute of Aging (NIA) Aged Rodent Colonies, were used to study age-related changes in rotator cuff neuromuscular function and structural changes in the muscle.

Results: Histological analysis revealed that the muscle fascicles are more densely packed in the young and middle-aged skeletal muscle, when compared to the old experimental group, which were less organized, displaying a greater inter-fascicular infiltration of fibrotic tissue. Further, there were differences in the expression level and localization of the muscle regulatory proteins MyoD and Myf5 as determined by quantitative immunohistochemistry. There were significant differences in peak tetanic contraction force between the middle aged experimental group and both the young and old experimental groups. There was also a significant amount of regional heterogeneity in maximal CMAP amplitude.

Discussion and Conclusion: Skeletal muscle structure and function change during the normal aging process. Structural histological and molecular changes observed during normal aging are likely to influence muscle contractile strength and the ability of the muscle to heal in response to injury. In particular, the young and old experimental groups were sensitive to preload tensions routinely encountered during rotator cuff repair surgery in this animal model. Age should be used in pre-operative planning to determine a patient's ability to handle the stress of orthopaedic surgery and the ability of young

and aged individuals to participate in rigorous physical activity (i.e. youth sports, post-operative rehabilitation).

Notes:

9:42am–9:47am

Human Osteoarthritic and Degenerative Monkey Menisci Have Differential Increases of Matrix Metalloproteases Compared to Both Osteoarthritic Chondrocytes and Healthy Monkey Menisci

Austin V. Stone, MD
Cristin M. Ferguson, MD
Richard F. Loeser, MD
David L. Long, BS

Introduction: Meniscus injury is a known predisposing factor for osteoarthritis (OA) which affects over 27 million Americans at an annual cost exceeding \$128 billion. The mechanisms by which meniscus injury leads to OA are unknown. This study sought to identify novel expression patterns in menisci in response to inflammatory cytokines present in OA joints.

Methods: Human meniscal cells and chondrocytes were isolated from patients undergoing total knee arthroplasty for end stage OA. Primary cell cultures were stimulated with inflammatory interleukins (IL). Menisci were obtained from healthy young and old vervet monkeys and explants were cultured. Matrix metalloprotease (MMP) expression was assessed by methods including protein array, immunoblot and gene expression.

Results: Novel expression patterns in MMPs were identified in human menisci distinct from those in cartilage. Increased amounts of MMP-1 and MMP-8 with mildly increased MMP-3 were present in human OA meniscus cell cultures after IL-6 stimulation, but not in chondrocytes. IL-1 did not substantially increase MMP expression. Increased expression of MMP-1, -3, and -8 was seen in older and degenerative monkey menisci and was not present in younger and non-degenerative menisci. Monkey explant culture also demonstrated expression of IL-6 and increased IL-7 expression in degenerative, but not healthy menisci.

Discussion and Conclusion: Human OA meniscus responds to inflammatory cytokines present in diseased joints by producing collagen-degrading enzymes in a different pattern than human OA chondrocytes. These trends are similar to the expression patterns identified in aged and degenerative monkey menisci and both are distinct from healthy and younger monkey menisci. The altered expression patterns emphasize the role of the meniscus in disease progression in the OA joint and provide a foundation for examining the degenerative changes in the meniscus following meniscal injury. These novel findings in diseased and injured menisci will also aid in defining normal meniscus homeostasis.

Notes:

9:47am–9:52am

Resident Travel Grant Award

Evaluation of Sterilization Methods: Following Contamination of ACL Hamstring Autografts

Xinning Li, MD

Introduction: Inadvertent contamination of the hamstring autograft during ACL reconstruction is infrequent, but can result in significant complications. Contamination occurs most commonly when the graft is accidentally dropped onto the operating room floor. The purpose of this study is to evaluate bacterial contamination of hamstring autografts dropped onto the operating room floor and different methods of graft sterilization.

Methods: Semitendinosis and gracilis tendons were harvested from patients using standard technique. Excess tendon not used in the ACL procedure was cut into six segments. Groups were divided into A through F (N=30 in each group). Group A was unaltered graft obtained after harvest (control), B was graft dropped on floor and retrieved in less than 5 seconds and C was retrieved after 15 seconds. All grafts in groups D to F were dropped on the floor for 15 seconds, then rinsed with

saline (D), antibiotics solution (E), or Chlorhexidine (4%) solution (F) for 3 minutes. All grafts were sent to laboratory for both anaerobic and aerobic cultures. Organisms were recorded and statistical analysis was performed.

Results: Positive cultures were seen in the control group (7/30), group B 10/30, group C (7/30), group D (9/21), group E (1/30) and group F (1/30). Sixteen total organisms were identified, with *Staphylococcus aureus* being the most common. Statistical analysis was performed and dropped grafts rinsed in antibiotics and chlorhexidine solution were significantly different than control ($p<0.05$). However, there was not a significant difference between grafts retrieved from the floor in < 5 secs vs. 15 secs.

Discussion and Conclusion: This study supports the practice of decontaminating a dropped ACL hamstring autograft using either 4% chlorhexidine or antibiotics solution. Specimens should be retrieved sterilely and washed for at least 3 minutes. This study also demonstrates no advantage in a retrieval time of less than 15 seconds.

Notes:

9:52am–9:57am

Clinical Measurement of the Patellar Tendon: Its Accuracy and Relationship to Actual Tendon Dimensions

Chad C. Zooker, MD
Michael G. Ciccotti, MD
Steven B. Cohen, MD
Peter F. DeLuca, MD
Matthew J. Kraeutler, BS
Rajeev Pandarinath, MD

Introduction: Patellar tendon width and length are commonly used for preoperative planning for anterior cruciate ligament (ACL) reconstruction. The tendon is commonly measured in the clinical setting to determine its suitability for grafting. The purpose of this study was to examine the accuracy of measurements made by palpation through the skin preoperatively and correlate to the actual dimensions of the tendon at the time of surgery.

Methods: Width and length of the patellar tendon were measured at full extension and at 90 degrees of flexion prior to making incision in 39 patients undergoing ACL reconstruction

with patellar tendon autograft. The distal pole of the patella and proximal edge of the tibial tubercle represented the landmarks used to standardize our measurements. The tendon was then exposed and width and length were measured at 90 degrees of flexion prior to harvesting.

Results: Average patellar tendon length and width at 90 degrees of knee flexion were found to be 41 mm (32mm-48mm) and 33 mm (25mm-40mm), respectively. Patellar tendon length was found to be uncorrelated to patient height, weight, or BMI. After performing a two-tailed, paired t-test, no significant difference was found between the estimated pre-incision and actual width measurements ($p = 0.288$). However, estimated, pre-incision length at flexion ($p = 0.018$) and extension ($p = 5.9E-4$) were found to be significantly shorter than the actual length.

Discussion and Conclusion: Clinical measurement of patellar tendon width appears to be statistically similar to actual width. However, length with the knee in flexion can significantly underestimate the actual length of the tendon. These are important considerations when planning for procedures utilizing a patellar tendon autograft. Based on the results of this study, patellar tendon width can be accurately determined preoperatively, but measurements of length are not as reliable. Patient height and weight should also not be considered a reliable means of estimating patellar tendon length prior to surgery.

Notes:

9:57am-10:02am

The Role of Physical Therapy in the Treatment of Shoulder Impingement Syndrome

Purab Viswanath, MD
 John D. Lubahn, MD, FACS
 Mary T. Nelson, PT, CHT
 Vamsi M. Singaraju, MD

Introduction: Shoulder impingement syndrome (SIS) is common in the general population. It is typically treated with conservative therapy, followed by surgical decompression for persistent symptoms. No prospective randomized data has been published describing the efficacy of physical therapy to

stave off surgical decompression for recalcitrant cases. We hypothesized that PT can relieve symptoms and improve function over a long term follow-up.

Methods: We followed seventy-five patients who were diagnosed with SIS through clinical evaluation. All patients had subjective assessment using PENN & DASH scores during initial PT visit and subsequent 1-2 year follow-up. Seventeen of these patients also had objective assessment of strength using Baltimore Therapeutic Equipment (BTE) Simulator II at initial visit and at two year follow up. Statistical analysis was done using paired 'T' TESTS for binomial and Shapiro-Wilko test for variable data.

Results: At two year follow up, average PENN shoulder score (86; range 28-99) showed statistically significant improvement over initial PENN score (61; range 37-87) for 17 subjects($p=0.002$). Similarly, average DASH score improved from 25 (range 9-66) to 14.8 (range 0-52.3), which was statistically significant($p=0.005$). Average BTE external rotation deficits compared to contralateral side improved from 22% at initial visit to 6% at final follow up which showed a statistically significant improvement. Of the remaining fifty-eight patients, thirteen patients needed surgical intervention (six subacromial decompression, seven rotator cuff repair) secondary to failure of nonoperative management. The remaining patients did not have a BTE follow up or subjective score assessment at two years either due to lack of follow up, or death.

Conclusions: Our results demonstrate that PT for SIS is moderately effective during a two year period for alleviating symptoms and improving function according to patient surveys. In addition, function is demonstrated to improve by PT, demonstrated by improvements in BTE scores.

Notes:

10:02am–10:07am

Effect of rhPDGF-BB-Coated Sutures on Tendon Healing in a Rat Model: A Histological and Biomechanical Study

Stephen Cummings, MD

Nadine Chahine

David Dines

Joshua S. Dines, MD

Daniel Grande

Christopher Hee

Pasquale Razzano

Introduction: In previous studies, rhPDGF has been shown to improve tendon healing in a variety of animal models. Elucidating the ideal scaffold to deliver the growth factor, however, has continued to be subject of much debate. The aim of this study was first to determine whether sutures coated with rhPDGF-BB could successfully deliver appropriate amounts of the factor to the repair site, and secondly to determine if the sutures coated with growth factors would improve healing in a rat achilles tendon model based on biomechanics and histology.

Methods: 4-0 Vicryl suture was coated with varying concentrations of rhPDGF (0, 0.3, 1.0, and 10.0 mg/ml) using a previously described dip-coating process. The 0 rhPDGF group served as the control. ELISA was used to determine resultant concentrations of rhPDGF on the suture after being coated in the varying dipcoat solutions. Rat Achilles tendons were transected and repaired acutely using one of the four suture types. At four weeks the tendons were harvested and specimen were scored for collagen organization and uniaxial tensile biomechanical analysis was performed.

Results: Sutures were successfully coated with the rhPDGF with higher dip-coat concentrations resulting in larger amounts of rhPDGF on the sutures. Histological analysis demonstrated a trend toward more organized collagen in the PDGF groups. A significant difference in ultimate tensile stress between control and high dose PDGF groups was observed. Modulus was significantly higher in highest dose PDGF group than in all other groups.

Conclusion: This study proved our hypothesis that rhPDGF-coated suture could improve material properties of repaired tendons in a positive, dose-dependent fashion. Clearly, larger animal studies are necessary to confirm the findings; but, if the surgical repair of Achilles and possibly other tendons could be improved via biologics, patients would benefit.

Notes:

Thursday, October 20, 2011

Concurrent General Session IV — Upper Extremity (*Burwell Room*)

**Moderators: David S. Zelouf, MD
Henry A. Backe, MD**

9:10am–9:15am

Resident Travel Grant Award

Results of Non-Cemented Semi-Constrained Total Elbow Arthroplasty for Inflammatory Arthritis: A Minimum Fifteen Year Followup

Michael B. Cross, MD

Mark P. Figgie, MD

Joseph D. Lipman, MS

Benjamin McArthur, MD

Denis Nam, MD

Introduction: Current designs in modern day total elbow arthroplasty include semi-constrained, non-constrained, and modular implants; however, the majority of these implants are cemented, and thus, the literature available on the results following noncemented total elbow arthroplasty in inflammatory arthritis is limited.

Methods: 11 patients (8 females, 3 males, 14 elbows total) who underwent custom, noncemented total elbow arthroplasty from 1988-1995 were retrospectively reviewed. The average patient age was 28 years (range: 17-45 years). 5 patients had rheumatoid arthritis and 6 patients had juvenile rheumatoid arthritis. The mean followup was 18 years (range 15-22 years). All patients underwent a custom, noncemented, semi-constrained total elbow arthroplasty with a plasma spray surface designed from preoperative CT scan to achieve metaphyseal fit. The primary outcome was Mayo elbow performance scores, and secondary outcomes were flexion and rotation arc of motion. Postoperative complica-

tions and revisions performed were also recorded. Radiographs were taken at final follow up and were evaluated for evidence of loosening.

Results: Mayo elbow performance scores improved from mean=35 preoperative to mean=91 postoperative. Flexion arc of motion improved from 57° preoperative to 115° postoperative, and rotation arc improved from 80° preoperative to 135° postoperatively, on average. 3 patients underwent bushing revision at 8, 22, and 22 years (21%) respectively, and there was one deep infection (7%). On final radiographic followup at a mean of 18 years, all the components were fully ingrown, and there was no evidence of loosening or loss of fixation.

Conclusion: In the young population with inflammatory arthritis, noncemented total elbow arthroplasty has reliable outcomes clinically and radiographically at long term followup with no components revised for loss of fixation or loosening, and an isolated bushing exchange rate of only 21%.

Notes:

a glenohumeral injection through an anterior approach with arthroscopic confirmation.

Methods: Seventy-five consecutive patients who were undergoing routine shoulder arthroscopy for a variety of shoulder disorders agreed to participate. All underwent anterior placement of a 1.5-inch, 21-gauge needle using a location just lateral to the coracoid and angled 45° towards the glenohumeral joint. Following injection of sterile saline, a diagnostic arthroscopy was initiated through a standard posterior portal. The needle was considered intra-articular if fluid was expressed from the eyelet of the needle when the arthroscopy pump was turned on and/or with direct visualization of the needle with the arthroscope.

Results: The needle was visualized with the arthroscope in all 75 cases (100%). In 70 out of 75 cases (93.3%), fluid was expressed through the eyelet of the needle when the arthroscopy pump was turned on. In the other five cases, the needle was intra-articular but was resting against bone or soft tissue.

Discussion and Conclusion: Based on this study we believe that a non-radiographic-assisted anterior injection into the glenohumeral joint can be accurately placed using standard landmarks. The technique used is similar to making a standard rotator interval portal during shoulder arthroscopy; therefore it is most successful in the hands of experienced shoulder arthroscopists.

Notes:

9:15am-9:20am

Accuracy of Intra-Articular Injections of the Glenohumeral Joint Through an Anterior Approach: Arthroscopic Correlation

Matthew J. Kraeutler, BS
 *Christopher C. Dodson, MD
 Michael G. Ciccotti, MD
 Steven B. Cohen, MD

Introduction: Intra-articular injections of the glenohumeral joint are an important tool for orthopaedic surgeons who treat the spectrum of shoulder disorders. Previous studies, however, have suggested that these injections may not be reliably placed intra-articularly in the glenohumeral joint when performed in the office setting and that radiographic assistance may be necessary. The purpose of this study was to assess the accuracy of

9:20am-9:25am

Ulnar Variance as a Predictor of Persistent Instability Following Galeazzi Fracture Dislocations

Richelle Takemoto, MD
 *Igor Immerman, MD
 Kenneth A. Egol, MD
 Nirmal C. Tejwani, MD

Introduction: Galeazzi fracture is a radial shaft fracture with concomitant distal radial ulnar joint (DRUJ) instability. Currently, the only predictor of DRUJ instability in association with a radial shaft fracture is the distance from the radial car-

pal joint to the fracture. However, this measurement does not account for the differences in the size of the radial shaft. The purpose of this study was to evaluate this predictor as a ratio in proportion to the size of the radial shaft as well as to identify other predictors of Galeazzi fractures by analyzing radiographic parameters associated with these fractures.

Methods: Forty-six patients with fractures of the radial shaft without fractures of the ulna were followed for a minimum of 6 months after surgery from 2003 to 2009. All radius fractures were treated with plate and screw fixation. Injury of the DRUJ was defined as continued instability after surgical fixation of the radial shaft. Medical records and radiographs were reviewed retrospectively. Demographic data, mechanism of injury, preoperative injury ulnar variance and the ratio of the distance from the radiocarpal joint to the fracture over the entire length of the radius were analyzed using Fisher's exact test and Student T test.

Results: 23/46 patients had persistent DRUJ instability following fixation of the radius fracture. The ratio of distance from the radiocarpal joint to the fracture line over the size of the entire radial shaft was 0.34 (SD=0.026) in the group with persistent DRUJ instability and 0.33 (SD=0.023) in the group without DRUJ instability. These differences were not significant ($p=0.81$). The mean preoperative injury ulnar variance in the group with DRUJ instability was +2.7mm (range -4.49 to +12.43mm). The mean preoperative injury ulnar variance in the group without DRUJ instability was +1.62mm (range -5.64 to +10.51). Only 2/23 patients with DRUJ instability did not have a normal ulnar variance (-2 mm to +2 mm) while 14/23 patients without DRUJ instability had a normal ulnar variance compared to their contralateral side. These results were found to be significant ($p=0.00044$). There were no significant differences with respect to age, time to surgery, gender, mechanism of injury, or the location of the fracture along the radius. Patients were followed for a minimum of 6 months after surgical fixation. Complications included, one nonunion and one periprosthetic fracture.

Conclusion: Preoperative ulnar variance measured on initial injury radiographs greater or less than 2 mm in the presence of an isolated radial shaft fracture is predictive of DRUJ instability. The ratio of distance from the radiocarpal joint to the fracture was not predictive of persistent DRUJ instability. This knowledge allows the surgeon to pre-operatively counsel the patient on the expected surgical tact and outcomes.

Notes:

9:25am–9:30am

Understanding Proximal Ulna Anatomy on Static Fluoroscopic Images

Anna Babushkina, MD

Scott G. Edwards, MD

Introduction: The three-dimensional anatomy of the proximal ulna can be difficult to interpret with two-dimensional imagery techniques, especially standard intraoperative fluoroscopy. Without appropriate visualization, surgeons risk placing implants in suboptimal locations, perhaps even within the joint. The purpose of this study is to delineate the borders of the trochlear ridge, and the medial and lateral facets, and provide identifying measurements to assist surgeons intraoperatively.

Methods: Ten fresh-frozen cadaveric elbows were analyzed: five female and five male specimens with an average age of 62 years. Female height ranged from 5'0"-5'2" and male height ranged from 6'0"-6'2". True lateral static fluoroscopic images were obtained of each specimen with a custom radiographic scale to allow assessments of true measurements. Radiographic markers were placed intra-articularly onto the trochlear ridge and the floor of the medial fossa. The specimens were imaged again and measurements taken using the custom scale.

Results: In the small specimen group, the average distance to the trochlear ridge, the medial facet, and lateral facet from the center of the trochlea were 10.2mm (95% CI 9.7 to 10.6mm), 13.6mm (95% CI 12.4 to 14.8mm), and 11.2mm (95% CI 10.9 to 11.5mm) respectively. The large specimens had average distances of 11.9mm (95% CI 11.3 to 12.4 mm), 16.6mm (95% CI 15.8 to 17.4mm), and 14mm (95% CI 13.3 to 14.7mm) respectively. Interobserver and intraobserver reliabilities were good to excellent (.85 to .98 for all measures).

Discussion and Conclusion: When viewing a true lateral of the elbow by intraoperative fluoroscopic imagery, the lateral facet may be easily visualized and resides 11-14mm from the center of the trochlea in most patients. The trochlear ridge and medial facet, however, are not readily seen on standard fluoroscopy. The trochlear ridge in most patients may be identified by measuring 10-12mm from the center of the trochlea. The medial facet in most patients may be identified by measuring 13.5-16.5mm from the center of the trochlea. These limits should be considered when placing implants about the sigmoid notch of the proximal ulna.

Notes:

9:40am–9:45am

Ninety-seven Percent Accuracy of Intra-Articular Glenohumeral Injection with a Modified Posterior Bone Touch Technique

Jeremie M. Axe, MD
Michael J. Axe, MD

Introduction: Unguided approaches have not demonstrated evidence of accurate intraarticularglenohumeral injections. The purpose of this study was to assess the accuracy of a posterior approach, bone touch technique in conscious subjects without shoulder pathology as a first step in developing an accurate, reliable technique for use in patients.

Methods: 26 young subjects (age 22-26) without shoulder pathology (BMI 24+/-3), had the left then right shoulders injected while awake and seated. A 20 gauge 3.5" needle was introduced 1.5cm below the scapular spine mid-way between the posterior lateral acromial corner and the posterior axillary crease. In Trial I, 20 shoulders were injected. After touching the humerus, the arm was ossilated. The needle advanced to 4-5 cms and 10 cc's of dye injected. Pop and ease of flow were recorded. Immediate room change, spot fluoroscopy, and independent experienced radiology reading followed. In Trial II, 32 shoulders were injected. The technique was modified to touching the humerus, externally rotating the arm 25 degrees, and while remaining in bone contact, delivering 10 cc's of dye. The same data as Trial I was recorded.

Results: In Trial I, 14/20 (70%) had dye within the glenohumeral joint. 5/7 failures were too anterior showing dye in the subscapularis muscle and all were associated with a pop. In Trial II, 31/32 (97%) had dye within glenohumeral joint. 45/52 (87%) had dye within glenohumeral joint and 39/45 (87%) had no extravasation (optimum). 85% of all shoulders had ease of flow. 23/52 shoulders had injection site pain, resolving within 24 hours.

Discussion and Conclusion: A modified posterior bone touch technique for glenohumeral joint injection is 97% accurate in conscious healthy young subjects. This study serves as an important first step in determining an optimum approach for injecting pathologic glenohumeral joints with corticosteroids or hyaluronic acid.

Notes:

9:45am–9:50am

The Epidemiology of Finger Dislocations in the United States

Kevin Kang, MD
Jack Choueka, MD
Karthik Jonna, MD
Archit Patel, MD

Introduction: Finger dislocations are common injuries, yet little data exists regarding incidence estimates and demographics. The purpose of this study was to determine the epidemiological characteristics of this injury using a longitudinal, prospective, nationwide, epidemiologic database.

Methods: The National Electronic Injury Surveillance System (NEISS) was queried for all finger dislocations between 2004 and 2008. Weighted estimates as well as United States Census data were used to calculate incidence ratios, demographics, and location of injuries.

Results: During the 5 year study period, an estimated 166,561 cases of finger dislocation were treated in 1,499,222,917 person-years for an incidence rate of 1.11 per 10,000 person-years (95% CI 0.96-1.26). The injury predominantly affected males (78.7% of cases) at an incidence rate of 1.78 per 10,000 person-years compared to females at 0.46 per 10,000 person-years. Males were almost 4 times more likely to sustain a finger dislocation with an incidence rate ratio of 3.82. Most dislocations occurred in the 15-19 year age group (3.86 per 10,000 person-years, 95% CI 3.33-4.39). Compared to the 45-49 year age group, the incidence rate ratio was 5.87. In terms of race, blacks (1.68 per 10,000 person-years, 95% CI 1.45-1.91) were affected more than white races (0.77, 95% CI 0.67-0.88) or patients characterized as "other" (0.49, 95% CI 0.42-0.56). For blacks, the incidence rate ratio was 2.17 compared to whites and 3.42 compared to "other." 35.9% of cases took place at a sporting or recreational facility. 24.7 % of all finger dislocations, regardless of location, occurred while playing basketball while 20.0% were sustained playing football.

Discussion and Conclusion: In the United States, finger dislocations appear to occur most often in black males between 15-19 years of age and those participating in sports activities, especially basketball and football.

Notes:

9:50am–9:55am

Incidence of Post-Traumatic Elbow Contractures

Mark Schrupf, MD
Huong T. Do, MS
David M. Gay, MD
Stephen Lyman, PhD

Introduction: The epidemiology of post-traumatic elbow contractures is poorly understood. There are limited studies describing the incidence and patient subgroups that are at increased risk of contracture development. The purpose of this study is to estimate the incidence of elbow contracture following elbow trauma and to identify patient, treatment and injury factors that may predict contracture development.

Methods: We used the New York SPARCS database identify patients who were treated surgically for elbow trauma from 1997-2005. Patients with cerebral palsy, non-New York residents and those who had releases during their initial treatment were excluded. Subsequent admissions for these patients were examined. All patients had a minimum of one year follow-up. Univariate statistics and multivariate logistic regression was performed.

Results: 25,238 patients were treated for traumatic elbow injuries with 228 of the patients requiring a subsequent contracture release. The median time from index fracture to contracture release was 196 days (range 16-2750). Non-contracture patients had a median follow-up time of 1958 days (range 365-3651). Patients: The mean age of contracture patients was 40.2 vs. 35.9 for non-contracture patients ($p=0.001$). The proportion of males to females was higher in the contracture group 56.6 vs. 49.6 ($p=0.0036$). The proportion of concomitant head injuries was higher in the contracture group 4.4% vs. 2.0% ($p=0.029$). There were no significant differences in patient Charlson-Deyo co-morbidity scores, rates of diabetes or burns. Treatment: The proportion of contracture patients who underwent 2 or more procedures was greater 6.1% vs. 1.5% ($p=0.001$). Internal fixation was used in 93.4% of the contracture patients vs. 97.1% of non-contracture patients ($p=0.011$) additionally they had more procedures classified as more invasive 95.6% vs 76.0% ($p=0.001$). Injury Pattern: Contracture patients had a higher proportion of injuries classified as severe (16.2 % vs. 4.6%, $p=0.001$). For the subset of patients whose ICD-9 codes could be used to identify articular involvement, open injuries and dislocations, contracture patients had a 75.4% intra articular involvement vs. 60.1%

($p=0.001$), 20.2% open fractures vs. 8.6% ($p=0.001$) and 11.4% dislocations vs. 6.8% ($p=0.024$).

Discussion and Conclusion: We conclude that patient Charlson-Deyo score, diabetes, and burns are not significantly associated with the development of a contracture. However, males, patients who suffer head injuries at the time of the index injury, patients who undergo 2 or more procedures, more extensive procedures, especially those with intra articular fractures, open injuries and dislocations are at significantly increased risk for contracture.

Notes:

9:55am–10:00am

Prospective Evaluation Following Arthroscopic Treatment of Anterior Shoulder Instability

Kevin D. Plancher, MD

Introduction: Anterior shoulder instability treated with arthroscopic intervention is approaching the success of open surgery in the general population. However, the recommended intervention technique for the collision/contact athlete remains controversial. The purpose of the study is to evaluate the results of arthroscopic inferior capsular shift in recreational and college athletes.

Methods: A retrospective chart review yielded 61 patients treated for anterior instability with arthroscopic modified inferior capsular shift from 1999 to 2009. Twenty-one of those shoulders met the inclusion criteria: 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 were evaluated with a physical examination and completed the WOSI, MISS, Rowe, Constant-Murley, and Simple Shoulder Test.

Results: All shoulder scoring systems revealed significant differences between pre- and post-operative testing, without a significant difference noted post operatively between contact and non-contact athletes. Internal rotation is the only motion parameter that changed significantly with intervention,

improving from T12/L1 to T9 post operatively. Important to note, there was no significant loss in external rotation post operatively. Ninety-seven percent of patients returned to sports; 86% returned at their preoperative level of performance. Return to full competition occurred at 5.1 months, with no significant difference between contact (5.4 months) and non-contact athletes (4.7 months). One failure occurred in a patient with recurrent dislocation at 10 months post operatively.

Conclusion: The treatment of anterior instability using an arthroscopic modified capsular shift in contact and non-contact athletes shows no significant difference in range of motion, instability testing, clinical outcome scores, recurrence or return to sport time. We recommend that arthroscopic stabilization be considered for contact and non-contact athletes undergoing treatment in anterior instability without an engaging osseous defect.

Notes:

and 9 women, involving dominant-sided surgery in 20 out of 27 patients. 2 patients were active smokers, and 3 cases were work-related. Average age at time of surgery was 55 ± 2.6 years, and average follow up was 51 ± 6.5 months. Preoperative and postoperative range of motion, grip strength, and radiographic evidence of osseous union were documented. Standardized Patient Rated Wrist Evaluation Scores for both Pain and Function were collected.

Results: Wrist extension and flexion was decreased postoperatively 17% and 25% respectively, yielding a 21% decrease in mean flexion-extension arc. There was no significant difference with regards to postoperative radial and ulnar deviation, or mean coronal plane arc compared to preoperative value. Compared to the contralateral side, pre and postoperative grip strength was 53% and 70% respectively; the average operative-sided grip strength increased by 27%. Mean PRWE Pain Score was 10.6 ± 2.3 (out of 50). Mean PRWE Functional Score was 17.3 ± 4.5 (out of 100). Complications included 1 non-union (yielding a 96.3% fusion rate), 1 median neuropathy (which resolved), and 2 superficial wound infections (treated successfully with oral antibiotics).

Discussion and Conclusion: The CLX Fusion, involving the intercarpal arthrodesis of the capitulum and triquetrum joints, offers a motion preserving strategy with a high union rate and good clinical function and pain outcomes for the treatment of the degenerative SLAC wrist.

Notes:

10:00am–10:05am

Resident Travel Grant Award

CLX Intercarpal Arthrodesis for the Treatment of the SLAC Wrist

Mark L. Wang, MD, PhD
John M. Bednar, MD

Introduction: Proximal Row Carpectomy and Four-Corner Arthrodesis are two well-established motion-preserving treatment strategies for the degenerative SLAC wrist. In this study, we present a novel arthrodesis technique (CLX fusion), involving the capitulum and triquetrum joints, as another potential treatment option.

Methods: From 2000-2009, 27 consecutive patients with degenerative SLAC and SNAC wrist arthritis were evaluated prospectively and treated with scaphoid excision and intercarpal arthrodesis (CLX Fusion). This cohort consisted of 18 men

2011 Scientific Program Abstracts — Friday

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

Friday, October 21, 2011

Concurrent General Session VII — Hip Preservation (Ballrooms C & D)

**Moderators: James C. Vailas, MD
Richard M. Wilk, MD**

7:00am–7:05am

Labral Tears Seen in MRI: What Is the Significance?

Ronald Huang, BS
Fiona Carty, MD
Javad Parvizi, MD, FRCS

Introduction: Acetabularlabral tear is becoming an increasingly common diagnosis with orthopedic surgeons facing patients who have been given an MRI diagnosis of labral tear. The significance of labral tear seen on the MRI is still not well understood. It has been our experience that a large number of patients presenting with labral tear in a symptomatic hip also have evidence of labral tear in the contralateral and often asymptomatic hip. The intention of this study was to determine the incidence of labral tear in asymptomatic hips.

Materials and Methods: Patients undergoing MR arthrogram for unilateral hip or pain were included in this study. Patients were excluded if they had documented bilateral hip pain, no labral pathology was present on the affected side, or if patients had recent hip or pelvic surgery. 69 studies met the inclusion criteria. Radiologist readings of both the affected and asymptomatic sides were compared. This study is ongoing with a plan to include a total of 777 MR arthrograms of the hip done within the past three years at our institution.

Results: Labral tear was seen in 62 of 69 symptomatic hips. Of the 62 patients with a labral tear on their symptomatic side, five patients (8%) also had a contralateral labral tear that was asymptomatic.

Conclusion: The relatively high presence of labral pathology in contralateral and asymptomatic hip reinforces the notion that presence of a labral tear on cross sectional imaging may not be a clinically significant finding and certainly does not warrant surgical intervention in all. Even in the presence of labral pathology (tear, cyst, detachment, and so on) meticulous clinical evaluation should be performed to determine the exact cause of hip pain. This study is most likely underreporting the incidence of labral pathology in asymptomatic hips, as arthrogram of the asymptomatic hips were not performed.

Notes:

7:05am–7:10am

Resident Travel Grant Award

Utility of Magnetic Resonance Arthrograms of the Hip in Diagnosis of Labral and Chondral Pathology

Fiona Carty, MD
James Cashman, MD
Ronald Huang, BS
Javad Parvizi, MD, FRCS

Introduction: Accurate evaluation of acetabularlabral pathology and the condition of articular cartilage in the hip is essential in order to optimize outcomes of hip preservation and labral repair surgery. Plain radiographs only offer a two dimensional view of the joint and conventional magnetic resonance imaging often provides suboptimal visualization of the labrum. Magnetic resonance (MR) arthrography is often used in hopes of obtaining improved visualization of labral pathology and the complete articular surface. The purpose of this study is to examine the sensitivity of MR arthrography of the hip.

Materials and Methods: 57 hips in 54 patients were imaged with MR arthrogram prior to undergoing femoroacetabular osteoplasty (FAO) via direct anterior mini-open approach. Acetabular labral tear was diagnosed by presence of contrast within the substance of the labrum or between the labrum and acetabular rim, or when a paralabral cyst was present. Cartilage defects were diagnosed by decreased signal intensity within the cartilage and joint space. The images were reviewed by a musculoskeletal radiologist and arthrogram findings were compared to intraoperative findings of the hip joint.

Results: 53 of 57 (93%) arthrogram readings correlated with intraoperative findings of labral tear. Of the four remaining arthrograms, one labral tear was not seen in the arthrogram, and three labral tears that were read were found to be intact intraoperatively. 30 of 57 (53%) arthrogram readings matched intraoperative findings of cartilage lesions. Of the 27 remaining arthrograms, 18 were false negatives, and 9 were false positives.

Conclusion: MR arthrography is highly sensitive in diagnosing acetabular labral tears. However, the usefulness of arthrograms in evaluating the extent of articular cartilage damage is questionable. Patients undergoing hip preservation surgery should be informed that it may be difficult to determine the extent of damage to their articular cartilage until the joint is directly visualized.

Notes:

7:10am–7:15am

Mini-Open Femoroacetabular Osteoplasty: How Do These Patients Do?

Javad Parvizi, MD, FRCS
 Ronald Huang, BS

Introduction: Femoroacetabular impingement (FAI), a condition seen in young active patients, is believed to lead to early degeneration of the hip joint if left untreated. Hip arthroscopy and surgical dislocation of the hip have been used for treatment of this condition. We have over the last 5 years utilized mini-open direct anterior approach to perform femoroacetabular osteoplasty (FAO) for the hip. We believe this surgical option offers the benefits of hip arthroscopy with direct visualization of the hip and does not subject patients to the morbidity

of surgical dislocation. This study evaluates the outcome of FAO performed using the mini-open approach.

Materials and Methods: Between January 2006 and February 2011, 293 hips (265 patients) underwent direct anterior mini-open FAO performed by a single surgeon. 85 hips (79 patients) have reached minimum two year follow-up, with an average follow-up of 2.6 years.

Results: Mean age was 31 years (range: 15 to 55 years) with 27 patients being women. Average BMI was 27.3 Kg/m². Intraoperatively, labral tear, degeneration, or ossification was found in all cases. The direct anterior approach allowed for adequate access to perform osteoplasty of the femoral head-neck junction in all patients and to trim the acetabular rim in 65 patients. Hip flexion and internal rotation increased significantly. Nine patients have been converted to THA, at an average of 1.34 years after the FAO procedure. Preoperative SF36 scores improved from 57.9 to 83.3, WOMAC from 47.8 to 10.9, UCLA from 5.9 to 8.3, modified Harris Hip from 52.3 to 77.3, and SUSHI activity from 52.3 to 63.2.

Conclusion: This study shows promising mid-term results for the mini-open FAO procedure, alleviating pain and allowing return to activity in young patients with FAI. Further studies need to be performed to determine risk factors for failure of FAO and ideal patient selection.

Notes:

7:15am–7:20am

Defining the Origins of the Iliofemoral, Ischiofemoral, and Pubofemoral Ligaments of the Hip Capsuloligamentous Complex Utilizing Computer Navigation

Daniel Choi, BA
 Struan H. Coleman, MD, PhD
 Bryan T. Kelly, MD
 Denis Nam, MD
 Daryl C. Osbahr, MD
 Anil S. Ranawat, MD

Introduction: In addition to its bony constraints, hip stability is imparted by a strong fibrous capsule reinforced by a series of three, longitudinally oriented ligaments. With the increased

use of arthroscopic capsulotomies during the treatment of intra-articular pathology, it is critical to understand the exact origins of the hip capsuloligamentous complex. The purpose of this study is to investigate the specific locations and variability of the iliofemoral, pubofemoral, and ischiofemoral ligament origins using computer navigation.

Methods: 6 fresh frozen cadaveric hips, without clinical or radiographic signs of arthrosis, were dissected for full identification of the capsuloligamentous complex. Each pelvis was rigidly mounted to a table stand, and infrared reflectors were attached to the femur and iliac crest for use with a 3-dimensional computer navigation system. The acetabular origins of the ligaments were digitized using 11 points of reference for the iliofemoral, 7 points for the pubofemoral, and 12 points for the ischiofemoral ligaments. The hip was disarticulated, and morphing of the pelvis and intraarticular surface were performed, creating a 3-dimensional computer replica accurate to within 1mm and 1°. Using software, the origins of the ligaments were calculated relative to a 180° (6:00) meridian line positioned over the midpoint of the acetabular notch. Data was presented both in a clock-like manner in hours and minutes (00:00), and also degrees relative to the 12 o'clock position.

Results: The anterior inferior iliac spine, relative to the articular clockface, is at the 2:08 (+ 0:04) position, or 64° (+ 2°) from the 12 o'clock position. The iliofemoral ligament had a mean starting point of 17° (+ 31°), and a mean end point of 69° (+ 13°) from the 12 o'clock position, spanning a mean distance of 52° (+ 19°). Of the three ligaments, the iliofemoral ligament demonstrated the greatest variation in the length of its origin: on average, the length of each iliofemoral specimen varied 16° from the mean iliofemoral length. The ischiofemoral origin was the largest, and the pubofemoral origin was the smallest, in length.

Discussion and Conclusion: In this study, the origins of the iliofemoral, ischiofemoral, and pubofemoral ligaments are presented relative to an acetabular clockface, with the intent that intraoperative landmarks such as the acetabular notch and AHS can guide surgeons with regards to the location of each, respective origin. Of note, significant variability in the size and location of the iliofemoral ligament origin was demonstrated, which makes performing an anterior capsulotomy without damage to the iliofemoral ligament difficult.

Notes:

7:30am–7:35am

Arthroscopic Treatment of Femoroacetabular Impingement in the Adolescent Athlete

Peter D. Fabricant, MD
Benton E. Heyworth, MD
Bryan T. Kelly, MD

Introduction: Femoroacetabular impingement (FAI) has become an increasingly recognized source of hip pathology in young and middle-aged patients. While arthroscopic procedures are frequently utilized in the treatment of FAI, there are minimal outcomes data regarding its efficacy and safety specifically in the adolescent athlete population.

Methods: Demographic data, operative details, complications, and validated pre- and post-operative joint-specific outcome scores (Modified Harris Hip Scores (MHHS) and Hip Outcome Scores (HOS)) were analyzed for 27 hips in 21 patients under the age of 20 who underwent arthroscopic treatment of FAI and who had an average of 1.5 years follow up. Sub-stratified analyses were performed to compare patient sub-groups based on demographic data (e.g. gender), FAI pattern (cam, pincer, combined), presence/absence of additional hip pathology (psoas impingement, labral repair, bilateral procedures).

Results: At short-term follow up, Modified Harris Hip Scores significantly improved by an average of 19.0 points, the activities of daily living subset of the Hip Outcome Score improved by an average of 14.5 points and the sports outcome subset of the Hip Outcome Score improved by an average of 32.5 points. Additionally, self-reported sports-centered outcomes measures improved significantly. No differences in clinical improvements between male or female patients, those with or without bilateral procedures, those with or without preoperative psoas tendinopathy, or those who underwent labral debridement vs. fixation were noted.

Discussion and Conclusion: This study demonstrated good to excellent short term outcomes for arthroscopic treatment of femoroacetabular impingement (FAI) in adolescent athletes. In this younger population, males appear to be more commonly affected by FAI, especially bilateral disease, but results may be similarly positive between genders. Further prospective and long-term outcome data are needed to determine spe-

cific clinical and demographic predictors of short- and long-term outcome in adolescents.

Notes:

7:35am–7:40am

Resident Travel Grant Award

The Twist Test: A New Test for Hip Labral Pathology

Farshad Adib, MD
 Skye Donovan
 Derek Ochiai

Introduction: Acetabularlabral pathology is now recognized as a more common injury than previously thought. With cost constraints of MRI and invasiveness of MRI arthrogram, physical examination remains essential for diagnosis. Most tests for labral pathology are currently done in the supine position. We have developed the “twist test”, which is done with the patient standing and can evaluate the patient in functional, weight bearing position. The purpose of this study is to describe the twist test and compare its reliability to MRI arthrogram.

Material and Methods: Between June 2009 and August 2010, the twist test was performed on all patients presenting to our clinic with complaint of hip pain. 371 patients had the twist test performed. Of these, 247 had an MRI arthrogram (MRA) of the affected hip. The twist test results were compared with MRA findings. A labral tear, degeneration, fraying and paralabral cyst were considered as a positive MRA. The twist test is done with the patient facing the examiner, toes pointing forward. The patient bends their knees to 30 degrees and performs a windshield wiper like action with maximal excursion to the left and right. If the patient tolerates this, then the patient first gets on the unaffected leg, again with the knee bent at 30 degrees, and “does the twist” one-legged, with the examiner holding their hands gently for balance. The test is then repeated on the affected hip. A positive test is groin pain

on the affected hip, apprehension with performing the test on the affected hip, or gross range of motion deficits on the affected hip compared with the unaffected side.

Results: Among 160 patients with positive twist test, 154 patients had positive MRA and 6 had negative MRA. Among 87 patients with negative twist test, 72 had positive MRA and 15 had negative MRA. In comparison with MRA, the sensitivity and specificity of twist test for labral injury were 68.14% and 71.5% respectively. Positive predictive value (precision) of twist test for diagnosis of labral lesion was 96.25% and the accuracy was 68.4%.

Conclusion: Physical examination tests for hip pathology are an important screening tool. Current tests include the McCarthy test and the impingement test. We introduce a new test for hip labral pathology, which is done standing. In our study, the twist test had a high positive predictive value (96.25%), so this test can be beneficial for ruling out labral pathology. An added benefit is that this test is quick to perform, so it could be incorporated into a general sports physical screening examination.

Notes:

7:40am–7:45am

Diagnostic Accuracy of Intra-Articular Anesthetic Hip Injection in Hip Arthroscopy Patients

Kevin W. Wilson, MD
 *Emily Shin
 Carl C. Eierle, MD

Introduction: The objective of the study is to determine if there is any association between diagnostic hip injection outcome and pathology seen at hip arthroscopy.

Methods: We retrospectively reviewed the records for 52 consecutive primary elective hip arthroscopy patients with a documented preoperative, fluoroscopically-assisted anesthetic hip injection. A Fisher Exact Chi Square analysis was conducted to correlate the response to injection with the type of pathology found during hip arthroscopy.

Results: There were 27 males and 25 females, (mean age 33.8 +/- 8.7 years). Only thirty-one patients (59.6%) with intra-articular pathology, confirmed and identified at hip arthroscopy, responded to preoperative anesthetic hip injection. There were 21 false negatives (40.4%) and one false positive. Pathology found during arthroscopy included chondromalacia (39), labral tears (38), cam or pincer deformities (21), and ligamentumteres tears (2). A significantly higher proportion of females with pathology had pain relief from injection than males (80.0% vs. 40.7%). Relief from injection was reported in 56% of patients with chondromalacia, 61% of patients with a labral tear, 58% of patients with both chondromalacia and a labral tear, and 47% of patients with evidence of FAI. Division of the patients into clinical subgroups failed to demonstrate a significant association with response to injection. While the presence of FAI showed a trend towards negative response to injection, no significant association could be established.

Discussion/Conclusion: The accuracy of our preoperative hip injections is significantly lower than previous reports, suggesting that anesthetic hip injections may not be a sensitive test for hip arthroscopy patients. From our review, the response to injection is independent of the type of pathology. Interestingly, female gender may be more likely to report a positive. Our findings suggest that the preoperative hip injection may not be as reliable of a preoperative screening test as previously reported.

Notes:

7:45am–7:50am

A Novel Approach to Assess Dynamic Function in the Non-Arthritic Hip

Travis G. Maak, MD
Bryan T. Kelly, MD
Anil S. Ranawat, MD

Introduction: There has been a recent interest in the non-articular hip and its associated complex pathologies. Passive

range-of-motion and static specialty tests are the corner stone of diagnosis and assessment of treatment. There has been little information on the use of dynamic functional measurements to assess non-articular hip function. The primary aim of this study was to measure and identify objective and reliable functional parameters as a novel approach to assess dynamic hip function.

Methods: A cross-sectional study was conducted on eight healthy non-articular male subjects. Functional kinematic and kinetic data were acquired with dynamic 3D motion analysis during stair ascent and descent, as well as a sit-to-stand maneuver. Surface electromyographic (EMG) activity was measured for hip and trunk musculature. The adjusted coefficient of multiple correlation (CMC) was calculated for angle, moment and EMG measures per subject, and then averaged across subjects.

Results: Mean sit-to-stand angle, moment, and EMG CMCs were 0.82, 0.83, and 0.63 respectively. Mean stair ascent angle, moment, and EMG CMCs were 0.83, 0.89, and 0.74, respectively. Mean stair descent angle and EMG CMCs were 0.79, 0.83, and 0.70 respectively. Hip-specific angle and moment CMCs for sit-to-stand, stair ascent, and descent were: 0.91 and 0.90; 0.91 and 0.91; 0.83 and 0.81.

Discussion: Overall the kinematic, kinetic and EMG repeatability was very good; these measures are sufficiently reliable to objectively assess dynamic function in healthy subjects. Given the importance of these activities of daily living and their requisite stresses, neuromuscular compensation strategies may be involved that are not present with static measures. This novel protocol has been shown to be a reliable way mean to assess dynamic hip function in the non-articular hip. The resultant data may lead to improved diagnostic and therapeutic regimens and also serve as a baseline data set to assess complex pathologies.

Notes:

Friday, October 21, 2011

Concurrent General Session VIII — Foot & Ankle
(Burwell Room)

Moderators: Judith F. Baumhauer, MD, MPH
Michael M. Romash, MD

7:00am–7:05am

Resident Travel Grant Award

Comparison of MRI and Physical Exam Accuracy in Diagnosing Acute Achilles Tendon Ruptures

David N. Garras, MD
Suneel B. Bhat, MPhil
Patricia Hansen, MS
Steven M. Raikin, MD

Introduction: Achilles tendon ruptures are common in middle age athletes. Diagnosis is based on clinical criteria. MRIs are often employed. We compared physical exam and MRI results with intra-operative findings. We hypothesize that physical exam findings are as sensitive in diagnosing acute Achilles ruptures as MRIs.

Methods: We retrospectively reviewed patients undergoing surgical repair of acute Achilles tendon ruptures who had a pre-operative MRI. Clinical diagnosis criteria: 1) an abnormal Thompson test, 2) decreased resting tension, and 3) a palpable defect. Time to diagnosis and surgical procedure, and need for additional procedures was compared to a matched group clinically diagnosed without MRIs.

Results: 66 patients obtained an MRI. All patients had the above clinical finding at initial evaluation and had complete ruptures intra-operatively. MRIs were read as complete tears in 60, partial tears in 4, and “unable to exclude a complete tear” in 2 patients. The presence of all three criteria predicted a complete tear in 100% of patients. It took a mean of 5.1 days to obtain an MRI, initial evaluation at 8.8 days, and surgical intervention to 12.4 days after injury. In the clinical group, initial evaluation occurred at 2.5 days, surgical intervention at 5.6 days. 19 patients in MRI group required additional procedures, none in the clinical diagnosis group.

Discussion: Physical exam findings, including abnormal Thompson test, palpable defect, and decreased resting tension, were more indicative of complete ruptures of the Achilles ten-

don than MRI findings. The MRI readings were inaccurate or “hedging” in 9.1% of our patients. MRIs are time consuming, expensive, and can lead to treatment delays and misdiagnosis, leading to suboptimal patient care. Clinicians should rely on the history and physical exam for accurate diagnosis and reserve MRIs for ambiguous presentations and subacute or chronic injuries for preoperative planning.

Notes:

7:05am–7:10am

Functional and T2-Mapping MRI Results of Autologous Osteochondral Transplantation of the Talus in 72 Patients

Christopher D. Murawski
John G. Kennedy, MD, FRCS (Orth)

Introduction: Osteochondral lesions of the talus are common injuries following acute and chronic ankle sprains and fractures, the treatment strategies of which include both reparative and restorative techniques. Reparative techniques include arthroscopic bone marrow stimulation (i.e., microfracture, drilling) and provide fibrocartilage infill to the defect site. The long-term concern with microfracture, however, is this biologically and mechanically inferior fibrocartilage will degrade over time, particularly in larger lesions. Recently, restorative techniques (i.e., autologous osteochondral transplantation) have become increasingly popular as a primary treatment strategy, in part due to the potential advantages of replacing “like with like” in terms of hyaline cartilage at the site of cartilage repair. The current study examines the functional results of autologous osteochondral transplantation of the talus in 72 patients.

Methods: Between 2005 and 2009, 72 patients underwent autologous osteochondral transplantation under the care of the senior author. The mean patient age at the time of surgery was 34.19 years (range, 16-85 years). All patients were followed for a minimum of 1-year after surgery. The mean follow-up time was 28.02 months (range, 12-64 months). Patient-reported outcome measures were taken pre-operatively and at final-follow-up using the Foot and Ankle Outcome Score and Short-Form 12 general health question-

naire. Identical questionnaires were used in all instances. Quantitative T2-mapping MRI was also performed on select patients at 1-year post-operatively to evaluate the collagen microstructure of the repair cartilage using a standardized evaluation protocol.

Results: The mean FAOS scores improved from 52.67 points pre-operatively to 86.19 points post-operatively (range, 71-100 points). The mean SF-12 scores also improved from 59.40 points pre-operatively to 88.63 points post-operatively (range, 52-98 points). Three patients reported donor site knee pain after surgery and one patient required the decompression of a cyst that developed beneath the graft site approximately two years after the index procedure. Quantitative T2-mapping MRI demonstrated relaxation times that were not significantly different to those of native cartilage in both the superficial and deep halves of the repair tissue.

Discussion and Conclusion: Autologous osteochondral transplantation is a reproducible and primary treatment strategy for large osteochondral lesions of the talus and provides repair tissue that is biochemically similar to that of native cartilage on quantitative T2-mapping MRI. This may ultimately allow the ankle joint to function adequately over time.

Notes:

7:10am–7:15am

Functional Outcome, Complications and Radiographic Comparison of Supination External Rotation Type IV Ankle Fractures in Geriatric Versus Non-Geriatric Populations

Milton T. M. Little, MD
Marschall B. Berkes, MD
Rachel M. Cymerman, BA
David L. Helfet, MD
Lionel E. Lazaro, MD
Dean G. Lorich, MD
Peter K. Sculco, MD

Introduction: Geriatric patients (> 65 years old) provide unique challenges in orthopaedics. Their comorbidities, func-

tional limitations, and bone quality require innovative treatment to achieve their previous functional status. We compiled a prospective series of supination external rotation type IV/IV equivalent (SER IV/IV equivalent) injuries between 2004-2009. We hypothesize that the geriatric population of this series will have worse functional outcome and maintenance of reduction, increased complications and higher risk of trimalleolar ankle fractures when compared to patients younger than 65.

Methods: All operative SER IV/IV equivalent ankle fractures treated by a single surgeon were enrolled in a prospective database (176). 114 patients fulfilled inclusion criteria: 1 year of clinical follow-up, postoperative radiographs, and Foot & Ankle Outcome Scores (FAOS). All patients underwent pre-operative MRI to determine the class of ankle fracture. Additionally, each patient underwent postoperative CT to evaluate syndesmotic reduction. There were 30 geriatric and 84 non-geriatric patients. The following variables were analyzed: range of motion, comorbidities, pattern of injury, syndesmotic reduction, postoperative complications, and change in postoperative radiographic alignment. The primary outcome measure was FAOS outcome score.

Results: Geriatric patients were statistically more likely to have comorbidities including diabetes mellitus ($p=0.0014$) and peripheral vascular disease ($p=0.00001$) compared with patients 0.99), change in tibio-fibular clear space, change in medial clear space($p=0.71$) or postoperative syndesmotic reduction ($p=0.989$).

Conclusion: Contrary to our hypothesis, geriatric patients demonstrated similar outcomes, complication rates, maintenance of reduction, and initial reduction despite their comorbidities and expectedly poor bone quality. We conclude that adequate fixation can overcome many of the challenges provided by elderly patients and their comorbidities.

Notes:

7:15am–7:20am

Complications Following Open Reduction Internal Fixation of Ankle Fractures in Patients with a Positive Urine Drug Screen

Vilas Saldanha, MD
Brett A. Sweitzer, MD

Introduction: Open reduction internal fixation of ankle fractures is among the most common procedures performed by orthopaedic surgeons. Previous studies have established a clear relationship between diabetes mellitus and perioperative complications. Medical and anesthetic complications associated with illicit drug use have also been well-documented. However, patients with a history of drug abuse may carry a separate but related set of complications associated with open treatment of ankle fractures.

Methods: We retrospectively reviewed 142 patients undergoing surgical stabilization of ankle fracture over a three-year period. Patients with a history of positive Urine Drug Screen were compared to matched controls with negative Urine Drug Screen. Outcomes measured were major and minor complications, including nonunion, malunion, superficial or deep infection, amputation, delay in treatment, days to healing, repeat surgery, long-term bracing, and loss to follow-up. Fisher's Exact Test, Wilcoxon rank sums test, and Univariate logistic regression were utilized to determine statistical significance, which was set a priori at 0.05.

Results: There were no significant differences in age, gender, fracture type, prevalence of diabetes, or incidence of open fracture between the groups. The incidence of nonunion was higher in patients with a positive Urine Drug Screen ($p=.01$), as was deep infection ($p=.05$). Incidence of pooled Major Complications was also higher in the positive Urine Drug Screen group ($p=.03$).

Discussion and Conclusion: Similar to diabetics, patients with history of illicit drug use, as evidenced by positive Urine Drug Screen, are at increased risk of perioperative complications while undergoing treatment for ankle fracture. These data suggest the practicing orthopaedist be more vigilant when caring for ankle fracture patients with positive Urine Drug Screens.

Notes:

7:15am–7:20am

Surgical Treatment of Nonunion Following Rotational Ankle Fractures

Sonya Khurana, BS
Roy I. Davidovitch, MD
Kenneth A. Egol, MD
Colin J. Prenskey, BA

Purpose: The purpose of this study is to evaluate the incidence, treatment, and outcomes following surgical treatment of ununited rotational ankle fractures.

Methods: Over a five year period, 251 patients who presented with a fracture nonunion at a single institution were followed in a prospective database. Of these, 16 (6.4%) patients were identified as having a nonunion of a rotational ankle fracture involving either the medial malleolus, distal fibula, or both. All patients were evaluated clinically and radiographically. Functional evaluation was obtained with the SMFA questionnaire and was compared to two cohorts of patients: one who had normal healing following a nonoperative treatment of a stable ankle fracture (SE2) and another who underwent surgical fixation of an unstable (SE4) ankle fracture.

Results: Two of the 16 patients were excluded from analysis. Of the remaining 14 patients, there were 6 males and 8 females with an average age of 43.8 years. There were no differences in age or gender compared with the other two cohorts. The average BMI of the nonunion patients was 29.6. Sites included 13 distal fibula (93%) and 1 medial malleolus. Thirteen patients (93%) were treated with open reduction with plate and screw fixation and grafting. The average time to healing was 4.9 months post-surgery. At latest follow up, mean 17.6 months, all nonunions had healed. SMFA scores in the nonunion patients were significantly worse than the SE2 group in the functional, bothersome, daily activities, emotional, and mobility categories. There was no difference in SMFA scores between the nonunion and surgically treated SE4 patients group.

Discussion: Data from this study suggests that patients who undergo surgery for nonunion of their fractures have exceptional healing rates and ultimately have similar functional outcome scores compared to those patients who had healing of their surgically treated ankle fractures.

Notes:

7:35am–7:40am

Resident Award

Efficacy of Popliteal Block in Post-Operative Pain Control After Ankle Fracture Fixation: A Prospective Randomized Study

Rachel Y. Goldstein, MD, MPH
Kenneth A. Egol, MD
Toni McLaurin, MD
Nicole M. Montero, BA
Nirmal C. Tejwani, MD

Introduction: Post-operative pain management after ankle fracture fixation often requires narcotic administration and overnight hospitalization. Previous studies have proven the efficacy of regional blocks for a wide variety of knee, ankle, and foot surgeries, and found success rates with popliteal regional block anesthesia for foot and ankle surgeries. The purpose of this prospective randomized study was to compare postoperative pain control in patients treated surgically for ankle fractures who receive popliteal blocks with those who received general anesthesia alone.

Materials and Methods: All patients being treated with open reduction internal fixation for ankle fractures at single institution were asked to participate in this study. Patients who agreed to participate were randomized to receive either general anesthesia (GETA) or intravenous sedation and a popliteal block. Intra-operatively, patients were assessed for location of incisions, duration of procedure, and total time in the operating room. Post-operative, all patients were monitored for their post-operative pain at 2, 4, 8, 12, 24, and 48 hours after surgery using visual analog scale (VAS). Patients were also monitored for signs of allergic or toxic reactions and post-operative nausea and vomiting. All patients were followed up to six months to confirm fracture healing.

Results: Forty-three patients agreed to participate in the study, 21 patients received popliteal block while 22 patients received GETA. The two groups were similar with regards to age, sex, type of ankle fracture, and tourniquet time. The popliteal block took 54.86 minutes from the time the patient entered the room until the skin incision was made, while the GETA group took 42.75 minutes. At four hours post-operatively, patients who underwent GETA demonstrated significantly higher pain based on VAS. However, by twenty-four hours, those who had received popliteal blocks had significantly higher pain. There was no significant difference between the two groups with regards to satisfaction with post-operative pain control.

Discussion and Conclusion: Popliteal block provides equivalent post-operative pain control to general anesthesia alone in patients undergoing operative fixation of ankle fractures. However patients who receive popliteal blocks do experience a significant increase in pain between 12 and 24 hours. Recognition of this phenomenon of “rebound pain” with early narcotic administration may allow patients who receive popliteal blocks to have more effective post-operative pain control.

Notes:

7:40am–7:45am

Quality of Research and Level of Evidence in Foot and Ankle Publications

Heather Barske, MD
*Judith F. Baumhauer, MD, MPH

Background: There is a heightened awareness of evidence-based medicine in the last decade. The quality of clinical research and evidence to support medical treatments is under scrutiny from the medical profession and the public. Some orthopedics subspecialties have examined the rigor of their scientific methods and quality of their published literature. In 2003, JBJS-A published a review assessing research quality in 9 orthopedics journals and found a high number of level IV studies. FAI had the highest percentage of level IV evidence 75% (30/40) amongst the 9 journals. Podiatric journals were similarly reviewed in 1998 finding a high percentage (72%, 47/65) of case series.

Purpose: The purpose of this study was to examine the current quality of research and level of evidence published in the subspecialty of foot and ankle surgery in both the orthopedic and podiatric medical journals.

Methods: Two independent evaluators performed a blinded assessment of all original foot and ankle clinical research articles (January 2010-June 2010) from North American orthopedic and podiatric journals. Only the title, introduction, abstract,

methods and results sections were used to assess the type of study and level of evidence (JBJS-A grading system). Articles were also assessed for subject number, use of validated outcomes measures and use of statistical analysis. The data was stratified by journal and author credentials. Qualitative analysis was performed.

Results: 245 articles were published, 128 were case studies, surgical techniques, biomechanical, basic science or cadaver studies and were excluded, leaving 117 clinical research articles. Of these 117 articles, 7 (6%) were level I, 14 (12%) level II, 18 (15%) level III and 78 (67%) level IV. Level of evidence by journal is listed in Table 1. Eighty-six articles (74%) were published by a MD and 21 (18%) by a DPM. MDs published 69% (59/86) level IV studies, whereas DPMs published a slightly higher percentage of level IV studies 76% (16/21). When the quality of research was examined, only 27 (28%) of the 95 therapeutic studies used validated outcome measures and only 37 of the 95 (39%) gathered data prospectively. Fifty three (56%) of the 95 therapeutic studies used a control or comparison group, however, only 2 (2%) studies performed a power analysis. The mean sample size for all studies was 65 patients (range 4-1000).

Conclusion: FAI published better quality studies with a higher level of evidence as compared to prior review. Fewer studies with lower level of evidence were published in the podiatric JFAS, and JAPMA journals. Regardless of the journal, MDs produced the majority of published clinical foot and ankle research. Every effort should be made to choose the best type of study for each question therapeutic, prognostic or diagnostic. Whenever possible, data should be gathered prospectively, and validated outcome measures and comparison groups should be used. Although small improvements have been made in the quality of some clinical research, this study highlights the need to strive for higher level study design and continued improvement in methodology within the foot and ankle literature.

Notes:

Friday, October 21, 2011

**Concurrent General Session IX — Total Hip
(Ballrooms C & D)**

**Moderators: Stephen B. Murphy, MD
William G. Hamilton, MD**

8:15am–8:20am

Resident Travel Grant Award

**Spinal Anesthesia: Should Everyone
Receive a Urinary Catheter? A
Randomized-Pro prospective Study in Patients
Undergoing Total Hip Arthroplasty**

Adam G. Miller, MD
Max Greenky, BA
William J. Hozack, MD
James McKenzie, BS
Javad Parvizi, MD, FRCS
Erica Shaw, CRNP

Introduction: Standard of care for patients receiving regional anesthesia is urinary catheter placement to minimize bladder distention during anesthesia and potential for neurogenic bladder. The use of indwelling urinary catheter or intermittent catheterization is associated with a higher incidence of urinary tract infection (UTI). Development of UTI especially during the early postoperative period can be associated with hematogenous spread, seeding of the implant and periprosthetic joint infection. The objective of this randomized prospective study was to determine the efficacy of urinary catheters in patients undergoing THA under standardized spinal anesthesia.

Methods: Consecutive patients undergoing primary THA were recruited. Patients were consented and randomized to either receive indwelling urinary catheter or not receive catheter. All patients received spinal anesthesia with 15 to 30mg of 0.5% bupivacaine. The catheter group followed standard postoperative protocol, removing the indwelling catheter up to 48 hours postoperatively. The experimental group was monitored for urinary retention and received a straight catheterization up to two times if necessary before receiving an indwelling catheter.

Results: 104 patients are currently enrolled. There were 59 men and 45 women with a mean age of 58. Of 52 patients in the no-catheter group, 5 patients (9.6%) required straight cath-

eterization. The mean volume of urine in these patients was 738 ml (range, 450 to 1000 ml). One patient in the catheter group required straight catheterization post catheter removal. One patient in the catheter group developed UTI. There was no significant difference in the mean length of hospital stay between the two groups.

Discussion and Conclusion: Patients undergoing THA under spinal anesthesia appear to be at small risk for urinary retention and when developed are amenable to treatment with straight catheterization. Thus, for patients undergoing THA using modern surgical and anesthesia techniques with early ambulation, routine indwelling catheter may not be required.

Notes:

8:20am–8:25am

Resident Travel Grant Award

Is There Faster Recovery After Direct Anterior than Posterior Approach Total Hip Arthroplasty?

Ajit J. Deshmukh, MD
Amar S. Ranawat, MD
Parthiv A. Rathod, MD
Jose A. Rodriguez, MD

Introduction: The direct anterior approach (DAA) has generated considerable interest as a muscle-sparing approach for THA. It has been found to allow quicker recovery after primary THA when compared with the lateral and antero-lateral approaches. However, no studies have compared the DAA to the posterior approach (PA). We designed this prospective study to determine the difference in recovery, general health outcome and surgical complexity (including prevalence of complications) between the 2 approaches.

Materials and Methods: From January through November 2010, consecutive patients undergoing primary THA were consented from the practices of 3 arthroplasty surgeons at a single institution. One surgeon performed all DAA THA's and 2 surgeons performed all PA THA's. All patients received similar design of uncemented acetabular and femoral components

and were managed with the same pain management and rehabilitation protocol. Functional recovery was assessed with the Timed-up-and-go (TUG) test, the motor component of Functional Independence Measure (M-FIM), length of stay (LOS), UCLA activity score, Harris hip score, and a patient-maintained "milestone diary" (time to discontinue walking aids and return to daily activities). General health outcome was measured with the Short-Form-12 score, and surgical complexity was determined based on surgical time and complications.

Results: There were 53 patients matched for age, sex, BMI, pre-operative health and function in each group. Functional recovery was faster in patients with DAA on the basis of TUG and M-FIM assessed on post-operative days 1, 2 and 3. No difference in TUG, M-FIM, clinical and general health outcome was found at 6 and 12 weeks. Comparison of "milestones," LOS and surgical complexity also revealed no difference.

Discussion/Conclusion: DAA offered accelerated early post-operative recovery after primary THA compared to the PA, although measured differences disappeared by 6 weeks, and parity was maintained at 12 weeks.

Notes:

8:25am–8:30am

Resident Award

Long-Term Survivorship and Wear Analysis in Young, Active Patients: A Matched Pair Analysis of Ceramic and Metal On Polyethylene

Morteza Meftah, MD
Gregory G. Klingenstein, MD
Amar S. Ranawat, MD
Chitranjan S. Ranawat, MD

Introduction: The objective of this study was to compare long-term survivorship and wear rates of ceramic and metal femoral heads against conventional polyethylene articulation in young, active patients.

Material and Methods: There were 39 matched pair with ceramic or metal femoral heads (28 mm). They were matched

for age, gender, body weight, follow-up and implant. There patients were assessed for clinical results, revisions and wear rates. All procedures were performed by a single surgeon between June 1989 and May 1992, using non-cemented RB stem, HG II cup and 4150 conventional polyethylene.

The wear measurements were performed by two observers utilizing computer-assisted Roman software. The wear measurements were performed at minimum least one year after the index procedure to eliminate the effect of bedding-in period, and at the last follow-up. In revision cases, the wear rate were calculated from radiograph was prior to revision surgery. P values less than 0.05 was considered significant.

Results: The mean age was 54.1 ± 9.2 . There were 58 males and 20 females. The mean clinical and radiographic follow-up was 16.8 ± 2 and 14.3 ± 2.5 years respectively. The mean wear rate in the ceramic and metal groups were 0.09 mm/yr and 0.13 mm/yr respectively, which was significant ($p < 0.05$). There were two revisions in the ceramic group for acetabular osteolysis. There were 6 revisions in the metal group, 4 for acetabular osteolysis and 2 for stem loosening. The Kaplan-Meier survivorship for mechanical failure in the ceramic and metal group was 94.7% and 86.4% respectively.

Conclusion: This is the first report to our knowledge for such a comparative study. Ceramic femoral head against conventional polyethylene has lower wear rates and better survivorship as compared to metal articulation.

Notes:

8:30am-8:35am

Resident Travel Grant Award

Celebrex & Heterotopic Bone Formation After Total Hip Arthroplasty

Juan S. Contreras, MD
 Jose C. Alcerro, MD
 Carlos J. Lavernia, MD

Introduction: Heterotopic ossification (HO) is an infrequent but troublesome complication after total hip arthroplasty (THA). The mechanism of action of NSAIDs on bone forma-

tion has been studied. There are two isoforms of COX, COX-1 & COX-2, with different localizations and expressions. Because of the selective expression of COX-2 in bone tissue, it's us unclear whether selective inhibitors would be equally effective at preventing HO formation. Our objective was to assess the effectiveness of a selective COX-2 inhibitor in the prevention of HO following THA.

Methods: 147 consecutive patients (mean age 64 years; 62% women) were studied. 63 patients (72 THA's) received celecoxib after primary THA (200 mg twice daily) for 28 days. 84 patients (98 THAs) did not receive celecoxib after surgery. The presence of HO was assessed using the Brooker scale by two blinded reviewers utilizing radiographs of the hip taken at 3, 6 and 12 months after THA. Adverse events were also recorded. Pearson-product moment and t-test were used to evaluate the relationship between raters. Mann-Whitney was used to assess differences between groups.

Results: Heterotopic ossification was more common in the group that did not receive celecoxib than in the celecoxib group at 3 months, 6 months and 1 year. This represented a drop of approximately 20%. At 1 year, fewer celecoxib recipients had Brooker classes II and III compared with the non-celecoxib group. 2% of patients in the group with non-celecoxib had Brooker class IV. There was a strong association between raters for HO classification. No patients had to discontinue treatment. We had no revisions for aseptic loosening at an average of 1 year.

Discussion: Our results demonstrate that celecoxib prevents HO. A short course of celecoxib after primary THA could be a useful treatment option that does not interfere with anticoagulation for the prevention of HO following THA. A short course of celecoxib is a safe treatment option for the prevention of HO following THA.

Notes:

8:30am–8:35am

Relative Head Size Increase Using an Anatomic Dual Mobility Hip Prosthesis Compared to Traditional Hip Arthroplasty: Impact on Hip Stability

Geoffrey H. Westrich, MD
Jim Nevelos, PhD
Alyssa M. Yeager, BA

Introduction: Smaller cups (50mm) have limited head sizes and are more prone to dislocation following total hip arthroplasty. Recent data indicates that larger cups (58mm) are also at risk for dislocation due to a smaller head/cup ratio. A new anatomic dual mobility (ADM) hip prosthesis has a larger head size that increases proportionally to the size of the cup which may provide greater stability.

Methods: We retrospectively reviewed a series of a new ADM prosthesis to determine cases with cup sizes 50mm and 58mm. The implants were matched to a cohort of traditional acetabular components based upon cup size, age, and gender. The average head size and jump distances for both the 50mm and 58mm cups in both groups were determined and compared.

Results: Of the 78 ADM cups, there were 42 cups 50mm, which had an average head size of 42.7mm, and 7 cups 58mm, which had an average head size of 52.9mm. In the control group, the average head size for cups 50mm was 31.2mm and for cups 58mm was 36.6mm. Comparing the ADM to the control groups, the differences in head sizes were 11.5mm or 37% greater ($p < 0.001$) for the cups 50mm and 16.3mm or 46% greater ($p < 0.001$) for the cups 58mm. Computer analysis shows that posterior horizontal dislocation distance during chair rise is 80% greater for a 42mm ADM bearing compared to a 32mm hemispheric bearing and 90% greater for a 52mm ADM bearing compared to a 36mm hemispheric bearing. No ADM cup had a dislocation.

Discussion: Using newer ADM cups provides a much greater head size than traditional THA. This is particularly important when using smaller cups, which limit the head size, and also in relatively larger cups in which the head/cup ratio is decreased. This newer prosthesis may have a major impact on reducing the incidence of dislocation.

Notes:

8:48am–8:53am

Survivorship of Revision Hip Arthroplasty in Patients Under the Age of 50

Gregory K. Deirmengian, MD
Michael C. Ciccotti, BA
Max Greenky, BA
Benjamin Zmistowski, BA

Introduction: The number of young patients undergoing total hip arthroplasty (THA) continues to increase. As this trend continues, the burden of revision hip arthroplasty (RHA) will also increase in this patient population. There are few studies that have investigated the survivorship for RHA in young patients. The aim of the present study was to explore the longevity of RHA in patients under the age of 50.

Methods: Perioperative data was collected for all hip revision arthroplasty patients under the age of 50 between January 2000 and June 2005. Patients were followed until failure or lost to follow up. The data was used to generate Kaplan-Meier survivorship curves.

Results: 138 hips in 128 patients required RHA. The average follow up was 64 months. Cementless components were used for reconstruction in all cases. The 10 year survivorship, with an endpoint of repeat revision for any reason and repeat aseptic revision, was 70% and 77% respectively. The 10 year survivorship of revised femoral and acetabular components, with an endpoint of repeat aseptic revision of the same component, was 86% and 89% respectively. Stratified by initial reason for revision, 10 year survivorship, with an endpoint of repeat aseptic revision, was 80% for component loosening, 77% for wear/osteolysis, and 72% for instability. An initial diagnosis of septic revision had 60% survivorship. Of the failed septic revisions, 63% failed for recurrent infection and 37% failed for aseptic reasons.

Discussion: Although repeat revision is common in the first 10 years after revision hip arthroplasty in patients under the age of 50, cementless components appear to remain durable over the same period of time. An initial diagnosis of instability poses the greatest risk for failure among aseptic causes. Patients initially revised for infection have the highest rate of failure in patients under the age of 50.

Notes:

8:53am–8:58am

Resident Travel Grant Award**Measurement of the Distance Between the Transverse Acetabular Ligament and the Radiographic Teardrop**

Matthew Harris, MD, MBA
 Paul A. Lucas, PhD
 Steven B. Zelicof, MD, PhD

Introduction: There are various intraoperative referencing techniques designed to aid the surgeon in properly positioning an acetabular component during hip arthroplasty procedures. One described method uses the transverse acetabular ligament (TAL) as an anatomic landmark to guide this process. Another commonly used method of judging proper cup position involves inspecting the distance between the radiographic teardrop (RT) and the convex edge of the component on plain films. Quantifying the distance between these anatomic (TAL) and radiographic (RT) landmarks should lead to more accurate acetabular component placement by linking these methods.

Methods: Sixteen randomly selected cadaveric pelvises (eight male, eight female) underwent dissection. Radiographic markers were placed at the anteromedial insertion of the TAL bilaterally. Cadavers were then positioned to yield a true AP Pelvis image and radiographs were taken. The images were then digitally uploaded on the local PACS and analyzed so that the distances between the markers and the lateral borders of the RT could be measured.

Results: The mean distance between the medial insertion point of the TAL and the lateral border of the RT in the male pelvises was 11.83mm [99% CI, 11.43 to 12.22mm], and in the female pelvises, 8.41mm [99% CI, 7.20 to 9.61mm]. This gender difference was statistically significant.

Discussion and Conclusion: Knowing the mean distance between the TAL the RT should aid surgeons in achieving more accurate and reproducible placement of the acetabular component during hip arthroplasty, especially in terms of obtaining adequate medialization. Particular relevance exists for revision arthroplasty, when there is often uncertainty as to how much medial bone stock remains. Surgeons can now gauge the depth of the acetabulum as it relates to the location of the TAL and the RT, in order to avoid overzealous reaming that may result in compromising the medial bone stock and/or over-medializing the component.

Notes:

8:58am–9:03am

Incidence and Indication for Readmission Following Total Joint Arthroplasty

Jordan A. Hess, BA
 Javad Parvizi, MD, FRCS
 Benjamin Zmistowski, BS

Introduction: Demand for total joint arthroplasty (TJA) has been predicted to increase over the coming years. Cost and labor requirements to meet this demand have caused great concern. The direct costs of primary TJA have been well established, however indirect costs related to these procedures remains unknown. We investigated a contributor to these indirect costs, acute readmission and complications.

Method and Materials: The total joint arthroplasty database at our institution provided 20,046 TJA (10,060 hips and 9,986 knees) in 15,679 patients from January 2000 to September 2008. Patients had an average age of 63.3 years.

Results: A total of 661 patients (4.2%) had an unplanned readmission due to a complication of their TJA within one year of the surgery. Causes included infection (251), arthrofibrosis (197), failed arthroplasty (94), periprosthetic fractures (28), dislocations (18), non-periprosthetic fractures (17), delayed hematoma formation (15), delayed wound problems (9), tendon ruptures (5), patellar subluxation (2), and a variety of other causes. 579 patients required reoperations (3.7%).

Discussion: It appears that a substantial number of patients require readmission and reoperation within one year of their index arthroplasty. The incidence of reoperation and readmission is plausibly even higher as this study may have missed patients being evaluated at outside institutions for whom we did not have adequate follow-up. Infection is the most common cause of failure of arthroplasty at our institution. There is a dire need for implementation of strategies that can minimize these complications that can result in early failure of arthroplasty.

Notes:

9:03am–9:08am

Total Joint Arthroplasty: Should Patients Have Preoperative Dental Clearance?

Alexander Lampley
Ronald Huang, BS
Javad Parvizi, MD, FRCS

Introduction: Obtaining dental clearance prior to elective total joint arthroplasty (TJA) is a common practice, based on the theory that bacteremia from dental pathology may lead to postoperative periprosthetic infection. However, little data exists regarding the efficacy of this practice in preventing postoperative infection.

Methods: The dental clearance data from 189 patients undergoing elective hip arthroplasty and 169 patients undergoing elective knee arthroplasty were collected. Patients were prospectively followed to determine the incidence of postoperative infection and the causative organisms. Additionally, 219 patients that underwent hip arthroplasties performed emergently for fracture and did not undergo dental clearance prior to surgery were retrospectively reviewed to provide a comparison group.

Results: Thirty of the 358 elective TJA patients (8.4%) required dental treatment prior to being cleared for surgery. Postoperatively, nine cases had superficial infection treated conservatively with antibiotics and five cases of deep infection treated surgically. Of the deep infections, two patients' cultures grew *Staphylococcus aureus*, one grew multiple organisms including *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida parapsilosis*, one was Coagulase-negative *Staphylococcus*, and another was culture negative. Postoperatively in the hip fracture group, three patients required incision and debridement for persistent drainage. One patient underwent resection arthroplasty for periprosthetic fracture and deep infection. All cultures in the hip fracture group were negative. Rate of infection was 1.3% in the elective group vs. 1.8% in the hip fracture group if all four reoperations, without positive culture, are to be considered as infection.

Conclusion: For both groups of patients, no postoperative infection could be obviously attributed to a dental source, as none of the organisms causing infection are oral pathogens. Furthermore, dental clearance does not appear to significantly lower infection rate. These results demonstrate no clear advantage to obtaining dental clearance prior to TJA in terms of reducing the immediate postoperative risk of infection.

Notes:

9:08am–9:13am

Nine Year Followup: Comparative Study of Highly Cross-Linked and Traditional Polyethylene in Total Hip Arthroplasty

Mark J. Jo, MD
*Santiago Lozano-Calderon, MD
Steven B. Zelicof, MD

Introduction: To compare the linear penetration rates of a highly cross-linked ultra-high-molecular weight polyethylene to those in traditional polyethylene in THA.

Methods: 27 THA patients with highly cross-linked inserts were matched to 27 THA patients that received traditional polyethylene inserts with respect age, gender, BMI and level of activity. Linear penetration for radiographs was measured using the Martell's computerized technique. Patients were evaluated at follow-up for pain, motion and function (Harris Hip Score).

Results: Minimum follow up for inclusion in study was 9 years. Both groups were comparable in terms of demographics, preoperative pain, preoperative motion and motion as rated per the Harris Hip Score. Postoperative penetration rate for the traditional PE group was 0.098mm/yr. Penetration rate for the highly cross-linked PE group was 0.037mm/yr. This represented a 62% decrease in wear which correlated with our previous data which showed a 59% decrease in wear at 5 years. There were no catastrophic failures of the polyethylene in either group.

Discussion and Conclusion: This follow up study reinforces previous finding that highly cross-linked polyethylene shows improved wear characteristics compared to traditional polyethylene. This study also shows that the previous concerns regarding long term durability of highly cross-linked polyethylene may not be clinically significant.

Notes:

9:21am–9:26am

Range of Motion Analysis Following Computerized Virtual Surgery of Total Hip Arthroplasty, Hip Resurfacing, and Anatomic Dual Mobility THA

Gregory G. Klingenstein, MD
Joseph D. Lipman, MS
Geoffrey H. Westrich, MD

Introduction: Since the 1970s, dual mobility bearings have been utilized in total hip arthroplasty to achieve increased range of motion and as an alternative to constrained liners. The purpose of this study was to determine the theoretical range of motion (ROM) before bony or prosthetic impingement of a dual mobility acetabular cup using computer-aided design modeling. The range of motion was then compared to that of conventional THA and hip resurfacing.

Methods: CT scans of five cadaver hips were segmented using Mimics 13.1. Each three-dimensional cadaver model underwent virtual THA with a 28mm and 36mm head, hip resurfacing, and implantation with a dual mobility acetabular component. The sizing of components was based on individual cadaver anatomy. ROM to impingement was tested in flexion, extension, abduction, adduction, internal/external rotation, internal/external rotation at 90 degrees of flexion, external rotation with 20 degrees of extension, and internal rotation with 45 degrees of flexion.

Results: For most of the motions tested, the dual mobility construct resulted in similar ROM as the conventional THA with both head sizes. The hip resurfacing led to significantly restricted ROM in all directions except adduction. Compared to the 28mm head THA, the dual mobility cup resulted in greater ROM in abduction and combined motions with the hips flexed at 90 degrees. When head size was increased to 36mm, only external rotation with 90 degrees of flexion favored the dual mobility construct.

Discussion: This 3-D computerized simulation of dual mobility THA demonstrated equal or superior ROM in all tests when compared to hip resurfacing or 28mm head THA, suggesting a potentially more stable implant system. The benefits of the dual mobility cup diminished when compared to conventional THA with a 36 mm head. This ROM simulator data should be used along with polyethylene wear rates, and eventually clinical data, to evaluate this novel implant concept.

Notes:

9:26am–9:31am

The Increased Utilization of Operating Room Time in Patients with Obesity During Primary Total Hip Arthroplasty

John Wang, MD
Stephen Lyman, PhD
Geoffrey H. Westrich, MD

Introduction: Obesity is associated with a variety of health problems including an increased need for total hip arthroplasty (THA) and increased surgical complications. However, the relationships between body mass index (BMI) and standard operating room (OR) time measurements recorded during primary THA are unknown.

Methods: We retrospectively reviewed a consecutive series of 425 primary cementless THAs implanted by one surgeon (2004-2010). Patients were grouped by BMI based on the World Health Organization classification: Underweight <18.5, Normal Weight 18.5-25, Overweight 25-30, Obese Class I 30<35, Obese Class II 35-40, Obese Class III >40. Three standard intra-operative time measurements (Total Room Time, Anesthesia Induction Time, Surgery Time) were examined and compared across BMI groups. Operative times by BMI category were analyzed using a one way ANOVA with a post hoc least squares difference test if the overall ANOVA model was statistically significant ($p<0.05$).

Results: As BMI category increased, a progressive increase in operating time was observed. Significant differences were found between normal weight and all 3 obesity groups in total room and surgery time. In normal patients, overall room time was 2 hours, which progressed to 2 hours 13 minutes in obese class I patients ($p<0.01$) and to 2 hours 33 minutes in obese class III patients ($p<0.01$). Surgery time was 1 hour 14 minutes in normal patients, which progressed to 1 hour 22 minutes in obese class I patients ($p<0.01$) and to 1 hour 37 minutes in obese class III patients ($p<0.01$). No significant differences were found between groups for anesthesia time.

Discussion: Obese patients spend more time in the OR during primary THA, reflecting the extra burden obesity poses to surgeons and hospitals performing THA as well as the increase in healthcare expenditures. Since operating time is extremely costly, the increased utilization of operating time in obese patients should potentially be met with greater reimbursement to hospitals and surgeons.

Notes:

9:31am–9:36am

Peri-Operative Plavix and Post-Operative Events After Hip and Knee Arthroplasty

Sumon Nandi, MD
Ling Li, MSPH
Claire E. Robbins, DPT
Carl T. Talmo, MD

Introduction: Clopidogrel bisulfate is a platelet inhibitor widely prescribed for vascular disease to decrease the likelihood of thrombosis. Clopidogrel bisulfate may cause intra- and post-operative bleeding, but discontinuing clopidogrel bisulfate increases the risk of vascular events. There are no evidence-based guidelines for peri-operative clopidogrel bisulfate administration in hip and knee arthroplasty patients. Our aim is to determine: 1) if hip and knee arthroplasty patients taking clopidogrel bisulfate experience post-operative events attributable to increased bleeding risk; 2) how these events, if any, relate to the time course of peri-operative clopidogrel bisulfate administration; and 3) if patient demographics or surgical course predict post-operative events.

Methods: Our inpatient pharmacy database was queried for all patients who received clopidogrel bisulfate from 2007 to 2009. Of the 417 patients retrieved, 116 patients underwent hip or knee arthroplasty. These records were reviewed for patient demographics, surgical factors, and post-operative events. Statistical analyses were performed.

Results: Post-operative infection was more common in patients who did not discontinue clopidogrel bisulfate at least five days prior to surgery. The post-operative day on which clopidogrel bisulfate was resumed had no effect on the rate of post-operative events. Older age, American Society of Anesthesiologists (ASA) Score of 4, and revision surgery were predictors of increased post-operative events, including re-operation.

Discussion and Conclusion: Clopidogrel bisulfate should be discontinued at least five days prior to hip or knee arthroplasty. Patients may resume clopidogrel bisulfate immediately after surgery without increased risk. Pre-operative platelet administration, meticulous surgical technique, and close post-operative monitoring may decrease the risk of post-operative events in at-risk patients.

Notes:

9:36am–9:41am

Autologous Blood Donation and Utilization in Total Hip Arthroplasty: A Comparison Between Genders

Vivek Sahai, MD
*Vivek M. Shah, MD
Claire E. Robbins, DPT
Carl T. Talmo, MD

Introduction: Many studies have examined the optimal situations for autologous blood donation before total joint arthroplasty, but to date, the role of gender in autologous blood donation and utilization has not been examined. The hypothesis is that there would be a significant difference between the genders with regards to the utilization of autologous blood donations in total hip arthroplasty (THA).

Methods: 1188 consecutive patients undergoing THA with one surgeon were examined. Eight hundred ninety one patients donated at least one unit of autologous blood prior to surgery. A retrospective review of the patients' hospital stays was performed to examine their utilization of their autologous blood donations as well as transfusions with allogenic banked blood.

Results: Eight hundred two of the 1188 patients (67.5%) received a transfusion of either autologous blood or allogenic banked blood. 595 of the 891 patients (66.8%) who donated autologous units received a transfusion. 323 of the 891 (36.3%) of the patients who donated autologous units wasted at least one unit.

Discussion and Conclusion: When separated by gender, males and females had similar rates of blood wastage when the pre-operative hematocrit was either greater than 45 or less than 36, but for the patients with pre-operative hematocrit values between 36 and 45, males were 2.8 times more likely (52.7% vs. 18.4%) to waste autologous units as compared to females. Males and females demonstrated a difference in autologous blood utilization, specifically in patients with pre-operative hematocrit levels between 36-45, the group of patients most likely to donate autologous blood prior to surgery. When selecting patients for pre-operative autologous blood donation in THA, gender may play a role in optimizing utilization and minimizing waste.

Notes:

9:41am–9:46am

Radiographic and Clinical Measurements of Limb Length Discrepancy Do Not Correlate

David Lunardini, MD
Antonia F. Chen, MD, MBA

Introduction: Evaluation of leg length discrepancy (LLD) before total hip arthroplasty (THA) is used to plan correction of lengths. Measuring based on the ischial line and the lesser trochanter on an AP radiograph is commonly used to assess LLD. This may be an unreliable technique to determine functional LLD. The purpose of this study was to compare AP radiograph measurements to clinical LLD measurements.

Methods: A prospective case series of 90 consecutive THA (80 patients, 39 female/41 male, 47 right/42 left) from January 2008 through August 2009 was studied. Preoperative and six month postoperative radiographs were measured using the ischial line and the lesser trochanter to assess for limb length discrepancy. Preoperative and six month postoperative clinical limb length measurements were taken in the office with the patient lying supine. Negative numbers indicated that the operative leg was shorter than the contralateral leg, and positive numbers indicated that the operative leg was longer. Statistical analysis was performed with paired t-tests.

Results: The average pre-operative LLD clinically was $-3.6\text{mm} \pm 7.3\text{mm}$ and by x-ray was $-2.3\text{mm} \pm 9.3\text{mm}$. In 30 of 77 preoperative cases (39.0%), the AP radiograph and clinical LLD measurements disagreed by more than 5mm on which leg was longer. The average post-operative clinical LLD was $+2.0\text{mm} \pm 5.2\text{mm}$ and x-ray was $+6.9\text{mm} \pm 10.0\text{mm}$. These differences were statistically significant. In 34 of 74 postop cases (45.9%), the AP radiograph and clinical LLD measurements disagreed by more than 5mm on which leg was longer.

Discussion and Conclusion: Measurement of LLD using the AP pelvis radiograph is not a reliable method of determining functional LLD. Clinical measurements of the LLD are important to minimize the risk of significant post-operative LLD after THA. Correlation of both methods with functional patient perception of LLD is ongoing.

Notes:

Friday, October 21, 2011

Concurrent General Session X — Spine/Pediatrics
(Burwell Room)

Moderators: James T. Guille, MD
Marc J. Levine, MD

8:15am–8:20am

Resident Travel Grant Award

The Ventral Lamina and Superior Facet Rule: The Key to Accurate Placement for Thoracic Pedicle Screws

Daniel G. Kang, MD
Rachel Gaume, BS
Ronald A. Lehman Jr., MD
Lawrence Lenke
Haines Paik, MD

Introduction: With the increasing popularity of thoracic pedicle screws, the freehand technique has been espoused to be safe and effective. We set out to define the morphologic relationship of the ventral lamina (VL) to the pedicle for optimal pedicle screw starting point in the thoracic spine.

Methods: 115 thoracic spine vertebral levels ($n=230$ pedicles) were evaluated. After the vertebral body was removed, K-wires were inserted retrograde along the four boundaries of the pedicle. Using digital calipers, we measured width of the SAF and pedicle at the isthmus, and from the borders of the superior articular facet (SAF) to the boundaries of the pedicle. We calculated the morphologic relationship of the VL and center of the pedicle, to the SAF.

Results: 229 pedicles were measured (1 excluded due to SAF fracture). The VL was identifiable in all specimens medial to midline SAF, forming the roof of the spinal canal, and confluent with the medial pedicle wall (MPW). The mean distance from SAF midline to the MPW was $1.34 \pm 1.25\text{mm}$ medial. The MPW was lateral to SAF midline in 34 (14.85%) pedicles, with a mean distance of only $0.52 \pm 0.51\text{mm}$ lateral. The mean distance from SAF midline to center of the pedicle (COP) was $2.22 \pm 1.49\text{mm}$ lateral. The COP was medial to SAF midline in only 9 (3.39%) pedicles. The mean distance from the SAF superior border to the COP was $13.15 \pm 2.47\text{mm}$.

Conclusion: The ventral lamina and “Superior Facet Rule” were valid and reproducible at every level in the thoracic

spine. The VL was medial to SAF midline in every specimen. The COP was lateral to SAF midline in 97% of pedicles. By placing the starting point for thoracic pedicle screws 2-3mm lateral to the SAF midline and 13mm caudad to the superior border of the SAF (“Superior Facet Rule”) the surgeon should not violate the spinal canal at any level in the thoracic spine.

Notes:

8:20am–8:25am

Does a Multilevel Lumbar Laminectomy with a Single Level PLF Increase the Risk of Adjacent Segment Disease? A Comparative Analysis

Brian Neuman, MD
Todd J. Albert, MD
David T. Anderson, MD
D. Greg Anderson, MD
Alan S. Hilibrand, MD
Kristen Radcliff, MD
Alexander R. Vaccaro, MD, PhD

Introduction: Little is known about the longer-term stability of a multi-level laminectomy adjacent to a single-level fusion. The purpose of this study was to evaluate whether a multi-level decompression in the setting of a single level fusion would increase a patient’s risk of developing adjacent segment disease (ASD).

Methods: A retrospective chart review of 183 consecutive patients who underwent a single-level posterior lumbar fusion (PLF) for spondylolithesis with stenosis was performed. 133 patients had a minimum of 24-month follow-up, averaging 54 months. 54 patients had a PLF with additional levels decompressed above the fusion, and 79 patients underwent a single-level laminectomy and PLF. The incidence of ASD and re-operation rate was calculated, and a Fisher’s exact test was used to compare each subgroup. ASD was defined as the development of new radiculopathy or claudication referable to a motion segment adjacent to the lumbar arthrodesis with symptom duration greater than 6 weeks.

Results: 24.1% (N=13/54) of patients who had a PLF with multi-level laminectomy developed ASD with a 5.5% (N=3/54) re-operation rate. Among patients who had a PLF with a laminectomy only at the fusion level, the incidence of ASD was 15.2% (N=12/79) and the re-operation rate was 7.5% (N=6/79). There was neither a significantly higher incidence of ASD (p=0.26) or re-operation rate (p=0.74) between the multi-level laminectomy and single level laminectomy groups.

Conclusion: Concomitant decompression of additional levels above a single-level PLF did not significantly increase the risk of ASD or additional surgery compared to single-level laminectomy and PLF.

Notes:

8:25am–8:30am

Incidence of Adjacent Segment Degeneration in the Cervical Spine

John M. Olsewski, MD

Introduction: Patients treated surgically for cervical spondylotic myelopathy by a single surgeon from 1994 to 2008 were retrospectively reviewed for the incidence of adjacent segment degeneration requiring surgical intervention.

Methods: 251 consecutive patients were reviewed for incidence of adjacent segment degeneration relative to surgical approach, levels operated on at index surgery, age and sex of patient. Mean follow up was 94 months, with a minimum of 24 months. Index anterior approach surgery was at a mean of 2 levels, and index posterior and combined anterior and posterior approach surgeries were at a mean of 5 levels.

Results: The overall incidence of adjacent segment degeneration requiring surgical intervention was 4%, with a mean follow up of 38 months, and with twice as many males as females. Index anterior approach surgery had an incidence of 3%, index posterior approach and combined anterior and posterior approach surgeries each had an incidence of 5%. The mean age of all patients with adjacent segment degeneration requiring surgical intervention was older than those not requiring surgery. The most common level requiring intervention was C7/T1.

Conclusion: The incidence of adjacent segment degeneration in this population treated surgically for cervical spondylotic myelopathy is low. There is a trend for correlation between approach, number of levels at index surgery, and gender, with adjacent segment degeneration, but the findings do not reach statistical significance.

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

Notes:

8:30am–8:35am

Founders' Award

The Role of ApoE in Intervertebral Disc Degeneration

X. Joshua Li, MD, PhD

Introduction: Intervertebral disc degeneration is a multi-factorial disease. Recently, accumulating evidence suggest that cardiovascular risk factors associated with disc degeneration. ApoE deficient mouse is a well-defined atherosclerosis model. The goal of the present study is to elucidate the role of ApoE in disc degeneration.

Methods: ApoE knock out (KO) and wild-type (WT) mice were compared and characterized by histological/Immunological studies, biochemical assays, and real time RT-PCR analyses.

Results: We found that ApoE protein was highly expressed in the endplates of discs. In ApoE KO mice, ectopic bone formed in the disc endplates. The mesenchemal stem cells from bone marrow of ApoE KO mice showed significant higher capability of osteogenic differentiation than that of WT mice, which was manifested by more Alizarin S staining and elevated gene expression of alkaline phosphate, Runx2 and osteocalcin. In cultured annulus fibrosus (AF) and nucleus pulposus (NP) cells of ApoE KO mice, the contents of glycosaminoglycan were decreased. In contrast, the collagen increased in AF cells and decreased in NP cells. The decreased extracellular matrix production may result from the increased expressions of matrix metalloproteinases 3, 9, and 13, at least partially. The

gene expression profile also showed increased or decreased expression of collagen I, II, aggrecan and biglycan in AF or NP cells, respectively, of ApoE KO mice. Moreover, the NP cells of ApoE KO mice showed more apoptotic cell than WT mice.

Discussion and Conclusion: Taken together, all these results suggest that ApoE KO mice demonstrate early disc degeneration changes manifested by ectopic bone formation, decreased extracellular matrix production and increased apoptosis. In addition to its critical importance to cardiovascular disease, ApoE plays an important role in disc integrity and function and may serve as a potential therapeutic target. The relationship between cardiovascular disease and disc degeneration deserves further investigation.

Notes:

8:35am–8:40am

The Impact of Preventable Spinal Imaging

Mark F. Kurd, MD

*Edward S. Chang, MD

Todd J. Albert, MD

D. Greg Anderson, MD

Alan S. Hilibrand, MD

James D. McDermott, BS

Ravi K. Ponnappan, MD

Jeffrey A. Rihn, MD

Alexander R. Vaccaro, MD, PhD

Introduction: The Government Accountability Office reported that Medicare spending from 2000 to 2006 for imaging services increased from \$6.89 to \$14.11 billion. Despite ample interest of policy makers, there is little medical literature evaluating the appropriateness of medical imaging utilization. This study was designed to assess the prevalence and predictors of preventable spinal imaging.

Methods: Two hundred thirty-six consecutive patients presenting for initial consultation to five spine surgeons completed a self-administered questionnaire. Data collected included demographic information, relevant medical and surgical history and information on previous spinal imaging studies. After a history and physical exam, the attending spine

surgeon determined whether each study the patient had undergone was necessary and what effect the study had in making the diagnosis and treatment plan.

Results: Seventeen percent of patients surveyed were found to have at least one potentially preventable imaging study. However, only 4% of MRI scans were deemed preventable whereas 49% of CT scans and 46% of EMG studies were deemed preventable. Predictors of preventable studies included a history of spine surgery ($p=0.049$) and having both cervical and lumbar symptoms vs symptoms at a single location ($p=0.004$). Age, sex, income, education, health insurance, duration of symptoms, number of doctor visits, location of pathology and prescribing physician were not predictive of having a preventable study.

Discussion and Conclusion: Although 17% of patients presenting to a spine surgeon has undergone potentially preventable medical imaging, less than 5% had an MRI which was not considered necessary for diagnosis. This information is encouraging in light of governmental reports suggesting that the increase in imaging expenses is, in part, due to greater utilization of advanced imaging techniques. However, these data suggest a need for clarification of spinal imaging guidelines to reduce patient exposure to unnecessary risk and the healthcare system to wasteful spending.

Notes:

8:48am–8:53am

Utility of 3D-Isotropic MRI in Routine Lumbar Spine Imaging

Daniel J. Blizzard, BS

*Jonathan N. Grauer, MD

Rattalerk Arunakul, MD

Andrew H. Haims, MD

Joshua W. Hustedt, BA

Andrew W. Lischuk, MD

Introduction: Despite its ubiquitous use in clinical practice, there remain limitations with MRI. Conventional two-dimen-

sional (2D) MRI requires independent acquisition of each imaging plane of interest. This can be problematic in spine imaging as the plane of interest often varies along its course (due to lordosis, kyphosis, or deformity). Although “through-disc” sequences may improve imaging, manual selection of imaging axes may lead to suboptimal planes and missed pathology. Recently, three-dimensional fast spin-echo (3D-FSE) has emerged, providing the capability to acquire volumetric data sets with scan times of 3-6 minutes. These datasets can then be dynamically reformatted by any reader to create images in any desired plane, analogous to the reconstructions possible from helical CT.

Methods: Forty subjects scheduled for routine lumbar MRI were included in a retrospective review. Each subject underwent both 3D-FSE and conventional 2D axial and sagittal MRI sequences. For each subject, the 3D-FSE and 2D sequences were separately evaluated (minimum 4 weeks apart) in a randomized order and read independently by four reviewers. Accuracy of the 3D-FSE images was determined by agreement with the 2D images using specific evaluation criteria for stenosis, herniation, and degenerative changes (57 data points per study).

Results: When comparing the mode response of the reviewers, there was an average agreement of 92% between sequences. There was no statistically significant trend for interpretation of more severe pathology using either sequence.

Discussion and Conclusion: 3D-FSE is a new MRI sequence available on certain scanners that has the potential to supplement or replace conventional 2D sequences for routine imaging. This systematic evaluation showed that there is a very high degree of agreement between 3D-FSE and conventional 2D-MRI (noting the difficulty in establishing “gold standard” benchmarks). Readers found particular utility for the 3D-FSE sequence if there was greater anatomic variation in the sagittal or coronal plane.

Notes:

8:53am–8:58am

Effect of Implantation Type on Instrumentation Fracture Rate in Adult Spinal Deformity Surgery

Lloyd A. Hey, MD, MS

Introduction: A major complication of spinal fusion surgery involving instrumentation is the fracture of implants, typically requiring revision surgery. This retrospective study of spinal fusion cases compares fracture rates of two types of instrumentation: an older model using titanium rods with fixed-head screws and a newer product using cobalt chrome rods with variable-angle screws.

Methods: The medical records of 210 consecutive adult patients with thoracic, thoracolumbar or lumbar posterior spinal fusions in 2005 and 2008 were reviewed for post-surgical instrumentation fractures. Cases from 2005 involved titanium instrumentation whereas cases from 2008 used cobalt chrome implants. Data was analyzed using a Chi square test.

Results: Fracture rates were 2.84% and 4.30% in 2005 and 2008, respectively; the difference between these rates is not statistically significant.

Discussion and Conclusion: There is no significant difference in post-surgical instrumentation fracture rates when comparing titanium and cobalt chrome implants. While switching to cobalt chrome implants seemed to be logical progression from titanium, a metal with poorer yield strength and wear resistance in comparison, the increased stiffness of cobalt chrome might have contributed to the negligible difference in fracture rates after the conversion.

Notes:

8:58am–9:03am

Early Results of Radiofrequency Assisted Lumbar Endoscopic Discectomy: A Retrospective Clinical Study of 33 Consecutive Patients

Robert C. Nucci, MD

Introduction: Evaluation of the global efficacy of radiofrequency assisted lumbar endoscopic discectomy on patients with

discogenic pain who failed conservative management.

Methods: Retrospective clinical study of one surgeon's experience with 33 consecutive patients with low back and radicular leg pain that failed to improve with conservative management. Subjects had MRI evidence of small to medium size disc herniations that correlated with their symptoms. Response to surgeries was evaluated with a global assessment scale and evaluation of the respondents willingness to repeat the same surgery. Questionnaires were administered between 11-44 weeks post operatively, with an average response at 24.5 weeks. All procedures were performed in an outpatient surgery center setting under general anesthesia with fluoroscopic guidance and neurospinal monitoring.

Results: 33 patients underwent a total of 51 procedures. 17 underwent endoscopic discectomy at 1 level, 14 at 2 levels, and 2 at 3 levels. 14 of the 33 underwent preoperative discograms, with subsequent discectomy performed at the positive levels. 18 were female, and 15 were male. Mean age was 38.5 years (range 23-58 years). 85% completed the global assessment scale and 82% responded to the question "would you have the same surgery again?" 9 (32.1%) responded "much better", 14 (50.0%) reported they were "better", 3 (10.7%) reported "no change", and 2 (7.14%) responded "worse". 0 responded "much worse". 25 (92.6%) agreed they "would you have surgery again". Average OR time was 16 minutes, range 11-35 minutes. Mean post-op recovery time 75.7 minutes (range 25-130 minutes). Blood loss was consistently less than 5cc. There were no complications.

Discussion and Conclusions: Preliminary results encourage the use of lumbar endoscopic discectomy in carefully selected patients with low back and radicular leg pain of discogenic origin.

Notes:

9:03am–9:08am

The Duplication of Buckling Mechanisms in Varus Deformities of the Knee and Adolescent Idiopathic Scoliosis

Edward B. MacMahon, MD

Introduction: The upright stride gait of humans placed the two vertical weight bearing columns, vertebral column and lower extremities at risk for buckling deformities in the coro-

nal plane. The intra-joint pressure distribution in the spine and knee are kept normal by using the balancing system of a first-class lever (see saw). However eccentric loading will tend to displace laterally a cross section of the column at a susceptible level. The result is a change of the balancing system from a physiological first class lever system to a pathological second class lever system (nutcracker). The objective was to document the evidence that the increase in apical translation in the vertebrae and knee follows an algorithm of buckling mechanics.

Methods: Tescan pads were inserted into the medial and lateral compartments of two fresh frozen normal lower extremities. The femoral head was loaded eccentrically with various weights. A load cell measured the amount of medial thrust needed to balance the lateral thrust from the eccentric load. A scale model of the thoraco-lumbar spine and ribs was created to test the relationship between eccentric loading and lateral thrust.

Results: The Tescan studies showed a linear relationship between the eccentric loading on the hip and the value of the lateral thrust to the knee. The scoliosis studies showed a similar relationship between the load on the top of the Cobb angle and the thrust to the apical vertebrae.

Discussion: The normal lateral thrust to the knee will create lateral compartment "lift-off" unless prevented by a compensatory muscle compression force on the lateral compartment. Empirically the lateral thrust from an abnormal eccentric loading of the spine will create lateral displacement and "lift-off" between the ribs on the convex side unless compensated for.

Conclusion: Buckling mechanics explain the progression of varus knees and adolescent scoliosis. The algorithm of eccentric loading and buckling has important clinical applications.

Notes:

9:08am–9:13am

Characterization of Bone Marrow Aspirates from the Vertebral Body in Order to Optimize Potential Utility as a Bone Graft Option

Joshua W. Hustedt, BA
Daniel J. Blizzard, BS
Jonathan N. Grauer, MD
Mark Horowitz, PhD
Kolawole Jegede, BS

Introduction: Bone marrow aspirate has shown great promise as a bone graft option in spinal fusion. This study is designed to determine the appropriate sampling volume for aspirate taken from the vertebral body.

Methods: Ten cc aliquots of bone marrow were incrementally aspirated through a cannulated pedicle tap for each instrumented vertebral body; only one side was assessed to avoid potential confounding effects of bilateral aspirations. Variables evaluated include: (1) the number of nucleated cells per cc of bone marrow aspirate (hemocytometer), and (2) the percentage of osteoprogenitor cells (alkphos production assay).

Results: Preliminary data is drawn from 11 pedicles and 110 aspirations. The average age of the subjects is 44.2 years old and the subject pool is comprised of six men and five women. The initial data shows no statistical difference between nucleated cells in the first 3 cc's aliquots. However, there is a statistically significant decrease in the number of cells after the third cc aliquot. The average number of nucleated cells in the first three cc aspirates was 5.05, 4.40, and 4.28 million cells respectively. Early data examining osteoprogenitor cell prevalence suggests similar trends in the first three cc aspirates.

Discussion and Conclusion: The 2 cc aspirate volume has been defined as ideal for the iliac crest, but there is no analogous assessment of the effect of aspiration volume for other sources such as the vertebral body. This information is important for the clinical implementation of vertebral body aspirations if volume, cells, and presumably performance, of this potential bone graft option are to be optimized for spine cases. Our preliminary data suggests that optimal aspiration volumes for different anatomical sites may vary. The vertebral body is a potentially exciting source of osteoprogenitor cells that can be implemented for a variety of spinal uses.

Notes:

9:21am–9:26am

Resident Travel Grant Award

Socioeconomic Factors Influence the Incidence of Repeat Emergency Department Visits in Pediatric Patients with Closed Fractures

Christopher J. Dy, MD, MSPH
 Huong T. Do, MS
 Peter D. Fabricant, MD
 Stephen Lyman, PhD

Introduction: Previous research has demonstrated both greater difficulty in obtaining follow-up appointments and increased likelihood of return visits to the emergency department (ED) for patients with government-funded insurance plans. The purpose of the current study is to determine whether socioeconomic factors, such as race and insurance type, influence the incidence of repeat ED visits in pediatric patients with closed fractures.

Methods: A review of ED visit data over a 2-year period from a statewide hospital discharge database in New York was conducted. Discharges for patients with a unique person identifier in the database age 17 and younger were examined for an ICD-9 diagnosis of closed upper or lower extremity fracture. The age, gender, race, and insurance type for patients with a return ED visit within 8 weeks for the same fracture diagnosis were compared to those without a return visit using standard univariate statistical tests and simple logistic regression analyses.

Results: Of the 68236 visits reviewed, the revisit rate was 0.85%. Patients of non-white or unidentified race were significantly more likely to have a revisit than white patients (OR 1.27). Patients with government-funded insurance were significantly more likely to have a revisit than those without government-funded insurance (OR 1.55). Patients with private insurance were significantly less likely to have a revisit than those without private insurance (OR 0.72).

Conclusion: Our analysis revealed that non-white patients are more likely to return to the ED within 8 weeks for the same fracture diagnosis. Patients with government insurance are 55% more likely to have a revisit, while patients with private insurance are 28% less likely to have a revisit. Our results suggest that socioeconomic disparities exist in access to orthopaedic care for pediatric closed fractures. Physicians and policy makers should be mindful of these disparities when striving to improve access to care and resource utilization.

Notes:

9:26am–9:31am

Resident Travel Grant Award

The Location of Medial Patellofemoral Ligament Tears in Adolescents and Children

Scott A. Putney, MD

Introduction: The location of medial patellofemoral ligament (MPFL) tears has been well-documented in the adult population, with most occurring at the insertion of the ligament on the adductor tubercle. It is not clear if a difference exists in the pediatric and adolescent populations. The location of the injury has implications for treatment recommendations and planning surgical approaches. The purpose of this study is to determine if the location of medial patellofemoral ligament injury differs among the adult and younger populations. Our hypothesis is that the location of medial patellofemoral ligament tears in adolescents and children is not predominantly at the adductor tubercle.

Methods: At our institution we retrospectively reviewed 113 children ages 5-17, who were surgically treated for a patellar dislocation. All patients had confirmation of a patellar dislocation or severe subluxation. Imaging studies, clinic notes, and operative notes were utilized to determine the location of the MPFL injury.

Results: Proportion of MPFL injuries found intraoperatively at the adductor tubercle was larger than 0.5 (z-test=2.97). Percentage of MPFL tears at the adductor tubercle was 73% of the cases studied.

Conclusion: The location of MPFL injuries found intraoperatively at the adductor tubercle was 73% in our series. This is slightly lower than MPFL tear location in the adult population which has been reported between 80 and 100%. Our hypothesis that the location of medial patellofemoral ligament tears in adolescents and children is not predominantly at the adductor tubercle was proven false. This study has clinical applications for treatment recommendations and planning surgical

approaches for the pediatric patient with a tear of the medial patellofemoral ligament.

Notes:

9:31am–9:36am

Pediatric Patellar Osteochondral Fracture Following Dislocation

Byung J. Lee, MD
*Melissa A. Christino, MD
Alan H. Daniels, MD
Craig P. Ebersson, MD

Introduction: Sequela of patellar dislocations in adolescents include osteochondral fractures of the patella and/or lateral femoral condyle. The aim of this study was to review the outcomes of pediatric patients at our institution who underwent surgical intervention for patellar osteochondral fracture following patellar dislocation.

Methods: This is a retrospective case series. Each patient was examined arthroscopically for patella stability and size of defects and loose bodies. If the fragment was large enough to support fixation, headless screws or bioabsorbable pins were used. Otherwise, the loose body was excised, and the donor site was managed with a microfracture technique. Follow up data was retrieved from office notes and radiographs.

Results: There was a total of nine patients with an average age of 14 (range 12-17). Preoperative MRI in all patients demonstrated loose bodies and patellar osteochondral fracture. Four of the nine patients underwent fixation. The average defect size in the non-fixation group was 1.2 cm² compared with 3.2 cm² in the fixation group. In the fixation group, one patient had a redislocation and another who developed arthrofibrosis secondary to symptomatic hardware underwent an arthroscopic release and hardware removal. In the nonfixation group, while there was evidence of sclerosis about the medial patellar facet postoperatively, at final follow up all of the patients had an excellent result.

Discussion and Conclusion: This is the first known series examining surgical outcomes of osteochondral fractures of the

patella following patellar dislocations in the pediatric population. While there is potential long term benefit to the preservation of the patellofemoral joint with fixation, our series demonstrates that patients with smaller fragments can have a good clinical outcome in the short term with excision and microfracture.

Notes:

9:36am–9:41am

The Role of the Small AO External Fixator in Proximal Tibial Osteotomies in Children

John E. Handelsman, MD
Folorunsho Edobor-Osula
David H. Godfried
Jacob Weinberg

Introduction: The small AO external fixator in proximal tibial osteotomies has specific advantages. Soft tissue disturbance is minimal and compartment syndrome is avoided. The osteotomy can be performed just below the tibial tubercle. The technique provides precise intraoperative and potential postoperative adjustability.

Methods: Three half-threaded 4mm pins are placed close to and parallel to the growth plate proximally, two medially and one laterally. Three similar pins are placed vertically and medially below the osteotomy site. A horizontal osteotomy is performed through a small incision just below the tibial tubercle. The fibula is osteotomized obliquely more distally through a separate incision. After rotational adjustment, correction of angular tibial deformities are achieved by invaginating distal cortex into proximal medulla without wedge resection. All pins are linked to each other to achieve a rigid delta construct. Postoperatively, weightbearing is permitted when callus is seen on X-Ray. Nineteen proximal tibial osteotomies were performed in fifteen children from August 2003 to January 2009. The mean age at surgery was ten years (range: five to sixteen years). Fifteen osteotomies were performed for Blount's disease, three for tibia vara, and one for severe internal tibial torsion. Patients with Blount's disease were obese.

Results: A full correction of angular and rotational deformities was consistently achieved. The mechanical axis was also

restored. One patient had a transient peroneal nerve palsy. There were no serious pin tract infections. The small AO external fixator was consistently well tolerated. The fixator was removed at an average of 11 weeks.

Discussion: This method of maintaining proximal tibial osteotomies can be performed close to the growth plate. It is accurate, relatively simple, well tolerated, and stable, even in obese children.

Conclusion: The small AO external fixator is an effective tool for controlling osteotomies of the proximal tibia in children.

Notes:

by an attending physician. Sixty casts (5.3%) required an unplanned change including 19 short arm casts, 18 short leg casts, 17 long arm casts, 4 thumb spica casts, and 2 long leg casts. The average duration from cast application until the unplanned change was 13 days. Twenty-eight (47%) were changed for wetness, 20 (33%) for wear/breakage, 2 (3%) for skin irritation, and 10 (17%) for other reasons including objects in the cast and patient self-removal. Two patients had superficial skin infections requiring oral antibiotics. No fracture reductions were lost secondary to an unplanned cast change. The need for an unplanned cast change did not correlate with the level of experience of the applicator.

Discussion and Conclusion: Most unplanned cast changes were the result of patient non-adherence to instructions and not related to cast application technique. Waterproof casting materials and improved education regarding cast care may reduce the frequency of unplanned cast changes, thus reducing an economic and time burden on the health care system.

Notes:

9:41am–9:46am

Incidence and Etiology of Unplanned Cast Changes

Joshua Abzug, MD
 Matthew J. DiPaola, MD
 Martin J. Herman, MD
 Peter D. Pizzutillo, MD

Introduction: The majority of pediatric fractures are treated in casts since children can heal rapidly and remodel. Unplanned cast changes are a time and economic burden and potentially cause adverse effects on fracture management. The purpose of this study is to document the incidence, etiology, and complications related to unplanned cast changes.

Methods: A prospective study was conducted over a six month period to determine the incidence of unplanned cast changes. All casts applied were non-waterproof. Data collected included the reason for cast placement, type of cast placed, duration of wear prior to the unplanned change, reason for the unplanned change, experience level of the original cast applicator, and cast-related complications.

Results: A total of 1135 casts were placed with 58% placed by a resident, 38% by a cast technician, 2% by a PA and 2%

2011 Scientific Program Abstracts — Saturday

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

Saturday, October 22, 2011

**General Concurrent Session XIII — Infection
(Ballrooms C & D)**

**Moderators: Javad Parvizi, MD, FRCS
Michael P. Bognesi, MD**

7:20am–7:25am

Diagnosis of Periprosthetic Joint Infection: The Role of a Simple, Yet Unrecognized, Enzyme

Elie Ghanem, MD
Bahar Adeli, BA
Javad Parvizi, MD, FRCS

Introduction: Synovial fluid leukocyte count and neutrophil differential has been reported to have high sensitivity and specificity in diagnosis of infected total joint arthroplasty. We hypothesize that neutrophils recruited into an infected joint secrete enzymes that may be used as markers for infection. In this prospective study, we tested the sensitivity and specificity of a method for detecting one of these enzymes, leukocyte esterase, in diagnosing periprosthetic joint infection.

Methods: From May 2007 to 2009, intraoperative aspirations for patients undergoing revision total knee arthroplasty were tested for the presence of leukocyte esterase using a simple colorimetric strip test. Color change (correlating with negative, trace, + or ++ level of the enzyme) was noted within two minutes.

Results: According to clinical, serological and operative criteria, 23 of those knees were determined to be infected and 94 were determined to be uninfected. We obtained two thresholds for reading the leukocyte esterase test as positive. If only ++ patients were considered positive, the test was 86.4% sensitive and 95.8% specific and had a positive predictive value (PPV) of 82.6% and a negative predictive value (NPV) of 96.8%; if both ++ and + patients were considered positive, the test was 59.5% sensitive and 98.8% specific, with a PPV of 95.6% and a NPV of 84.0%.

Discussion: This early report of an ongoing study suggests that a test for leukocyte esterase in synovial fluid is a valuable addition to the diagnostic armamentarium for prosthetic joint infection. Additionally, the reagent strips add the advantage of rapid testing with an excellent ability both to rule out and to confirm infection.

Notes:

7:25am–7:30am

ESR and CRP Serology in Infected Inflammatory and Non-Inflammatory Arthritis Patients Undergoing Joint Revision Surgery

Ismar Dizdarevic, MD
Bahar Adeli, BA
James Cashman, MD
Javad Parvizi, MD, FRCS

Introduction: Joint arthroplasty is routinely performed for patients with inflammatory arthritis. Patients with rheumatoid arthritis are more prone to infections due to the immunosuppressive nature of the disease and also treatment with DMARDs. Diagnosis of infection in patients with inflammatory conditions is often challenging as routine serological tests (ESR and CRP) are believed to be unreliable. This purpose of this study was to evaluate whether serological markers can be used reliably to diagnose PJI in patients with inflammatory arthritis and if the value for these markers are different than patients without inflammatory arthritis who develop PJI.

Materials and Methods: Utilizing the prospective joint arthroplasty database at our institution, inflammatory arthritis patients undergoing revision for PJI were identified. These patients were matched to a control group of infected patients without inflammatory arthritis also undergoing revision arthroplasty. Patients were matched based on BMI, age, joint, gender, and year of surgery. ESR and CRP values from the

date of admission for revision were collected and analyzed using student-t test analysis.

Results: 47 PJI patients were identified as suffering from inflammatory arthritis for a total of 73 separate ESR/CRP serology tests. These patients were compared to 133 PJI patients without inflammatory arthritis. The mean ESR and CRP values were 91.4 mm/hr and 14.2 mg/dL for patients with inflammatory arthritis and 75.4 mm/hr and 9.8 mg/dL for patients without inflammatory arthritis respectively. Joint fluid analysis showed a trend toward increased WBCs in inflammatory patients.

Conclusion: It appears that serological markers still have a role in diagnosis of PJI in patients with inflammatory arthritis. These patients, however, have a statistically higher mean value for both ESR and CRP. The data suggests that a higher threshold for these markers may need to consider for patients with inflammatory arthritis. Further studies are needed to determine these threshold values.

Notes:

7:30am–7:35am

Is Repetitive Intraoperative Splash Basin Use a Source of Bacterial Contamination in Total Joint Replacement Surgery?

Sergio Glait, MD
Joseph Bosco, MD
Stephen Gould, MD
Ran Schwarzkopf, MSc, MD
James Slover, MD, MS

Introduction: Infections in total joint arthroplasty are detrimental to patients. Maintaining optimal sterile conditions in the operating room and improving infection control is important. Splash basins are used routinely in arthroplasty cases to wash instruments. Several studies in the literature have shown that these basins may be a potential source of infection. This study examines the sterility of the splash basin in order to assess the risk of infection for arthroplasty patients.

Methods: A total of 46 random clean primary arthroplasty cases (32 hips, 13 knees, and 1 unicondylar knee) were studied by taking cultures of sterile splash basins as soon as they are opened (controls) and again at wound closure after instru-

ments and debris have come into contact with the sterile water. All cultures are taken with sterile culture swabs and sent to the lab for aerobic/anaerobic/fungal cultures. Outcome measured was any positive culture.

Results: A total of 92 culture samples from 46 cases were analyzed. All controls were negative for growth except one (2.17%) which grew *S. viridens* and was likely a contaminant. Among the 46 samples taken at wound closure, only one was positive for coagulase negative staph (2.17%) during a unicondylar knee arthroplasty. Mean time between basin opening and wound closure was 180 min ± 45 min (for the single infected case it was 240 minutes).

Discussion and Conclusion: Previous studies have shown as high as a 74% contamination rate for splash basins. Our study contradicts the belief that splash basins are a high source of infection with only 1 basin showing a positive culture out of 46 cases. Splash basins can be a potential source of infection, but the risk does not seem to be as high as previously cited in the orthopaedic literature.

Notes:

7:45am–7:50am

Efficacy and Cost Analysis of Saline-Coupled Bipolar Sealing in Infected Total Knee Arthroplasty

Peter B. Derman, BS
Atul F. Kamath, MD
Gwo-Chin Lee, MD

Introduction: Blood conservation with saline-coupled bipolar sealing devices in primary total knee arthroplasty (TKA) has had mixed results. Moreover, the utility of these devices has not been investigated in the setting of infected TKA when conventional blood management methods such as cell salvage cannot be used. New technologies, in addition to being clinically effective, must be cost effective in order to gain widespread use. The purpose of this study is to evaluate the efficacy and cost effectiveness of saline-coupled bipolar sealing devices in infected TKA.

Methods: We performed a single surgeon case-matched study of 80 consecutive patients undergoing surgery for infected TKA using a saline-coupled bipolar sealing device. The

results were compared to a control group of 40 patients immediately predated the use of this device. Groups were matched for age, BMI, ASA classification, and surgery type. These groups were subsequently compared for multiple variables including total blood loss, transfusion requirements, operative time, discharge hemoglobin, and length of stay.

Results: No difference in blood loss or transfusion requirements was observed between the two groups. Operative time and length of stay were significantly lower (140.2 ± 45.7 vs. 161.6 ± 47.3 minutes; and 3.7 ± 0.8 vs. 5.3 ± 2.6 days), and the discharge hemoglobin was higher (9.4 ± 1.0 vs. 8.9 ± 0.8 g/dL) in the bipolar sealer group. This translated to an average net cost savings of \$6,400 per case. There were no reoperations or complications associated with the use of this device.

Discussion and Conclusion: Despite the fact that the use of a saline-coupled bipolar sealing device did not significantly decrease blood requirements in patients undergoing treatment for infected TKA, reductions in operative time and length of stay economically justifies its consideration in these cases.

Notes:

7:50am–7:55am

Resident Travel Grant Award

Serum White Blood Cell Count and Differential Does Not Have a Role in the Diagnosis of Periprosthetic Joint Infection

Nader Toossi, MD
Bahar Adeli, BA
Ronald Huang, BS
Javad Parvizi, MD, FRCS

Introduction: Diagnosis of periprosthetic joint infection (PJI) remains a challenge. Serum WBC counts and differentials have long been used during work up of a patient suspected for PJI. Although previous tests have shown a low sensitivity and specificity for this test, most surgeons still continue to utilize this test. The aim of this single institution study consisting of a relatively large cohort of patients with and without PJI was to determine the utility of this serological test in diagnosis of PJI.

Methods: The study recruited 2,071 patients undergoing revision hip or knee arthroplasty at our institution between 2000 and 2010. Among this cohort, 962 patients had a diagnosis of PJI based on our institutional criteria. Preoperative WBC counts and differentials (if available) were retrieved and receiver operating characteristic (ROC) curves were constructed to determine optimum sensitivity and specificity.

Results: The area under the ROC curve for serum WBC count and neutrophil differential was 0.64 and 0.68 respectively. The diagnostic cut-off point determined by ROC curve analysis was 7,950 cells/ μ l with only 53.4% sensitivity and 46% specificity for WBC count while the cut-off value for PMN percentage was 68% with 55.2% sensitivity and 72.4% specificity.

Conclusion: Our study confirms the long held belief that serum white blood cell count and differential has minimal role in routine work up of patients with suspected PJI. This test should be abandoned for routine use and only utilized in patients with systemic infections.

Notes:

7:55am–8:00am

Can Blood Culture Be Used to Diagnose Periprosthetic Joint Infection?

Bahar Adeli, BA
Javad Parvizi, MD, FRCS
James J. Purtill, MD

Introduction: Diagnosis of periprosthetic joint infection presents a real challenge in some patients. A battery of tests are available to reach this diagnosis. It is not known if blood cultures have any role in diagnosis of PJI. The objective of this study was to evaluate whether blood cultures, taken in a group of patients with PJI, were useful in identifying the infecting pathogen.

Methods: The prospective institutional database was used to identify all patients treated at our institution between 2000 and 2010 for PJI. There were a total of 978 patients with mean age of 66 years. Synovial fluid sample and/or deep tissue samples were analyzed and cultured in all of these patients. In 96

patients with PJI, blood cultures were also taken. Statistical analyses were performed for correlation purposes.

Results: Results of blood cultures and those from joint tissue/fluid culture were identical in 67 patients. The pathogen identified from blood was the same infecting organism isolated from joint tissue/fluid in 59 cases (concordance of 100%). Interestingly one infection that was fungal in nature showed no growth on tissue/fluid culture, yet the same organism was isolated in blood culture. 29 patients isolated no organism from blood, while joint fluid revealed isolated growth in 16 patients and multi-organism infections in 13.

Discussion: Although this study does not advocate the use of blood culture for diagnosis of PJI, the finding that blood culture is successful in isolating the infecting organism as the joint in majority of cases is compelling. Thus, the result of blood culture when performed should be considered as representative of the infecting organism in PJI cases. Based on the findings of this study it appears that blood cultures may have a better yield than joint fluid and may be a useful additional test in patients with culture negative PJI.

Notes:

use of the two most common surgical treatments for LHB lesions, either the biceps tenotomy or biceps tenodesis. Currently there is no consensus management in the literature because most studies lack high levels of evidence.

Methods: Electronic databases were reviewed for eligible articles relating to biceps tenotomy or tenodesis. Outcome measurements were diverse across the various studies, and included ASES score, Constant score, UCLA shoulder score, or personal patient assessments. Outcomes were normalized and reported as the percentage of “excellent/good” vs “poor” results based off criteria laid out by each article’s lead author.

Results: All articles reviewed were of level IV evidence. 17 articles met the inclusion criteria. Combined results from reviewed papers on the difference between tenodesis vs tenotomy demonstrated a higher incidence of cosmetic deformity (“Popeye sign”) in those treated with tenotomy. Overall, tenodesis gave a good or excellent result in 73% of patients, with a 5% rate of a Popeye sign. Tenotomy had a good or excellent outcome in 75% of patients, with a 52% occurrence of a Popeye sign.

Conclusion: Both tenotomy and tenodesis have comparably favorable results in the literature, with the only major difference being a higher incidence of cosmetic deformity with biceps tenotomy. However, there is currently no consensus regarding the use of tenotomy vs tenodesis for the treatment of LHB lesions. The lack of any high levels of evidence limits our ability to recommend one technique over the other. There is a great need for high quality, controlled trials to investigate the difference between these two procedures before consensus can be determined. Individual patient factors and needs should guide the surgeon on which procedure to use.

Notes:

Saturday, October 22, 2011
Concurrent General Session XIV — Sports <i>(Burwell Room)</i>
Moderators: James C. Vailas, MD Mark J. Lemos, MD
7:20am–7:25am

Biceps Tenotomy Versus Tenodesis: A Comprehensive Review of Clinical Outcomes

Nicholas Slenker, MD
Steven B. Cohen, MD
Kevin Lawson, BS

Introduction: Lesions of the long head of the biceps brachii (LHB) tendon are common and are often associated with other various shoulder pathologies. Debate continues regarding the

7:25am–7:30am

Outcomes for Arthroscopic Repair of Type II SLAP Lesions in the Worker's Compensation Population

Randall Murphy, MD

Introduction: When compared with the general population, worker's compensation (WC) status has been associated with disparate clinical outcomes in studies of surgical treatment for other common shoulder pathologies such as subacromial impingement, rotator cuff repair, and instability. However, little work has been done to evaluate the influence of WC status on arthroscopic superior labrum anterior-posterior (SLAP) repair outcomes. The purpose of this study was to evaluate functional and subjective outcomes for the WC population after arthroscopic Type II SLAP repair.

Methods: A retrospective review was conducted of outcomes data for worker's compensation patients undergoing SLAP repair by a single surgeon over a 5 year period. All patients underwent comprehensive assessment at the time of final impairment rating. This included instrumented strength analysis using the Baltimore Therapeutic Equipment Work Simulator and subjective assessment with a validated questionnaire designed to identify non-organic pain response (range 0-30 with a score of 14 or greater indicating non-organic response). Time to maximum medical improvement, complications, and final active range of motion were recorded.

Results: Nineteen patients were reviewed, with an average age of 40 years old. Five patients underwent concomitant subacromial decompression. These were analyzed as a subgroup, and no clinically significant differences were found between groups. Mean follow up was 6 months. Strength in the operative extremity was compared as a percentage of the uninjured arm. Mean isometric shoulder flexion and mean maximum overhead lift strength were 45% (range 19-74) and 53% (range 0-90), respectively. The mean subjective pain score was 12. Mean time to maximum medical improvement was 188 days. No infections or revisions were recorded.

Discussion and Conclusion: Notable strength loss was encountered post-operatively in this study. Establishment of objective outcomes measures are valuable in the care of this patient population.

Notes:

7:30am–7:35am

Helmet Characteristics as Profile Elements Identifying Susceptibility to Mild Traumatic Brain Injury (Concussion) in Tackle Football

Joseph Torg, MD
*Hank Hirsch, ATC

Currently the literature on managing mild traumatic brain injury (concussion) emphasizes the importance of careful evaluation and safe return to play in the prevention of complications including post-concussion syndrome. The purpose of this research is to identify characteristics that contribute to a predisposing profile of concussions that occur in tackle football. Reports from 1400 high school football concussions, collected by the National High School Sports-Related Injury Surveillance System, were examined using loss of consciousness (LOC) as the severity indicator. Multivariate odds ratio of (LOC) was calculated for helmet fit, helmet condition—new vs. reconditioned—and athlete age. Athletes wearing properly fitting helmets, as reported by team certified athletic trainers, were 80% less likely to experience LOC. Helmet condition and athlete age were not significant predictors of loss of consciousness. Helmet fit is an important and easily modifiable risk factor for severe concussion injury.

Notes:

7:45am–7:50am

Pain Causes Inhibition of the Infraspinatus During Isometric External Rotation

Thomas K. John, MD
*Brett A. Sweitzer, MD
Ashley Eisennagel, PT
Hallie Lenker, PT
Philip W. McClure, PhD
Scott K. Stackhouse, PhD

Introduction: Pain related to rotator cuff pathology is a known cause of abnormal shoulder mechanics, yet the effect of pain on cuff muscle activation remains poorly understood.

We hypothesize that experimental subacromial pain causes inhibition of infraspinatus voluntary activation (VA).

Methods: Seventeen healthy adults were secured to a dynamometer. Subjects performed two baseline maximum voluntary isometric contractions (MVIC) of external rotation during which a maximal electrical stimulus was applied to augment force when the voluntary force peaked, and again at rest. VA was calculated as (1-augmentation force during contraction/force elicited by stimulation at rest). Hypertonic saline(5%) was injected into the subacromial space, pain recorded every 30s, and MVIC testing repeated 3 additional times. Repeated measures ANOVAs were used to examine force, VA, and pain over time and associations between these variables were examined using regression.

Results: Mean (sd) initial pain from the injection was 6.6/10 (1.3) and produced a 32.8% decline in force and a 22.7% decline in VA. Pain diminished over a 10 minute period and as pain resolved, force and VA improved. There was a strong relationship between force and VA, and moderately strong relationship between pain and VA.

Discussion and Conclusion: Pain in the subacromial space produces a decline in force and VA of the infraspinatus. While this study only examines experimental pain, it supports the concept that pain inhibits rotator cuff VA, which may contribute to abnormal shoulder mechanics in patients.

Notes:

7:50am–7:55am

The Prevalence of Articular Cartilage Changes in the Knee Joint with Increasing Age in Patients Undergoing Arthroscopy for Meniscal Pathology

Michael C. Ciccotti, BA
 *Luke S. Austin, MD
 Michael G. Ciccotti, MD
 Steven B. Cohen, MD
 Matthew J. Kraeutler, BS
 Ashwin Rangavajjula, BS
 Benjamin Zmistowski, BS

Introduction: Articular cartilage changes in the knee joint are often seen during arthroscopic surgery to address meniscal pathology. The purpose of this study was to evaluate the prevalence of articular cartilage changes in increasing age groups to provide a framework for counseling patients undergoing such surgery.

Methods: Between March 2005 and June 2009, 1,010 patients presenting with meniscal pathology underwent arthroscopic surgery by the senior author. At the time of surgery, a precise diagram was used to note the presence, location, size, and Outerbridge grade of changes to the articular surfaces of the knee joint. The prevalence of articular cartilage changes was calculated for six age groups: under 20, 20-29, 30-39, 40-49, 50-59, and 60+. Demographic data including gender, ethnicity, smoking status, and BMI were acquired from the patient charts.

Results: Overall, 48% of patients demonstrated changes to the medial compartment, 25% to the lateral compartment, and 45% to the patellofemoral compartment. Eighty-six % of patients aged 60+ demonstrated articular cartilage changes to at least one compartment of the knee joint. In contrast, only 13% of patients under 20 years of age and 32% of patients aged 20-29 displayed changes to at least one compartment. A significant relationship was found between age and the development of articular cartilage changes in each of the three compartments. BMI was also significantly related to articular cartilage changes in the medial and patellofemoral compartments but not the lateral compartment.

Discussion and Conclusion: Arthroscopic knee surgery for meniscal pathology can be a highly successful procedure in the appropriate patient. The surgeon’s judgment is critical to proper patient selection. This study indicates that the incidence of articular cartilage changes increases with increasing age and BMI. This information can serve as a framework for counseling patients both pre- and post-arthroscopy in order to more precisely define expectations and outcomes.

Notes:

7:55am–8:00am

Complete Triceps Tendon Ruptures Requiring Surgical Repair in Professional Football Players

Steven B. Cohen, MD
Michael G. Ciccotti, MD
Peter F. DeLuca, MD
Christopher C. Dodson, MD

Background: Complete triceps tendon ruptures are relatively rare in the general population and uncommon in most sports except football. One prior study found 11 complete ruptures over a 6 season period.

Hypothesis: Triceps ruptures occur commonly in football linemen due to forced elbow flexion during an eccentric contraction and may occur more commonly with the increasing size and speed of professional players. Surgical repair allows full return to sports however there is a lengthy recovery time.

Methods: A search of the National Football League Injury Surveillance System (NFLISS) found a total of 37 triceps tendon ruptures requiring surgical repair over a 10 season period (2000-2009). Data was obtained for setting of injury, player position, activity causing injury, play type, time period of game, height, weight, body mass index (BMI), and number of days lost from football. Players with non-operative treatment of partial tendon injuries were excluded from the study.

Results: There were 37 players requiring surgical repair for triceps tendon ruptures over the 10 season period. The average height, weight, and BMI of the players were 75 inches, 292 pounds, and 36.5 respectively. The injury occurred during the game in 25 of the 37 players (68%). The majority of the players were linemen (86%), 16 defensive, 15 offensive, and 1 tight end. Of the 5 non-linemen, there were 2 linebackers, 2 running backs, and 1 special teams player. The injury took place during blocking or being blocked in 29 players (78%), and during tackling or being tackled in 5 players (14%). For players injured during a game the injury happened on average in the 2.5 quarter with 13 injuries in the first half (6=1st quarter, 7=2nd), and 12 in the second half (5=3rd quarter, 7=4th). Players missed an average of 165 days (range: 49-318) from football as a result of their injury and surgery.

Conclusion: Complete triceps tendon tears are more common in professional football players and are occurring more commonly than previously reported. Surgical repair allows full return however the injury essentially guarantees missing the

current season for an in-season injury and potentially an additional season. Potential treatment strategies for injury prevention may include bracing and off-season strength programs focusing on eccentric triceps strengthening.

Notes:

Saturday, October 22, 2011

Concurrent General Session XV — Pain Management (Ballrooms C & D)

**Moderators: Amar S. Ranawat, MD
Brian S. Parsley, MD**

8:15am–8:20am

Resident Award

Efficacy of Postoperative Intraarticular Analgesia Following Total Knee Arthroplasty: A Randomized, Double-Blinded, Prospective Study

Nitin Goyal, MD
William J. Hozack, MD
James McKenzie, BS
Javad Parvizi, MD, FRCS

Introduction: There is no consensus on the optimal postoperative analgesia protocol for patients undergoing total knee arthroplasty (TKA). The objective of this study was to determine the analgesic efficacy of an intraarticular catheter delivering a local anesthetic agent following TKA.

Methods: Patients undergoing primary, unilateral TKA for osteoarthritis were consented for this study. Participating patients were randomized to receive an intraarticular catheter filled either with 0.5% bupivacaine or 0.9% normal saline placebo solution, with patients, surgeons, and all study personnel blinded as to which solution was used. All patients received spinal anesthesia with a morphine injection, and a standardized perioperative anti-inflammatory schedule. Catheters were prepared under sterile conditions by the pharmacy, and placed intraoperatively. The catheters utilized released fluid continu-

ously at 5mL per hour over a two-day postoperative period. Patients were asked to complete Visual Analog Scale questionnaires at 5PM on the day of surgery, and 8AM and 5PM each day until discharge, as well as at the 6-week follow-up visit. All narcotic consumption during the hospital stay was recorded and converted to morphine equivalent units for data comparison.

Results: 100 patients have been enrolled to date. There was a significant difference in mean VAS levels, highest VAS level, narcotic consumption, and degree of least pain between the two groups with the patients receiving bupivacaine having the least pain and narcotic consumption.

Discussion and Conclusion: TKA patients may positively benefit from the use of postoperative intraarticular catheter in decreasing overall pain levels and reducing the need for opioids for pain management. With no noted increase in infection risk from the study population, intraarticular analgesia may provide an effective alternative for pain relief in the immediate postoperative time period without the disadvantages encountered with epidural anesthesia, regional nerve blockade, and patient controlled analgesia (PCA) pumps.

Notes:

8:20am–8:25am

Lumbar Plexus Block for Pain Control After Hip Arthroscopy: A Randomized Controlled Trial

Anil S. Ranawat, MD
 Struan H. Coleman, MD, PhD
 Bryan T. Kelly, MD
 Matthew Rade, BA
 Tiffany R. Tedore, MD
 Sarah Wilfred, BA
 Jacques T. YaDeau, MD, PhD

Introduction: The indications for hip arthroscopy are rapidly increasing to include both intra- and extra-articular disorders such as femoro-acetabular impingement, synovial disorders, abductor pathology, etc. These large, complex cases are associated with moderate to severe postoperative pain, and treatment with opioids can result in nausea, vomiting and delayed discharge. Lumbar plexus blockade (LPB) has a low compli-

cation rate and is superior to opioids for pain control after total hip replacement. However, a dearth of literature exists on using LPB for hip arthroscopy. This study investigated whether the addition of LPB to neuraxial anesthesia reduced postoperative pain.

Methods: Following IRB approval, 82 patients undergoing ambulatory hip arthroscopy were enrolled in this randomized controlled trial. All patients received intravenous sedation, combined spinal-epidural and postoperative hydrocodone/acetaminophen and oral NSAIDs. Study patients additionally received LPB using 30 mL 0.25% bupivacaine (with 5 mcg/ml epinephrine) following quadriceps stimulation. A blinded investigator interviewed patients at 0.5, 1, 2, 3 and 4 hours postoperatively, and via telephone the following day.

Results: Demographics were uniform between groups. Using the General Estimating Equations method, the LPB was shown to reduce pain at rest in the PACU (mean NRS 3.3±2.2 for LPB versus 4.2±1.8 for CSE-only patients). Non-significant trends in analgesic usage (21mg oral morphine equivalents vs. 29mg), pain with movement (NRS of 4.0 vs. 5.0), and patient satisfaction (8.6/10 vs. 7.9/10) also favored the intervention. There were no associated neurovascular complications from the LPB but there were two falls in the LPB group, without injury.

Discussion and Conclusion: LPB combined with a multimodal analgesic regimen reduced pain on the day of hip arthroscopy surgery and can be considered for reduction of short-term pain. The absence of significant improvement in secondary outcomes suggests that risk-benefit assessment of LPB for hip arthroscopy patients should be individualized.

Notes:

8:25am–8:30am

Preoperative Narcotic Medication Has Minimal Postoperative Effect in Total Joint Arthroplasty

Antonia F. Chen, MD, MBA
 James Yu Chang Shen
 Melissa K. Stewart

Introduction: The role of preoperative narcotic medication use in recovery after primary total joint arthroplasty (TJA) has

not been well studied. This study investigates the effects of preoperative narcotics on postoperative recovery.

Methods: A prospective case series of 128 consecutive patients and 136 TJAs from 2008 to 2009 was examined. The study population had 3 preoperative narcotic medication categories: 95 TJAs took no narcotics preoperatively (average age 63.4 yrs; 43M/52F; 36 hips/59 knees; 49R/46L); 35 TJAs took short acting narcotics (average age 61.2 years, 7M/28F, 20 hips/15 knees, 18R/17L); and 6 TJAs received long acting narcotics (average age 63.1 years, 5M/1F, 2 hips/4 knees, 1R/5L). Short acting narcotics included drugs with half-lives less than 4 hours taken on a 4-6 hour dosing schedule. Long acting narcotics included medications with half-lives longer than 4 hours and were dosed on a 12+ hour schedule. Pain levels were determined by the 0-10 visual analog scale. Length of stay (LOS) was determined by operative start time until the time of discharge. Early physical therapy was defined as treatment on the day of surgery (POD 0). Continuous variables were analyzed by one-way ANOVA and categorical variables were analyzed by chi-squared tests.

Results: In the immediate post-operative period, pain scores were significantly different in patients who were on preoperative narcotics compared to those who were not taking narcotic medication (no narcotics 4.5±1.6, short acting 5.3±1.9, long acting 5.5±1.4). However, there were no differences between length of stay (no narcotics 3.4 days±1.7, short acting 3.4±1.5, long acting 4.5±2.1) or early rehabilitation (no narcotics POD 0 17.9%, short acting POD 0 20%, long acting 16.7%).

Discussion and Conclusion: Patients who receive preoperative narcotic medication have more pain postoperatively, but this does not affect length of stay or postoperative rehabilitation.

Notes:

8:40am–8:45am

Monopolar Capacitive Coupled Radiofrequency (mcRF) and Platelet Rich Plasma (PRP) for the Treatment of Common Orthopaedic Conditions

Joseph Cronkey, MD

Introduction: Emergent technologies (i.e., mcRF and PRP) are now available to treat conditions characterized by a

failed healing response. PRP in particular is also indicated for the treatment of degenerative joint disease. Both mcRF and PRP positively influence the chemical/cellular inflammatory cascade to promote healing. mcRF application results in temperature elevation at the targeted structure up to 50°C stimulating heat shock proteins and inciting the wound healing response. Ultrasound guided PRP injections results in an inflammatory/repairative reaction through cytokin release.

Methods: Eighty-nine patients who have failed previous conservative treatment for tendinopathies of the elbow, quadriceps, patellar and Achilles tendon and plantar fasciopathy, were treated either with mcRF or PRP. PRP was the only treatment option for patients with osteoarthritis and rotator cuff pathology including tendinosis and partial tears. Treatments were delivered directly by the investigator and patients were followed prospectively for an average of 9 months (range 3 to 15).

Results: Average age for the mcRF cohort was 53 years (range 17 to 88) and 58 years for the PRP group (range 19 to 90). Male to female ratio was 1/1. 33 of 42 patients treated with mcRF experienced marked improvement (78%), while in the PRP group 33 of 47 patients experienced marked improvement (70%) as self-assessed by study subjects.

Discussion/Conclusion: Results of this study are in agreement with published data on the use of both technologies; however, this the first time that a side by side comparison is established. PRP and mcRF represent a new approach to musculoskeletal pathology; both modalities aim at inducing a biological response and are considered at the frontier of regenerative therapeutics. The risk/benefit ratio found suggests that these noninvasive, office-based alternatives for the management of musculoskeletal conditions are valuable tools and should be used based on a clear understanding of the underlying pathology.

Notes:

8:45am–8:50am

Are Femoral Nerve Blocks Effective for Post-Op Pain Management After Hip Arthroscopy

James P. Ward, MD
Rachel Y. Goldstein, MD, MPH

Introduction: The purpose of this study is to evaluate femoral nerve block in post-operative pain control after hip arthroscopy. We hypothesize that femoral nerve blocks will provide improved pain control, satisfaction, lower unplanned admission rates, and improved rehabilitation.

Methods: Forty consecutive patients scheduled for hip arthroscopy were randomized into two groups. Half received intravenous narcotics for pain scores of seven or greater while the other half received a femoral nerve block in the PACU for the same pain scores. Data was compared with respect to patient sex, age, nausea, overall satisfaction with analgesia, and duration of time in the PACU.

Results: Thirty-six patients had pain scores of seven or greater. Sixteen were randomized to receive post-operative morphine and twenty to receive a femoral nerve block. There were no significant differences between the groups. Patients who received morphine had a significantly longer time to discharge from the PACU than the nerve block group. The morphine group was also significantly more likely to report post-operative nausea than the nerve block group. Patients receiving nerve blocks were significantly more likely to be satisfied with their post-operative pain control than those who received morphine. All patients receiving nerve blocks stated they would have the block again for hip arthroscopy.

Discussion and Conclusion: We hypothesized that femoral nerve block may be beneficial in controlling post-operative pain after hip arthroscopy because of the anterior location of the muscles that are penetrated and instrumented. The anterior portal traverses the sartorius and rectus femoris muscles, both supplied by the femoral nerve. Another mechanism for pain control of the block is the femoral nerve supply to the anterior and anterolateral portions of the capsule. We conclude that by all criteria studied, femoral nerve blocks are an excellent alternative to narcotic pain medication in patients undergoing hip arthroscopy.

Notes:

8:50am–8:55am

Current Trends in Perioperative Pain Management for the Hip Fracture Patient

Micah Lissy, MD, MS, PT, ATC
David S. Geller, MD

Introduction: Perioperative pain management in the hip fracture patient population is challenging for numerous reasons including communication limitations, drug interactions, sensitivities and side effects. We hypothesize that pain management in this population is suboptimal and can be improved. The goal of this study is to assess and report current trends in pain management within this population as well as physician satisfaction with current modalities.

Methods: A 5-question survey evaluating current pain control practices for hip fracture patients was sent via electronic mail to 2000 randomly selected orthopaedic surgeons. Additionally, the survey was sent to the 120 members of the Association of Residency Coordinators in Orthopaedic Surgery for distribution to their respective programs on two separate occasions. Lastly, it was posted for Orthopaedic Trauma Association (OTA) members on the OTA web site.

Results: Of the 350 individuals who responded to the survey, only 42% of respondents were very satisfied with their pain control. For patients over 85 years of age, satisfaction fell to 36%. In general, practitioners relied heavily on both intravenous (IV) and oral (PO) narcotics. In patients over 85, less medication was used overall, with use of IV patient controlled analgesia (PCA) significantly decreased while use of acetaminophen was significantly increased. Side effects were cited as the most common reason for decreased satisfaction in the over 85-year cohort. Inadequate pain control was cited as the most common reason for decreased satisfaction in the under 85-year cohort.

Conclusion: Currently, perioperative pain management appears to be inadequate in younger hip fracture patients, while management of older patients seems to be limited by side effects. Clinician dissatisfaction is prevalent underscoring the relevance of revisiting perioperative pain control and the approaches that may optimize care for these patients. Further study of modalities and algorithms is warranted.

Notes:

Saturday, October 22, 2011

Concurrent General Session XVI — General Orthopaedics/Tumors (*Burwell Room*)

**Moderators: Robert N. Richards Jr., MD
Colin Couper, MD**

8:15am–8:20am

Use of a Novel Wide-Field Imaging Device for Real-Time, Intra-Operative Assessment of Microscopic Residual Cancer in the Tumor Bed

Jessica E. Carter, BS, MSIII

Brian E. Brigman

Cindy Eward

William C. Eward

Jorge M. Ferrer

David G. Kirsch

Jeffrey K. Mito

Introduction: Soft tissue sarcomas (STS) are a group of rare connective tissue tumors. Approximately 2/3 of soft tissue sarcomas do not recur after limb-sparing surgery alone. Currently, local control can be achieved in 70-90% of patients treated with surgery and radiation therapy. Failure to achieve a negative surgical margin results in higher rates of local recurrence and increased patient risk for developing fatal metastatic disease. We have developed a wide-field imaging system for in vivo, real-time, intra-operative assessment of the tumor bed to identify residual cancer remaining after surgical resection. We believe that when paired with an appropriate molecular imaging agent, this imaging system will be able to detect microscopic residual cancer in vivo. Specific Aims 1) Identify an appropriate molecular imaging agent that is preferentially activated in sarcomas compared to adjacent normal tissue. 2) Identify microscopic residual disease in vivo. 3) Determine if this imaging system is cable of targeting spontaneous tumors in other mammalian species.

Methods: We have utilized multiple cathepsin activated near-infrared probes. Tumor and normal tissues were analyzed using the wide-field imaging device to identify a probe preferentially activated by sarcomas in vivo using a primary mouse model of soft tissue sarcoma.

Results: The imaging system achieved a tumor-to-normal muscle signal ratio of 10-25:1 when paired with a cathepsin activated probe. This system can identify single fluorescently-

labeled cells that have activated the imaging probe in vivo and can be used to risk stratify animals for local control. Additionally, spontaneously arising tumors in canine patients can be efficiently labeled with the multi-cathepsin activated probe, VM249.

Discussion and Conclusion: Cathepsin-activated probes can be used for identification of microscopic residual tumor in the tumor bed after oncologic resection. Furthermore, cathepsins are viable molecular imaging targets in multiple mammalian species. and clinical development of cathepsinactivatable probes should progress.

Notes:

8:20am–8:25am

The Intra-Observer and Inter-Observer Reliability of a Magnetic Resonance Imaging Based Scoring System for Post-Traumatic Osteoarthritis

Ethan W. Blackburn, MD

Bruce D. Beynnon, PhD

Robert J. Johnson, MD

Diego Lemos, MD

Shelly Naud, PhD

Timothy Tourville, ATC

Introduction: The objective of this study was to adapt the Magnetic Resonance Imaging (MRI) primary knee OA scoring system developed by Meredith et al. as a Post-Traumatic Osteoarthritis Scoring System (PTOAS) and then determine the intra-observer and inter-observer reliability associated with its application to Anterior Cruciate Ligament (ACL) injured subjects and controls. This included articular cartilage evaluation by calculating a Cartilage Disease Score (CDS), assessment of osteophytes, bone marrow lesions (BML), joint effusion, subchondral sclerosis, and ACL integrity.

Methods: Fifteen Knee MRI scans were randomly selected from the four-year follow-up of a case (39 ACL injured sub-

jects) control (32 uninjured controls) study of post-traumatic OA. An Orthopaedic Surgery resident and a Musculoskeletal radiologist then read the 15 selected MRI's with 2 weeks between "test" and "retest" reads. The scores were treated as ordinal data. Intra-observer and inter-observer reliability were evaluated with weighted kappa. Values ranged from 0 (agreement not higher than expected by chance) to 1 for perfect agreement.

Results: The CDS intra-observer weighted kappa values for the resident and radiologist were 0.76 and 0.86, respectively. Values for grading ACL integrity, osteophyte, BML and effusion were all greater than 0.78 for intra-observer agreement for both clinicians. Subchondral sclerosis scoring had variable intra-observer reliability (0.10=resident, 0.78=attending). Test-retest precision (percent of exact matches) was high (greater than 80%) for intra-observer CDS, osteophyte, BML, and joint effusion scoring. There was poor inter-observer agreement demonstrated in this study with all values less than 0.42.

Discussion and Conclusion: Lesions associated with the early progression of PTOA with cartilage specific MRI sequences were identified. Intra-observer reliability was good to excellent using this system; however, reliability between observers was unsatisfactory. These results demonstrate reproducible intra-observer assessment in clinicians with different levels of training and areas of expertise, but support the need for further group training with standardized MRI scans to enhance interobserver reliability.

Notes:

8:25am-8:30am

Resident Travel Grant Award

Inpatient Pulmonary Embolism in US Elective Primary Hip and Knee Arthroplasty Patients

Usman Zahir, MD
 Mary L. Forte, PhD
 Vincent D. Pellegrini Jr., MD
 Robert S. Sterling, MD

Introduction: The risk of inpatient pulmonary embolism (PE) in elective arthroplasty patients in the United States is unknown. Prior studies of inpatient PE have often included patients with differing risk profiles than most elective arthroplasty patients, such as surgery for trauma or in patients under age 60. The purpose of this study is to determine the incidence of inpatient PE among elderly elective primary hip and knee arthroplasty patients in the U.S.

Methods: The 1999-2007 Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project of AHRQ provided a national stratified probability sample of all-payer hospital discharge data for this study. Patients age 60 or older with an inpatient admission for at least one total hip (THA) or total knee (TKA) arthroplasty were included (ICD-9-CM 81.51, 81.54). Patients with cancer or surgery for revision, infection or trauma were excluded. The outcome was inpatient PE (ICD-9 diagnosis 415.1). Descriptive statistics and unadjusted PE rates by procedure are reported.

Results: 796,214 sample cases representing 3,981,070 patients met inclusion criteria. Nearly two-thirds of patients were female (63.4%) and under age 75 (63.5%). Osteoarthritis was the primary diagnosis in 95.3%. TKA comprised 65.6% of cases and 4.6% of all patients had multiple procedures (95.6% of these were bilateral TKA). The overall unadjusted PE incidence was 0.35%. PE incidence differed by procedure (TKA=0.39%, THA= 0.20%, bilateral TKA=0.81%, any two joints=0.81%) and reason for surgery (osteoarthritis=0.35%, RA=0.28%, AVN=0.23%). PE was highest among patients with a Charlson comorbidity score=1(0.41%).

Discussion and Conclusion: TKA is associated with higher rates of inpatient PE than THA, especially in multiple-procedure patients. This study updates knowledge about PE incidence by procedure in elective primary arthroplasty patients, and may assist surgeons in patient education and perioperative planning. Studies to determine factors associated with PE risk differences by procedure are warranted.

Notes:

8:40am–8:45am

Surgical Treatment Improves Clinical and Functional Outcomes for Patients Who Sustain Incomplete Bisphosphonate Induced Femur Fractures

Colin J. Prenskey, BA
Kenneth A. Egol, MD
Zehava S. Rosenberg, MD
Nirmal C. Tejwani, MD

Purpose: Recently increasing evidence has shown a pattern of subtrochanteric femur fractures associated with long-term bisphosphonate use. The purpose of this study is to describe the ultimate outcomes for patients treated at a single institution, for incomplete bisphosphonate induced femoral fractures.

Methods: Sixty six patients with ninety-eight femoral fractures (31 bilateral) in the setting of long-term bisphosphonate therapy were identified to have lesions consistent with bisphosphonate induced pathology within the past 5 years. Displaced fractures were diagnosed following low energy trauma and treated surgically, while incomplete fractures were defined according to the pattern of lateral cortical thickening on radiographs with or without fracture. Incomplete fractures were treated conservatively unless symptoms were refractory and then they were treated with surgery. Patient demographic data and treatment information was gathered. Patients were contacted via telephone to answer a questionnaire regarding their functional status. Initial radiographic diagnosis, treatment intervention, time to heal and self-reported functional status were retrospectively documented and analyzed. Fifty patients with 64 incomplete fractures were identified and analyzed. Patients with bilateral pathology were only included in this study group if both fractures were incomplete. The Short Musculoskeletal Functional Assessment was used to gauge baseline as well as post-intervention functional status. Data was collected and managed using electronic data capture tools.

Results: Average treatment with bisphosphonates prior to presentation was 10 years (range of 7-15). Bisphosphonates were discontinued upon presentation. Overall, the average time to heal was 10.5 months (range of 1.5-24 months). Two fractures went on to nonunion. There were no other significant complications noted for any patients. Twenty two patients (44%) were treated surgically with Intramedullary nail (IMN) in addition to discontinuing meds for refractory pain or failure of medical management to alter radiographs. Average healing time for patients who underwent IMN was 8.6 months. Aver-

age time to heal in non-surgical patients was 15.6 months. 71% of patients reported having intermittent mild pain after one year of follow-up. 85% of patients reported a functional return to baseline with one year with 43% reporting return to baseline within 6 months. Patients who reported significant functional limitations at latest follow-up listed pain (86%) and apprehension (40%) as the major causes for their limitation.

Discussion and Conclusion: While bisphosphonate therapy is an important weapon in the fight against post-menopausal vertebral fractures, its long-term use is not without risk. We found that nearly half of the patients with non-displaced bisphosphonate induced femoral fractures ultimately required surgical intervention for relief of symptoms. Functional outcomes positively correlate with radiographic and clinical signs of healing.

Notes:

8:45am–8:50am

Surface Area Across Osteosynthesis Site in Bulk Allograft Reconstruction

Ajay Lall, MS, MD
David S. Geller, MD
Eric A. Hohn, BS

Introduction: Bulk allograft reconstruction serves an important role in limb-salvage surgery following tumor resection. Despite its benefits, allograft reconstruction can result in non-union in up to 27% of cases. Decreasing non-union rates can greatly impact patient outcomes by minimizing surgical exposure and allowing patients earlier rehabilitation and return to function. Although congruous osteotomy cuts are desirable, exact matching surfaces are rarely achieved. The implication of incongruous osteotomy surfaces and the potential impact on non-union rates has not been examined to date. The purpose of this study is to quantify average surface contact areas across simulated intraoperative free-hand osteotomies after application of a large fragment dynamic compression plate.

Methods: A 1 cm segment was removed from a validated composite femoral saw bone with two transverse cuts using an operative sagittal saw. A pressure sensitive paper was positioned between the two ends and an eight-hole large fragment

dynamic compression plate was applied using standard AO compression technique. A total of 32 samples were obtained and contact areas from each trial were quantified.

Results: Average contact area was 0.21 square inches (range 0.07 to 0.36) and mean contact area was 0.19. Compared with a control of 0.69 square inches, the average contact area represents 30.5% of optimal surface contact (range 10.1% to 52.1%).

Discussion and Conclusion: Intraoperative allograft-host junction contact area is difficult to estimate and slight gapping across a portion of the junction site is frequently accepted. Our findings suggest that using conventional techniques, average contact areas of only 30% are realized. This finding may help explain the observed rate of non-union and raises the possibility that an increased contact area could promote bony healing. We furthermore propose a novel telescoping method of allograft-host bone mating which is estimated to increase junctional contact area by 83-167%.

Notes:

8:50am–8:55am

Enchondromas Treated by Curettage Alone

Oliver P. Loeffler, MD
 Gregory T. Altman, MD
 John D. Lubahn, MD, FACS
 Carl Y. Seon, MD

Introduction: Treating enchondromas of the hand with curettage alone is as effective a treatment as curettage with bone graft augmentation based on tumor ablation, bony consolidation, and the prevention of recurrence of the lesion.

Methods: We performed a retrospective cohort study, from 1989 through 2010, of fifteen patients, four men and eleven women, representing twenty-five enchondromas treated with curettage alone. Patients were splinted post-operatively for 3-6 weeks. Upon follow-up bony consolidation was radiographically evaluated, range of motion and pain were assessed, and any complications were noted, including infection, recurrence, and pathological fracture at the site of the lesion.

Results: Mean age at operation was 28.9 years (range, 4 to 52 years). Mean follow-up was 30 months (range, 3 to 96 months). Thirteen lesions (52%) in eleven patients (73%) were classified as Tordai Group 1. Twelve lesions (48%) in four patients (27%) were categorized as Group 2. No lesion was classified as Group 3. Lesions were resected from the distal phalanx (2 of 25 or 12%), middle phalanx (5 of 25 or 20%), proximal phalanx (10 of 25 or 40%), and metacarpals (7 of 25 or 28%). Two patients had multiple enchondromatosis. All patients showed bony consolidation radiographically by 3 months. One patient complained of pain during passive extension postoperatively; another experienced intermittent aching. Two patients experienced recurrence; one presented seven years after the original surgery, and the other presented eight years after the original surgery. No patient experienced infection, postoperative fracture, or loss of function.

Discussion and Conclusion: Curettage without bone graft augmentation is an effective treatment for enchondromas of the hand, producing outcomes comparable to previous cohort studies. The additional cost, pain and donor site morbidity of autograft and risk of transmitting disease via allograft make curettage alone a justifiable treatment option.

Notes:

Saturday, October 22, 2011

Concurrent General Session XVIII — Knee
(Ballrooms C & D)

Moderators: David W. Romness, MD
 Jose A. Rodriguez, MD

11:50am–11:55am

Metaphyseal Sleeves in Revision TKA with Bone Loss — Does Cementation Have a Role?

Prashant P. Deshmane, MD
 Ajit Deshmukh, MD
 Amar S. Ranawat, MD
 Parthiv A. Rathod, MD
 Jose A. Rodriguez, MD

Introduction: Fixation remains a challenge in revision total knee arthroplasty (TKA) with bone loss. Metaphyseal sleeves

have been proposed to improve the overall rotational and axial stability of the revision TKA construct. Lack of experience with the immediate stability of the sleeve construct, has led some surgeons to use them with cement. The goal of this retrospective study was to assess the short term outcomes of cemented metaphyseal sleeves in revision TKA with AORI type 2 and 3 bone loss.

Methods: From 2005 through 2010 we identified 35 consecutive patients with revision TKA for AORI type 2 and 3 bone loss. There were 13 men and 18 women with average age of 68.2 yrs. Four patients with less than 1 year follow up were excluded. 27 tibial and 18 femoral metaphyseal sleeves in 32 knees formed the study cohort. All knees received hybrid cementation incorporating the sleeves and leaving the stems press-fit. Patients were assessed clinically with knee society scores (KSS) and radiographically by quality of metaphyseal cement mantle, radiolucent lines (RLL) and implant migration/subsidence

Results: Average follow-up was 18.4 months. 3 tibial sleeves and 1 femoral sleeve developed partial, non-progressive RLLs by 1 year. Use of constrained insert or hinged implants did not increase the incidence of RLL. The KSS improved from 45.6 to 72.4 and function score improved from 45.5 to 70 postoperatively. One patient had pain at the tip of tibial stem. There was no component migration or revisions.

Conclusion: Cemented metaphyseal sleeves along with press fit stems provided reproducible fixation cement mantle with minimal radiolucencies at short-term follow up. Reaming and broaching for the sleeve may have eliminated irregular cavitory defects and provided better access to the metaphyseal region for cement pressurization and could lead to better long-term survivorship.

Notes:

11:55am–12:00pm

UKA Improves Physical Function More than TKA

William Macaulay, MD
*Jeffrey A. Geller, MD
Jonathan H. Lee, MD
Manish S. Noticewala, BA

Introduction: Multiple series separately following patients having undergone unicompartmental knee arthroplasty (UKA)

or total knee arthroplasty (TKA) have reported excellent outcomes over the short-term, mid-term, and long-term follow-up periods. However, there is scant literature directly comparing UKA and TKA outcomes over similar follow-up time points. The objective of this study was to compare physical function, mental well-being, pain, and stiffness outcomes as assessed by Short Form 12 Health Survey (SF) and Western Ontario and McMaster University Osteoarthritis Index (WOMAC) between patients that underwent UKA and TKA.

Methods: We prospectively collected data on 293 TKAs and 93 UKAs performed at our institution. Baseline pre-operative variables recorded included: age, gender, body mass index, comorbidities, diagnosis, and pre-operative SF-12 Physical Component, SF-12 Mental Component, WOMAC Pain, WOMAC Stiffness, and WOMAC Physical Function scores. Post-operatively, SF-12 Physical Component, SF-12 Mental Component, WOMAC Pain, WOMAC Stiffness, and WOMAC Physical Function scores were recorded during 1-year and/or 2-year follow-up visits.

Results: At baseline, UKA patients had higher WOMAC Stiffness scores than TKA patients; otherwise, pre-operative characteristics of both cohorts were similar. Post-operatively, UKA patients reported significantly higher SF-12 Physical Component, SF-12 Mental Component, and WOMAC Physical Function scores. Multivariate analysis confirmed higher SF12 Physical Component and WOMAC Physical Function scores for UKA patients while controlling for all pre-operative variables. Furthermore, UKA patients had significantly larger improvements in SF-12 Physical Component and WOMAC Physical Function scores than TKA patients.

Conclusion: We found greater improvement in physical function at short-term (2-year) follow-up in patients that underwent UKA as compared to those that underwent TKA. Moreover, post-operative physical function scores in UKA patients were sufficiently greater than those in TKA patients such that a clinically perceptible difference was likely.

Notes:

12:00pm–12:05pm

A Comparison of Post-Operative Blood Loss in Total Knee Arthroplasty Using Epinephrine Pain Cocktail Injection, Platelet Rich Plasma, and a Fibrin Sealant

Brandon Burris, MD
Thomas L. Bernasek, MD
Hideki Fujii, MD
Melissa Levering, BS

Introduction: Platelet-rich plasma (PRP), fibrin sealants, and peri-articular epinephrine pain cocktail injections have been touted to improve hemostasis, wound healing, and reduce pain post-operatively after total knee arthroplasty (TKA). This study evaluated specifically the effect of these treatments on blood loss and transfusion rate after total knee arthroplasty.

Methods: A retrospective review of 400 patients undergoing primary total knee arthroplasty was performed. Group 1 (n=100) received PRP sprayed directly onto exposed tissue surfaces. Group 2 (n=100) received an injection of a pain cocktail (ropivacaine, morphine, epinephrine, depo-medrol, and Zinacef). Group 3 (n=100) received a fibrin sealant sprayed onto tissue surfaces. Group 4 (n=100) received no additional treatment and served as a control. Operative and post-operative TKA regimen was otherwise the same. The primary outcomes measured were bloody drain output, postoperative hemoglobin levels, and allogenic blood transfusion rates. Significant differences were analyzed with $p=0.05$.

Results: Average total blood drain output at 48 hours was as follows: Group 1 PRP-539 ml, Group 2 Pain Cocktail- 669 ml, Group 3 Fibrin Sealant- 442 ml, Group 4 control-756ml. The PRP and fibrin sealant decreased blood loss by 217 ml and 314 ml respectively compared to the control group. This was significant. There was no significant difference in postoperative hemoglobin levels between all groups. Allogenic blood transfusions were not significantly different between groups.

Discussion and Conclusion: The results suggest that fibrin sealant and platelet rich plasma significantly decreased post-operative blood loss; however, there was no significant difference between postoperative hemoglobin levels or blood transfusion rates. The clinician must weigh the potential decreased blood loss benefit with cost analysis when deciding to use these products intra-operatively.

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

Notes:

12:05pm–12:10pm

Is Perception Reality? Can Surgeons Predict Patient Satisfaction After Total Knee Arthroplasty?

Manny Porat, MD
Andrew C. Fischer, BS
William J. Hozack, MD
Javad Parvizi, MD, FRCS
James J. Purtill, MD

Introduction: Despite extensive research on patient outcomes after total knee arthroplasty (TKA), predicting which patients will benefit from surgery remains a challenge. Previous studies have attempted to identify factors that influence the outcome of TKA. As far as we are aware, no study has attempted to determine if the surgeon can predict which patients would be most satisfied after TKA.

Methods: This was a prospective study of a consecutive series of primary TKA patients at a single institution. The surgeons were given a questionnaire prior to the surgery that focused on patient factors thought most likely to affect patient outcome. All patients underwent primary unilateral cemented posterior-stabilized TKA with patella resurfacing. The surgeons were given a separate questionnaire immediately after the surgery that focused on surgical factors thought most likely to affect patient outcome. Patient satisfaction was measured by SF-36 scores at 6 weeks and 6 months following surgery. Surgeon preoperative and postoperative perceptions were statistically correlated with patient SF-36 outcome scores.

Results: A total of 88 (34 males, 54 females) patients were recruited. At 6 weeks, there was no significant correlation between preoperative ($R=-0.1$) or postoperative ($R=-0.15$ to -0.31) surgeon perception and patient outcome. Similarly, at 6 months there was no correlation between preoperative ($R=0.01$) or postoperative ($R=0.007$ to -0.28) perception.

Discussion: TKA is regarded as a successful and effective surgery when measuring function, prosthesis survival and pain relief. However, patient reported outcomes often differ as compared to surgeon reported outcomes. The preliminary

results of this study demonstrate that even very experienced high-volume surgeons cannot accurately predict patient satisfaction after TKA. Further study is needed to improve our understanding of patient outcomes after TKA.

Notes:

12:10pm–12:15pm

Preoperative Anemia in Total Joint Arthroplasty: Prevalence, Mortality, and Morbidity

Max Greenky, BA
Ronald Huang, BS
Javad Parvizi, MD, FRCS
Camilo Restrepo, MD

Introduction: Anemia is highly prevalent in patients undergoing total joint arthroplasty (TJA), with reported rates as high as 24%. Numerous studies have shown anemia to be associated with increased risk of infection, length of hospital stay, and mortality in surgical populations. Few studies have assessed the relationship between preoperative anemia and postoperative morbidity and mortality in patients undergoing TJA. The aim of the present study was to explore this association.

Materials and Methods: 15,722 patients undergoing TJA at a single institution between January 2000, and June 2007 were included. Five hundred patients with acute trauma or infection were excluded to maintain homogeneity. Anemia was defined as Hb<12 g/dl in women and Hb<13 g/dl in men as per the guidelines of the World Health Organization. Statistical analysis was performed to evaluate the effect of preoperative anemia and other confounding variables on postoperative complications.

Results: Of the 15,722 patients, 19.6% presented with preoperative anemia. Thirty day, 90 day, and 1 year mortality rates were all significantly higher in patients with preoperative anemia. Periprosthetic joint infections also occurred more frequently in anemic patients, affecting 4.3% and 2% of anemic and non-anemic patients respectively. Forty-three percent of anemic patients received an allogenic transfusion compared to only 13.4% of non-anemic patients. These differences were

statistically significant. Anemic patients had increased hospital stays averaging 4.35 days compared with 3.99 days in non-anemic patients.

Discussion and Conclusion: The findings of our study implicate that preoperative anemia is associated with significant postoperative morbidity and mortality. Due to these findings, we believe steps should be taken to correct the hemoglobin level of patients with acute preoperative anemia prior to surgery. Patients with chronic anemia associated with disease should be well informed by their physician about the increased risks for postoperative complications.

Notes:

12:25pm–12:30pm

Assessment of Accuracy of Robotically Assisted Unicompartmental Arthroplasty (Makoplasty)

Ali Mofidi, MD
Michael Conditt, PhD
Maria S. Goddard, MD
Riyaz H. Jinnah, MD
Bo Lu, MD
Gary G. Poehling, MD

Introduction: The conventional knee arthroplasty jigs, while usually being accurate, often result in prostheses being inserted in an undesired alignment resulting in poor post-operative outcome. This is especially true about unicompartmental knee replacement. Computer navigation and robotically assisted unicompartmental knee replacement were introduced in order to improve surgical accuracy of the femoral and tibial bone cuts. The aim of this study was to assess accuracy and reliability of robotic assisted, unicompartmental knee surgery in producing reported bony alignment.

Methods: Two hundred and twenty consecutive patients who underwent medial robotic assisted unicompartmental knee surgery performed by two surgeons were retrospectively identified and included in the study. Femoral and tibial sagittal and coronal alignments and posterior slope of the tibial component were measured in the post-operative radiographs. These measurements were compared with the equivalent measurements

collected during intra-operative period by the navigation to study the reliability and accuracy of femoral and tibial cuts.

Results: We found an average difference of 2.2 to 3.6 degrees between the intra-operatively planned and post-operative radiological equivalent measurements.

Discussion and Conclusion: Assuming appropriate planning, robotically assisted surgery in unicondylar knee replacement will result in reliably accurate positioning of component and reduce early component failures caused by malpositioning. Mismatch between preplanning and post-op radiography is caused by poor cementing technique of the prosthesis rather than wrong bony cuts.

Notes:

12:30pm–12:35pm

Sexual Function Before and After Primary Total Hip and Knee Arthroplasty

Ajit J. Deshmukh, MD
 *Amar S. Ranawat, MD
 Parthiv A. Rathod, MD
 Jose A. Rodriguez, MD

Introduction: Osteoarthritis (OA) of the hip and the knee has been found to affect sexual activity. Few retrospective studies have investigated the role of total hip replacement on sexual function. We designed a prospective study to evaluate the influence of total hip arthroplasty (THA) and total knee arthroplasty (TKA) on the physical and psychological aspects of sexuality of patients.

Methods: Between April 2009 and September 2010, patients under 70 years of age scheduled for primary THA or TKA for OA were invited to anonymously participate in this study. All patients were recruited from the practices of 2 arthroplasty surgeons (at the same institution) by mailing the 2 questionnaires, 2 pre-paid self-addressed envelopes and a cover letter. Patients were instructed to mail back the pre-operative questionnaire prior to surgery and the post-operative questionnaire 6 months after surgery, and responses were identified only by a unique code number on the questionnaire.

Results: Out of 294 consecutive patients, 63 returned both questionnaires. The mean age of patients was 56.8 years (34-70) with 33 males and 30 females. 63.6% patients reported physical problems with sexual activity (pain 64%, different positions 52%, stiffness 30%, reduced libido 21%, inability to attain proper position 16%), and 91% reported psychological issues (general well-being 90%, sexual self-image 52%). Six-months post-op, 39% patients reported an improvement in libido, 41% reported increased intercourse duration, 46% reported increased intercourse frequency, 84% had improvement in general well-being and 55% had improved sexual self-image. 19% patients reported fear of damaging replaced joint during sexual activity, while 7% patients reported their replacement surgery to adversely affect sexual function.

Discussion/Conclusion: In 90% patients, THA or TKA improved overall sexual function. Patients with THA had better improvement in sexual function than patients with TKA. After THA, sexual activity improvement was significantly more in females than males.

Notes:

12:35pm–12:40pm

Intra- and Inter-Observer Variability of Jig Placement in Shape Match Technique of Total Knee Arthroplasty — A Cadaver Study

William J. Hozack, MD
 *Michael Nogler, MD
 Gregory K. Deirmengian, MD

Introduction: Shape matching is a new surgical technique for total knee arthroplasty. For this technology to be effective, correct and reproducible placement of the customized, pre-manufactured jigs on the patient's bone is essential. The current study aimed to evaluate intra- and interobserver variability of a shape match cutting guides in a cadaver study.

Methods: A prospective series of 12 eviscerated human torso's were acquired for a total of 24 limb specimens that included intact pelvises, femoral heads, knees, and ankles. The cadavers received an MRI, from which were manufactured the shape match cutting guides. Additionally all specimen received "pre-operative" CT-scans to determine leg axes.

Knee joints were opened with a parapatellar approach and on each tibia and femur and on the cutting guides navigation trackers were mounted. Four surgeons placed the specific cutting guides six times each on all specimens. Positions of the cutting guides in relation to the navigation trackers were recorded using a navigation system. For statistical analysis SAS was used and Cronbach alpha coefficient was applied. Cronbach alpha tests whether or not measurements produce similar results.

Results: Cronbach alpha was calculated to measure the internal consistency within surgeons. The results ranged from 84% to 100% for flexion, varus/valgus and rotation for the placement of the femur as well of the tibia jigs suggesting good to excellent reliability.

Discussion and Conclusion: Jigs placement of both the femoral as well as the tibial jig proved to be highly reproducible. With minimal resulting three-dimensional deviation, this low inter- and intra-observer variability indicates that the tested system can be safely used in order to transfer a MRI- based surface reconstruction to the individual patients anatomy.

Notes:

12:40pm–12:45pm

The Effect of 5mm Osteochondral Defects on Coronal Plane Knee Stability — A Cadaveric Study

Christopher Plaskos, PhD
 *Mahmoud Michael Khair, MD
 Michael B. Cross, MD
 Stephen Lyman, PhD
 David J. Mayman, MD
 Denis Nam, MD

Introduction: In varus knee osteoarthritis, patients often present with variable amounts of denuded articular cartilage and bone loss in the medial compartment, however the quantitative effects of osteochondral defects on both leg alignment and coronal stability are poorly understood. The purpose of this study was to quantify the overall coronal plane laxity in

the native knee throughout flexion, and determine the effects of osteochondral defects of the medial distal femoral condyle (MDF), medial posterior femoral condyle (MPF), and medial tibial plateau (MT), on coronal plane stability.

Methods: 5mm osteochondral defects were simulated in ten cadaver limbs by sequentially removing subchondral bone and cartilage off of the MDF, MPF, and MT. Computer navigation software and a robotic cutting-guide were used to standardize the depth of the osteochondral defects in each location. The navigation software was used to measure alignment and stability of the knee at 0°, 30°, 60°, and 90° of flexion. Moments of 9.8Nm in varus and valgus were standardized using a 4kg spring load applied 25cm distal to the joint line. A repeated measures ANOVA was performed to analyze whether a difference was present in the mean mechanical varus alignment angle at each degree of flexion, both between the native knee and each individual defect, and between the native knee and all defects combined.

Results: In the native knee, coronal laxity increased with flexion, ranging from $2.2^\circ + 1.5^\circ$ at 0° of flexion, to $10.8^\circ + 4.2^\circ$ at 90° of flexion. The MPF defect increased varus opening at 90° of flexion by $3.3^\circ + 1.2^\circ$, but did not show a significant difference from 0° to 60° of flexion. The MDF defect resulted in an increase in varus opening at 0° and 30° of flexion ($2.2^\circ + 1.7^\circ$ and $2.1^\circ + 1.3^\circ$, respectively), but not at 60° and 90° of flexion. The MT defect increased varus opening at all flexion angles by 4.0° to 7.0°, but was only statistically significant at 30° of flexion. With all defects present, varus laxity increased at all flexion angles by 4.0° to 7.7°.

Discussion and Conclusion: Defects in the medial distal femur significantly altered stability in 0° and 30° of flexion, posterior femoral condyle defects significantly altered stability in 90° of flexion, and tibial defects affected coronal stability throughout flexion. The quantitative values presented in this study may help surgeons with preoperative templating and intraoperative decision making when balancing both a total knee and unicompartmental arthroplasty.

Notes:

12:45pm–12:50pm

What Makes a Perfect Knee?

Bryan A. Hozack, BA
William J. Hozack, MD
Javad Parvizi, MD, FRCS

Introduction: Surgeons use post-operative imaging to confirm proper positioning of components following total knee arthroplasty (TKA). The aim of this study is determine clinical and radiographic differences between patients with good outcomes (scores) and poor outcomes following unilateral TKA.

Methods: We identified patients who underwent unilateral TKA between 2000 and 2008. Inclusion criteria were patients with post-operative scores more than two years after surgery. Short-form health outcome surveys (SF-36) combined with the Knee Society Clinical Rating System (KSS) were used to classify good and poor outcomes. Patients who underwent revision surgery for mechanical reasons were also included in the poor group. Patients with a revision due to infection, with a previous TKA in place in the contralateral leg, or who underwent a major surgery on either leg were excluded. Numerous radiographic measurements were also performed. Medical records of the patients were evaluated to extract all important parameters that were thought to influence patient outcome.

Results: So far the data collection has been completed on 75 patients with 97 further patients being reviewed. Based on statistical analyses, no significant correlation between functional outcome and radiographic measurements could be found. Old age, female sex, preoperative anemia, and higher medical comorbidities (as measured by Charlson Index) appear to be associated with poor functional outcome.

Discussion: Poor outcomes of TKA are associated with pre-operative conditions and not radiographic parameters. This explains the radiographic measurements such as alignment, femoral overhang, anterior femoral offset, posterior femoral offset, change in AP dimension, tibial overhang, tibial slope, change in joint line, patellar height, composite patellar thickness, sagittal patellar displacement, and patellar tilt are not significantly related to successful outcomes. Careful attention should be paid to comorbidities when considering TKA.

Notes:

Saturday, October 22, 2011

Concurrent General Session XIX — General Orthopedics (*Burwell Room*)

Moderators: Richard M. Wilk, MD
Bernie Pfeifer, MD

11:50am–11:55am

Gloving Technique and Intraoperative Bacterial Contamination

Kevin A. Shamburg, BS

Introduction: Surgical site infection is a common and potentially serious complication involved in all types of surgical procedures. These infections cause significant morbidity and there has recently been a national movement to decrease intraoperative bacterial contamination. Surgical team members' gloves are in direct contact with the surgical instruments and the surgical wound. The objective of this study is to determine whether certain glove donning techniques affect the rate of intraoperative bacterial contamination.

Methods: We observed the gloving technique of OR personnel for clean, non-contaminated, elective surgical cases. Surgical team members followed standardized scrubbing procedures and their glove donning technique was recorded. A closed gloving method involves keeping the hand completely inside the gown cuff while donning the glove. With an open gloving method the fingers or entire hand extend beyond the gown cuff while glove donning. We also recorded whether the subject gloved themselves or were gloved by the scrub staff. Cultures of the gloved palm and gown sleeve were taken before the case began using D/E Neutralizing Rodac agar plates. The plates were incubated for 48 hours at 37°C and checked for the presence of bacteria.

Results: We found that scrub staff assisted gloving using a closed technique resulted in significantly less bacterial contamination than scrub staff assisted gloving using an open technique. The closed assisted gloving technique also had significantly less contamination than that observed with a closed self-gloving technique.

Discussion and Conclusion: We believe that a closed scrub staff assisted gloving technique should be employed by as many members of the operating team as possible. Efforts to minimize the contamination rates observed with the self-gloving technique seem to be prudent. Although the closed tech-

nique is slightly more difficult to perform, it appears to significantly reduce intraoperative bacterial contamination and may reduce the incidence of perioperative infections.

Notes:

11:55am–12:00pm

Medical Student Musculoskeletal Education: An Institutional Review Following the Bone and Joint Decade

Nathan W. Skelley, MD
*Logan M. Skelley, BS
Dawn M. LaPorte, MD
Miho J. Tanaka, MD

Introduction: This year concludes the United States Bone and Joint Decade, and in response to the “Project 100” goals, our institution conducted a 5-year curriculum reform to address medical student musculoskeletal education.

Methods: We reviewed the musculoskeletal curriculum at our institution and five other institutions across the country. A validated orthopaedic questionnaire designed to assess musculoskeletal competency was distributed to students in our School of Medicine. A passing score was set at 70% based on previous exams. Additional information related to demographics, career interests, teaching, confidence and electives was collected.

Results: The survey was completed by 348/460 (75.7%) medical students. The average score was 51.1% while 67/348 (19.3%) attained a passing score. The fourth-year students scored significantly higher compared to first-year students (59.0% vs 37.3%), however, greater than 65% of students in both groups failed the exam. Only 34.2% of graduating students surveyed completed a musculoskeletal elective. Students who participated in elective musculoskeletal education, involving one-on-one resident or attending instruction outside of the basic curriculum, had higher pass rates (67.5%) than those who did not (43.9%).

Discussion and Conclusion: Despite low overall scores, the students at our institution performed better than students at other East Coast medical schools on the same questionnaire.

This analysis found that a minimum of 15 days dedicated to the study of musculoskeletal medicine significantly increased the chance of passing this exam. To our knowledge, this is the first study to have quantifiable results that advocate for a dedicated musculoskeletal block in medical student education. Furthermore, our integrated curriculum, led by orthopaedic residents and faculty, provides a model for improvement at other institutions. Musculoskeletal education is a nationally recognized deficit in the current system of medical student education. This study profiles a 5-year curriculum reform and demonstrates that these changes have begun to correct this deficiency.

Notes:

12:00pm–12:05pm

Length of Stay After Total Joint Replacement: Does Day of Surgery Matter?

Raghuvveer Muppavarapu, MD
Charles Cassidy, MD
Daniel Greenwald, BS, MD
Elizabeth Matzkin, MD
Eric L. Smith, MD

Introduction: The issue of shortening hospital stay and decreasing healthcare costs is at the forefront of modern medicine. The current study compares the length of postoperative hospital stay for total joint replacement patients in terms of the day of the week on which the operation was performed. The prediction is that once confounding factors and co-morbidities are considered, patients undergoing surgery on Thursday will have a longer length of stay compared to those having surgery on Monday or Friday.

Methods: This is a retrospective cohort study involving 416 patients who underwent a primary total hip or knee arthroplasty at one medical center by a single surgeon over a 2 year period from 8/23/2007 to 5/24/2010. A total of 395 patients were included in the study. Patients were divided into three groups based on the day they had surgery: Monday, Thursday, or Friday. The distribution of patients was 102 patients on Monday, 180 patients on Thursday, and 113 on Friday. Data was col-

lected regarding ASA, BMI, medical co-morbidities, and length of stay.

Results: Patients who had surgery on Thursday had a statistically significant longer length of stay compared to Friday or Monday. Monday (mean=4.55) and Friday (mean=4.75) operations were associated with the shortest length of stay and this was significantly shorter than Thursday (mean=5.23). An interaction between two independent co-variables and length of stay was found. ASA number and BMI were used as covariates and played a significant role in overall length of hospital stay.

Discussion and Conclusion: Day of surgery significantly influences the length of post-operative stay. Operating earlier in the week can be advantageous to surgeons and patients, lead to lower costs, lower complications, and less time spent in the hospital.

Notes:

12:05pm–12:10pm

Combating Fatigue Within Orthopedic Surgery Residency

Frank M. McCormick, MD
James H. Herndon, MD, MBA
John Kadzielski, MD

Introduction: The Institute of Medicine recently published “Resident Duty Hours: Enhancing Sleep Supervision and Safety” which asserts to better protect patients against fatigue related errors and further restrict resident work-hours. The purpose of this study is to determine the incidence and severity of orthopedic surgery resident’s fatigue and their relative risk for error. A high-quality prospective cohort study was conducted using the Sleep, Activity, Fatigue, and Task Effectiveness (SAFTE) model, which is previously validated as a human-factors accident predictor.

Methods: Twenty-three orthopedic surgery residents were monitored for two-week intervals. Subjects’ sleep and wake periods were continuously recorded to measure activity, sleep quality and duration, and then calculate individual Mental Fatigue Analysis via the SAFTE model. Dependent variables were: percentage of time spent with a fatigue level less than

80 (correlating to an increased risk of error); percentage of time spent with a fatigue level less than 70, (correlated to a Blood Alcohol level of 0.08); average daily sleep; and the relative risk for error compared to a well-rested person.

Results: 87.5% of subjects completed the study, in a cohort that enrolled 38% of the total group. Fatigue had a significant impact on the cohort’s calculated effectiveness. Overall, residents performed at less than 80% effectiveness due to fatigue 49% of their time awake. Moreover, residents performed at less than 70% effectiveness twenty-eight percent of their time awake. Average daily sleep ranged from 2.8 hours to 6.4 hours per individual with a group mean of 5.2 hours. When compared to the National Transportation Safety Board’s data on fatigue and human-factor accidents, residents demonstrated a 23% increased risk of error attributable to fatigue for the entire cohort, with an individual range from 11 to 49%. Nightfloat residents had significantly more critical impairment. They achieved an effectiveness score of 70% or below, 17% more of the time as compared to daytime residents.

Conclusion: Resident fatigue is prevalent, pervasive and variable. It increases the risk for error department wide by 23%. Our study describes an operationally feasible and non-invasive method to study and quantify resident fatigue. This method allows for identification of specific time-periods, rotations, or individuals at risk where direct intervention can be implemented.

Notes:

12:10pm–12:15pm

Addressing the Shortage of Academic Orthopaedic Surgeons: Evaluation of an Innovative Seven-Year Physician Scientist Residency Training Program

L. Andrew Koman, MD
Riyaz H. Jinnah, MD
Sandeep Mannava, MD
Johannes F. Plate, MD
Thomas L. Smith, PhD
Austin V. Stone, MD

Introduction: To address the need for orthopaedic surgeon scientists, our institution pioneered a seven-year physician sci-

entist training program (PSTP) with the goal of providing research-oriented residents the necessary knowledge and skills for clinical and basic science research in an academic career. The program consists of two years of mentored continuous protected research time in conjunction with a PhD dissertation, followed by the traditional five-year clinical orthopaedic residency. The present study sought to identify orthopaedic surgeons with MD/PhD degrees and residency programs with dedicated research tracks and to assess the effectiveness of the novel seven-year program in training prospective academic orthopaedic surgeons.

Methods: All 152 orthopaedic residency programs listed in the American Medical Association FREIDA Online database were searched for orthopaedic surgeons with MD/PhD degrees and compared to the overall number of program faculty. Information on available research tracks was obtained from each residency program's website. Research activities of our seven-year physician scientists were analyzed from 1999 and 2011.

Results: Surgeons with MD/PhD degrees account for 2.3% of all 3408 orthopaedic faculty positions in US residency programs. Each year, 1% of all orthopaedic residents are enrolled in six-year tracks with one year dedicated to research. During the last 11 years, our PSTP program produced a total number of 58 peer-reviewed publications and received \$239,724 from 19 resident-authored extramural grants. All four of our current seven-year alumni practice orthopaedic surgery in an academic setting; three alumni are assistant professors.

Discussion and Conclusion: The seven-year PSTP successfully develops surgeon scientists who obtain and refine their skills in basic science and clinical experimental design, grant proposals, scientific presentations, and manuscript preparation, in addition to their clinical development. The PSTP institutional cost is justified by effectively addressing the shortage of surgeon scientists in the US and producing future leaders in academic orthopaedics.

Notes:

12:25pm–12:30pm

Hazardous Attitudes in Surgeons

John Kadzielski, MD
James Herndon, MD, MBA
Frank M. McCormick, MD

Introduction: Attitudes, “personal motivational predisposition to respond to persons, situations, or events in a given manner,” influence how a person makes decisions. Since the advent of the jet age, attitudes have been linked to accidents; General Chuck Yeager in his autobiography stated, “Arrogance got more pilots in trouble than faulty equipment.” In 1987, the FAA first started teaching new pilots about hazardous attitudes which were believed to be incompatible with repeated safe flight. Research focused on attitudes described as macho, impulsive, worry, resignation, self-confidence and antiauthority. If these attitudes are dangerous for pilots and passengers, they may also be incompatible with reliable and safe delivery of surgical care. Surgeons may harbor unsafe levels of hazardous attitudes.

Methods: We used a validated aviation psychology tool which measures these attitudes in pilots. We converted the aviation scenarios to analogous situations for surgeons. Orthopaedic surgeons at one New England hospital completed this modified surgeon hazardous attitude scale. As in the aviation scale, scores ranged from 0-30 for each attitude. Values > 20 indicated dangerously high levels of hazardous attitudes.

Results: Thirty-six surgeons completed the protocol. Dangerous levels of macho were found in 25% of surgeons. Hazardous levels of self-confidence were found in 8% of surgeons. High levels of impulsivity were found in 5% and abnormally high levels of antiauthority were found in 3%. Only 3% of surgeons reported dangerously high levels of worry and 0% reported hazardous levels of resignation. Thirty-one percent of surgeons harbored at least one abnormally high hazardous attitude.

Discussion and Conclusion: High levels of hazardous attitudes may not be consistent with the routine delivery of safe surgical care in a teamwork setting where human factors and safe systems are the key to success. Further research is needed to determine if abnormally high levels of these hazardous attitudes impact patient care.

Notes:

12:30pm–12:35pm

Analysis of Operating Room Traffic During Primary and Revision Total Joint Arthroplasty

Mitchell Stroh, BS
Javad Parvizi, MD, FRCS

Introduction: Periprosthetic joint infection is a challenging complication associated with joint arthroplasty. It is well known that traffic in the operating room (OR) is a major issue resulting in an increased bacterial count in the OR. The main purpose of this study was to evaluate whether traffic in the OR is an issue at a high volume joint arthroplasty center.

Methods: An observer prospectively collected data during primary and revision joint arthroplasty surgeries over a period of 11 months. All surgeries were performed under laminar flow with the use of personal protective system suits. Operating room personnel were unaware of the observer, hence removing any bias from the flow of the operating room traffic. The number, reason and personnel involved in the event of a door opening event were documented from the time of the tray opening to the closure of the surgical site.

Results: A total of 80 primary and 36 revision arthroplasty surgeries were observed. The average operative time was 92 and 161 minutes respectively. The average number of door openings was 60 in primary and 135 in revisions, yielding per minute rates of 0.653 and 0.839, respectively. Circulating nurse and surgical implant representatives constitute the majority of the OR traffic.

Conclusions: It appears that OR traffic is a major issue during joint arthroplasty even in high volume centers such as our institution. Based on the findings of this study it is plausible that the laminar flow might have proven to be ineffective during these cases as frequent door opening is known to disrupt laminar flow. Revision cases were in particular risk for high traffic. Implementation of strategies such as storage of components in the operating room and education of the OR personnel is required to reduce the number of entries into the operative theater.

Notes:

12:35pm–12:40pm

Metal-On-Metal Hip Resurfacing in the Severely Obese

Matthew I. Stein, MD
Michael A. Perrone, MPH

Background: The indications for metal-on-metal hip resurfacing arthroplasty remain controversial and continue to evolve. Many authors suggest that morbid obesity should be considered a contraindication, however, the actual effect of morbid obesity on the outcomes of metal-on-metal resurfacing arthroplasty is not currently known. In this study, we assessed the influence of body mass index on the survival of metal-on-metal hip resurfacing prosthesis by comparing the clinical results of patients with a body mass index > 35 (morbidly obese) with those with a body mass index of <35.

Methods: We retrospectively reviewed our registry to identify all patients who had been followed for at least two years after a metal-on-metal hip resurfacing arthroplasty, and we divided those patients according to whether they had a body mass index >35 (study group) or <35 (control group) at the time of surgery. 47 hips with an average BMI of 38.4 were included in the study group, and 233 hips with an average BMI of 27.6 were included in the control group. We compared the clinical results and prosthetic survival of the two groups.

Results: Preoperatively, there was no significant difference between the groups with respect to Harris hip score (Study 45.6, Control 48.5; p-value 0.102). There was no significant difference between the groups with regard to postoperative Harris hip score (p=0.424), complications rates (p=1.00), or prosthetic survival (p=0.334). At an average follow-up of 43 months (31-54 months), two patients in the study group required a revision surgery following hip resurfacing (96% survival). Five patients in the control group required conversion to total hip arthroplasty (98% survival).

Total: Metal-on-metal resurfacing arthroplasty is performing well in the morbidly obese. Our data suggest that the morbidly obese should be considered candidates for metal-on metal resurfacing arthroplasty.

Notes:

12:40pm–12:45pm

Recovery Room Radiographs Following Total Hip Arthroplasty: Tradition Vs. Utility?

Anthony Ndu, MD
Jonathon N. Grauer, MD
Kolawole Jegede, BS

Introduction: Recovery room radiographs following hip arthroplasty have evolved into standard of care to assess for implant alignment and complications despite limited evidence to support their utility.

Methods: 632 consecutive portable, postoperative, recovery room radiographic series performed at our single academic institution for primary total hip arthroplasty were reviewed. These were evaluated for radiographic adequacy and noteworthy clinically findings that affected the post-operative course of the patient.

Results: Inadequacies were identified for 17% of radiographic series. Surgical-related findings requiring take back to the operating room were identified for 0.32% of the radiographic series: one was a dislocation and one was an acetabular screw with medial penetration.

Discussion and Conclusion: Recovery room radiographs are often of limited quality, and this study raises the question of optimizing quality versus emphasizing time from surgery for obtaining these films, as less than 1% of patients had their care affected by the result of the recovery room radiograph.

Notes:

12:45pm–12:50pm

Closure Time Analysis of Traditional Suture Methods Versus Barbed Suture in Total Joint Arthroplasty

Elizabeth Matzkin, MD
* Pinak Shukla, MD
Steven DiSegna

Introduction: The purpose of this study was to investigate the wound closure time comparing barbed sutures to traditional suturing methods in total knee and total hip arthroplasties. We

hypothesized that using a barbed suture would expedite wound closure resulting in a decreased amount of time spent in the operating room.

Methods: A cohort of 34 patients was enrolled in a prospective, randomized controlled trial. Participants were randomized to either receive the barbed suture or traditional sutures and the time to wound closure was recorded for each layer. Layers consisted of fascia, fat, subcutaneous and subcuticular. Length of incision and BMI were used as controls during analysis.

Results: A significant difference was found between barbed and traditional methods of suturing when analyzing the total time to wound closure, as well as the time to close each individual layer of the wound. The mean total time to wound closure was 15.87 minutes for the barbed and 27.52 minutes for traditional methods of suturing, an 11.65 minute difference. The barbed suture was on average 3.58 minutes faster when closing the fascia, 4.37 minutes faster when closing the fat layer, 4.02 minutes faster when closing the subcutaneous layer, and 3.55 minutes faster when closing the subcuticular layer. Wound complications were also recorded and preliminary results indicate that there may be more complications associated with the barbed suture than traditional suturing.

Discussion and Conclusion: The barbed suture saves surgeons a substantial amount of operating room time, allowing physicians to tend to other obligations and has significant potential cost savings. It may however, have an increase in early wound complications, which is the subject of continuing investigation.

Notes:



Eastern Orthopaedic Association

Scientific Poster Exhibits

October 20-22, 2011

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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2011 Poster Abstracts

Thursday-Saturday

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Poster 1

The Safety and Efficacy of Wrist Arthroscopy in the Pediatric Orthopaedic Population

Joshua Abzug, MD
*Meredith Osterman, MD
Scott H. Kozin, MD
A. Lee Osterman, MD

Introduction: Wrist arthroscopy has become a mainstay of treatment for adult wrist injuries. Numerous studies have shown the efficacy of wrist arthroscopy in adults, however, little research has been performed evaluating the utilization of wrist arthroscopy in the pediatric population. The purpose of this study was to review the indications, results, and complications of wrist arthroscopy in the pediatric population.

Methods: A retrospective review of all pediatric wrist arthroscopies over a three and one half year period was performed. Charts were reviewed for demographic information, mechanism of injury, diagnoses, procedure(s) performed, complications and outcomes.

Results: Seventy one wrist arthroscopies were performed on sixty five pediatric patients. Forty three of the patients were female and 22 were male. The mean age at injury was 12.4 years (range 6.2 to 17.7) and the mean age at surgery was 15.5 years (range 10.9 to 17.9). Twelve patients sustained injuries directly related to a fall, 42 were sports related injuries, and 17 had other mechanisms including direct blows, insidious onset, or systemic illness. The procedures included 5 diagnostic arthroscopies, 18 synovectomies, 18 TFCC debridements, 28 TFCC repairs, 19 ulnar extrinsic capsulodeses, 7 scapholunate thermal capsulodeses, 5 dorsal ganglion excisions, 3 arthroscopic assisted scaphoid reductions, and one midcarpal thermal capsulodesis. The average follow-up time was 12.7 months (range; 1 month to 53.7 months). Average wrist flexion was 91% and extension 89% compared to the contralateral wrist. Forearm pronation averaged 95% and supination 97% compared to the contralateral limb. Grip strength returned to 84% of the contralateral wrist. Sixty three patients had consid-

erable improvement or complete resolution of their symptoms. Six patients required revision surgery secondary to continued pain or instability. Four complications were noted including one keloid, one superficial infection treated with oral antibiotics, one dorsal ganglion recurrence, and one patient with dorsal ulnar sensory nerve paresthesias.

Conclusion: Wrist arthroscopy is a safe and effective treatment for the pediatric population. Appropriate patient selection based on a thorough pre-operative examination allows for its utilization without significant risk. Significance: This is the largest series of pediatric wrist arthroscopy patients reported to date and demonstrates the efficacy of this procedure.

Poster 2

Acetabular Component in Total Hip Arthroplasty: Is There Evidence That Uncemented Is Better?

Bahar Adeli, BA
Javad Parvizi, MD, FRCS
Nader Toossi, MD

Introduction: Almost all THA performed in North America is currently performed using uncemented acetabular component. It is not known what exactly was the impetus behind this current practice. The objective of this systematic review was to determine the survivorship of cemented and uncemented acetabular components utilized in THA.

Methods: Literature search revealed 2361 publications of which 27 were excluded because of not meeting the inclusion criteria. Only studies in English language, those with average follow-up of 10 years, and primary THA were included. This study consisted of 16 publications (9753 patients) evaluating long term outcome of uncemented acetabular component and 11 papers (65,808 patients) reporting the outcome of cemented acetabular component. Analysis was done to determine the survivorship.

Results: Preliminary analysis has revealed that the mean survivorship of cemented acetabular component at 18.2 years (range, 10 to 26 years) is longer than the mean survivorship of

uncemented acetabular at 13.1 years (range, 10 to 22 years). In addition, there was a statistically higher reoperation rate in THA utilizing uncemented acetabular component.

Conclusion: It appears that the uncemented acetabular component has lower survivorship and higher reoperation rate. Thus, the use of uncemented acetabular components for better survivorship is not supported by evidence. Perhaps the ease of insertion of uncemented components, the ability to utilize alternative bearing surfaces, and aggressive marketing are the main reasons for the popularity of uncemented THA in North America.

Poster 3

Fluoroscopy in Hip Arthroscopy

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Introduction: Fluoroscopy is an important tool to facilitate hip arthroscopy from joint access to real time assessment of bony decompression. Surgeons usually underestimate the amount of radiation exposure during fluoroscopic-guided hip arthroscopy.

Methods and Materials: 100 patients were enrolled. Fluoroscopic time was obtained from the fluoroscope as the measurement of radiation exposure.

Results: The mean total fluoroscopy time was 57.19 ± 11.3 seconds/hip arthroscopy. The mean of fluoroscopic shots in each procedure was 66.1 ± 12.0 .

Conclusion: For experienced hip arthroscopist, fluoroscopic time is less than the reportable time. Considering the learning curve of hip arthroscopy the fluoroscopic time and radiation exposure may be increased for junior surgeons particularly in unprotected areas such as eyes and hands. Education about the risks of radiation is a crucial step in the training of hip arthroscopy.

Poster 4

Modular Tapered Fluted Stem with Distal Fixation for Periprosthetic Femoral Fractures — Does Stem Design Matter?

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Introduction: The prevalence of periprosthetic femoral fractures has increased due to an increase in primary and revision hip arthroplasty and the longer life expectancy of the population. The use of modular, tapered, fluted stem with distal fixation has been increasing. The purpose of this study was to report outcomes of treatment of periprosthetic femoral fractures using two different stem designs.

Methods: We retrospectively analyzed the outcomes of patients with periprosthetic femoral fractures from the practices of three arthroplasty surgeons from 1999 to 2010. The Vancouver classification system was used to categorize the fractures. Postoperative radiographs were evaluated for fracture union, implant alignment and stability. Clinical outcomes were evaluated using Harris hip scores.

Results: There were 29 patients (23 females, 6 males) with an average age of 69.3 years. 17 hips had type B2 and 12 had type B3 fractures. 19 hips were treated with the Link MP stem, while 10 hips received the Restoration stem. 27 of 29 fractures united with an average time of union being 6.1 months. Mean HHS was 83.4 at an average follow-up of 2.62 years (1-9.2). Five stems subsided by 6 weeks, of which 2 stems had progressive subsidence and nonunion necessitating revision. 4 of 5 cases of subsidence, and both revisions occurred with the Restoration stem. No new cases of subsidence appeared after 6 weeks.

Discussion: Periprosthetic femoral fractures can be managed using this modular distal fixation stems with reasonable success. Different modular stem design features include surface roughness, and flute geometry. These design factors may influence clinical success in the setting of periprosthetic fracture.

Poster 5

Rotator Cuff Repair: An Analysis of Surgeon Experience on Outcome

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Background: Arthroscopic rotator cuff repair (ARCR) is one of the most common procedures performed in orthopaedic surgery. The effect of experience on ARCR outcomes has not been fully elucidated. The goal of this study was to evaluate the effect of surgical experience on patient outcomes. We hypothesized that with increased experience surgical outcomes would improve.

Methods: A retrospective review of 117 consecutive patients with a minimum of one year followup that underwent ARCR by one surgeon from the start of practice was conducted. We divided the patients into two cohorts: early (n=52) and recent (n=65). All patients has minimum of 1 year follow up. Clinical outcome measures included American Shoulder and Elbow Surgeons (ASES) and Penn Shoulder Scores (PSS) were assessed preoperatively and at final follow up.

Results: Patient demographics including mean age, gender distribution hand dominance, BMI, were similar between the early and recent cohorts ($p>0.05$ for all comparisons). In addition, degree of rotator cuff pathology and repair technique was similar between both groups. Both cohorts showed significant improvement ($p<0.001$) in ASES and PSS post-operatively. However, the early and late cohort had statistically equivalent improvements in ASES ($p=0.87$) and PSS ($p=0.83$).

Conclusion: Rotator cuff repair provides predictable relief and improvement in function. Beneficial results noted early in practice may be similar to those noted with more experience.

Poster 6

Foot Injuries in the National Basketball Association

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Introduction: The purpose of this study was to review the foot injuries sustained in the National Basketball Association over a 21-season surveillance period as a model for understanding these injuries at the professional competition level. With a focus on identifying injury trends, incidence, type, specific diagnoses, and time lost from play, our hypothesis is that foot injuries are a common cause of injury and missed play in professional basketball players.

Methods: The National Basketball Trainer's Association (NBTA) injury database was retrospectively reviewed to evaluate foot injuries occurring over a 21-season period from the 1988/1989 thru 2009/2010 NBA seasons. Foot injuries were defined as injuries distal to the tibiotalar joint, including proximal soft tissue structures with insertions distal to the ankle. Injury frequency, game-related injury incidence, time lost from play, and surgical rates were calculated for specific diagnoses.

Results: Foot injuries accounted for 2220 reports. Specific foot regions included 627 forefoot, 341 midfoot, and 1252 hindfoot injuries. Forty-six percent of injuries were game-related injuries, while 54% occurred in non-game settings. Inflammatory injuries occurred most frequently (38%), followed by muscle strains (24%) and ligament sprains (20%), contusions (8%), and fractures (7%). The fewest injuries were sustained by centers (19%), while guards and forwards each accounted for 41% of foot injuries. The highest game-related injury incidences were for triceps surae/Achilles strains (5.1 per 1000 athletic exposures) followed by chopart-midfoot-lisfranc joint sprains (2.9 per 1000AE). The greatest mean time lost occurred after peroneal tendon rupture (83.3 days) followed by triceps surae/Achilles rupture (83.1 days). Five percent of all foot injuries were treated with surgical intervention.

Discussion and Conclusion: Foot injuries are a common cause of injury and missed play in the NBA. Understanding these injury patterns may allow for the development of strategies to improve foot injury treatment and prevention.

Poster 7

Outcomes in Bilateral Extensor Mechanism Ruptures

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Introduction: Bilateral extensor mechanism ruptures are rare. Risk factors for these injuries include diabetes, gout, autoimmune diseases, steroid use, chronic kidney disease and obesity. Most literature describing these injuries are individual case reports and the largest reported study included five patients with a mean age of 72 years. Medical risk factors were not identified on all patients and a standardized outcome score was not performed. The purpose of this study is to assess a series of six patients (4 bilateral quadriceps, 1 bilateral patellar tendon and 1 quadriceps and contralateral patellar tendon rupture) treated surgically with clinical evaluation and postoperative functional scores.

Methods: Six patients with bilateral extensor mechanism injuries were identified. Mechanism of injury, medical history, social factors, operative report and post-operative exam were recorded with a minimum 1-year follow-up. In addition, each patient completed a physical examination and subjective IKDC score at 1 year.

Results: All patients underwent acute surgical extensor tendon repair employing a 3 patellar hole and a locked, running nonabsorbable suture technique followed by a 6 week period of immobilization and bracing for 10-12 weeks. The mean age was 49.5 years (range: 29-68) and mean follow up was 14 months. Mean postoperative knee flexion was 135 degrees. All had active, resisted knee extension. All but one returned to work and were able to walk pain free. Only 1 patient had a medical comorbidity (Diabetes Mellitus). The mean IKDC score was 67.8 (range 34.5 to 93.1; median 74.1). The 3 highest scores had injury mechanisms of falling down the stairs. One patient was worker's compensation case and is currently on disability (IKDC score 34.48).

Discussion and Conclusion: Bilateral extensor mechanism ruptures are relatively rare and have been associated with medical comorbidities. Our series of patients (the largest in current literature) treated surgically for bilateral extensor mechanism ruptures showed significant improvement and return to a high level of function following acute repair. Factors associated with poorer outcomes included injury at work and injuries other than fall down stairs.

Poster 8

Chronic Antibiotic Suppression Reduces the Reinfection Rate of Periprosthetic Knee Infections

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Introduction: Periprosthetic joint infection (PJI) is the most common cause of revision in total knee arthroplasty (TKA) and usually requires two-stage reimplantation with 6 weeks of antibiotics prior to reimplantation. This study examines factors that may reduce reinfections in TKA.

Methods: 29 patients (16M/13F) were treated by 2-stage revision for PJI between 2006 and 2008 at a single institution. Infection was documented from clinical presentation, positive aspirates, or positive intraoperative tissue cultures. There were a total of 29 TKA PJIs (19R/10L) with 9 reinfections at 2+ year follow-up. Of the 9 reinfections, 2 had MSSA, 1 had MRSA, 1 had MRSA and GBS, 1 had MSSA and streptococcus viridans, 2 had coagulase negative staphylococcus, 1 had klebsiella, and 1 had pseudomonas aeruginosa. Antibiotic therapy was managed by a single musculoskeletal infectious disease specialist. Long-term suppression was defined as antibiotic treatment greater than 6 weeks after reimplantation. Continuous variables were analyzed by the Mann-Whitney U Test and nominal variables were analyzed by Fisher's Exact Test.

Results: The reinfections rate for periprosthetic knee infections was 31.0%. There was significant association between long-term antibiotic suppression and recurrences. Patients on long-term antibiotic suppression had fewer reinfections (9.5%) when compared to those who were not on chronic antibiotic suppression (90.5%). Bactrim use was significantly associated with fewer reinfections. There were no differences in age, gender, BMI, laterality or comorbidities.

Discussion and Conclusion: Long-term antibiotic suppression after reimplantation reduces the likelihood of PJI reinfection. Bactrim may be an effective antibiotic for long-term suppression, but further studies must be conducted with larger sample sizes.

Poster 9

Revision Total Knee Arthroplasty: Does Epoetin- α Reduce Postoperative Transfusions?

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Introduction: The large quantity of blood loss during revision total knee arthroplasty has been reported. Allogeneic transfusion has been associated with poor short, intermediate, and long term outcomes, increased infection rates, prolonged ventilator times, disease transmission, allergic reactions, cross match errors, lung injury, increased mortality and high cost. The present study evaluated the efficacy of epoetin- α treatment prior to RTKA in patients with preoperative hemoglobin (Hb) values of 10–13 g/dL.

Methods: This study was a retrospective review of revision knee arthroplasty patients. Patient matching occurred by attending physician, gender, bmi (+/- 3), and age (+/- 3) 56 enrolled (28vs28). The Mean age for revision knee arthroplasty patients was 63.86; epoetin- α , 64.21. Patients were case matched with regards to age, preoperative hemoglobin, complexity of surgery, gender, bmi (+/- 3), and age (+/- 3). The preoperative work up, surgical technique, anesthesia, postoperative management of patients in both groups was identical. The need for allogeneic blood transfusion was determined based on Hb level (<8 gr/dL) and/or presence of clinical symptoms. Blood salvage was not used in any patient.

Results: A significant decrease in allogeneic transfusion occurred for those patients who received epoetin- α . None of the patients who received epoetin- α underwent a peri or postoperative transfusion. Hgb at day of surgery and ASA scores were significantly increased in the patients who received epoetin- α . Gender, BMI, surgical duration, total blood loss, length of stay, discharge Hgb, preopHct, preop PLT, PT, PTT, and INR were not significant. One Epoprostenol patient had a PE/DVT (3.6%). The cost of a unit of packed red blood cells and whole blood at our institution are \$239.02 and \$633.17, respectively. The cost of Epoprostenol injection is \$12.40/million-units.

Conclusion: Although the ASA score was higher in the epoetin- α group, there were remarkably no transfusions, suggesting that the efficacy of its use in patients with medical

comorbidities may offset cost; however, the postop occurrence of a subdural hemorrhage needs to be further investigated. We may consider epoetin- α injection for anemic revision knee patients with a complicated medical picture.

Poster 10

Isolated Flexion Instability in Posterior Stabilized Total Knee Replacements

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Introduction: Symptomatic flexion instability in posterior stabilized (PS) Total Knee Arthroplasty (TKA) is a rare but distinct problem, which is often difficult to diagnose and treat. The purpose of this retrospective study was to identify clinical features and reliability of revision surgery for management of this condition.

Methods: From 2005 through 2010, we identified 17 patients with symptomatic isolated flexion instability after PS TKA. There were 9 men and 8 women with mean age of 59 years. All knees were evaluated by assessing anterior translation and varus-valgus stress test at 90 degrees flexion as part of clinical exam. Knee Society Scores (KSS) were used to document pain, range of motion and function.

Results: Preoperatively all 17 knees demonstrated at least 5mm anterior translation when assessed with anterior translation force and 3 to 5 mm condylar lift-off with varus-valgus stress test at 90 degrees flexion. Management included complete revision in 12 knees and isolated tibial insert exchange in 6 knees. All isolated liner exchanges were to a mid-level constrained liner. Average time from primary TKA to revision was 18 months. Postoperatively, all knees demonstrated < 5 mm anterior tibial translation and absence of condylar lift-off. This corroborated with improvement in mean KSS (clinical 53.5 to 81.2 and functional 50.5 to 79.1) and disappearance of instability symptoms. Erosion under medial tibia base plate were seen in 7 knees with no compromise on implant stability, possibly related to episodes of recurrent synovitis.

Discussion: Careful history taking and clinical examination can correctly identify flexion instability in well-fixed and well-aligned TKA. Revision surgery with careful gap balancing was successful in alleviating signs and symptoms of flexion instability in this cohort of patients.

Poster 11

Fasciotomy Following Total Knee Arthroplasty: A Report of Six Cases

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Introduction: Acute compartment syndrome may occasionally arise following complicated total knee arthroplasty (TKA). Emergent surgical decompression of acute compartment syndrome, at least in trauma patients, is the accepted treatment. It is not however known if the same pressure thresholds for the compartments, determined in trauma patients, can also be applied to TKA patients. Further, the adverse consequences of compartment decompression in patients with prosthetic knee joint is likely to be very different and include serious events such as infection. This study was conceived to study the course of postoperative events in a series of patients who were diagnosed or suspected of having compartment syndrome after TKA.

Methods: We identified six patients who underwent fasciotomy for proven or suspected compartment syndrome following primary TKA between 2000 and 2010. A detailed chart review was conducted to study the course of events following fasciotomy.

Results: The etiology of compartment syndrome was indirect (3 cases) or direct (3 cases) vascular injury during TKA. Fasciotomy was performed at a mean of 29 hours (range, 17 to 70 hours) following index arthroplasty. Complications after fasciotomy were numerous and included foot drop (2), periprosthetic joint infection (2), and cellulitis (2). One patient who developed periprosthetic infection required an above the knee amputation for control of infection.

Conclusion and Discussion: In the context of acute compartment syndrome, fasciotomy can be a limb-sparing procedure. It is not, however, known if the same principles for diagnosis and treatment of compartment syndrome after trauma can be applied to patients undergoing TKA. Fasciotomy appears to carry disastrous complications following TKA and for this reasons surgeons may need to maintain a relatively higher threshold for performing a fasciotomy following TKA.

Poster 12

The Maximum Distal and Ulnar Extents of Positioning for the DVR Locked Volar Plate

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Introduction: The current study determines how far distal and ulnar the DVR fixed-angle volar plate can be placed without screw penetration into the radiocarpal and distal radioulnar joints. We also quantified the radiographic depth of the sigmoid notch and evaluated surgeons' ability to detect joint penetration.

Methods: A fixed-angle volar plate was implanted 1cm proximal to the lunate facet in 10 cadaveric wrists. Intra-articular screw penetration of the radiocarpal joint was evaluated directly and fluoroscopically. The plate was advanced distally in 2mm increments and the joint evaluated until joint penetration occurred. The plate was then advanced ulnarly in 2mm increments while evaluating the DRUJ until joint penetration occurred. Radiodense markers were then placed at the volar lip and trough of the sigmoid notch. The distance between the markers was quantified radiographically. All fluoroscopic images were later reviewed for penetration by a group of orthopaedic surgeons of different levels.

Results: Radiocarpal joint penetration occurred with the distal aspect of the volar plate positioned at a mean distance of 1.4mm from the lunate fossa of the distal radius, and did not occur in any specimen with the plate at least 6mm. The DRUJ was violated in 3 specimens, and only with the plate positioned at the ulnar-most edge of the radius. The mean depth of the sigmoid notch was 1.96mm. All surgeons were able to detect joint penetration on all specimens on at least one view.

Discussion: The findings of the current study demonstrate that a fixed-angle volar plate can be placed as distal as 6mm proximal to the lunate fossa and 2mm radial to the DRUJ without screw placement into the joint. Using multiple views, surgeons can accurately detect joint penetration. This knowledge allows the surgeon to position the plate with maximal subchondral bony purchase and less risk of intra-articular screw placement.

Poster 13

Combat Blast Injuries to the Pelvis and Acetabulum Associated with Multiple Extremity Amputations

CDR Mark E. Fleming, DO

Introduction: Combat operations in Afghanistan and Iraq have resulted in a devastating injury pattern involving multiple extremity amputations associated with pelvis and/or acetabulum fractures. Our objectives were to identify pelvis and acetabulum fracture patterns of patients who sustained multiple extremity amputations, identify the associated injuries and to propose a treatment algorithm.

Methods: After IRB approval the combat trauma registry was queried for US service members with multiple extremity amputations sustained in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) from September 2007 through December 2010. The query identified 14 patients with multiple extremity amputations with associated pelvic ring or acetabulum fracture. All pelvic ring injuries were classified utilizing the Young-Burgess classification system. The acetabulum fractures were classified utilizing the Letournel's classification system. Associated injuries were categorized into general anatomic areas including abdominal, thoracic, neurologic, vascular, urinary and skeletal. Treatment modality was based on the associated injuries including the presence of bowel or urinary system injury. External and/or internal fixation was performed during extremity amputation revision treatment.

Results: There were 14 patients with a pelvis or acetabulum fractures that sustained 30 major extremity amputations. The most common fracture pattern was the Anterior Posterior Compression (APC) pattern as proposed by Young-Burgess. The most common associated amputation pattern was bilateral transfemoral amputations. Trauma to the genital urinary tract was present in 13 out of 14 patients. The average number of associated injuries was 7.9 (range 2-14). The average number of operations was 7.9 per patient (range 3-13). The average blood transfusion requirement was 21 units of packed red blood cells.

Conclusion: This is the largest series of combat blast injuries to the pelvis and acetabulum to be presented in the literature. Bilateral transfemoral amputation was the most common amputation pattern associated. The most common treatment applied for the pelvic ring injuries was the application of a

supra-acetabular external fixator combined with percutaneous sacral-iliac screws.

Poster 14

Does Obesity Affect the Sagittal and Coronal Plane Deformities in Adolescent Idiopathic Scoliosis?

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Background: Patients with adolescent idiopathic scoliosis usually exhibit relative hypokyphosis in the thoracic spine due to a lordotic region at the apex. Hyperkyphosis in AIS patients may be a sign of intraspinal anomaly. Reflecting the epidemiology of the general population, the prevalence of obesity in adolescents has increased from 5% to 17.6% in the last 3 decades and this may have important implications for scoliosis treatment. We hypothesize that obesity affects the coronal and sagittal alignment in AIS patients. The purpose of this study was to compare the preoperative coronal and sagittal thoracic alignment of obese AIS patients with those of healthy weight AIS patients.

Methods: An IRB approved, multicenter database of operative AIS patients was queried for preoperative radiographic measurements and height and weight data. Radiographic measurement of the major coronal and sagittal thoracic alignment was performed using the modified Cobb method. We used the WHO definition of obesity, BMI > 30.

Results: 1099 patients had BMI < 30 (group 1) and 39 patients had BMI > 30 (group 2). Mean apical thoracic kyphosis (T5-T12) was 22.4° ± 12.1° in group 1 and 31.1° ± 13.4° in group 2. Mean global thoracic kyphosis (T2-T12) was 30.9° ± 12.7° in group 1 and 38.6° ± 14.0° in group 2. The average preoperative major coronal curve was also larger in the group 2 than group 1, 58.7° ± 13.4° versus 53.6° ± 12.1°.

Discussion: Preoperative thoracic kyphosis was significantly greater in AIS patients with a BMI > 30, both at the thoracic apex and globally in sagittal thoracic alignment. This could be attributed to the higher truncal mass leading to greater forces across the anterior vertebral body, limiting anterior overgrowth in the apical segments. This has important implica-

tions in the preoperative workup, operative planning, and perioperative outcomes.

Poster 15

Pitch Change During Femoral Stem Insertion: Can It Be Heard?

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Introduction: Uncemented femoral stems require proper initial press-fit within the proximal femur. Implants which are not properly seated are subject to micromotion, which may preclude bony ingrowth and result in loosening. Implants inserted with excessive force may result in fracture. It is common belief that a distinct pitch change occurs as the femoral stem seats firmly into the femur. The purpose of this study is to determine if audible pitch changes can be accurately and reliably identified by orthopaedic surgeons.

Methods: Six validated composite femoral saw bones were prepared for femoral stem placement in a sound-insulated box. Press-fit titanium alloy stems with proximal hydroxyapatite coating were implanted using standardized mallet strikes using a pendulum exciter. The impactions were recorded and the first, middle and final strikes from each trial were arranged in randomized permutations to generate a sound file examination. Thirty unique permutations were contained in each exam which was administered to 35 orthopaedic surgeons and residents. Results were analyzed using student's t-test.

Results: Overall, 49.1% of all pitch changes were correctly identified. Preliminary results show no correlation between exam score and years-in-training or between exam results of residents and attendings. There was a significant increase in correct responses as the exam progressed.

Conclusion: Auditory feedback is commonly used to assess implant seating during hip arthroplasty. Although the mating of two objects with different resonant frequencies results in a new resonant frequency, results suggest that the human ear's ability to perceive such changes is questionable. Furthermore, these changes are likely confounded by myriad variables including mallet strike force, ambient resonant frequencies, and bone quality. Pitch change should probably not be used as a measure of adequate seating during femoral stem implantation.

Poster 16

Robot-Assisted Unicompartmental Knee Arthroplasty: Outcomes of 500 Consecutive Procedures

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Introduction: Osteoarthritis of the knee is a debilitating condition affecting millions of persons. For those patients with disease in only one compartment of the knee, unicompartmental knee arthroplasty (UKA) can be a viable surgical alternative to total knee arthroplasty (TKA). When the surgery is performed with assistance of robot, correct implant positioning and ligament balancing can be obtained with increased accuracy. To date, there has not been a large series reported in the literature of UKAs performed with robotic assistance. The aim of this study was to examine the clinical outcomes of patients who underwent robot-assisted UKA.

Methods: Five hundred procedures in patients with a mean age of 63.7 years (range, 28 to 88 years) who underwent unicompartmental knee arthroplasty using a robotic-assisted system between July, 2008 and June, 2010 were identified. Clinical outcomes were evaluated using the Oxford Knee Score and patients without recent follow-up were contacted by telephone. The revision rate and time to revision were also examined.

Results: Mean follow-up for the cohort was 10 months (range, 1 to 28 months). At latest clinical follow-up, most patients were doing well with after UKA with a mean Oxford Knee Score of 36.1 ± 9.92 . The revision rate was 2% with 5 patients revised to total knee arthroplasty due to progression of arthritis, 4 patients converted from an inlay to onlay due to bony collapse and 1 polyethylene liner exchange for suspicion of infection. One patient underwent TKA following failure of tibial component after conversion to onlay.

Conclusion: Unicompartmental arthroplasty with a robotic system provides good pain relief and functional outcome at short-term follow-up. Ensuring correct component alignment and ligament balancing increases the probability of a favorable outcome following surgery.

Poster 17

Re-Displacement of Distal Radius Fractures Following Immobilization in Skeletally Immature Patients: Does the Ulna Fracture Matter?

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Purpose: The purpose of this study was to evaluate the effect of a concomitant ulnar fracture on the stability of displaced pediatric distal radius fractures.

Methods: The trauma database of an urban level one trauma center was queried for skeletally immature patients who sustained a displaced fracture of the radius within the metaphyseal segment, proximal to the distal radial physis, with or without an associated ulna fracture. All patients were seen in the emergency department and treated with a standardized protocol of closed reduction and immobilization. All radiographs were reviewed for initial and residual displacement. Fracture patterns of the radius and the ulna were noted. Baseline demographic data was also collected. Need for operative intervention and associated complications were noted.

Results: Forty-five patients were identified with displaced distal radius fractures requiring closed reduction. Twenty-two of these patients sustained an associated ulna fracture (52 percent). Seven of these ulna fractures were complete and displaced, five were complete but nondisplaced, one was an ulnar styloid fracture, and one was a buckle fracture. Of those patients with an associated ulna fracture, right required surgical intervention for loss of reduction (36 percent). Only one patient without an associated ulna fracture required surgical intervention for loss of reduction (6 percent). This difference was statistically significant.

Discussion and Conclusion: The presence of an associated ulna fracture significantly increases the risk for redisplacement in pediatric metaphyseal distal radius fracture. Patients with a distal both bones forearm fracture are at increased risk for redisplacement and therefore require careful follow-up.

Poster 18

Revision Total Knee Arthroplasty in the Young Patient

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Introduction: As the volume of total knee arthroplasty (TKA) in the young patient rises, the Adult Reconstruction surgeon can expect the revision load in young patients will concomitantly increase. Minimal data exists on the results of revision knee arthroplasty in patients under the age of fifty, or even the reason for revision in this population. The objective of this study was to explore the reasons for knee revision, the causes of failure of revision TKA, and to determine the survivorship of revision TKA in patients under the age of fifty.

Methods: Perioperative data was collected for all revision TKA procedures between January 2000 and November 2009 in patients under the age of fifty at the time of the revision surgery. The primary cause of failure of the primary TKA was determined, and causes for reoperation after revision surgery were ascertained. Patients were followed until failure or until they were lost to follow-up.

Results: Seventy-five patients were identified that fulfilled the criteria listed above. More than thirty percent of revisions were for loosening of components, nearly twenty percent for infection, fifteen percent for arthrofibrosis, fifteen percent for instability, and almost ten percent for patellar maltracking. The incidence of revision for wear and periprosthetic fracture was minimal. Early failure of revision surgery (15%) was most commonly due to infection (greater than 50% of the time) and usually occurred within the first year.

Discussion: Component loosening is the most common cause of revision surgery in the young, while infection appears to be the greatest risk to success of the revision operation. This population is distinct from the overall population undergoing TKA and revision TKA and this must be taken into account when considering fixation options and risks at the time of revision.

Poster 19

Kinematic Alignment Versus Standard Mechanical Alignment in Cadaveric Knee Specimens

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Introduction: While standard instrumentation tries to reproduce mechanical axes based on mechanical alignment guides, shape matching (SM) systems derive their plan from pre-operative MRI-measurements. The current study was aimed to compare the resulting alignment in a matched pair cadaveric study between the SM and standard mechanical system, measured with a navigation system as well as post-operative CT-scans.

Methods: A prospective series of 12 eviscerated torso's were acquired for a total of 24 limb specimens that included intact pelvises, femoral heads, knees, and ankles. The cadavers received MRI-scans, from which were manufactured specific shape match cutting guides. Additionally all specimen received "pre-operative" CT-scans to determine leg axes. Knee joints were opened with a parapatellar approach and on each tibia and femur and on the cutting guides navigation trackers were mounted. Two investigating surgeons performed total knee arthroplasties on randomly chosen sides using conventional instruments. On the contralateral sides, implantation was done using the shape match cutting guides. A navigation system was used to check for leg alignment. Implant alignment was determined using post-operative CT-scans. For statistical analysis SPSS was used.

Results: The overall alignment of the leg as well as the alignment of the tibial component showed no significant difference between the two tested systems. A significant difference was measured for the femoral component alignment, with SM matching placing femoral components overall in more valgus.

Discussion and Conclusion: The two compared systems employ different alignment strategies which can be reflected in variations of the combinations of the three-dimensional component position on the femur and the tibia. These different strategies result in overall limb alignment that compares well between the two different methods.

Poster 20

Bilateral TKA: Simultaneous or Staged?

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Introduction: The timing of total knee arthroplasty (TKA) for patients with bilateral degenerative knee arthritis is controversial. Simultaneous bilateral procedures are performed during the same anesthetic episode, providing a shorter hospitalization, anesthesia, and shorter overall recovery time. However, concern for higher complication rates after simultaneous bilateral TKA has prompted further investigation into the ideal candidate for this procedure. The purpose of our study is to compare the morbidity and mortality following simultaneous bilateral TKA compared with staged bilateral TKA in a large, consecutive cohort of patients from a single institution.

Materials and Methods: Between January 2004 and June 2007, 626 simultaneous bilateral TKAs were performed under the same anesthetic. In addition 180 patients underwent staged bilateral TKA. 22 patients were staged between 0 to 26 weeks, 65 were staged between 26 and 52 weeks, and 93 were staged between six months and one year.

Results: Charlson index, BMI, and age were significantly lower in patients undergoing simultaneous bilateral TKA compared to staged bilateral TKA. Overall complication rate was highest in patients undergoing staged bilateral TKA between 6 months and one year (32/93; 34.4%) and lowest in simultaneous bilateral TKA (103/626; 16.5%). DVT rate was highest after staged bilateral TKA between 6 months and one year (25/93; 26.9%) and lowest in the simultaneous bilateral group (80/626; 12.8%). Transfusion rate was higher in the simultaneous bilateral TKA group (334/626; 53.4%) compared to the overall staged bilateral TKA group (52/180; 28.9%). One year mortality rate was 0.32% (2/626 patients) in the simultaneous bilateral group and 1.1% (2/180 patients) in the staged bilateral group.

Conclusion: Our results suggest that simultaneous bilateral TKA is a safe procedure when performed in selective group of healthy patients with minimal medical comorbidities. Further, staging the bilateral procedure in those who are not candidates for simultaneous procedure can be short (less than 4 weeks), as the complication rate does not seem to increase during this interval in the small cohort of patients that were included in this study.

Poster 21

Is Age a Significant Predictor of Ability to Comply with Partial Weight-Bearing Instructions?

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Introduction: Previous studies have suggested biofeedback is an effective way to train subjects to limit weight-bearing on a lower extremity. This study is designed to evaluate the effect of age on common types of weight-bearing training.

Methods: 50 subjects aged 21-78 yrs were enrolled in our study to determine the effect of educational interventions on partial weight-bearing compliance. Initially, subjects were given only verbal instructions; subsequently, they were trained with a bathroom scale and a biofeedback device. Weight bearing was assessed after each training with the use of a weight monitoring and biofeedback system consisting of an inflatable insole and an ankle device that continually measures weight placed on the extremity.

Results: Subjects given only verbal touch down weight-bearing instructions (25 lbs) initially bore an average of 61.25 ± 4.8 lbs (average \pm standard error). This was reduced to 51.50 ± 4.47 lbs after training with a bathroom scale and was further reduced to 30.01 ± 2.33 lbs after biofeedback training. Likewise, subjects given verbal partial weight-bearing instructions (75 lbs) initially bore an average of 89.06 ± 5.58 lbs. There was no improvement with the use of a bathroom scale (at 75 lbs), which showed an average of 88.48 ± 4.75 lbs. After training with a biofeedback device, weight-bearing improved to an average of 68.11 ± 2.46 lbs. In a mixed model analysis age was not a significant predictor of subject compliance with the given weight-bearing instruction. However, higher BMI and male gender were predictive of heavier weight-bearing.

Discussion and Conclusion: Biofeedback training leads to superior compliance with touch down and partial weight-bearing instructions as compared to verbal instructions or training with a bathroom scale. This effect was not modulated by age. As partial weight-bearing instructions are commonly given to orthopaedic patients, training with such a device may be appropriately considered.

Poster 22

Heterotopic Ossification Following Blast Amputation: A Comparison of Forelimb and Hindlimb Injury in a Rat Model

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Introduction: Heterotopic ossification (HO) commonly complicates extremity blast amputations in soldiers in the contemporary war theater. This injury has become more prevalent due to the increased use of improvised explosive devices in modern warfare. The objective of this project is to compare the frequency, quantity, and quality of heterotopic bone following blast amputation of the hindlimb and forelimb in an animal model.

Methods: On an IACUC-approved protocol, twenty-five 12-week old, male Sprague-Dawley (SD) rats, anesthetized on a customized protective platform, underwent extremity blast amputation with a column of propelled water after detonation of a submerged explosive. The blast-injured limb was manually irrigated with a 40:1 saline/chlorhexidine solution prior to fascial closure. Only minimal skin debridement was performed to facilitate wound healing. Thirteen rats underwent forelimb and 12 underwent hindlimb amputation. The rats were followed clinically and with serial radiographs until euthanasia at 24 weeks.

Results: One rat did not survive forelimb amputation, related to an anesthetic overdose. The remaining 24 rats survived blast amputation and closure until euthanasia at 24 weeks. All 24 animals developed HO. Moderate to severe HO was found in 8/12 hindlimbs and 0/12 forelimbs; 10/12 hindlimb amputations developed Type III HO (ectopic bony islands developing in surrounding soft tissue) compared to 3/12 forelimbs. One animal in the hindlimb group experienced a wound dehiscence with bone protrusion through the stump at 4 weeks post blast requiring bone resection and revision of the wound closure. This animal subsequently developed severe HO.

Discussion and Conclusion: This simulated blast model produced a high prevalence of heterotopic ossification in the amputated limb stump without addition of any exogenous osteogenic agent. Hindlimb amputations developed substantially more frequent and more severe HO and more likely

involved the surrounding soft tissues than forelimbs. The unexplained protective influence of the forelimb parallels the human clinical experience.

Poster 23

Biomechanical Stability of Stand-Alone Interbody Spacers with Integrated Screws for Multi-Level Cervical Arthrodesis

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Introduction: Postoperative complications after anterior cervical fusions have been attributed to anterior cervical plate profiles and the necessary wide operative exposure for their insertion. Consequently, low-profile stand-alone interbody spacers with integrated screws have been developed. While they have demonstrated similar biomechanical stability to the anterior plate in single-level fusions, their role as a stand-alone device in multi-level reconstructions has not yet been established. The objective of this study is to evaluate the biomechanical stability of multi-level cervical reconstruction using the stand-alone interbody spacer with integrated screws.

Methods: Thirteen human cadaveric cervical spines (C2-T1) were non-destructively tested under axial rotation, flexion-extension, and lateral bending loading. After intact analysis, eight single-levels (C4-5 & C6-7) from four specimens were instrumented and tested with: 1) anterior cervical plate (ACP) and 2) stand-alone spacer (SAS). Nine specimens were tested with: 1) C5-7 SAS, 2) C5-7 ACP, 3) C4-7 ACP, 4) C4-7 ACP & posterior fixation, 5) C4-7 SAS, and 6) C4-7 SAS & posterior fixation.

Results: No significant difference in ROM was noted between the ACP and SAS for single-level fixation. For multi-segment reconstructions (two and three levels) the ACP proved superior to SAS and intact condition, with significantly lower ROM in all planes. In spite of this, when either the three-level SAS or ACP constructs were supplemented with posterior lateral mass fixation, there was a greater than 80% reduction in ROM under all testing modalities with no significant difference between the ACP and SAS constructs.

Discussion/Conclusion: Stand-alone interbody spacers with integrated screws may be a reasonable option for single-level fixation. However, stand-alone interbody spacers with integrated screws should be used with caution in the setting of multi-level cervical fusion, unless supplemented with posterior fixation.

Poster 24

The Effect of Pedicle Screw Hubbing on Pullout Resistance in the Thoracic Spine

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Introduction: The biomechanical fixation strength afforded by pedicle screws has been strongly correlated with bone mineral density (BMD). It has been postulated in the osteoporotic spine that “hubbing” the head of the pedicle screw against the dorsal cortex provides a load-sharing effect thereby improving the pull-out strength (POS) of the pedicle screw. The reduction in the moment arm provided by “hubbing” may also reduce the incidence of implant failure/loosening by decreasing cephalocaudal toggling. The purpose of our study was to evaluate POS of fixed-head pedicle screws after “hubbing” versus standard fixation in the thoracic spine.

Methods: Twenty-two fresh-frozen, human cadaveric thoracic vertebrae were obtained and DEXA scanned. Sixteen osteoporotic and six normal specimens were instrumented with pedicle screws non-hubbed on the control side, and with “hubbing” into the dorsal lamina in the opposite pedicle. Cyclic fatigue loading in a cephalocaudal direction was applied for 2000 cycles at a rate of 1 Hertz. Pull-out testing was performed toward the midline at a rate of 0.25 mm/sec and peak POS measured in Newtons(N).

Results: Irrespective of BMD, “hubbed” screws resulted in significantly lower POS (290.5 ± 142.4 N) compared to standard pedicle screws (511.5 ± 242.8 N). During instrumentation, 50% (n=11) of hubbed pedicles fractured through the lamina or superior articular facet (SAF), and 83% of pedicles fractured during hubbing in the non-osteoporotic spine. No visible fractures occurred during instrumentation of the pedicles on the “non-hubbed” side. Mean POS for hubbed screws was significantly lower in the osteoporotic versus normal BMD specimen (242.62 ± 118.73 N versus 418.16 ± 126 N).

Discussion/Conclusion: Hubbing of pedicle screws resulted in significantly lower POS compared to conventional pedicle screws in the thoracic spine. Hubbing may result in iatrogenic fracture of the dorsal lamina, transverse process, or SAF. Hubbed pedicle screws are biomechanically inferior to standard pedicle screws and should be avoided in the osteoporotic spine.

Poster 25

Total Hip Arthroplasty Following Post-Traumatic Osteoarthritis of the Hip

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Purpose: The purpose of this study was to evaluate the outcomes, surgical details and sociodemographic factors associated with total hip arthroplasty in patients with post-traumatic arthritis as compared to a control group of patients who underwent THA for primary osteoarthritis.

Methods: 3,844 patients who underwent THA for osteoarthritis at a single center were followed. Of these, 66 patients were identified who underwent THA for post-traumatic osteoarthritis following previous acetabular or proximal femur fracture fixation (Group A). The remaining patients were those who received THA for other causes. There were 1137 patients who underwent THA for primary osteoarthritis and had complete data (Group B). Charts were reviewed and clinical follow up was obtained using the modified Harris Hip Score.

Results: Sixty patients were available for a mean five year follow up. No differences were seen between the groups except for age. The average time between fracture fixation and THA was 124.6 months. Patients in Group A were younger, lost more blood, were transfused more units of blood, had longer OR times, and had a higher complication rate than those in Group B. The average post-operative modified Harris Hip Score was 87.6 at latest follow up. Thirteen percent of patients in Group A have required revision of their THA at an average of 3 years after their initial arthroplasty.

Conclusion: Patients who develop post traumatic osteoarthritis of the hip have limited options. While THA is a very popular and reliable technique, it is not without problems. Total hip arthroplasty in patients with post-traumatic arthritis of the hip following an acetabular or proximal femur fracture is a longer and more complicated procedure. There also appears to be a higher rate of early failure compared to those undergoing THA for primary osteoarthritis.

Poster 26

Outcomes of Grade I and II Hamstring Injuries in an Intercollegiate Athletic Population Using a Novel Rehabilitation Protocol

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Introduction: Hamstring muscle strains represent a common and disabling athletic injury with variable recurrence rates and prolonged recovery times. Controversy exists regarding the optimal rehabilitation program, time to return to sport, and recurrence rates. The purpose of this retrospective case series is to present the outcomes of a novel rehabilitation protocol for the treatment of proximal hamstring strains in an intercollegiate sporting population.

Methods: After IRB approval, a retrospective review of 48 consecutive hamstring strains in intercollegiate athletes treated by a senior athletic trainer at X was performed. The rehabilitation protocol consisted of immobilization for twenty-four hours immediately following injury. On post injury day 1 the athlete was started on a supervised rehabilitation program consisting of hamstring stretching and progressive running (10 yard build up, 10 yard sprint, 10 yard cool down). Isokinetic exercises were started on post injury day 6 and athletes were allowed to return to sport after return of symmetrical strength and ROM with no pain during sprinting.

Results: In 23 of the 48 patients, the injury was a recurrent hamstring strain which had not been previously treated by the senior athletic trainer. The left leg was injured in 26 patients and the right leg was injured in 22. There were 30 Grade I, 18 Grade II and no Grade 3 or 4 injuries. All patients returned to their sport and three patients sustained a repeat hamstring strain (6.2% re-injury rate) after a minimum follow-up of 6 months. The average number of days missed from sport was 11.9 days (range 5-23 days). There was no statistically significant difference between time to return to sport between first-time injuries and recurrent injuries, or between first and second-degree injuries. ($p>0.05$) Time to return to sport was analyzed using the Kaplan Meier survivorship model and no significant difference was noted using the Log Rank Test for age, sex, sport, side, grade and initial versus recurrent injuries. Cox regression analysis showed no significant difference in a multivariate analysis adjusting for each of the variables.

Discussion and Conclusion: While there are many variations of hamstring strain rehabilitation protocols, Grade I and II hamstring strains may be aggressively treated using a protocol of brief immobilization followed by early initiation of running and isokinetic exercises. Using this protocol, athletes with a grade I or II hamstring injury can expect to return to sport at an average of approximately 2 weeks with a relatively low re-injury rate.

Poster 27

Radiological Severity of Illness in Knee Osteoarthritis: Treat the Patient or Treat the X-Ray?

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Introduction: Radiographic findings influence a surgeon's decision as to when a total knee arthroplasty (TKA) is offered to the patients with osteoarthritis (OA). Although traditionally not held as the sole determinant, radiographic findings will influence the clinician's judgement. Our objective was to evaluate if the severity of knee OA, as assessed on x-rays is related to the patient's perception of severity of illness.

Methods: Forty-nine patients were included in this study; patient perceived outcome measures were obtained before and after TKA [WOMAC, QWB, SF-36, Orthopaedic Scores, KSKS, KSFS]. Patients were classified according to two radiographic severity scales (Kellgren-Lawrence / Ahlback). Spearman Rho correlation coefficient and independent t-tests were used to assess for differences between classification grades and within each classification system. A p value <0.05 was considered significant.

Results: All dependent measures before and after surgery were poorly related to the radiographic classification systems (range: rho= -0.08 to 0.18). Regardless of classification system, assessments of perceived function, pain, and well-being were not different between radiographic severity levels.

Discussion: Metrologically valid measurements of the pre-operative and postoperative status had a poor correlation with radiographic findings. Therefore, surgeon's decision as to when to recommend surgery should not rely on the severity of X-ray findings. Patient's pain, function and motion should continue to be the key factors in deciding whether to suggest TKA.

Poster 28

Low Energy Patellar Fractures: An Osteoporotic Fracture and Sign of Decreased Bone Strength in Men?

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Introduction: Osteoporotic fractures are becoming an increasingly recognized problem in men. Currently, men who present with low energy fractures are not routinely screened for osteoporosis. In this study we hypothesized that low energy patellar fractures are an indicator of osteoporosis and decreased bone strength.

Methods and Results: Ninety-three patellar fractures that received operative treatment at our institution from 2003 to 2010 were reviewed. There were 64 females with an average age of 58 years, 73% (47/64) aged 55 years, and nearly all (45/47 =96%) sustained a low energy mechanism. Considering only males (N=29), average patient age was 57 years. In 79% (23/29) of male patients and in all males aged 55 years, the injury mechanism was a fall from standing height. Those male patients that sustained a low energy mechanism had 25-hydroxyvitamin D insufficiency (mean=44.15nmol/L [17.69ng/ml]) and a mean calcium level of 9mg/dL.

Conclusion: In the absence of a generally accepted screening algorithm, a case-finding strategy can identify people with strong risk factors for osteoporotic fracture. This study presents compelling trends to suggest that male patients who sustain low energy patellar fractures should undergo a metabolic bone work-up.

Poster 29

Predicting Need for Allogeneic Transfusion Following Total Knee Arthroplasty

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Introduction: Total knee arthroplasty (TKA) can lead to substantial blood loss. To avoid the high costs of autologous blood pre-donation (ABP) programs and efficiently allocate

limited blood resources, we sought to identify pre- and intra-operative factors associated with allogeneic blood transfusion (AllTx) following primary TKA and subsequently, develop a model to predict patients who would require AllTx.

Methods: We retrospectively evaluated 644 primary unilateral TKAs without ABP before September 2010 at our institution. Thirty-one independent variables were analyzed: age, gender, height, weight, body mass index, diagnosis; co-morbidities: hypertension, diabetes mellitus, coronary artery disease, bleeding dyscrasias, anemia, rheumatoid arthritis, chronic obstructive pulmonary disease; home medications: heparin, warfarin, aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, corticosteroids, diuretics, iron; pre-operative laboratory values: prothrombin time, international normalized ratio, partial thromboplastin time, hemoglobin (Hgb), hematocrit (Hct), platelet count; intra-operative factors: anesthesia type, surgical time, tourniquet time, drain placement. The primary endpoint was AllTx.

Results: Of the 644 TKAs analyzed, 71 (11.0%) received an AllTx. Univariate analysis revealed a significant relationship between AllTx and age, anemia, Hgb, Hct, surgical time, and tourniquet time. However, multivariate logistic regression analysis confirmed a significant relationship only between transfusion and age, anemia, Hgb, and surgical time. We derived an equation for predicting the probability (ϵ) of needing an AllTx following primary TKA: $\epsilon = (.36e^{[(.06*Age)+(1.7*HxA)+(.02*ST)-(.57*Hgb)]}) / [1+.36e^{[(.06*Age)+(1.7*HxA)+(.02*ST)-(.57*Hgb)]}]$ When applied to an independent cohort of 69 primary unilateral TKA procedures, this equation was 90% sensitive and 52.5% specific.

Conclusion: We conclude that advanced age, anemia, decreased pre-operative Hgb, and prolonged surgical times place patients at increased risk of needing an AllTx. Anemia and Hgb are two parameters which may be improved pre-operatively to decrease the risk for AllTx.

Poster 30

Long Tapered Hydroxyapatite-Coated Stems in Revision Total Hip Arthroplasty

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Introduction: Femoral component options used during revision THA include long fully porous coated diaphyseal stems

and modular tapered stems designed for distal fixation in the femoral metaphysis. The purpose of this study is to evaluate the outcome of femoral component revisions using a long tapered HA coated femoral stem.

Methods: Between 2001 and 2008, 56 femoral component revisions were performed using a long tapered HA coated femoral revision stem. 42 patients were available for follow up evaluation. Of those there were 23 men and 19 women with mean age of 61 years. The clinical results were evaluated using the HHS and serial radiographs were evaluated for loosening.

Results: The minimum follow up was 26 month with an average follow up of 59 months (range 26 months - 117 months). At last follow up, the mean HHS was 71 (range 22 -100). 3 hips required revision (1 aseptic loosening, 1 infection, 1 limb length discrepancy). Radiographic evaluation revealed evidence of bone in-growth and no subsidence in all but one prosthesis, which was subsequently revised.

Discussion and Conclusion: Long tapered HA coated revision femoral components can provide stable fixation and in-growth in cases where there is good proximal femoral bone stock and favorable canal geometry. Advantages of using these stems selectively include preservation of bone and minimizing proximal stress shielding associated with long fully porous coated implants.

Poster 31

Comparative Long-Term Survivorship of Fixed-Bearing and Rotating-Platform Posterior Stabilized Total Knee Replacement

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Introduction: The objective of this study was to compare the long-term clinical and radiographic survivorship of mechanical failure in fixed-bearing (FB) and rotating-platform (RP) posterior stabilized (PS) total knee replacements (TKR) with an identical femoral component design.

Methods: Between February 1997 and October 2001, 200 consecutive cemented FB-PS TKRs (160 patients) and 138 consecutive cemented RP-PS (117 patients) from our prospective database were included in this study. Knee Society criteria

were utilized to assess clinical outcomes. Anteroposterior and lateral radiographs were analyzed for loosening or osteolysis.

Results: The mean follow-up for FB and RP was 13.2 ± 0.3 years (range of 12.8 to 14.3 years) and 10.5 ± 0.4 years (range of 10 to 11 years) respectively. There were 97 patients (127 knees) in the FB group and 89 patients (106 knees) in the RP group for final analysis. Good to excellent results based on KSS in FB and RP was achieved in 89.5% and 95% respectively. There were no cases of malalignment, spinout, aseptic loosening or osteolysis in the RP group. There were five revisions for osteolysis in the FB and none in the RP group. The Kaplan-Meier survivorship for mechanical failure in the FB and RP was 98.3% and 100% respectively.

Conclusion: This is the first study comparing FB and RP-PS with identical femoral component design. Both FB and RP-PS designs demonstrates excellent clinical and radiographic results. RP group had superior survivorship for mechanical failures.

Poster 32

Proximal Femoral Anatomy in Total Hip Arthroplasty: A Tri-Planar Computerized Tomographic Assessment

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Introduction: Limb length discrepancy is one of the most common surgical complications following total hip arthroplasty. A commonly used surgical reference point is the tip of greater trochanter as a reference for the rotation centre of the femoral head to align the femoral component. Prior studies have suggested that a considerable variation may exist in this relationship.

Methods: We used tri-planar computerized tomography analysis of the proximal femoral anatomy in a consecutive series of 150 patients (n=150) to accurately delineate the relationship between the tip of the greater trochanter to the centre of the femoral head. CT scans included the full length images of the patients from pelvis to ankle.

Results: The mean location for the centre of the femoral head was 8.64mm (95% confidence interval, 9.44-7.83) distal to tip of the greater trochanter. The centre of the femoral head was found to be distal to the tip of the tip of the GT in 90.6% of cases.

Conclusion: Based on our study we would suggest caution in using the tip of the greater trochanter as a reference point during total hip arthroplasty as it could be associated with an inadvertent intraoperative leg lengthening.

Poster 33

Measurement of Rotator Cuff Tear Atrophy in MRI

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Introduction: Rotator cuff tears are a common source of disability having the potential to impact the functional use of the upper extremity. Current measurements of rotator cuff atrophy are made utilizing sagittal oblique MRI approximately 1 cm medial to the glenoid surface. This study attempts to define normal morphology of the rotator cuff via MRI and evaluate the effect of rotator cuff tears and the degree of retraction on measurements of atrophy.

Methods: 17 patients were identified with a full-thickness rotator cuff tear and 44 patients were identified without a tear. MRI's coronal images were reviewed to measure: glenoid reference line (GRL) tangential to the glenoid surface; the musculotendinous junction (MT) of the supraspinatus; maximum superior-to-inferior width of the supraspinatus (MSI). Measurements were made on sagittal images 1 cm medial to the glenoid surface of the area of the supraspinatus muscle belly (SS).

Results: MT in an intact cuff is always lateral to GRL (mean=25.3mm) and significantly lateral to cuff tear measurements. Cuff tears had a MT junction lateral to GRL 45% of the time (mean=2.5mm lateral). SS is significantly greater in patients with intact rotator cuffs, 67% vs. 36%. The MSI is significantly greater in patients with an intact rotator cuff compared to those with a tear (25.1mm vs. 21.9mm). The distance from the MSI to the MT is significantly greater in intact rotator cuffs compared to those with a tear (52.3mm vs. 41.6mm).

Discussion: MT to GRL distance is significantly more lateral in patients without a tear, signifying retraction of the torn tendon. MSI to MT is significantly reduced in shoulders with a rotator cuff tear. Additionally, the amount of supraspinatus fossa occupied by supraspinatus muscle is significantly less in rotator cuff tears. Traditional measurements of atrophy overestimate atrophy if there is medial retraction of the torn cuff.

Poster 34

Autologous Osteochondral Transplantation of the Talus — Regional and Local Contact Mechanics and a Graft Height Analysis: A Biomechanical Study

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Introduction: This study was designed using robotic technology to biomechanically evaluate and quantify the changes in contact mechanics on the talar dome after the creation of an osteochondral defect and implantation of an osteochondral graft.

Methods: Ten fresh-frozen cadaveric lower limb specimens were used for this study. Specimens were loaded using a six-degrees-of-freedom robotic arm and contact mechanics were simultaneously measured using a standard ankle joint pressure sensor. An 8-millimeter osteochondral defect was created at the centromedial aspect of the talar dome. An autologous osteochondral graft from an ipsilateral knee was then transplanted to the defect site in the most congruent position possible. Regional contact mechanics were analyzed across the talar dome as a function of the defect and repair conditions and compared to the intact ankle. Local contact mechanics at the peripheral rim of the defect and at the graft site were also analyzed and compared to the intact condition. A three-dimensional laser scanning system was used to determine the graft height differences relative to the native talus.

Results: The creation of a centromedial defect significantly decreased mean force, mean pressure and peak pressure on the medial region of the talus ($p < 0.05$). Mean force, mean pressure and peak pressure on the peripheral rim of the defect were also restored to intact levels. The posterior region of the graft sustained a significant increase in force, mean pressure and peak pressure relative to the intact condition ($p = 0.024, 0.047, 0.054$, respectively). The mean graft height difference of the overall population was -0.2 ± 0.3 millimeters (range -1.00 mm to 0.40 mm).

Discussion and Conclusion: Implanting an osteochondral graft at the centromedial aspect of the talus resulted in the restoration of regional contact mechanics on the talar dome. However, certain local regions of the graft were subjected to significant changes in pressures despite a trained orthopaedic surgeon placing the graft in the most congruent position possible. Further investigation is warranted to optimize intraoperative methods of obtaining perfect articular congruency.

Poster 35

Radiographic Analysis of a Hand-Held, Accelerometer Based Surgical Navigation System for the Tibial Resection in Total Knee Arthroplasty

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Introduction: In total knee arthroplasty (TKA), conventional intramedullary (IM) and extramedullary (EM) tibial alignment guides have only been shown to be 72% and 88% accurate, respectively, in aligning a tibial component within 2° of perpendicular to the mechanical axis in the coronal plane. The purpose of this study was to determine the efficacy of a hand-held, surgical navigation system in obtaining a postoperative tibial component alignment $90^\circ + 2^\circ$ to the mechanical axis in the coronal plane, and a posterior slope of $3^\circ + 2^\circ$ to the mechanical axis in the sagittal plane.

Methods: From May to November 2010, 75 patients and a total of 92 knees, received a posterior cruciate substituting TKA utilizing a navigation system to perform the femoral resection, and a knee system to perform the tibial resection. The patients had a mean age of $62.6 + 11.2$ yrs, and a mean BMI of $30.5 + 5.8$ kg/m². The knee system is a hand-held, accelerometer based console attached to an EM tibial jig. After calibration, the tibial jig is used to register the medial and lateral malleoli, to establish the tibial mechanical axis. The display console then provides real-time feedback of both the tibial cutting block's varus/valgus alignment and posterior slope prior to performing the tibial resection. Standing AP hip-to-ankle and lateral knee-to-ankle radiographs were obtained postoperatively, and the overall mechanical and tibial component alignment in the coronal plane, and the posterior slope relative to the mechanical axis in the sagittal plane, were measured.

Results: Postoperatively, the mean overall mechanical alignment was $0.3^\circ + 1.3^\circ$ of valgus. 96.7% of the tibial components were placed within $90^\circ + 2^\circ$ to the mechanical axis in the coronal plane, and 95.8% of the components were placed within $3^\circ + 2^\circ$ of posterior slope relative to the mechanical axis in the sagittal plane. The mean absolute difference between the preoperative goal and the postoperative radiographic alignment for varus/valgus was $0.9^\circ + 0.6^\circ$, and for posterior slope was $0.8^\circ + 0.6^\circ$.

Discussion and Conclusion: The knee system provides intra-operative, real-time feedback to the surgeon via a hand-held console attached to the EM jig. It is compatible with all TKA systems, making it user-friendly for surgeons acclimated to the use of EM alignment guides, while avoiding the costs of capital equipment purchases associated with computer-assisted surgery systems. Most importantly, the knee system greatly improves the accuracy of tibial component alignment in TKA compared to prior published accuracy rates of conventional IM and EM tibial alignment guides, which leads to improved restoration of a neutral mechanical axis.

Poster 36

Validation of a Novel, Low-Cost Digital Templating System for Total Hip Arthroplasty

Sumon Nandi, MD

Introduction: Templating for total hip arthroplasty (THA) is an essential component of pre-operative planning that guides decision-making during surgery, particularly with regard to component selection and sizing. The use of acetate templates predominates, but they can be both cumbersome and inaccurate. Due to prohibitive costs, digital THA templating is uncommon despite its ease of use and increased accuracy over acetate templating. We have developed novel, low-cost digital THA templating software that is up to 10-fold lower in cost than currently available software. Our aim is to validate our software against an industry standard.

Methods: 20 consecutive pre-operative AP pelvis x-rays from 2 surgeons were templated for THA in random order by a third blinded surgeon using both our software and an industry standard. Templated acetabular component size, femoral component size, and femoral neck cut position were recorded. Statistical analyses were performed.

Results: Comparison of THA templates created using our software and an industry standard yielded identical average acetabular component size, femoral component size, and femoral neck cut position. Inter-class correlation coefficients for these two software packages were 0.90 for templated acetabular component size, 0.96 for femoral component size, and 0.84 for femoral neck cut position.

Discussion and Conclusion: Our novel, low-cost digital THA templating software was equivalent in accuracy to an industry standard. The affordability of our software and its compatibility with digital images on any PC enable widespread use of

digital THA templating. Our software may facilitate higher quality of care at a lower cost.

Poster 37

Attainment of Postoperative Functional Milestones Following Hip Resurfacing

Elizabeth Niedbala, DPT

Introduction: To establish the pre-operative demographic profile and functional outcomes in the acute post-operative phase, for patients undergoing primary hip resurfacing.

Methods: A retrospective normative analysis of 230 primary hip resurfacing patient data forms collected from January 2007 to April 2008.

Results: When analyzed, the data illustrated that the average patient was 50.9 years old, 96.9% of the patient's primary diagnosis was osteoarthritis, and 70% of the patients were male. Pre-operative statistics show that 55.2% of the patients were ambulating greater than 10 blocks per day, and were 87.1% of the patients were not using an assistive device for ambulation prior to surgery. Throughout the patients stay in the hospital 90.2% of the patients achieved unassisted transfers in 2.49 days, 86.5% of the patients achieved unassisted ambulation with axillary crutches in 2.75 days, and was able to ascend and descend steps independently in 2.8 days. The average length of stay was 3.13 days with 91.4% of the patients being discharged directly home.

Conclusion: Through this analysis it was found that statistically a patient with primary hip resurfacing patient fits the characteristic of a male in his early 50's with a primary diagnosis of osteoarthritis. A typical hip resurfacing patient will be independent with transfers in 2.49 days, ambulating with crutches independently in 2.75 days, and is able to ascend and descend steps independent in 2.8 days. The establishment of a typical hip resurfacing postoperative functional timetable is beneficial to clinicians when creating goals in the acute care setting.

Poster 38

Pulmonary Embolism Following Total Joint Arthroplasty: When Do They Occur?

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Ronald Huang, BS

Introduction: The elevated risk of pulmonary embolism (PE) following total joint arthroplasty (TJA) has been well established, but little is known about the natural course of the disease. Studies have shown an elevated risk of PE up to 90 days postoperatively. Thus, anticoagulation is often continued for many weeks postoperatively. However, chemical prophylaxis carries the risk of bleeding and associated periprosthetic joint infection. Current guidelines for duration of prophylaxis are nonspecific. By determining when patients are at highest risk for developing PE following TJA, we may be able to tailor anticoagulation regimens to provide an ideal risk-benefit ratio.

Materials and Methods: We retrospectively reviewed the records of 11,929 consecutive patients that underwent primary TJA at our institution between January 2004 and December 2008. All patients were started on warfarin the evening after surgery and continued for six weeks. Patients were investigated for symptomatic DVT and PE. Pulmonary embolism that occurred within 90 days of TJA was documented.

Results: 165 patients were diagnosed with PE postoperatively by multidetector computed tomography (MDCT) and/or ventilation-perfusion (VQ) scan. Median occurrence of PE was two days postoperatively (range: 0 to 38 days), with 137 of 165 PEs (84%) occurring within the first three days after surgery. Average INR at time of diagnosis of PE was 1.4 (range: 0.94 to 2.61). Elevated BMI was found to be associated with an early presentation of PE within the three days postoperatively.

Conclusion: Risk of PE appears to be highest during the first week after TJA. Efforts must be made to minimize risk during this period. Furthermore, frequency of PE after the first postoperative week appears very low. Further studies must be done to evaluate the necessity of prolonged prophylaxis following TJA.

Poster 39

Venous Thromboembolic Events in Low Energy Fracture Patients

Colin J. Prenskey, BA
Kenneth A. Egol, MD
Raj Karia, MPH

Purpose: There is little data to guide clinicians about the risk of Venous Thromboembolic Event (VTE) complications in patients who have sustained isolated, low energy extremity fractures. Our purpose was to analyze the incidence of thromboembolic complications in patients with isolated single-extremity fractures who have been treated with prophylaxis and report factors associated with their incidence.

Methods: Patients were identified in Billing Records from all admissions to our tertiary care orthopaedic hospital between the years of 2007-2009. Patients were identified according to ICD-9 codes for upper extremity and lower extremity fractures including the pelvis and shoulder girdle. ICD-9 codes were also used to identify those patients who developed deep vein thrombosis (DVT) and or pulmonary embolism (PE) complications during their admission or shortly after being discharged. Patient charts were accessed on the hospital Electronic Medical Records systems. Data was collected on patient demographic information as well as type of injury, treatment, length of stay in the hospital, and type of DVT prophylaxis if applicable. Regression analysis was done to find predictors of VTE. These included co-morbidities with an emphasis on those shown to increase risk for VTE were also compiled. For patients who developed VTE complications, time to VTE was also gathered. Data was collected and managed with electronic data capture tools. patients were 4 male and 15 were female. The average age of all fracture admissions was 64.9 years. 66% of all fracture admissions were female. 52% of patients had fractures of the lower extremity.

Results: 2079 patients were identified as having been admitted with isolated, low energy extremity fractures during the 3 year period (52% lower extremity fractures) 23 of which developed either DVT or PE that were symptomatic and confirmed diagnostically. The mean age was 64.9 years (5-94). Twenty three patients (1.1%) developed VTE complications that were confirmed diagnostically by either CT scan or lower extremity Doppler. The mean age of patients who developed VTE was 72.9 (46-90). Of these, 11 patients sustained a pulmonary embolus and the other 8 developed deep vein thromboses. Seventeen of the VTE complications were associated

with lower extremity fractures (1.5% of all lower extremity fractures). Three upper extremity fracture patients went on to develop symptomatic VTE (0.3% of all upper extremity fractures). The average time from injury to VTE was 8 days (1-77) with 2 patients having symptomatic PE on admission or during pre-operative testing. Regression analysis failed to demonstrate any statistically significant predictors of VTE when examining age or comorbid conditions.

Discussion: The Incidence of VTE complications in low energy extremity fractures was found to be extremely rare when patients were treated according to standard DVT prophylaxis protocols. Incidence of VTE complications among lower extremity fractures was higher than upper extremity fractures when patients were treated with standard DVT prophylaxis.

Poster 40

Risk Factors for Medical Complications After Total Knee Arthroplasty

Kristen Radcliff, MD

*Alvin Ong, MD

Jamie L. Blair, BS

Fabio Orozco, MD

Introduction: Medical complications commonly occur after total knee arthroplasty and relatively little is known about risk factors for non-cardiac medical complications. The purpose of this study was to identify factors that were predictive of delirium after total knee arthroplasty.

Methods: Retrospective consecutive case series analysis. The study population consists of consecutive patients who underwent total knee arthroplasty by two surgeons. Administrative records were reviewed for delirium and altered mental status during the perioperative stay. The incidence of complications was compared between groups using Fisher's Exact test. The correlation between delirium and length of stay was calculated using Spearman correlation coefficients.

Results: There were 768 patients in the study population who underwent total knee arthroplasty in 2009. Of these, there were 43 patients who developed delirium. There were 39 patients with baseline metabolic syndrome and 58 patients with depression at baseline. There was an increased incidence of postoperative delirium in patients with depression (17% vs non-depression 4.65%, $p=0.001$) and metabolic syndrome (12.2% vs non-metabolic syndrome 5.7%, $p=0.034$).

Discussion: We have identified that depression and metabolic syndrome, a systemic inflammatory condition associated with obesity, diabetes, hyperlipidemia, and hypertension, are associated with an increased incidence of postoperative delirium. Other studies have linked metabolic syndrome and mental illness to postoperative delirium after general surgery. Future studies are indicated to evaluate whether control of metabolic syndrome and depression are associated with reduced risk of postoperative delirium.

Poster 41

Nationwide Analysis of Bearing Surface Usage for Primary Hip Replacement in Extremely Young Patients

Sean Rajae, MS

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David Trofa, BA

Introduction: The objective of this study was to provide a complete analysis of national trends in the distribution of bearing surface usage in total hip arthroplasty in patients 30 years and younger. Studies describing the national usage of bearing surfaces in hip arthroplasty are very limited, especially in the young patient population.

Methods: This study used a national administrative data set obtained from the Healthcare Cost and Utilization Project Nationwide Inpatient Sample for the years 2006-2008. Between 2006 and 2008, a total of 3,263 bearing surface type coded discharges were identified using ICD-9-CM procedure codes, for primary total hip arthroplasty in patients 30 years and younger. The prevalence of each type of bearing surface was analyzed along with associated patient and hospital demographic data. Data were compared with the following age groups: 40-50 years and 60-70 years.

Results: The most commonly used bearing surface in patients 30 years and under was metal-on-metal, representing 40.6% of all cases. Ceramic-on-Ceramic was the second most common and represented 26.4% of all cases, while metal-on-polyethylene represented 20.9% of all cases, and ceramic-on-polyethylene represented 12.0% of all cases. Mean age for all patients in this study was 24.8 years. The ceramic-on-ceramic subgroup had a lower average age (23.1) in comparison to other bearing surface groups. The average length of hospital stay for all discharges collectively was 3.8 days and the average hospital charge was \$51,522. Ceramic-on-polyethylene discharges

were associated with the longest length of hospital stay (4.4 days) and highest hospital charges (\$57,129).

Discussion and Conclusion: The usage of specific bearing surfaces in total hip arthroplasty is a controversial topic. This study aims to characterize the epidemiology of current bearing surface usage in patients that are 30 years and younger on a national level. This study also presents patient demographics and hospital characteristics for this patient population.

Poster 42

A Novel Method for Accurate and Reproducible Cup Positioning in Total Hip Replacement

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Amar S. Ranawat, MD

Introduction: Acetabular component positioning plays a major role in reducing dislocation and edge loading and thus improving survivorship of total hip replacement (THR). We are proposing a simple novel intra-operative method that is accurate and reproducible for cup positioning.

Technique: The axis of the pelvis is identified intra-operatively as a line drawn from the highest point of the iliac crest to the middle of the greater trochanter. Prior to reaming the acetabulum, an undersized trial acetabular component is placed parallel and inside the transverse ligament, inside the anterior column and projecting posterior to the axis of the pelvis. This direction is marked and the subsequent reaming and final component placement is performed in the same direction. The lateral opening was judged based on 45 degree angle from the tear drop to the lateral margin of the acetabulum on antero-posterior pelvic radiographs. The final anteversion of the was cup adjusted based on increase or decrease of lumbar lordoses and combined anteversion.

Methods: Antero-posterior pelvic radiographs of 100 consecutive patients undergoing posterior THR between September 2010 and March 2011 with this method were evaluated for cup inclination angle and anteversion using EBRA software.

Results: There were no malalignment or dislocation. The mean cup inclination angle and anteversion were 41 ± 5.1 degrees (range 37.1 – 48.4) and 22.1 ± 4.8 degrees (range 16.6 – 29.3) respectively.

Conclusion: This is a reproducible method of cup positioning.

Poster 43

Glenoid Labral Tears in Professional Hockey Players: A Case Series

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Introduction: There is a paucity of literature on glenoidlabral tears in elite contact athletes, particularly ice hockey. The purpose of this study was to evaluate the return to sport and post-operative performance in professional hockey players following arthroscopic labral repair.

Methods: A retrospective review identified 11 professional hockey players who had undergone arthroscopic labral repair with one of the senior authors between January 2004 and December 2008. Operative data and pre/postoperative hockey time on ice (TOI), shots on goal (SOG), and post-operative Western Ontario Shoulder Index (WOSI) scores were obtained for statistical analysis.

Results: The cohort consisted of 11 players (13 shoulders), with 7 forwards and 4 defensemen. The 13 types of labral tears included 4 superior, 2 posterior, 1 anterior, and 6 combined labral tears (3 Anterior/Posterior, 2 Superior/Anterior, 1 Panlabral). An average of 4.5 anchors was used (Range: 2-9, SD 1.9). The average age at the time of surgery was 28 (Range: 20-36, SD 5.1). Eight (62 %) of the thirteen labral repairs were in the dominant shoulder. All players, in-season and after-season surgeries, returned to play (RTP) at an average of 4.4 months (Range: 1.9-7.3, SD 1.5). Five players (6 shoulders) had no significant difference for average TOI before and after surgery while 2 players (2 shoulders) had significantly increased TOI after surgery. Three players (4 shoulders) had significantly increased TOI prior to surgery. The average SOG per game played before and after surgery analysis indicated no significant difference in individual player performance (SOG/games played). One player, 1 shoulder, was excluded from the TOI and shots on goal (SOG) analysis due to lack of preoperative data. WOSI questionnaires were obtained at an average of 22.3 months after surgery (Range: 4-32.5), with an average score of 163.5 (Range: 8-682, SD 258).

Conclusion: Arthroscopic labral repair allows professional hockey players to return to full, competitive sport at an aver-

age of 4.4 months without significant alteration from pre-injury player performance with respect to TOI and SOG.

Poster 44

Enterococcal Periprosthetic Joint Infections: Is It a Real Gloom and Doom?

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Introduction: Enterococcal periprosthetic joint infections (PJI) are rare after hip and knee arthroplasty. Previous studies of Enterococcal PJI are limited and are difficult to interpret. Herein, the outcome of treatment of Enterococcal PJIs is presented.

Methods: Among 978 PJIs treated at our institution from 2000 to 2010, all patients with at least one positive culture for Enterococcus were identified. PJI diagnosis was considered with the presence of at least one of the following: positive culture, intraoperative purulence or draining sinus tract. PJI was also considered if three out of the four following were met: ESR > 30 mm/hr, CRP > 10 mg/L, synovial fluid WBC > 1760 cells/ μ L or 10,700 cells/ μ L acute postoperative and synovial PMN% > 73% or >89% acute postoperative. Mean duration of follow-up was 5.34 years (range: 1.56-10.27).

Results: There were 38 Enterococcal PJIs in 22 hips and 16 knees, representing 3.9% of all PJIs. Mean age at time of first revision was 65.1 years (range: 34-85). In 13 cases (34.2%), Vancomycin-resistant Enterococcus (VRE) was obtained from culture. Irrigation and debridement (I&D) was performed in 36 joints of which 23 failed. Thirteen joints required two-stage exchange arthroplasty. Appropriate antibiotic which determined via susceptibility testing was also administered. Mean number of operations per joint for Enterococcal PJI was 3 (range 1-8). The success of I&D and two-stage exchange arthroplasty were 31.6% and 50%, respectively. Definitive resection arthroplasty without reimplantation and above-the-knee amputations were performed in 8 and 2 cases respectively.

Discussion: I&D may be ineffective in the management of Enterococcal PJI. Furthermore, the success of two-stage exchange arthroplasty is not as dismal as expected, despite the high incidence of VRE. However, the success rate remains unacceptably low and is achieved only after multiple operations. This study's findings are important for counseling patients with this challenging infection.

Poster 45

The Safety and Efficacy of One-Stage Bilateral Metal-On-Metal Hip Resurfacing Arthroplasty

Brian J. Rebolledo, MD
Michael B. Cross, MD
Denis Nam, MD
Edwin P. Su, MD

Introduction: Metal-on-metal hip resurfacing arthroplasty has become a viable alternative to total hip arthroplasty in the younger, active adult with hip arthritis. However, while the majority of studies have focused on the results of unilateral hip resurfacing, many patients present with bilateral pathology. The objective of this study was to report the perioperative results of a cohort of patients receiving a single-stage, bilateral hip resurfacing arthroplasty.

Methods: From June 2006 to the present, 104 patients, with a mean age of 49.8 + 6.1 yrs, and a mean body mass index of 27.3 + 4.8 kg/m², underwent single-stage, bilateral hip resurfacing arthroplasties. Preoperative ASA grade, Harris Hip Scores (HHS), University of California Los Angeles (UCLA) activity scores, and autologous blood donations were recorded. The total operative time, frequency of blood transfusions, local and systemic complications, and length of hospital stay (LOS) were noted. Secondary measures included HHS and UCLA scores, metal ion levels, and the radiographic presence of heterotopic ossification (HO) at the most recent follow-up.

Results: The mean preoperative ASA grade was 1.7 + 0.6, and the mean total operative time was 3 hours and 31 minutes (3:31 + 0:02). 64 patients donated blood preoperatively, but 33 units of autologous blood were not re-transfused. 13 patients (12.5%) required a homologous blood transfusion. The mean LOS was 4.1 + 0.9 days. Five patients had unilateral, serous drainage from their incision past postoperative day (POD) 3, four of which resolved by POD 5. One patient (0.9%) required a superficial irrigation and debridement. One systemic complication (0.9%) was noted, as one patient converted into atrial fibrillation. At a follow-up of 1.2 + 1.1 years, the HHS improved from 62.2 + 9.2 to 92.1 + 10.4 for the left hip, and 62.5 + 9.4 to 92.3 + 10.1 for the right hip. The UCLA activity score improved from 4.9 + 1.7 to 7.6 + 1.7. The mean serum chromium and serum cobalt levels were 5.8 + 3.4 μ g/L, and 4.1 + 2.6 ng/mL, respectively. 24 patients demonstrated slight radiographic evidence of HO, with a mean Brooker grade of

1.3 + 0.6. During this study period, there were no episodes of femoral neck fracture, deep venous thrombosis, or pulmonary embolism, and no patient has required a revision of either hip resurfacing.

Discussion and Conclusion: This series represents the largest reported cohort of patients undergoing a single-stage, bilateral hip resurfacing arthroplasty. While debate exists over the benefit of single-stage versus two-stage, bilateral total hip arthroplasty, the authors feel that a single-stage, bilateral hip resurfacing arthroplasty is safe, requires a low rate of homologous blood transfusion, and has a low rate of local and systemic complications. Early functional results are encouraging, but long-term follow-up of both patient function and metal ion levels are required.

Poster 46

Rapid Weight Loss After Gastric Bypass Surgery May Increase Need for Total Joint Arthroplasty

Vivek M. Shah, MD
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David Trofa, BA

Introduction: Obesity is a well-known risk factor for the development of arthritis, which places patients at risk for needing a total joint arthroplasty (TJA). As such, weight loss could prove to be an effective means of reducing one's risk of TJA. The purpose of this study was to determine if there was an association between rapid weight loss and time to TJA.

Methods: All patients who underwent gastric bypass with a minimum 10% decrease in BMI and subsequently underwent primary TJA at our institution between 2000 and 2009 were retrospectively reviewed. Matched control patients fulfilled the same decrease in BMI requirements as subject patients but did not require a TJA. The effect of BMI reduction on the need for a subsequent primary TJA or a time-matched point among controls was examined. In addition, linear regression analysis was used to compare BMI reduction rates to various lengths of time to TJA.

Results: 15 patients met all inclusion criteria. On average, subjects had a BMI reduction of 18.8 kg/m² (35.4%) between their gastric bypass and primary TJA surgery while controls had a BMI reduction of 14.7 kg/m² (29.7%) over an identical time period. Thus, compared to controls, patients who underwent a primary TJA lost 27.9% more of their original BMI. Subjects undergoing primary TJA 24-48 months after gastric

bypass showed a significantly greater decrease in BMI compared to controls over a matched time period (41.8% versus 28.6%).

Discussion and Conclusion: Our study found that patients with significant, rapid weight loss after gastric bypass were more likely to undergo TJA compared to matched controls. This finding may help physicians guide the expectations of patients undergoing bariatric surgery who have a concomitant diagnosis of osteoarthritis.

Poster 47

A Single US Surgeon Experience with the Adoption of Hip Resurfacing Using 3 Different Implants

Edwin P. Su, MD

Introduction: Hip resurfacing has grown rapidly since its introduction in the United States, as an alternative to total hip replacement in the younger, active patient. Some studies have suggested a steep learning curve and a higher complication rate when compared to THR. Existing studies have originated from the pioneering surgeons, using a specific type of resurfacing implant. The purpose of this study was to look at the experience of a single, non-inventor surgeon with the adoption of hip resurfacing, using 3 different implants.

Methods: All consecutive hip resurfacings performed by the senior surgeon between 2004 and 2008 were included, providing a minimum 2 year follow-up period. 3 different implant types were used; 2 of these were used as part of the clinical trials, and 1 was used after US FDA approval. A total of 560 hip resurfacings were eligible for the study based upon a minimum of 2 year follow-up.

Results: Nine revisions were performed in this cohort (1.6%). 2 were femoral conversions to endoprostheses for femoral neck fracture; 3 additional femoral conversions were done for osteonecrosis of the femoral head. 1 acetabular revision only was performed for malposition. 2 revisions to THR of both the acetabular and femoral components were done for acetabular loosening and excessive metal production (edge loading). There was 1 revision for metal hypersensitivity. Overall, the K-M survival curve is 98.1% at 4 years. There was no difference with regard to survival from additional surgery with regard to the different implant types. Radiographic signs of failure were also documented. In this cohort, 3 femoral and 1 acetabular components were identified to be radiographically

loose, giving a K-M survival from clinical and radiographic failure to be 96.8% at 4 years.

Discussion: Hip resurfacing can be adopted successfully with a low rate of reoperation, by the use of careful patient selection. A single surgeon's experience with 3 different types of implants demonstrated no difference in clinical results between the devices.

Poster 48

The Effects of Locked and Unlocked Neutralization Plates on Load Bearing of Fractures Fixed with a Lag Screw

Richelle Takemoto, MD
Kenneth A. Egol, MD

Purpose: The use of a locked plate as a neutralization device for lag screw fracture fixation has been reported. Because these plates have different fixation biomechanics than unlocked plates, we investigated how this would affect loading of the lag screw at the fracture site. The purpose of this study was to assess load seen at a fracture site compressed with a lag screw when both locked and unlocked plates are used as neutralization devices.

Materials and Methods: Nine cadaver femurs had a mid-shaft, oblique fracture created and were fixed with a lag screw incorporating load transducers at the fracture site and lag screw. Three different neutralization plate constructs, a standard plate, a locked plate applied to bone and an offset locked plate were sequentially applied and loaded. The fracture site and at the lag screw were measured following the various applied axial loads to the constructs.

Results: Application of plates to the lag screw fixations did not significantly change the load at the fracture site or on the lag screw. The unlocked, locked and offset locked plates all behaved similarly. The addition of a load to the specimens did not appreciably change the lag screw loads but increased the average fracture loads by approximately 20% of the applied load.

Conclusion: Our study showed that unlocked and locked neutralization plates do not affect the initial compressive load across a fracture fixed by a lag screw and that both behaved similarly in transferring load when the fracture was loaded. For a well-fixed, stable fracture fixed with a lag screw, use of a locked plate and screw neutralization plate is not detrimental to fracture biomechanics, but there is no advantage to the use

of this expensive implant over a standard plate if adequate screw purchase can be achieved.

Poster 49

The Role of Computed Tomography for Post-Operative Evaluation of Percutaneous Sacroiliac Screw Fixation

Richelle Takemoto, MD
Toni McLaurin, MD
Nirmal C. Tejwani, MD

Purpose: The purpose of our study was to evaluate the rate of revision surgery of percutaneous SI screw fixation and to determine whether CT was an accurate tool for evaluation of the reduction and need for revision surgery.

Methods: A total of forty-six patients with fractures or widening of the sacroiliac joint that were surgically treated with percutaneous SI screw fixation were retrospectively evaluated at an urban city hospital over a five-year period from 2005 to 2010. Medical records and radiographic data were reviewed. Demographic data, mechanism of injury, and pre and post-operative sacroiliac widening measured on both radiographs and CTs were recorded.

Results: 46 patients with fractures or subluxation of the sacroiliac joint that were treated with percutaneous sacroiliac screw fixation were retrospectively evaluated. There were 6 vertical shear injuries, 12 lateral compression type, 15 anterior-posterior type, 11 sacral fractures and 3 combination or unclassifiable type pelvic injuries. Six of 46 patients had documented preoperative neurologic deficits. After percutaneous screw fixation, 10/46 patients had post-operative neurologic deficit, 4 of which were unchanged from preoperative evaluation. Of the 6 patients with new postoperative neurologic deficit, CT demonstrated neural foramen penetration >2.1 mm in 2 patients. Both patients underwent screw revision, resulting in improved neurologic deficit. The remaining four patients did not have foraminal penetration and had improved their neurological function with full return at six weeks without screw removal. A total of 11/46 patients had some violation of the neural foramen of an average of 1mm (range 0.5mm -2.3mm) on CT. Neural foramen penetration documented with CT did not correlate with neurologic deficit unless the penetration was >2.1 mm. None of the patients who had this finding on CT underwent revision surgery in the absence of neurological deficit. The post-operative radiographs, which included inlet and outlet views, did not reveal sacral foramen penetration in any

patient. Similarly radiographs indicated persistent widening in only 25% of the cases diagnosed on CT scans.

Conclusion: Postoperative CT demonstrating neural foramen penetration was the cause for revision surgery in 2/10 patients with postoperative neurologic deficit after percutaneous SI screw fixation. Based on these findings we recommend postoperative CT only in those cases where there is suspicion for neural foramen penetration in patients with correlative neurological deficit.

Poster 50

Readmissions After Primary Total Hip Replacement: A Quality Measure?

Jesus M. Villa, MD
Carlos J. Lavernia MD

Introduction: Specific reasons for readmissions in the age group receiving total hip replacement (THR) vary and may not reflect quality of the surgical intervention. Primary purpose of this study was to determine readmission rates in patients who underwent primary THR and to identify reasons for readmissions within 30 days (30d), 90 days (90d), and 1 year (1y) after surgery.

Methods: 201 consecutive patients (222 replacements) were studied. We reviewed the office charts including all postoperative visits and follow-up phone calls performed. The number of readmissions and specific reasons leading to rehospitalizations was noted. QWB-7, SF-36, WOMAC, Hip-Harris-Score, and Hip-Postel-D'Aubigné Score prospectively recorded were retrospectively studied. Preoperative diagnosis, demographics, Charlson-Index-Score, BMI, ASA score were noted. We compared the mean costs of index-surgery-related-readmissions to the costs of non-index-surgery-related-readmissions. Significant Alpha level: $p < 0.05$.

Results: Readmission rates were 3.5% (30d), 6.7% (90d), and 21.3% (1y). Most frequent reason for readmission within 30d, 90d was surgical-site-infection (57.1%, 38.4% respectively). Within 1y, it was elective procedure of another joint (42.1%). Non-index-surgery-related-readmissions accounted for 14.2% of all readmissions within 30d; 23.0% (90d); and 65.7% (1y). Readmitted patients within 30d, 90d, and 1y had significant higher mean preoperative Charlson-Index-Score compared to non-readmitted patients (3.1vs.1.7; 2.9vs.1.6; 2.7vs.1.5 respectively). Readmitted patients within 1y had significant higher mean preoperative ASA scores and worst preoperative QWB-7 Total (0.50vs.0.53); Hip-Harris-Score (36.6vs.44.2);

Hip-Postel-D'Aubigné (8.9vs.10.7); WOMAC Pain (12.8vs.11.3) when compared to non-readmitted patients. No significant differences were found between the costs of index-surgery-related-readmissions (\$73,398) compared to non-index-surgery-related-readmissions (\$69,338).

Conclusion: Many hospitalizations not related to the index procedure occur in this age group. Patient's preoperative health status affects readmission rates. Patient risk-adjustment would be required to use readmissions as a quality measure for hospital comparisons; reduced payments could be unfairly applied to hospitals focused heavily on complex cases. Readmission rates are a poor quality measure in THR.

Poster 51

Clinical and Radiographic Outcome of a Newer Acetabular Cup Design

John Wang, MD
Geoffrey H. Westrich, MD

Introduction: Cementless press-fit hydroxyapatite-coated (HA) acetabular cup designs have the potential to offer a lower incidence of loosening and migration compared to older designs. Our study evaluated the initial clinical and radiographic success of a newer cementless cup design in a large cohort of patients.

Methods: We queried our prospectively collected registry for a consecutive series of 771 primary THAs (695 patients) implanted with this cup with 2 year minimum follow up by 4 senior surgeons at our institution (1/2006-12/2007). Diagnosis, age, gender, implant data, postoperative complications and revisions were collected. Clinical outcome measures included: Harris Hip Scores (HHS), WOMAC and VAS pain scores preoperatively and annually thereafter. Radiographic analysis was performed for cup position and radiolucencies. Clinical and radiographic findings were compared to published data on outcomes of similar cementless primary THAs.

Results: During the study period, 27 patients died leaving 744 patients for analysis. 609 patients completed a two year minimum follow up visit and the average follow up was 3 years (range 2 to 5.1 years). The bearing couples were metal on polyethylene, ceramic on polyethylene, and ceramic on ceramic. At the latest follow up, the average HHS was 93.4, WOMAC 86.4, VAS pain score 1.4. Revisions were performed in 11 THAs, yielding a 98% survival rate. The reasons for revision were as follows: 7 instability, 1 infection, 2 periprosthetic fractures, 1 heterotopic ossification. No revi-

sions were performed for aseptic loosening. Mean abduction and anteversion angles at latest follow-up were 45.9 degrees and 23.6 degrees, respectively. No radiolucencies at the implant-bone interface were observed.

Discussion: At early follow-up, this newer cementless acetabular cup implant design exhibits high survivorship and excellent clinical success as well as excellent bony on-growth and no radiolucency at the implant-bone interface.

Poster 52

Combat-Related, Open Traumatic Disruption of the Knee Extensor Mechanism —Treatment Strategies and Preliminary Results

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MAJ Benjamin K. Potter, MD

Introduction: There is a paucity of literature reviewing knee extensor mechanism disruption from high energy ballistic injuries. We present a case series detailing the injury patterns, management, complications, and preliminary outcomes of wartime traumatic knee extensor mechanism injuries.

Methods: Retrospective record review was used to identify active duty patients treated at our facility between March 2003 and January 2009 for high-energy, open, complete disruptions of the knee extensor mechanism. Injury patterns, initial management, definitive treatments, and complications were outlined. Functional outcomes in regards to salvage success, ambulation status, and ROM were analyzed.

Results: We identified 10 knees in 7 patients, with an average age of 29 years. Mean follow-up was 14 months. Fifty percent of cases were treated with composite allograft, while 20% underwent primary repair. In addition, there was one transfemoral amputation due to infection, one total patellectomy, and one revision of a primary quadriceps repair. Half of the cases required soft-tissue flaps. Complications included deep infection in 40% and heterotopic ossification in 20%. Overall revision rate was 71%. While all of the patients achieved ambulation, over half of the cases required assistive devices. The average knee flexion (excluding the prosthesis) was 90 degrees. The average extensor lag was 5 degrees. There was

an average of 11 procedures per injury, most frequently attributable to interventions required for infection, soft tissue coverage, and limited range of motion.

Discussion/Conclusion: High energy injuries to the knee extensor mechanism resulting in complete disruption are devastating injuries that require a multi-faceted approach to address soft tissue coverage, associated fracture fixation, and functional reconstruction. Preliminary results demonstrate that salvage is a complicated, yet viable treatment option. A return to ambulation is a reasonable expectation; however, limited knee range of motion and need for assistive devices often prevent return to higher-level activity.

Individual Orthopaedic Instruction/ Multimedia Education

Schedule:

Thursday, October 20, 2011	3:00-5:00pm
Friday, October 21, 2011	3:30-5:00pm
Saturday, October 22, 2011	3:30-4:30pm

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

Multimedia Financial Disclosure

Eastern Orthopaedic Association has identified the option to disclose as follows:

The following participants have disclosed whether they or immediate family have received something of value from any pharmaceutical, biomaterial, orthopaedic device or equipment company, or supplier.

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2. Served on a speakers' bureau or have been paid an honorarium to present, within the past twelve months;
- 3a. Employee;
- 3b. Paid Consultant;
- 3c. Unpaid Consultant;
4. Any other financial/material support;
5. Own stock or stock options (excluding mutual funds);
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 10. Department/division/practice receives research or institutional support from any publisher;
- n. No conflicts to disclose

The Academy does not view the existence of these disclosed interests or commitments as necessarily implying bias or decreasing the value of the author's participation in the meeting.

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Maurice Albright, MD (n.)
Rodney K. Baker (n.)
James Burlin Bennett, MD (4. SBi; 6. Arthrex, Inc.)
James Michael Bennett, MD (n.)
Keith R. Berend, MD (1. Biomet; 3b. Biomet, Salient Surgical Synvasive; 5. Angiotech)
Karen K. Briggs, MPH, MBA (6. Smith & Nephew, Ossur, Genzyme; 3b. IBalance, Regen Biologics)
Stephen L. Brown, MD (n.)
Robert T. Burks, MD (1. Arthrex, Inc.; 4. Mitek; 6. Stryker)
Prithviraj Chavan, MD (7. Arthrex, Inc., Smith & Nephew, DePuy, Synthes)
Patrick M. Connor, MD (1. Arthrotek; 3b. Arthrotek, Zimmer)
Donald F. D'Alessandro, MD (3b. Biomet Sports Medicine)

Ryan E. Dobbs, MD (n.)
Christopher John Dy, MD (n.)
Jill A. Erickson, PA-C (6. Biomet)
James E.. Fleischli, MD (n.)
Darren J. Friedman, MD (n.)
Freddie H. Fu, MD (6. Smith & Nephew Endoscopy)
William H. Garrett, BS (7. Arthrex, Inc., Smith & Nephew, DePuy, Synthes)
Patrick Greis, MD (6. Stryker)
Brian Grottkau, MD (6. Biomet)
Amy L. Hallock, MEd (n.)
James Patrick Halloran, MD (n.)
Brett L. Hayden, BA (n.)
Laurence D. Higgins, MD (1. Zimmer; 4. DePuy; 6. DePuy, Zimmer, DJ Orthopaedics)

Nicholas J. Honkamp, MD (<i>n.</i>)
William J. Hozack, MD (<i>n.</i>)
Michael Huang, MD (<i>6. Genzyme, Smith & Nephew</i>)
Kristofer Jones, MD (<i>n.</i>)
Stefan Kreuzer, MD (<i>3b. Stryker Orthopaedics; 4. Stryker Orthopaedics</i>)
Sumant G. Krishnan, MD (<i>1. Innovation Sports; 3b. Mitek, Tornier; 4. Mitek, Tornier; 5. Johnson & Johnson, Pfizer, Merck; 6. Mitek, Tornier</i>)
Martin Krismer, MD (<i>6. Stryker Orthopaedics</i>)
David A. Kuppersmith, BS (<i>n.</i>)
Sameh A. Labib, MD (<i>2. Ossur, Arthrex; 3b. Ossur; 7. Linvatec, Arthrex, Ossur</i>)
Laurent Lafosse, MD (<i>n.</i>)
John F. Lawrence, MD (<i>n.</i>)
Kenneth C. Lin, MD (<i>n.</i>)
Adolph V. Lombardi Jr., MD, FACS (<i>4. Biomet, Medtronic, GlaxoSmithKline, Merck, Tornier, Allergan, New Albany Surgical Hospital, Pivotal Research Solutions, Inc.; 6. Biomet</i>)
Colin G. Looney, MD (<i>n.</i>)
Martin M. Malawer, MD (<i>3b. Stryker</i>)
Krismer Martin, MD (<i>n.</i>)
Eckart Mayr, MD (<i>6. Stryker</i>)
Thomas L. Mehlhoff, MD (<i>n.</i>)
Gregory P. Nicholson, MD (<i>1. Innomed, Zimmer; 3b. Zimmer; 5. Zimmer; 6. EBI</i>)
Michael M. Nogler, MD (<i>3b. Stryker, Howmedica</i>)
Keith D. Nord, MD (<i>1. Arthrex; 2. Synthes; 3b. Smith & Nephew; 7. Arthrex, Smith & Nephew, Synthes, Johnson & Johnson</i>)
Dana Piasecki, MD (<i>n.</i>)
Javad Parvizi, MD, FRCS (<i>3b. Stryker Orthopaedics; 5. Smartec Intellectual</i>)
Joanna Patton, ROT (<i>n.</i>)
Andrew D. Pearle, MD (<i>n.</i>)

Christopher L. Peters, MD (<i>n.</i>)
Marc J. Philippon, MD (<i>1. Smith & Nephew; 3b. Smith & Nephew; 4. Smith & Nephew; 6. Smith & Nephew</i>)
Matthew T. Provencher, MD (<i>6. AANA, AOSSM</i>)
Anil Ranawat, MD (<i>n.</i>)
Gleeson Rebello, MD (<i>n.</i>)
Leonard Remia, MD (<i>3b. Encore Medical; 4. Encore Medical</i>)
Anthony A. Romeo, MD (<i>1. Arthrex, Inc.; 2. Arthrex, Inc., DJ Orthopaedics; 3b. Arthrex, Inc.; 4. Arthrex, Inc.; 6. Arthrex, Inc., DJ Orthopaedics, Ossur, Smith & Nephew, CONMED Linvatec</i>)
Wei Shen, MD, PhD (<i>n.</i>)
Andrew M. Silverman, BA (<i>n.</i>)
Daniel J. Solomon, MD (<i>n.</i>)
William I. Sterett, MD (<i>1. EBI; 3b. EBI; 6. Smith & Nephew, Genzyme, EBI</i>)
James B. Stiehl, MD (<i>1. Zimmer; 3b. Implex, Praxim/Medivision, Zimmer; 4. Zimmer; 5. Praxim/Medivision; 6. Praxim/Medivision, Zimmer</i>)
Allston J. Stubbs, MD (<i>3b. Smith & Nephew; 5. Johnson & Johnson</i>)
Michael L. Swank, MD (<i>3b. Brainlab, DePuy; 6. Brainlab, DePuy</i>)
Brett A. Sweitzer, MD (<i>n.</i>)
Samuel Arthur Taylor, MD (<i>n.</i>)
Fotios P. Tjoumikaris, MD (<i>7. Stryker, DePuy, Smith & Nephew</i>)
Geoffrey Van Thiel, MD (<i>n.</i>)
Alex R. Vap, BA (<i>n.</i>)
Camilo E. Villalobos, MD (<i>n.</i>)
Bradford A. Wall, MD (<i>7. Yes</i>)
Jon J. P. Warner, MD (<i>1. Zimmer; 6. Aircast (DJ), Arthrex, Inc., Mitek, Smith & Nephew, Zimmer</i>)
Hugh Godfrey Watts, MD (<i>n.</i>)
James C. Wittig, MD (<i>n.</i>)
Zachary R. Zimmer, BA (<i>n.</i>)



Eastern Orthopaedic Association

42nd Annual Meeting

Kingsmill
Williamsburg, Virginia

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Multimedia Education

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Please place an × in the box by each DVD viewed and write any comments you may have in the space provided.
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Multimedia Sessions attended:

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- | | | |
|--|--|--|
| <input type="checkbox"/> DVD 1 (25 min) | <input type="checkbox"/> DVD 11 (9 min) | <input type="checkbox"/> DVD 21 (22 min) |
| <input type="checkbox"/> DVD 2 (11 min) | <input type="checkbox"/> DVD 12 (10 min) | <input type="checkbox"/> DVD 22 (20 min) |
| <input type="checkbox"/> DVD 3 (22 min) | <input type="checkbox"/> DVD 13 (11 min) | <input type="checkbox"/> DVD 23 (7 min) |
| <input type="checkbox"/> DVD 4 (12 min) | <input type="checkbox"/> DVD 14 (14 min) | <input type="checkbox"/> DVD 24 (7 min) |
| <input type="checkbox"/> DVD 5 (15 min) | <input type="checkbox"/> DVD 15 (25 min) | <input type="checkbox"/> DVD 25 (9 min) |
| <input type="checkbox"/> DVD 6 (11 min) | <input type="checkbox"/> DVD 16 (13 min) | <input type="checkbox"/> DVD 26 (18 min) |
| <input type="checkbox"/> DVD 7 (12 min) | <input type="checkbox"/> DVD 17 (13 min) | <input type="checkbox"/> DVD 27 (15 min) |
| <input type="checkbox"/> DVD 8 (12 min) | <input type="checkbox"/> DVD 18 (8 min) | <input type="checkbox"/> DVD 28 (21 min) |
| <input type="checkbox"/> DVD 9 (23 min) | <input type="checkbox"/> DVD 19 (24 min) | <input type="checkbox"/> DVD 29 (13 min) |
| <input type="checkbox"/> DVD 10 (25 min) | <input type="checkbox"/> DVD 20 (18 min) | <input type="checkbox"/> DVD 30 (12 min) |

Please indicate the DVD(s) you found to be most meaningful and any comments. Begin with the DVD number.

Please indicate any feedback that you may have concerning other DVDs. Begin with the DVD number.

Please indicate any comments or suggestions that you have regarding the Multimedia Presentations.



Eastern Orthopaedic Association

42nd Annual Meeting

October 20-22, 2011

Kingsmill
Williamsburg, Virginia

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Scientific Program

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2011 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 20, 2011

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>Concurrent General Session I</i> or <i>Concurrent General Session II</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session III</i> or <i>Concurrent General Session IV</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent Symposium I</i> or <i>Concurrent Symposium II</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session V</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Resident/Fellow "Mini" Program</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Friday, October 21, 2011

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session VI</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session VII</i> or <i>Concurrent General Session VIII</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session IX</i> or <i>Concurrent General Session X</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session XI</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium III</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium IV</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Saturday, October 22, 2011

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session XII</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session XIII</i> or <i>Concurrent General Session XVI</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session XV</i> or <i>Concurrent General Session XVI</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium V</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session VII</i> or <i>Concurrent General Session VII</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Concurrent General Session XVIII</i> or <i>Concurrent General Session XIX</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1



Eastern Orthopaedic Association

42nd Annual Meeting

October 20-22, 2011

Kingsmill
Williamsburg, Virginia

2011 CME Credit Record

Poster Presentations

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Thank you for your cooperation.

2011 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 7 CME credits available during the course of the meeting for viewing posters (or a total of 42 posters).

Poster Sessions attended:

(Please check the boxes of the poster sessions you attended).

- | | | | | | |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 11 | <input type="checkbox"/> 21 | <input type="checkbox"/> 31 | <input type="checkbox"/> 41 | <input type="checkbox"/> 51 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 12 | <input type="checkbox"/> 22 | <input type="checkbox"/> 32 | <input type="checkbox"/> 42 | <input type="checkbox"/> 52 |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 13 | <input type="checkbox"/> 23 | <input type="checkbox"/> 33 | <input type="checkbox"/> 43 | |
| <input type="checkbox"/> 4 | <input type="checkbox"/> 14 | <input type="checkbox"/> 24 | <input type="checkbox"/> 34 | <input type="checkbox"/> 44 | |
| <input type="checkbox"/> 5 | <input type="checkbox"/> 15 | <input type="checkbox"/> 25 | <input type="checkbox"/> 35 | <input type="checkbox"/> 45 | |
| <input type="checkbox"/> 6 | <input type="checkbox"/> 16 | <input type="checkbox"/> 26 | <input type="checkbox"/> 36 | <input type="checkbox"/> 46 | |
| <input type="checkbox"/> 7 | <input type="checkbox"/> 17 | <input type="checkbox"/> 27 | <input type="checkbox"/> 37 | <input type="checkbox"/> 47 | |
| <input type="checkbox"/> 8 | <input type="checkbox"/> 18 | <input type="checkbox"/> 28 | <input type="checkbox"/> 38 | <input type="checkbox"/> 48 | |
| <input type="checkbox"/> 9 | <input type="checkbox"/> 19 | <input type="checkbox"/> 29 | <input type="checkbox"/> 39 | <input type="checkbox"/> 49 | |
| <input type="checkbox"/> 10 | <input type="checkbox"/> 20 | <input type="checkbox"/> 30 | <input type="checkbox"/> 40 | <input type="checkbox"/> 50 | |

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.

2011 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"/>



2012 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.
