



Southern Orthopaedic Association

28th Annual Meeting

July 20–23, 2011
Fairmont Orchid Hotel
Big Island, Hawaii

2011 Meeting Program

Chuck Freitag

Executive Director, DTMS

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Please notify the SOA 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 Southern 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 28.25 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

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Meeting Information

FORMAT

The educational sessions will be held Thursday, Friday, and Saturday, July 21-23, from approximately 6:00am until 2:30pm at the Fairmont Orchid Hotel in Big Island, Hawaii.

TARGET AUDIENCE

The 28th Annual Meeting of the Southern 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.

CME ACCREDITATION

The American Academy of Orthopaedic Surgeons designates this live activity for a maximum of 28.25 *AMA PRA Category I Credits*[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity.

- * 19.25 CME Credits for Scientific Program
- * 4.5 CME Credits for Scientific Poster Sessions
- * 4.5 CME Credits for Multimedia Education Sessions

BADGES/WRIST BANDS

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

PHYSICIAN REGISTRATION FEE

Registration covers the Scientific Program Sessions, Meeting Program, Poster Sessions, Multimedia Sessions, Daily Continental Breakfasts, Welcome Reception, Exhibitor/Poster Reception, Gala Reception/Dinner Dance, Coffee Breaks, and Daily Drawings.

REGISTER FOR THE EXHIBITORS DRAWING

Registered physicians will receive a raffle ticket every day during the meeting to register with the exhibitors and sponsors. Place your ticket in the raffle box for a drawing 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.

MANAGEMENT

The Southern Orthopaedic Association is managed by Data Trace Management Services, Towson, MD.

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.

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Future SOA Meeting	Inside Back Cover
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Meeting-at-a-Glance

Times and locations are subject to change.

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

TUESDAY, JULY 19, 2011

3:40pm–10:30pm **Mauna Kea Summit and Stars Adventure*** (*Meet in Lobby*)

WEDNESDAY, JULY 20, 2011

7:20am–12:00pm **Scuba Dive or Snorkel with SOA President*** (*Meet in Lobby*)
12:00pm–5:00pm **Meeting Registration** (*Salon Foyer*)
12:00pm–5:00pm **Exhibitor Setup** (*Salons II & III*)
12:00pm–5:00pm **Scientific Poster Setup** (*Salon Foyer*)
1:00pm–2:30pm **Industry Workshop—Cadence Pharmaceuticals*** CME credit not available
(lunch included.) (*Orchid Room*)
2:00pm–5:00pm **Speaker Ready Room** (*Salon Foyer*)
3:00pm–5:30pm **SOA Board of Directors Meeting** (*Paniolo Hospitality Room*)
3:40pm–10:30pm **Mauna Kea Summit and Stars Adventure*** (*Meet in Lobby*)

THURSDAY, JULY 21, 2011

6:00am–6:30am **Scientific Poster Session** (*Salon Foyer*)
Note: Presenters will be available to answer questions.
6:00am–2:30pm **Speaker Ready Room** (*Salon Foyer*)
6:00am–2:30pm **Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily
Drawing** (*Salons II & III*)
6:00am–5:00pm **Meeting Registration** (*Salon Foyer*)
6:30am–12:10pm **Scientific Program** (*See pages 6-7 for details.*) (*Salon I*)
9:00am–10:30am **Spouse/Children's Hospitality*** (*Plaza Ballroom I & II*)
11:26am–12:05pm **Presidential Guest Speaker** (*Salon I*)
12:11pm–12:30pm **First Business Meeting** (*Salon I*)
12:30pm–1:30pm **Industry Workshop—ConvaTec*** CME credit not available (lunch included.)
(*Plaza Ballroom I*)
1:00pm–2:30pm **Instructional Course Lecture** (*Salon I*)
2:30pm–3:30pm **Scientific Poster Session** (*Salon Foyer*)
Note: Presenters will be available to answer questions.
3:30pm–5:00pm **Multimedia Education Session** (*Salon Foyer*)
7:00pm–9:30pm **Welcome Reception*** (*Pool Deck*)

FRIDAY, JULY 22, 2011

6:00am–6:30am **Scientific Poster Session** (*Salon Foyer*)
Note: Presenters will be available to answer questions.

* See Activities Information on pages 8-9 for more details.

6:00am–7:00am	Regional and AAOS President’s Breakfast Meeting with State Presidents and Board of Councilors (<i>Plaza Ballroom I & II</i>)
6:00am–2:30pm	Speaker Ready Room (<i>Salon Foyer</i>)
6:00am–2:30pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Salons II & III</i>)
6:00am–5:00pm	Meeting Registration (<i>Salon Foyer</i>)
6:30am–12:30pm	Scientific Program (<i>See pages 6-7 for details.</i>) (<i>Salon I</i>)
11:15am–11:30am	Presidential Address (<i>Salon I</i>)
12:30pm–5:00pm	Kona Historical Excursion* (<i>Meet in Lobby</i>)
1:00pm–2:30pm	Instructional Course Lecture (<i>Salon I</i>)
1:30pm–5:30pm	Golf Tournament* (<i>Meet in Lobby</i>)
2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)
5:30pm–7:30pm	Exhibitor and Poster Reception* (<i>Salons II & III</i>)
5:30pm–7:30pm	Kids’ Movie Party and Arts & Crafts* (<i>Plaza Ballroom I & II</i>)

SATURDAY, JULY 23, 2011

6:00am–6:30am	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–2:30pm	Speaker Ready Room (<i>Salon Foyer</i>)
6:00am–2:30pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Salons II & III</i>)
6:00am–5:00pm	Meeting Registration (<i>Salon Foyer</i>)
6:35am–12:00pm	Scientific Program (<i>See pages 6-7 for details.</i>) (<i>Salon I</i>)
8:47am–9:16am	Distinguished Southern Orthopaedist (<i>Salon I</i>)
12:00pm–12:15pm	Second Business Meeting (<i>Salon I</i>)
12:30pm–1:30pm	Industry Workshop—Auxilium Pharmaceuticals, Inc.* CME credit not available (lunch included). (<i>Maile Room</i>)
1:00pm–2:30pm	Instructional Course Lecture (<i>Salon I</i>)
2:00pm–4:00pm	Tennis Round Robin* (<i>Meet at Tennis Courts</i>)
2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)
6:15pm–7:00pm	Cocktails with SOA President* (<i>The Plantation Estate</i>)
7:00pm–10:00pm	Family Luau — “Gathering of the Kings”* (<i>The Plantation Estate</i>)

SUNDAY, JULY 24, 2011

7:30am–5:30pm	Hamakua Coast/Volcano* (<i>Meet in Lobby</i>)
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* See Activities Information on pages 8-9 for more details.

Scientific Program Agenda

Salon I (unless otherwise specified)

Presenters and times are subject to change.

THURSDAY, JULY 21, 2011

6:00am–6:30am	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–2:30pm	Speaker Ready Room (<i>Salon Foyer</i>)
6:30am–7:42am	GENERAL SESSION 1: Adult Reconstruction I — Knee Osteoarthritis and Total Knee Arthroplasty
7:43am–8:40am	SYMPOSIUM 1: Frontiers in Sports Medicine
8:40am–9:00am	Break — Please visit exhibitors and posters (<i>Salons II & III and Foyer</i>)
9:00am–10:05am	GENERAL SESSION 2: Upper Extremity and Hand — Pain and Arthritis
10:05am–11:05am	GENERAL SESSION 3: Trauma and Basic Science
11:05am–11:25am	Break — Please visit exhibitors and posters (<i>Salons II & III and Foyer</i>) The drawing will take place in the Exhibit Area at the end of the break.
11:25am–12:10pm	GENERAL SESSION 4: Presidential Guest Speaker and OREF Presentation
1:00pm–2:30pm	Instructional Course Lecture
2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)

FRIDAY, JULY 22, 2011

6:00am–6:30am	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–2:30pm	Speaker Ready Room (<i>Salon Foyer</i>)
6:30am–7:17am	GENERAL SESSION 5: Sports Medicine
7:18am–8:10am	SYMPOSIUM 2: Update on Hip Fractures
8:11am–8:55am	SYMPOSIUM 3: Update on Ankle/Foot Fractures
8:55am–9:15am	Break — Please visit exhibitors and posters (<i>Salons II & III and Foyer</i>)
9:15am–10:05am	GENERAL SESSION 6: Spine and Pediatric
10:05am–10:54am	GENERAL SESSION 7: Basic Science
10:54am–11:14am	Break — Please visit exhibitors and posters (<i>Salons II & III and Foyer</i>) The drawing will take place in the Exhibit Area at the end of the break.
11:14am–11:45am	GENERAL SESSION 8: Presidential Address and AAOS Report
11:45am–12:30pm	GENERAL SESSION 9: Pain Management and Miscellaneous Topics
1:00pm–2:30pm	Instructional Course Lecture

2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)

SATURDAY, JULY 23, 2011

6:00am–6:30am	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
6:00am–2:30pm	Speaker Ready Room (<i>Salon Foyer</i>)
6:35am–7:25am	SYMPOSIUM 4: Clinical Orthopaedic Society — Update on Common Upper Extremity Problems
7:25am–8:20am	GENERAL SESSION 10: Foot & Ankle and Tumors
8:20am–8:45am	Break — Please visit exhibitors and posters (<i>Salons II & III and Foyer</i>) The drawing will take place in the Exhibit Area at the end of the break.
8:45am–9:16am	GENERAL SESSION 11: Distinguished Southern Orthopaedist Lecture
9:17am–10:10am	GENERAL SESSION 12: Adult Reconstruction II — Hip Arthritis and Arthroplasty
10:10am–10:25am	Refreshment Break
10:25am–11:05am	GENERAL SESSION 13: Sports Knee and Shoulder
11:05am–12:00pm	SYMPOSIUM 5: New Frontiers in Total Hip and Knee Arthroplasty for Osteoarthritis
1:00pm–2:30pm	Instructional Course Lecture
2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)

Activities Information

*Badges or wrist bands are required for admittance to all events.
NO REFUNDS FOR TOURS AFTER JUNE 15, 2011.*

Tuesday, July 19, 2011

Mauna Kea Summit and Stars Adventure

3:40pm–10:30pm (*Meet in Lobby*)

The summit of Mauna Kea is renowned as the world's greatest astronomical observation site. It is also one of Hawaii's most sacred cultural sites. Learn about the remarkable evolution and changes the island's natural world has experienced. A dinner stop will be made at an historic ranch outpost. After dinner you'll be taken to the top for a sensational sunset. Stand in awe at the top of the world's tallest volcano amidst the largest collection of telescopes on earth and some of the most dramatic scenery you'll ever witness. And then, at a lower elevation, an Interpretive Naturalist will reveal the wonders and world-class clarity of the Hawaiian night skies.

Must be 16 years or older. Not advised for those with respiratory or heart conditions, pregnancy, or in poor health. Scuba divers please note that summit altitude is over 13,000 feet (4,000 meters). Although guests are provided hooded parkas, they should bring a light sweater or jacket, wear long pants and good walking shoes. Sunset and star viewings are subject to weather conditions.

Price: \$195 per person (minimum 12 people)

Wednesday, July 20, 2011

Scuba Dive or Snorkel with the SOA President

7:20am–12:00pm (*Meet in Lobby*)

Depart Lanikai beach and experience great diving — 50ft dives, lava tubes, arches, turtles, mantas, white tip reef sharks, 60-90ft visibility and 78 degree water. For the scuba divers — 2 tank dives on board the Lanikai (heavenly sea) a 38-foot custom dive boat. Snorkelers are welcome.

Price: Two scuba dives with own gear – \$180; rental gear – \$32. Two snorkel dives – \$95 (includes snorkel gear). Included for everybody: towels, fruit and snacks, all gratuities and taxes. (minimum 18 people)

Industry Workshops — Cadence Pharmaceuticals

1:00pm–2:30pm (*Orchid Room*)

OFIRMEV[®] (acetaminophen) injection — A Non-Opioid, Non-NSAID Analgesic for Perioperative Pain Management

Presented by: Paul F. Lachiewicz, MD

This presentation will provide information on the safety and efficacy of the OFIRMEV[®] (acetaminophen) injection.

Price: Included in Registration Fee
(lunch included)

Mauna Kea Summit and Stars Adventure

3:40pm–10:30pm (*Meet in Lobby*)

See description of Tuesday's tour.

Thursday, July 21, 2011

Spouse/Children's Hospitality

9:00am–10:30am (*Plaza Ballroom I & II*)

Spend time with a Hawaiian Cultural Advisor and learn interesting facts about Hawaiian culture and traditions while you enjoy a tropical breakfast in a lovely setting.

Price: Included in Registration Fee
\$40 per Unregistered Adult Guest
\$20 per Unregistered Child (5–17)

Industry Workshop — ConvaTec

12:30pm–1:30pm (*Plaza Ballroom I*)

Surgical Site Infection in Total Hip & Knee Arthroplasty
Presented by: C. Lowry Barnes, MD, Arkansas Specialty Orthopaedics and Louis M. Kwong, MD, UCLA-Harbor Medical Center

Dr. Barnes and Dr. Kwong will discuss the following topics:

- Overview of Surgical Infection in Hip and Knee Arthroplasty
- Risk Mitigation of Infection in Arthroplasty
- Wound Management in Total Joint Arthroplasty

Price: Included in Registration Fee
(lunch included)

Welcome Reception

7:00pm–9:30pm (*Pool Deck*)

Have a wonderful evening overlooking the ocean and enjoying the Hawaiian breezes. You'll savor food delicacies and drinks while chatting with friends and colleagues. Take pleasure in the Hawaiian entertainment and soak in the "Big Island" experience.

Attire: Resort Casual (no coat required)

Price: *Included in Registration Fee*
\$100 per Unregistered Adult Guest
\$50 per Unregistered Child (5–17)

Friday, July 22, 2011

Kona Historical Excursion

12:30pm–5:00pm (*Meet in Lobby*)

Become versed in the history of both contemporary and ancient Hawaii through the chronicles of Kona. Drive through coffee farms where the distinctive flavor of Kona coffee is nurtured and developed. You'll learn more about the background of this unique crop at the *Kona Coffee and Tea Company*. Your adventure continues to one of the most legendary cultural sites in the State of Hawaii — Pu'u honua O Honaunau, or the City of Refuge. The most complete restoration of an ancient Hawaiian religious sanctuary, it was once a refuge for vanquished warriors and *kapu* (taboo) breakers guaranteed relief once reaching temple grounds. The only access to the compound was by swimming a bay known as "Shark's Den." Watch Hawaii's history come alive as you begin your journey into the colorful past of the islands.

Price: *\$90 per person (minimum 16 people)*

Golf Tournament

1:30pm–5:30pm (*Meet in Lobby*)

Mauna Lani Resort South Course snakes through the stark, rugged a'a lava of the prehistoric Kaniku lava flow. The challenging South Course offers the golfer a panorama of mountain and ocean views. The South Course is also home to No. 15, one of the most photographed over-the-water golf course holes in the world.

Price: *\$185 per person (lunch included)*

Exhibitor and Poster Reception

5:30pm–7:30pm (*Salons II & III and Foyer*)

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

Attire: Resort Casual (no jacket required)

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

Kids' Movie Party and Arts & Crafts

5:30pm–7:30pm (*Plaza Ballroom I & II*)

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

Price: *Included in Registration Fee*
\$25 per Unregistered Child (5–17)

Saturday, July 23, 2011

Industry Workshop— Auxilium Pharmaceuticals, Inc.

12:30pm–1:30pm (*Maile Room*)

Xiaflex Case Studies Workshop

Presented by: Frederick N. Meyer, MD

A case study presentation of a variety of cases that highlight Dr. Meyer's individual treatment techniques in the administration of Xiaflex for Dupuytren's Contracture.

Price: *Included in Registration Fee (lunch included)*

Tennis Round Robin

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

Price: *\$35 per person*

Cocktails with SOA President

6:15pm–7:00pm (*The Plantation Estate*)

Attire: Resort Casual (no jacket required)

Price: *Included in Registration Fee*

Family Luau — "Gathering of the Kings"

7:00pm–10:00pm (*The Plantation Estate*)

Just another luau? Think again! A Polynesian blend of traditional and modern choreography, music, and performance built around a feast fit for the *ali'i* (royalty). Island Breeze Productions and The Fairmont Orchid Hotel, Hawaii partner together to bring the story of the settlement of Samoa, Tahiti, Aotearoa (New Zealand) and Hawaii to you with "islands" of food representing these islands before the performance.

Beginning in a time when the vast, open ocean was yet uncharted, discover how brave people, whose descendants would be called Polynesians, carved a path through this ocean thoroughfare to settle one of the most colorful and lively group of islands in the world. Displayed in its fullness is the *mana* (power) of the *ali'i* (royalty) that would be linked to the one star that guided them — the star of gladness that the Hawaiians call Hokule'a.

The "Gathering of the Kings" calls to all mankind to fulfill their destiny to bring peace and unity to all.

Attire: Resort Casual (no jacket required)

Price: *Included in Registration Fee*
\$150 for Unregistered Adult Guest
\$50 for Unregistered Child (5–17)

Sunday, July 24, 2011

Hamakua Coast/Volcano Excursion

7:30am–5:30pm (*Meet in Lobby*)

This sweeping tour of the scenic Northern part of the Big Island serves to highlight its most popular sightseeing spots, from the second largest cowboy ranch in the United States to the world's most active volcano. Sit back and relax in air-conditioned comfort, listen to the rich narration and survey the multitude of marvels Hawaii has to offer. Your journey begins with a drive through the magical emerald fields of Waimea, Hawaii's main ranching community. Waimea is renowned for its size and their *paniolos* — cowboys who have remade the “Old West” in Hawaiian style. From there you'll continue up the Hamakua coastline, with scenic panoramas of gently waving sugar cane fields and frothy golden beaches. Just 8.5 miles north of Hilo Town, Hawaii Tropical Botanical Gardens is a museum of living plants that attracts photographers, gardeners, scientists, and nature lovers from around the world. Enjoy a self-guided tour of this one-of-a-kind garden.

Cruise through Hilo Town and stop for a delicious buffet lunch at the historic Hilo Hawaiian Hotel. Next stop, a rendezvous at the Volcanoes National Park where sulfurous steam billowing out from deep fissures in the earth recreates a primeval setting. Winding down the day, a stop will be made at the Mauna Loa Macadamia Nut Farm for a quick tour before heading back to the hotel.

Price: *\$180 per person (lunch included) (minimum 16 people)*

Buy one, get one free Fun & Sun Activity Passes: Passes may be purchased at the Beach Shack or Front Desk. Remember to mention that you are affiliated with the SOA to receive this special buy one, get one free offer. The cost is \$75 for adults and \$60 for children.

Parents/Guardians are responsible for their children at all of our functions.

SOA President's Message



Paul F. Lachiewicz, MD

Dear Colleagues:

Welcome to the 28th Annual Meeting of the Southern Orthopaedic Association at the Fairmont Orchid Hotel, on the beautiful Big Island of our 50th state, Hawaii. My wife Ave and I are very happy to welcome you, your family, and guests to this beautiful and unique part of the United States. Three of our five children (with two spouses and one grandchild) are with us, along with a sister-in-law and her children. The staff of SOA (with special thanks to Cynthia, Stacy, and Heather) have worked incredibly hard to put this meeting together with Clay Thomason, our Program Chair. In addition to our standard program, for the first time we will offer a single topic instructional course or “personal tutorial” each afternoon on a “hot topic” in orthopaedics with one or two faculty members. Even though we will have just a single plenary session each

day, we will offer more CME's (28.25 CME credits) than ever before. Please acknowledge Clay and the Program Committee for a job well done.

Please also welcome, for the first time, the many members of the almost 100 year old Clinical Orthopaedic Society, from all over the United States, who have been invited to participate fully in our program.

The Presidential Guest Speaker is my friend and colleague from the Hip Society, Dr. Josh Jacobs and his wife, Faye, from Chicago. Josh is the quintessential orthopaedic scientist-clinician and is now the Chair of the Department of Orthopaedic Surgery at Rush-Presbyterian Medical Center. When Josh accepted my invitation almost two years ago, he was unaware that he would be nominated for the American Academy of Orthopaedic Surgeons' Presidential Line. What a coup for the SOA! His Presidential lecture will focus on the extremely controversial and timely topic of metal-metal total hip arthroplasty. He will also participate in an additional symposium.

The Distinguished Southern Orthopaedist is one of our Past Presidents, Dr. Andy Koman, Chair of the Department of Orthopaedic Surgery at Wake Forest University and Editor of our successful Journal of Surgical Orthopaedic Advances. Andy is also a quintessential clinician-scientist and we have asked him to speak about translational research in orthopaedics. Finally, my friend and colleague, Dr. Dan Berry, Chair of the Mayo Clinic, and current President of the AAOS has graciously accepted my invitation to be part of our program as well as giving us an update of Academy activities.

Ave and I are also excited about what you, your family, and guests can explore culturally and enjoy socially at our 28th Annual Meeting. We have both pre- and post-meeting excursions to two unique areas of the Big Island: Mauna Kea and Volcanoes National Park. There is also a trip to the ancient Hawaiian “Place of Refuge.” Please take some time to hike and explore if you are able, the Hawaiian petroglyph field, which is close to the hotel grounds.

There will be ample opportunity to socialize with old friends and make new ones at our evening events, including the pool-side Welcome Reception and buffet dinner, the Exhibitor's reception, and farewell dinner, which, this year, will be a Luau with Polynesian entertainment! Please dress comfortably for all events, guys — Hawaiian shirts, please no ties or jackets.

Please remember to visit and interact with all of our sponsors and exhibitors each day in the Exhibit Hall. It is the partnership with our sponsors and exhibitors that makes this educational event possible. We hope you have a wonderful time during the meeting and your visit to the Big Island.

Mahalo,

Paul Lachiewicz

Paul F. Lachiewicz, MD
President, Southern Orthopaedic Association

2010 - 2011 SOA Leadership

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2011 SOA New Active Members

We are pleased to welcome the following New Active Members to the Southern Orthopaedic Association:

Oliver Achleitner, MD
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Richard J. Alioto, MD
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Mahesh R. Bagwe, MD
St. Louis, MO

Sandy M. Bidner, MD
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Frank O. Bonnarens, MD
Louisville, KY

Mark Buchanan, MD
Bowling Green, KY

George R. Burton, MD
Orange Beach, AL

Barry S. Callahan, MD
Gulf Breeze, FL

Craig C. Callewart, MD
Dallas, TX

Brett E. Casey, MD
Houma, LA

Camille Coates-Clark, MD
Gainesville, FL

John E. Conway, MD
Fort Worth, TX

Jonathan Cook, MD
El Paso, TX

William Craven, MD
Decatur, GA

Brent A. Davis, MD
Hayesville, NC

John Drkulec, MD
Mansfield, TX

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Hammond, LA

Martin J. Fiala, MD
Tulahoma, TN

Samuel S. Fleming, MD
Marietta, GA

Richard L. Gaertner, MD
Vienna, VA

Marty P. Gagliardi, MD
Santa Rosa Beach, FL

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New Orleans, LA

David B. Griffin, MD
Hampton Cove, AL

John T. Harper, MD
Decatur, GA

Keith Hechtman, MD
Coral Gables, FL

Kirk Hensarling, MD
Anderson, SC

Pedro Hernandez, MD
Miami, FL

Joseph N. Holobinko, MD
Hagerstown, MD

Alireza Jamali, MD
Chesapeake, VA

W. Scott James, MD
Rock Hill, SC

Chet Janecki, MD
Tampa, FL

Andrew R. Jones, MD
Chapel Hill, NC

Saurabh Khakharia, MD
Moultrie, GA

Zeeshaan I. Khan, MD
Oklahoma City, OK

Steven W. Krein, MD
Kingsport, TN

Keith E. Larkin, MD
Metairie, LA

James W. Larson III
Winchester, VA

Christian Lattermann, MD
Lexington, KY

Andrew K. Lee, MD
Houston, TX

Thomas R. Lehmann, MD
Louisville, KY

Rickey L. Lents, MD
Cape Girardeau, MO

Dominic J. Lewis
Aventura, FL

Robert D. Loeffler, MD
Key West, FL

Gerhard E. Maale, MD
Dallas, TX

William C. MacCarty III, MD
South Boston, VA

Kevin P. McCarthy, MD
Baton Rouge, LA

Timothy G. McGarry, MD
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Salvador J. Mendez, MD
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Lebanon, TN

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Steven A. Olson, MD
Durham, NC

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S. Houston Payne, MD
Atlanta, GA

Brad Penenberg, MD
Beverly Hills, CA

V. Douglas Pierce Jr., MD
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Alexandria, LA

Jason T. Randall, MD
Montgomery, AL

J. Randall Riehl, MD
Decatur, AL

Michael Robichaux, MD
Baton Rouge, LA

Rene F. Rodriguez, MD
Doral, FL

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Perry L. Schoenecker, MD
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Tyler S. Watters, MD
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Cooperstown, NY

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Exhibitor/Grantor Acknowledgements

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

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Biomet, Inc. — *Grantor*

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Exhibitor/Grantor Information

Auxilium Pharmaceuticals, Inc.

40 Valley Stream Parkway
Malvern, PA 19355
484-321-5900
www.xiaflex.com

Auxilium Pharmaceuticals, Inc. is a specialty biopharmaceutical company committed to providing innovative solutions for unmet medical needs which are often undiagnosed or under-treated.

Biomet, Inc.

56 East Bell Drive
Warsaw, IN 46582
800-348-9500
www.biomet.com

Biomet, Inc. and its subsidiaries design, manufacture, and market products used primarily by musculoskeletal medical specialists in both surgical and non-surgical therapy. Biomet's product portfolio encompasses reconstructive products, including orthopedic joint replacement devices, bone cements and accessories, autologous therapies and dental reconstructive implants; fixation products, including electrical bone growth stimulators, internal and external orthopedic fixation devices, craniomaxillofacial implants and bone substitute materials; spinal products, including spinal stimulation devices, spinal hardware and orthobiologics; and other products, such as arthroscopy products and softgoods and bracing products. Headquartered in Warsaw, Indiana, Biomet and its subsidiaries currently distribute products in approximately 90 countries.

Cadence Pharmaceuticals

12481 High Bluff Drive, Suite 200
San Diego, CA 92130
858-436-1400
www.cadencepharm.com

Cadence Pharmaceuticals is a biopharmaceutical company focused on in-licensing, developing and commercializing proprietary product candidates principally for use in the hospital setting. The company is currently marketing OFIRMEV (intravenous acetaminophen) for the treatment of acute pain and fever.

Carticept Medical, Inc.

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Alpharetta, GA 30005
770-754-3800
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Carticept Medical Inc., a private medical device company,

markets proprietary advanced injection delivery technology and portable ultrasound equipment (manufactured by SonoSite – the world leader in point-of-care ultrasound) to improve the quality of life for orthopedic patients.

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Germany
901-672-7569
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CeramTec is the world's leading manufacturer of ceramic products for use in hip arthroplasty. It has been at the forefront in the development of innovative ceramic products that offer the highest reliability with the lowest articulation wear for Total Hip Replacement. Technological advances such as the introduction of our Alumina Matrix Composite (Biolox[®] delta) will further increase the reliability of our products. Every 45 seconds a Biolox[®] component is surgically implanted around the world.

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ConvaTec develops and markets innovative medical technologies that help improve the lives of millions of people in Ostomy Care, Wound Therapeutics, Continence and Critical Care, and Infusion Devices.

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DePuy Orthopaedics Inc., a Johnson and Johnson Company, is the world's oldest and largest orthopaedic company and is a leading designer, manufacturer, and distributor of orthopaedic devices and supplies.

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DeRoyal is a global supplier of over 25,000 medical products and services with 2300 employees worldwide. Its five divisional business units, Acute Care, Patient Care, Trauma, Wound Care, and OEM, are headquartered in Powell, Tennessee, with 25 manufacturing facilities and offices in five U.S. states and in six other countries.

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DJO provides solutions for musculoskeletal and vascular health, and pain management. Products help prevent injuries or rehabilitate after surgery, injury or degenerative disease. Visit www.DJOglobal.com.

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Based in Gainesville, Fla., Exactech develops and markets orthopaedic implant devices, related surgical instruments and biologic materials and services to hospitals and physicians.

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973-796-1600
www.euflexxa.com

Ferring Pharmaceuticals Inc. is a research based biopharmaceutical company that offers treatments for patients with osteoarthritis (OA) of the knee. Euflexxa is a highly purified hyaluronan, also called Hyaluronic Acid (HA). It is the first bioengineered HA approved in the US for the treatment of OA knee pain.

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Cambridge, MA 02142
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LifeNet Health

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888-847-7831
www.accesslifenethealth.org

LifeNet Health Bio-Implants Division is a leader in the engineering and processing of dental, cardiovascular, spinal and orthopaedic bio-implants and distributes more than 300,000 bio-implants every year to restore health to patients around the world.

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954-927-2044
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336-691-1286 or 877-MED-JUST
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Medical Justice® is a membership-based organization, run by physicians, that offers patented services to protect physicians' most valuable assets — their practice and reputation. Our programs include affordable services to: deter frivolous malpractice claims; address unwarranted demands for refunds; provide proven strategies for successful counterclaims; and prevent internet defamation while promoting physicians' online reputations.

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Memometal is a leading global designer and manufacturer of surgical implants for extremities. We are continually consulting with our surgeon partners and researching new surgical solutions that will enable patients to recover faster and regain mobility. Our ultimate goal is to enhance the ability of physicians to deliver improved patient outcomes and quality of life.

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Ortho-McNeil, Division of Ortho-McNeil-Janssen Pharmaceuticals, Inc., is committed to providing innovative, high-quality, prescription medicines and resources in the areas of bacterial infection and cardiovascular disease for healthcare providers and their patients in hospitals and other care facilities. For more information, visit www.ortho-mcneil.com.

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Parker, CO 80134
410-935-1617
www.peakpro-formanceproducts.com

Peak Pro-Formance Products is a medical device company specializing in Musculoskeletal Diagnostic Ultrasound as well as other sports medicine diagnostic and therapeutic devices.

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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.

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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.

TeDan Surgical Innovations

11333 Chimney Rock Road, #180
Houston, TX 77035
713-726-0886
www.tedansurgical.com

TeDan Surgical Innovations (TSI) offers cervical and lumbar patented products such as our Phantom CSTM, Phantom TLTM, Phantom LSTM, Phantom MCTM, and our new Phantom MLTM for minimally invasive Lumbar Fusion.

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Arlington, TN 38002
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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.

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Founded in 1927, Zimmer is a global leader in designing, developing, manufacturing and marketing orthopaedic reconstructive, spinal and trauma devices, dental implants, and related surgical products. Zimmer had 2010 sales of \$4.2 billion, has operations in more than 25 countries, sells products in more than 100 countries and has more than 8,000 employees worldwide.

SOA Business Meetings

Southern Orthopaedic Association

**Salon I
Fairmont Orchid Hotel
Big Island, Hawaii**

Thursday, July 21, 2011
12:11pm–12:30pm

First Business Meeting

AGENDA

- I. Call to Order, Paul F. Lachiewicz, MD
- II. Approval of Minutes, Thursday, June 17, 2010, Fajardo, Puerto Rico
- III. Report of the President, Paul F. Lachiewicz, MD
 - (a) Update on Association Status
 - (b) Review of Annual Meeting Activities
 - (c) Update on Membership Activities
 - (d) Report on Actions of the Board of Trustees
 - (e) Review of Future SOA Meetings
- IV. Report of the Treasurer, William C. Andrews Jr., MD
- V. Report of the Bylaws Committee, John J. McGraw, MD
 - (a) Presentation and approval of Bylaws changes
- VI. Old Business
- VII. New Business
 - (a) Presentation of 2011-2012 Slate of Officers, C. Lowry Barnes, MD
 - (b) Election of 2012 Nominating Committee Two Members at Large, Paul F. Lachiewicz, MD

2011 Nominating Committee (cannot be reappointed)

 - C. Lowry Barnes, MD, *Chair*
 - Robert M. Perouka, MD (Presidential Appointment)
 - Preston Waldrop, MD (Councilor Representative)
 - Richard L. Worland, MD (Member-at-Large)
 - Ryan M. Nunley, MD (Member-at-Large)

2012 Nominating Committee

 - Paul F. Lachiewicz, MD, *Chair*
- VIII. Announcements
- IX. Adjournment

Minutes of the 2010 First Business Meeting of the Southern Orthopaedic Association

Grand Caribbean Salon 5, El Conquistador
Fajardo, Puerto Rico
Thursday, June 17, 2010

CALL TO ORDER

C. Lowry Barnes, MD, President, called to order the First Business Meeting of the Southern Orthopaedic Association. The meeting took place in Grand Caribbean Salon 5, El Conquistador, Fajardo, Puerto Rico. The meeting began at 12:30 pm.

APPROVAL OF MINUTES

A copy of the Minutes for the First Business Meeting held at the Amelia Island Plantation in Amelia Island, FL, Thursday, July 16, 2009 was distributed in the 2010 Meeting Program on page 21 for review and approval.

ACTION: — It was moved by Dr. McGraw and seconded by Dr. Lachiewicz that the Minutes for the 2009 First Business Meeting be approved. The motion carried.

REPORT OF THE PRESIDENT

Dr. Barnes reported that the SOA is in a strong position financially. He briefly reviewed the activities to take place during the meeting here in Puerto Rico. He related that more abstracts had been submitted for this meeting than we have had previously. Dr. Barnes commended Dr. Bolognesi for developing a great Scientific Program. He stated that SOA has had significant involvement from the Orthopaedists in Puerto Rico and that the local support from Dr. Manuel Garcia is appreciated. He encouraged everyone to work on growing membership and inviting others to join SOA. Dr. Barnes concluded his report by announcing that the 2011 Annual Meeting will be held on the Big Island of Hawaii and that the 2012 Annual Meeting will be at the Greenbrier.

REPORT OF THE TREASURER

Dr. Frederick C. Flandry reported that SOA is financially healthy. He stated membership revenue is slightly down, but that Annual Meeting revenue is up a little due to attendance here in Puerto Rico and increased sponsorship dollars. He reported that there was no SEC revenue this year, because the meeting was not held due to a conflict with the AAOS meeting. Dr. Flandry said that SOA has \$370,000 in net assets. He stated that the President's Gift Fund was recently established and encouraged gifts from the membership. Dr. Flandry concluded that this is an exciting time for SOA.

ACTION: — It was moved by Dr. Brown and seconded by Dr. Moorman to approve the Report of the Treasurer. The motion carried.

NEW BUSINESS

Dr. Barnes announced that SOA will be offering a new professional liability product called Ortho-Preferred as a new member benefit. Dr. Lachiewicz asked that anyone interested in serving on the Administrative Board of Ortho-Preferred to let either him or Dr. Barnes know. Some experience in this area is required.

Dr. Brown reported that SOA needs Councilors for some of the states in its territory and encouraged anyone interested to let himself or Dr. Barnes know.

It was reported that the Nominating Committee for 2010 had met via Conference Call and developed the following proposed Slate of Officers for 2011:

President	Paul F. Lachiewicz, MD
President-Elect	Claude T. Moorman III, MD
Secretary/Vice President	Frederick C. Flandry, MD
Treasurer	William C. Andrews Jr., MD
Three Trustees	Samuel I. Brown, MD Spero G. Karas, MD Kurt P. Spindler, MD

ACTION: — It was moved by Dr. Nunley and seconded by Dr. McGraw to accept the Report of the Nominating Committee. The motion carried.

Dr. Barnes stated that two members need to be elected from the floor to serve on the 2011 Nominating Committee, which also includes the Immediate Past President, a Presidential Appointment and a Councilor Representative. The following members were nominated to serve on the 2011 Nominating Committee: Richard Worland, MD and Ryan Nunley, MD.

ACTION: — It was moved by Dr. Moorman and seconded by Dr. Flandry that Drs. Worland and Nunley be elected to serve on the 2011 Nominating Committee. The motion carried.

ADJOURNMENT

There being no further business, Dr. Barnes adjourned the Business Meeting at 12:40 pm.

Southern Orthopaedic Association

Salon I
Fairmont Orchid Hotel
Big Island, Hawaii

Saturday, July 23, 2011
12:00pm–12:15pm

Second Business Meeting

AGENDA

- I. Call to Order, Paul F. Lachiewicz, MD
- II. Approval of Minutes, June 19, 2010, Fajardo, Puerto Rico
- III. Election of Officers and Trustees, Paul F. Lachiewicz, MD
 - President Claude T. Moorman III, MD
 - President-Elect Frederick C. Flandry, MD
 - Secretary/Vice President. William C. Andrews Jr., MD
 - Treasurer Langdon A. Hartsock, MD
 - Trustees Darren L. Johnson, MD
 - Spero G. Karas, MD
 - Andrew A. Shinar, MD
 - Ryan M. Nunley, MD
- IV. Report of the 2012 Annual Meeting, July 18-21, Claude T. Moorman III, MD
- V. Announcements
- VI. New Business
- VII. Adjournment

Minutes of the 2010 Second Business Meeting of the Southern Orthopaedic Association

Grand Caribbean Salon 5, El Conquistador
Fajardo, Puerto Rico
Saturday, June 19, 2010

CALL TO ORDER

C. Lowry Barnes, MD, President, called to order the Second Business Meeting of the Southern Orthopaedic Association. The meeting took place in Grand Caribbean Salon 5, El Conquistador, Fajardo, Puerto Rico. The meeting began at 12:40 pm.

APPROVAL OF MINUTES

A copy of the Minutes for the Second Business Meeting held at the Amelia Island Plantation in Amelia Island, FL, Saturday, July 18, 2009 was distributed in the 2010 Meeting Program on page 23 for review and approval.

ACTION: — It was moved and seconded that the Minutes for the 2009 Second Business Meeting be approved.
The motion carried.

NOMINATING COMMITTEE REPORT

Dr. C. Lowry Barnes presented for approval the proposed slate of Officers and Board of Trustee members for 2010-2011.

President	Paul F. Lachiewicz, MD
President-Elect	Claude T. Moorman III, MD
Secretary/Vice President	Frederick C. Flandry, MD
Treasurer	William C. Andrews Jr., MD
Three Trustees	Samuel I. Brown, MD
	Spero G. Karas, MD
	Kurt P. Spindler, MD

ACTION: —It as moved and seconded that the Slate be approved as presented. The motion carried.

2011 ANNUAL MEETING

Dr. Lachiewicz reported that the 2011 Annual Meeting will be held at Fairmont Orchid, July 20-23, 2011 on the Big Island of Hawaii. He said that Josh Jacobs will be his Presidential Guest Speaker and that Daniel Berry, MD with the AAOS has committed to attending the meeting and will be on the Program. Dr. Lachiewicz also stated that his Program Chair is Clay Thomason. He encouraged everyone to attend.

ADJOURNMENT

There being no further business, Dr. Barnes adjourned the Business Meeting at 12:50 pm.

Past Annual Meetings of the Southern Orthopaedic Association 1984–2011

First Annual Meeting

President: Guy T. Vise Jr., MD
 President-Elect: Angus M. McBryde Jr., MD
 Secretary-Treasurer: William C. Collins, MD
 Dates: March 28–April 1, 1984
 Location: Cable Beach Hotel
 Nassau, Bahamas
 Physician Attendance: 115
 Guest Speakers: William Enneking, MD
Gainesville, Florida
 Wallace E. Miller, MD
Miami, Florida
 Heinz Mittelmeier, MD
Homburg, West Germany

Second Annual Meeting

President: Angus M. McBryde Jr., MD
 President-Elect: J. Lorin Mason Jr., MD
 Secretary-Treasurer: William C. Collins, MD
 Dates: March 28–April 1, 1985
 Location: Frenchman's Reef Beach Resort
 Virgin Islands
 Physician Attendance: 179
 Guest Speakers: PD Dr. med R.P. Jakob
Berne, Switzerland
 Peter J. Fowler, MD
Ontario, Canada
 Clement B. Sledge, MD
Boston, Massachusetts

Third Annual Meeting

President: J. Lorin Mason Jr., MD
 President-Elect: Kurt M. W. Niemann, MD
 Secretary-Treasurer: William C. Collins, MD
 Dates: May 28–June 1, 1986
 Location: The Homestead
 Hot Springs, Virginia
 Physician Attendance: 112
 Guest Speaker: Mr. David J. Dandy
Cambridge, England

Fourth Annual Meeting

President: Kurt M. W. Niemann, MD
 President-Elect: William C. Collins, MD
 Secretary-Treasurer: Jack H. Henry, MD
 Dates: May 20–24, 1987

Location: Southhampton Princess
 Hamilton, Bermuda
 Physician Attendance: 151
 Guest Speakers: James Langston Hughes Jr., MD
Jackson, Mississippi
 Robert G. Volz, MD
Tucson, Arizona
 First Distinguished Orthopaedist Award:
 Wood W. Lovell, MD
Jacksonville, Florida
 Best Paper Award: Michael Heckman, MD
Atlanta, Georgia

Fifth Annual Meeting

President: William C. Collins, MD
 President-Elect: J. Ollie Edmunds Jr., MD
 Secretary-Treasurer: Jack H. Henry, MD
 Dates: August 4–6, 1988
 Location: Caledonian Hotel
 Edinburgh, Scotland
 Physician Attendance: 200
 Guest Speakers: Bryan Hurson, MD
Dublin, Ireland
 James W. Harkess, MD
Louisville, KY
 Mr. Douglas Lam
Edinburgh, Scotland
 Professor Sean P. F. Hughes
Edinburgh, Scotland
 Mr. David Dandy, FRCS
Cambridge, England
 Brian Roper, FRCS
London, England
 Michael Freeman, MD, FRCS
London, England
 Basil Helal, MCh, FRCS
London, England
 Mr. John King
London, England
 Mr. Bill Grange
London, England
 Distinguished Orthopaedist Award:
 J. Leonard Goldner, MD
Durham, North Carolina
 Best Paper Award: Scott R. Grewe, MD
Atlanta, Georgia

Sixth Annual Meeting

President: J. Ollie Edmunds Jr., MD
 President-Elect: Jack H. Henry, MD
 Secretary-Treasurer: Owen B. Tabor Sr., MD
 Dates: May 3-7, 1989
 Location: Royal Antiguan Hotel
 Antigua, West Indies
 Physician Attendance: 152
 Guest Speaker: Professor Reinhold Ganz
 Germany
 Distinguished Orthopaedist Award:
 Alvin J. Ingram, MD
 Jackson, Tennessee
 Best Paper Award: D. F. Martin, MD
 Baltimore, Maryland

Seventh Annual Meeting

President: Jack H. Henry, MD
 President-Elect: Owen B. Tabor Sr., MD
 Secretary-Treasurer: Lowell H. Gill, MD
 Dates: June 6-10, 1990
 Location: Hyatt Regency Hotel
 Maui, Hawaii
 Physician Attendance: 186
 Guest Speakers: David S. Bradford, MD
 Minneapolis, Minnesota
 David P. Green, MD
 San Antonio, Texas
 William G. Hamilton, MD
 New York, New York
 Roby C. Thompson, MD
 Minneapolis, Minnesota
 Distinguished Orthopaedist Award:
 Jack C. Hughston, MD
 Columbus, Georgia
 Best Paper Award: Scott D. Boden, MD
 Washington, DC

Eighth Annual Meeting

President: Owen B. Tabor Sr., MD
 President-Elect: Lowell H. Gill, MD
 Secretary-Treasurer: Albert H. Dudley III, MD
 Dates: August 8-10, 1991
 Location: The Broadmoor
 Colorado Springs, Colorado
 Physician Attendance: 153
 Guest Speakers: Augusto Sarmiento, MD
 Los Angeles, California
 Michael A. R. Freeman, MD,
 FRCS
 London, England
 Distinguished Orthopaedist Award:
 Frank H. Stelling III, MD
 Greenville, South Carolina

Best Paper Award: Mark R. Brinker, MD
 New Orleans, Louisiana

Ninth Annual Meeting

President: Lowell H. Gill, MD
 President-Elect: Albert H. Dudley III, MD
 Secretary-Treasurer: Roger L. Mell, MD
 Dates: August 5-7, 1992
 Location: Chateau Whistler Resort
 Whistler, British Columbia
 Physician Attendance: 167
 Guest Speakers: William R. Murray, MD
 San Francisco, California
 Michael Coughlin, MD
 San Francisco, California
 Paul Brand, MD
 London, England
 Distinguished Orthopaedist Award:
 William Fisher Enneking, MD
 Gainesville, Florida
 Dow Corning-Allen Lacey, MD Endowment*:
 Walker A. Wynkoop, MD
 El Paso, Texas

Tenth Annual Meeting

President: Albert H. Dudley III, MD
 President-Elect: Eugene E. Taylor, MD
 Secretary-Treasurer: Edward E. Kimbrough III, MD
 Dates: August 12-14, 1993
 Location: Hotel Inter-Continental
 Vienna, Austria
 Physician Attendance: 96
 Guest Speakers: Henry Bohlman, MD
 Cleveland, Ohio
 Anne Brower, MD
 Bethesda, Maryland
 Distinguished Orthopaedist Award:
 Thomas B. Dameron Jr., MD
 Raleigh, North Carolina
 Dow Corning-Allen Lacey, MD Endowment*:
 Deepak Bhatia, MD
 Baltimore, Maryland

Eleventh Annual Meeting

President: Eugene E. Taylor, MD
 President-Elect: Edward E. Kimbrough III, MD
 Secretary-Treasurer: Neil E. Green, MD
 Dates: August 19-21, 1994
 Location: Southampton Princess
 Southampton, Bermuda
 Physician Attendance: 163
 Guest Speakers: James Andrews, MD
 Birmingham, Alabama

Distinguished Orthopaedist Award:
 Lewis D. Anderson, MD
Mobile, Alabama

Wright Medical Technology-Allen Lacey, MD
 Endowment**:
 O. Alton Barron, MD
New York, New York

Twelfth Annual Meeting

President: Edward E. Kimbrough III, MD
 President-Elect: Neil E. Green, MD
 Secretary-Treasurer: J. F. Rick Hammesfahr, MD
 Dates: July 6-8, 1995
 Location: Chateau Frontenac
 Quebec City, Canada

Physician Attendance: 120
 Guest Speakers: Robert B. Salter, MD
Toronto, Canada
 Henry J. Mankin, MD
Boston, Massachusetts

Distinguished Orthopaedist Award:
 Charles E. Epps, MD
Washington, DC

Wright Medical Technology-Allen Lacey, MD
 Endowment**:
 Randy Schwartzberg, MD
Orlando, Florida

Thirteenth Annual Meeting

President: Neil E. Green, MD
 President-Elect: J. F. Rick Hammesfahr, MD
 Secretary/Vice-President: John B. Gunn, MD
 Treasurer: Robert S. Adelaar, MD
 Dates: August 22-24, 1996
 Location: Sheraton Edinburgh
 Edinburgh, Scotland

Physician Attendance: 123
 Guest Speakers: Anthony Catterall, M.Chir., FRCS
London, England
 Robert Neil Hensinger, MD
Ann Arbor, Michigan

Distinguished Orthopaedist Award:
 James R. Urbaniak, MD
Durham, North Carolina

Wright Medical Technology-Allen Lacey, MD
 Endowment**:
 Evan Ekman, MD
Hermosa Beach, California

Fourteenth Annual Meeting

President: J. F. Rick Hammesfahr, MD
 President-Elect: John B. Gunn, MD
 Secretary/Vice-President: W. Jason McDaniel Jr., MD
 Treasurer: Robert S. Adelaar, MD

Dates: July 24-26, 1997
 Location: Inn at Spanish Bay
 Pebble Beach, California

Physician Attendance: 140
 Guest Speakers: Robert W. Jackson, MD
Dallas, Texas
 Mr. Henri Landwirth
Orlando, Florida

Distinguished Orthopaedist Award:
 Thomas Whitesides Jr., MD
Atlanta, Georgia

The HealthSouth Residents & Fellows' Award***:
 D. Montgomery Hunter, MD
Winston Salem, North Carolina

Fifteenth Annual Meeting

President: John B. Gunn, MD
 President-Elect: W. Jason McDaniel Jr., MD
 Secretary/Vice-President: L. Andrew Koman, MD
 Treasurer: Robert S. Adelaar, MD
 Dates: July 30-August 1, 1998
 Location: Eldorado Hotel, Santa Fe
 New Mexico

Physician Attendance: 131
 Guest Speakers: Robert W. Jackson, MD
Dallas, Texas
 William N. Capello, MD
Indianapolis, Indiana

Distinguished Orthopaedist Award:
 John A. Murray, MD
Houston, Texas

The HealthSouth Residents & Fellows' Award***:
 Douglas W. Lundy, MD
Atlanta, Georgia

Sixteenth Annual Meeting

President: W. Jason McDaniel Jr., MD
 President-Elect: L. Andrew Koman, MD
 Secretary/Vice-President: Robert S. Adelaar, MD
 Treasurer: Robert M. Peroutka, MD
 Dates: July 15-17, 1999
 Location: Ritz-Carlton Hotel
 Amelia Island, Florida

Physician Attendance: 171
 Guest Speakers: K. Donald Shelbourne, MD
Indianapolis, Indiana
 Bradley K. Vaughn, MD
Raleigh, North Carolina

Distinguished Orthopaedist Award:
 Frank C. Wilson, MD
Chapel Hill, North Carolina

The HealthSouth Residents & Fellows' Award***:
 Robert E. Coles, MD
Durham, North Carolina

Seventeenth Annual Meeting

President: L. Andrew Koman, MD
 President-Elect: Robert S. Adelaar, MD
 Secretary/Vice-President: Riyaz H. Jinnah, MD
 Treasurer: Robert M. Peroutka, MD
 Dates: July 20-22, 2000
 Location: Southampton Princess
 Southampton, Bermuda
 Physician Attendance: 137
 Guest Speakers: Jesse B. Jupiter, MD
Boston, Massachusetts
 Andrew J. Weiland, MD
New York, New York
 Panayotis Soucacos, MD, FACS
Ioannina, Greece
 Distinguished Orthopaedist Award:
 Frank H. Bassett III, MD
Durham, North Carolina

Eighteenth Annual Meeting

President: Robert S. Adelaar, MD
 President-Elect: Riyaz H. Jinnah, MD
 Secretary/Vice-President: Champ L. Baker Jr., MD
 Treasurer: Robert M. Peroutka, MD
 Dates: July 19-21, 2001
 Location: Coeur d'Alene Resort
 Coeur d-Alene, Idaho
 Physician Attendance: 110
 Guest Speakers: Michael J. Coughlin, MD
Boise, Idaho
 Lamar L. Fleming, MD
Atlanta, Georgia
 Distinguished Orthopaedist Award:
 John S. Gould, MD
Birmingham, Alabama

Nineteenth Annual Meeting

President: Riyaz H. Jinnah, MD
 President-Elect: Champ L. Baker Jr., MD
 Secretary/Vice-President: James H. Armstrong, MD
 Treasurer: Robert M. Peroutka, MD
 Dates: April 2-6, 2002
 Location: Excelsior/Grand Hotels
 Florence, Italy
 Physician Attendance: 139
 Guest Speakers: Peter McLardy-Smith
Oxford, England
 S. Michael Tooke, MD
Los Angeles, California
 Distinguished Orthopaedist Award:
 David Hungerford, MD
Baltimore, Maryland

Twentieth Annual Meeting

President: Champ L. Baker Jr., MD
 President-Elect: James H. Armstrong, MD
 Secretary/Vice-President: Lamar L. Fleming, MD
 Treasurer: Robert M. Peroutka, MD
 Dates: July 30-August 3, 2003
 Location: The Burlington Hotel
 Dublin, Ireland
 (In conjunction with EOA)
 Physician Attendance: 199
 Guest Speakers: Carlton G. Savory, MD
Columbus, Georgia
 Steven P. Arnoczky, MD
East Lansing, Michigan
 Distinguished Orthopaedist Award:
 David Sisk, MD
Memphis, Tennessee

Twenty-first Annual Meeting

President: James H. Armstrong, MD
 President-Elect: Lamar L. Fleming, MD
 Secretary/Vice-President: Robert M. Peroutka, MD
 Treasurer: John J. McGraw, MD
 Dates: July 21-24, 2004
 Location: The Westin Resort, Hilton Head
 Island, South Carolina
 Physician Attendance: 172
 Guest Speaker: Dempsey S. Springfield, MD
New York, New York
 Distinguished Orthopaedist Award:
 Charles A. Engh Sr., MD
Alexandria, Virginia

Twenty-second Annual Meeting

President: Lamar L. Fleming, MD
 President-Elect: Robert M. Peroutka, MD
 Secretary/Vice-President: George W. Brindley, MD
 Treasurer: John J. McGraw, MD
 Dates: August 3-6, 2005
 Location: The Grove Park Inn
 Asheville, North Carolina
 Physician Attendance: 220
 Guest Speaker: Gary G. Poehling, MD
Winston Salem, North Carolina
 Distinguished Orthopaedist Award:
 Charles A. Rockwood Jr., MD
San Antonio, Texas
 Harley and Betty Baxter Resident Paper Award Winners:
 Christopher T. Donaldson, MD
Baltimore, Maryland
 Matthew J. Hawkins, MD
Washington, DC

Michael S. Wildstein, MD
Charleston, South Carolina

Twenty-third Annual Meeting

President: Robert M. Peroutka, MD
 President-Elect: George W. Brindley, MD
 Secretary/Vice-President: John J. McGraw, MD
 Treasurer: Claude T. Moorman III, MD
 Dates: July 19-22, 2006
 Location: The Atlantis Resort
 Paradise Island, Bahamas
 Physician Attendance: 253
 Guest Speaker: James R. Urbaniak, MD
Durham, North Carolina
 Distinguished Orthopaedist Award:
 Frank J. Frassica, MD
Baltimore, Maryland
 Harley and Betty Baxter Resident Paper Award Winners:
 Michael S. Shuler, MD
Atlanta, Georgia
 Nathan A. Mall, MD
Durham, North Carolina
 Jeffrey P. Garrett, MD
Winston-Salem, North Carolina

Twenty-fourth Annual Meeting

President: George W. Brindley, MD
 President-Elect: John J. McGraw, MD
 Secretary/Vice-President: James A. Nunley, MD
 Treasurer: Claude T. Moorman III, MD
 Dates: August 1-4, 2007
 Location: The Fairmont Empress Hotel
 Victoria, BC, Canada
 Physician Attendance: 252
 Guest Speakers: Robert H. Cofield, MD
Minneapolis, Minnesota
 Distinguished Orthopaedist Award:
 Richard J. Haynes, MD
Houston, Texas
 Harley and Betty Baxter Resident Paper Award Winners:
 Ajay Aggarwal, MD
Philadelphia, Pennsylvania
 Daniel Del Gaizo, MD
Chapel Hill, North Carolina
 Michael S. Shuler, MD
Atlanta, Georgia
 Brett Sweitzer, MD
Atlanta, Georgia

Twenty-fifth Annual Meeting

President: John J. McGraw, MD
 President-Elect: James A. Nunley, MD
 Secretary/Vice-President: C. Lowry Barnes, MD
 Treasurer: Claude T. Moorman III, MD
 Dates: June 11-15, 2008
 Location: TheHomestead
 Hot Springs, Virginia
 Physician Attendance: 187
 Guest Speaker: Peter Alexander Cole, MD
St. Paul, Minnesota
 Distinguished Orthopaedist Award:
 Champ L. Baker Jr., MD, FACS
Columbus, Georgia
 Harley and Betty Baxter Resident Paper Award Winners:
 Peter J. Apel, MD
Winston-Salem, North Carolina
 Melvin D. Helgeson, MD
Washington, DC
 Ryan U. Riel, MD
Jacksonville, Florida

Twenty-sixth Annual Meeting

President: James A. Nunley II, MD
 President-Elect: C. Lowry Barnes, MD
 Secretary/Vice-President: Paul F. Lachiewicz, MD
 Treasurer: Claude T. Moorman III, MD
 Dates: July 15-18, 2009
 Location: Amelia Island Plantation
 Amelia Island, Florida
 Physician Attendance: 228
 Guest Speaker: Professor Beat Hintermann, MD
Liestal, Switzerland
 Distinguished Orthopaedist Award:
 Robert S. Adelaar, MD
Richmond, Virginia
 Harley and Betty Baxter Resident Paper Award Winners:
 Daniel E. Davis, MD
New Orleans, Louisiana
 Daniel S. Heckman, MD
Chapel Hill, North Carolina
 William Reisman, MD
Athens, Georgia
 Special Travel Grants:
 Jonathan C. Barnwell, MD
Winston-Salem, North Carolina
 John S. Shields, MD
Winston-Salem, North Carolina

Twenty-seventh Annual Meeting

President: C. Lowry Barnes, MD
 President-Elect: Paul F. Lachiewicz, MD
 Secretary/Vice-President: Claude T. Moorman III, MD
 Treasurer: Frederick C. Flandry, MD
 Dates: June 16-19, 2010
 Location: El Conquistador Resort
 Fajardo, Puerto Rico
 Physician Attendance: 262
 Guest Speaker: Thomas Parker Vail, MD
San Francisco, California
 Distinguished Orthopaedist Award:
 In Memory of Banks Blackwell,
 MD
Pine Bluff, Arkansas
 Harley and Betty Baxter Resident Paper Award Winners:
 Jonathan C. Barnwell, MD
Winston-Salem, North Carolina
 John Gibbs, MD
Fort Worth, Texas
 Morteza Meftah, MD
New York, New York
 Haines Paik, MD
*Washington, District of
 Columbia*
 Jason D. Rabenold, MD
San Antonio, Texas

Twenty-eighth Annual Meeting

President: Paul F. Lachiewicz, MD
 President-Elect: Claude T. Moorman III, MD
 Secretary/Vice-President: Frederick C. Flandry, MD,
 FACS
 Treasurer: William C. Andrews Jr., MD
 Dates: July 20-23, 2011
 Location: Fairmont Orchid Hotel
 Big Island, Hawaii
 Physician Attendance: TBA
 Guest Speaker: Joshua J. Jacobs, MD
Chicago, Illinois
 Distinguished Orthopaedist Award:
 L. Andrew Koman, MD
Winston-Salem, North Carolina
 Harley and Betty Baxter Resident Paper Award Winners:
 Gregory P. Colbath, MD, MS
Charleston, South Carolina
 Nathan A. Mall, MD
St. Louis, Missouri
 Clinical Orthopaedic Society Resident Award Winners:
 Brett Beavers, MD
Fort Worth, Texas
 Adam M. Kaufman, MD
Durham, North Carolina
 SOA Resident Award Winners:
 Stephen Hamilton, MD
Atlanta, Georgia
 Lt. Scott M. Tintle, MD
*Washington, District of
 Columbia*
 Kyle E. Hammond, MD
Atlanta, Georgia

* Previously referred to as the “Best Paper Award”

** Previously referred to as the “Dow Corning-Allen Lacey, MD Endowment”

*** Previously referred to as the “Wright Medical Technology-Allen Lacey, M.D. Endowment”

SOA Educational Endowment Program

The SOA Board created an Educational Endowment Program in which the Board pledged to participate 100%. The purpose of the Endowment Program is to provide educational opportunities for our young Orthopaedists. The goal is to expand SOA orthopaedic resident educational award opportunities throughout the Southern region.

To participate in this gift of stewardship and investment in the future of SOA Orthopaedic Resident Education, call or email Chuck Freitag with your commitment at 866-762-0730/cfreitag@datatrace.com. The opportunity to contribute to the Endowment Program is also available on your dues renewal notices.

Contributions to the SOA Endowment Program may be tax-deductible. Contributions to the Endowment Program will be used for educational purposes only and will not be included in SOA's operating revenue.

With Sincere Appreciation the following individuals are recognized for their support:

William C. Andrews Jr., MD
William Banks, MD
Betty Baxter
James Brooks Jr., MD
Samuel I. Brown, MD
Frederick C. Flandry, MD, FACS
Virginia Gunn
Langdon A. Hartsock, MD
Darren L. Johnson, MD
Spero G. Karas, MD
John S. Kirkpatrick, MD, FACS
L. Andrew Koman, MD
Matthew J. Matava, MD
Claude T. Moorman III, MD
William L. Morris
Judith Oppenheim, MD
Andrew A. Shinar, MD
John Turba, MD
R. Vaclav-Hamsa, MD
Thomas Vail, MD
Tse-Shuing Wu, MD

Presidents' Gift Fund

\$48,000

The SOA Proudly acknowledges with sincere appreciation the following Past Presidents, Spouses, and Friends for their support of the Presidents' Gift Fund:

James H. Armstrong, MD

Champ L. Baker Jr., MD, FACS

C. Lowry Barnes, MD

George W. Brindley, MD

J. Ollie Edmunds, MD

Paul F. Lachiewicz, MD

W. Jason McDaniel Jr., MD

John J. McGraw, MD

James A. Nunley II, MD

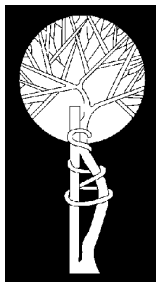
Robert M. Peroutka, MD

The Harley and Betty Baxter Fund

\$20,000

Out of the long-time friendship of Harley and Betty Baxter and the Southern Orthopaedic Association and its members, Mrs. Betty Baxter has generously donated \$20,000 to establish the Harley and Betty Baxter Fund which will provide an award each year to two residents/fellows for excellence in research. The SOA is humbled and appreciative of the generous gift from Mrs. Baxter and more importantly the wonderful relationship that all of its members have had over the years with the Baxters.

The SOA would like also to acknowledge the Baxter's long-time friends and those of the SOA, William & Lynne Morris who generously supported the SOA's resident award programs. Mr. Morris died this year and we will miss his participation and fellowship at our meetings.



Southern Orthopaedic Association

2011 Scientific Program

July 21–23, 2011
Fairmont Orchid Hotel
Big Island, Hawaii

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

2011 Program Chairman

H. Clayton Thomason III, MD

Gastonia, North Carolina



H. Clayton Thomason III, MD “Clay” is President of Carolina Orthopaedic and Sports Medicine Center, PA, in Gastonia, North Carolina. He completed his medical degree at the University of North Carolina at Chapel Hill and followed with his residency in orthopaedics there as well. He joined his current practice in 2000, after com-

pleting his residency. He has numerous publications and presentations.

Dr. Thomason is a general orthopaedic surgeon in private practice whose focus is on adult reconstruction. The majority of his case load consists of hip and knee arthroplasty, shoulder arthroplasty, revision hip and knee arthroplasty, and computer assisted knee arthroplasty. The rest of his practice consists of fracture care, sports medicine including knee and shoulder arthroscopy, and minor hand surgery.

He is very involved in local and state organizations, currently serving on the Executive Committee for the North Carolina Orthopaedic Association. Dr. Thomason is also extremely active within his local hospital, serving in such leadership roles as Chief of Orthopaedics, Chief of Surgery, and, most recently, Chief of Staff in 2010. He is currently involved in a pilot program for bundled knee payments with Gaston Memorial Hospital and local industry as well as an Accountable Care Organization structure. His interests also include missionary work abroad as he serves on the board of Lumiere Medical Ministries, focusing on medical missions in Haiti.

2011 Presidential Guest Speaker

Joshua J. Jacobs, MD

Chicago, Illinois



SOA is pleased to have Joshua J. Jacobs, MD as its Presidential Guest Speaker for the 2011 Annual Meeting in Hawaii. He is currently Professor and Chairman of the Department of Orthopaedic Surgery at Rush. In addition, Dr. Jacobs is an Adjunct Professor of Materials Science and Engineering at Northwestern University.

Dr. Jacobs received a Bachelor of Science degree in Materials Science and Engineering from Northwestern University and graduated from the University of Illinois Medical School. In 1987, Dr. Jacobs completed his orthopaedic training at the Combined Harvard Orthopaedic Residency Program in Boston. Dr. Jacobs then completed a one-year fellowship in adult reconstructive orthopaedic surgery at Rush University Medical Center.

Dr. Jacobs has remained at Rush since his fellowship training. His major research focus is on the biocompatibility of permanent orthopaedic implants, particularly joint replacement devices. Dr. Jacobs has published numerous peer-reviewed manuscripts, most of which focus on the biological consequences of material degradation from joint replacement implants. Dr. Jacobs has received several research awards including a Career Development Award from the Orthopedic Research and Education Foundation, the Otto Aufranc Award from The Hip Society, the Ann Doner Vaughan Kappa Delta Award from the American Academy of Orthopaedic Surgeons/Orthopaedic Research Society, and the Mark Coventry Award from the Knee Society.

Dr. Jacobs has served on the Special Grants Review Committee of the National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS) and in 2005, he was appointed to the NIAMS Advisory Council recently completing his four-year term. In 2000, he was named Fellow, American Institute for Medical and Biological Engineering and elected to the International Hip Society. Dr. Jacobs is the Past Chairman of the Council on Research, Quality Assessment and Technology of the American Academy of Orthopaedic Surgeons and Past President of the Orthopaedic Research Society. He is the current President of the United States Bone and Joint Decade.

2011 Distinguished Southern Orthopaedist Award



L. Andrew Koman, MD

Winston-Salem, North Carolina

SOA is pleased to have L. Andrew Koman, MD as the recipient of the 2011 Distinguished Southern Orthopaedist Award. Dr. Koman is Professor and Chair in the Department of Orthopaedic Surgery, Professor of Pediatrics, Associate

Director for Development and Research for the Division of Surgical Sciences, and Director of the Hand Fellowship at Wake Forest University in Winston-Salem, North Carolina. After a year of pediatrics and a year of general surgery, he completed a four-year orthopaedic residency at Duke University, which included 6 months as a Cerebral Palsy Foundation fellow. After completing a hand and microsurgery fellowship in 1979, he was a faculty member at Duke until 1981 at which time he joined the faculty at the Bowman Gray School of Medicine (now Wake Forest University School of Medicine). As Chair, Dr. Koman directs a department composed of twenty-six clinical faculty, four PhD faculty, and thirty residents and fellows. Dr. Koman is board certified in orthopaedic surgery and has a Certificate of Added Qualifications in hand surgery. His clinical practice is devoted to hand, microsurgery, and pediatric orthopaedics. He is the current and founding director of the Orthopaedic Fellowship in hand surgery, which has trained 20 surgeons.

Dr. Koman is a member of 20 professional societies and has served as President of the Eastern Orthopaedic Association, the North Carolina Orthopaedic Society, North Carolina Society for Surgery of the Hand (which he founded), the Hand Forum, Southern Orthopaedic Association, Southeastern Hand Club, and American Society for Surgery of the Hand. He currently serves as the President of the Clinical Orthopaedic Society. Dr. Koman is Editor-in-Chief of the *Journal of Surgical Orthopaedic Advances* and *Orthopaedic Care*, an online textbook. He reviews manuscripts for 10 national and international journals.

Dr. Koman has received more than 5 million dollars in grants and awards, and has been awarded three patents. In 1999, he and his research team received the Clinical Research Award from the Orthopaedic Research and Education Foundation for basic sciences and translational research in microvascular physiology. This work advanced clinical care of upper extremity vascular disorders, including occlusive and vaso-occlusive disease. In 2004, Dr. Koman was awarded the Heune Award by the Pediatrics Orthopaedic Society of North America for excellence in his previous research endeavors and

for the potential of his future research. This award honored clinical and research activities in the research and treatment of congenital hand disorders, cerebral palsy, spasticity management (including botulinum toxins), and pediatric nerve and vessel injury. Dr. Koman was the 2006 recipient of the Established Investigator in Clinical Sciences Award at Wake Forest University Health Sciences. The orthopaedic laboratories run by Dr. Koman have trained eleven post-doctoral fellows, three PhD recipients, and pioneered a 7-year physician scientist orthopaedic residency program. Dr. Koman's current basic research focuses on nerve repair and reconstruction, biomodulation after injury, botulinum toxin, microcirculation, microneural control, biomaterials, and motor unit activation.

Past Recipients of the Distinguished Southern Orthopaedist Award

1987	Wood W. Lovell, MD	Jacksonville, Florida
1988	J. Leonard Goldner, MD	Durham, North Carolina
1989	Alvin J. Ingram, MD	Memphis, Tennessee
1990	Jack C. Hughston, MD	Columbus, Georgia
1991	Frank H. Stelling III, MD	Greenville, South Carolina
1992	William Fisher Enneking, MD	Gainesville, Florida
1993	Thomas B. Dameron Jr., MD	Raleigh, North Carolina
1994	Lewis D. Anderson, MD	Mobile, Alabama
1995	Charles E. Epps, MD	Baltimore, Maryland
1996	James R. Urbaniak, MD	Durham, North Carolina
1997	Thomas E. Whitesides Jr., MD	Atlanta, Georgia
1998	John A. Murray, MD	Houston, Texas
1999	Frank C. Wilson, MD	Chapel Hill, North Carolina
2000	Frank H. Bassett III, MD	Durham, North Carolina
2001	John S. Gould, MD	Birmingham, Alabama
2002	David Hungerford, MD	Baltimore, Maryland
2003	David Sisk, MD	Memphis, Tennessee
2004	Charles A. Engh Sr., MD	Alexandria, Virginia
2005	Charles A. Rockwood Jr., MD	San Antonio, Texas
2006	Frank J. Frassica, MD	Baltimore, Maryland
2007	Richard J. Haynes, MD	Houston, Texas
2008	Champ L. Baker Jr., MD, FACS	Columbus, Georgia
2009	Robert S. Adelaar, MD	Richmond, Virginia
2010	Banks Blackwell, MD	Pine Bluff, Arkansas
<i>In Memorium</i>		

2011 Resident/Fellow Paper Award Winners

Harley & Betty Baxter Resident Awards

Augmentation of Rotator Cuff Repairs Using a
Bioengineering Approach and Myostatin Inhibitors
*Gregory P. Colbath, MD, MS, Medical University of South
Carolina, Charleston, SC*

*Friday, July 22, 2011, 10:18am–10:24am

Mid Term Survival of Head and Liner Exchange Revision for
Well-Fixed Acetabular Components: The Effect of Cup
Position and Polyethylene Type

*Nathan A. Mall, MD, Washington University School of
Medicine, St. Louis, MO*

*Saturday, July 23, 2011, 9:23am–9:29am

Clinical Orthopaedic Society Resident Awards

Incidence of Femoral Neck Fractures in Floating Knee
Injuries

*Brett Beavers, MD, John Peter Smith Hospital, Fort Worth,
TX*

*Thursday, July 21, 2011, 10:06am–10:12am

Cost Effectiveness Analysis of the Fixation of
Intertrochanteric Hip Fractures

*Adam M. Kaufman, MD, Duke University Medical Center,
Durham, NC*

*Friday, July 22, 2011, 10:36am–10:42am

SOA Presidents' Resident Award

Combat Related Major Upper Extremity Amputations
*Lt Scott M. Tintle, MD, Walter Reed Army Medical Center,
Washington, DC*

*Thursday, July 21, 2011, 9:18am–9:24am

SOA Resident Awards

Inpatient Enoxaparin and Outpatient Aspirin
Thromboprophylaxis Regimen Following Primary Hip and
Knee Arthroplasty

Stephen Hamilton, MD, Emory University, Atlanta, GA

*Thursday, July 21, 2011, 7:10am–7:16am

Anatomic Landmarks Utilized for Physseal-Sparing, Anatomic
Anterior Cruciate Ligament Reconstruction: An MRI Based
Study

Kyle E. Hammond, MD, Emory University, Atlanta, GA

*Saturday, July 23, 2011, 10:37am–10:43am

(Location listed by an author's name indicates the institution where the research took place.)

Financial Disclosure Information

Southern 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.

1. Royalties;
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);
6. Research or institutional support;
7. Department/division/practice receives research or institutional support.

The following participants have disclosed whether they or immediate family have received something of value from any medical and/or orthopaedic publishers.

8. Financial/material support;
9. Research or institutional support from any publisher;
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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MISSION

The Southern Orthopaedic Association (SOA) is a physician organization composed of orthopaedic surgeons in practice in the southern region of the United States. Its mission is to provide educational programs that are based upon the practice and developmental needs of its members, to foster collegiality among its members, and to encourage and support their professional development while maintaining the unique qualities of a southern regional organization. By addressing the above, the SOA provides the means by which its members are able to provide optimal high quality and ethical care for the musculoskeletal patients in the southern region of the United States.

PURPOSE

1. To provide the participants with an unbiased educational experience that will enable them to remain current in the general practice of orthopaedic surgery.
2. To provide the participants with an in-depth exposure to various subspecialty areas of orthopaedic surgery.
3. To provide participants with an opportunity to be exposed to leading orthopaedic advances.
4. To present a forum for an open exchange of ideas between the presenters, the faculty, and the participants through paper presentations, instructional courses, guest lectureships, symposia, multimedia educational sessions, and poster exhibits.

OBJECTIVES

Educational objectives will be met through a combination of paper presentations, instructional courses, guest lectureships, symposia, multimedia educational sessions, and poster exhibits 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. Critically evaluate orthopaedic diseases and treatments through evidence based outcome presentations.
2. Discuss basic science and clinical study advances and their implications pertaining to the diagnosis and treatment of orthopaedic diseases.
3. Enhance and maximize clinical and operative skills in the management of new and leading technology in orthopaedic disorders.

SCIENTIFIC POSTER SESSIONS

Scientific Posters are an important feature of the SOA Annual Meeting. Posters will be on display each day of the Scientific Program and poster presenters will be available to answer questions before and after the Scientific Program Sessions. **The Scientific Program Schedule (pages 6–7) designates the times the poster presenters will be available for discussion.**

MULTIMEDIA EDUCATION SESSIONS

Multimedia education materials will be offered on Thursday, Friday, and Saturday, July 21-23, 3:30pm–5:00pm. A comprehensive selection of AAOS DVDs will be available for your individual education.

CME ACCREDITATION

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons and the Southern Orthopaedic Association.

The American Academy of Orthopaedic Surgeons is accredited by the ACCME to sponsor continuing medical education for physicians.

The American Academy of Orthopaedic Surgeons designates this live activity for a maximum of 28.25 *AMA PRA Category 1 Credits*[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity.

* 19.25 CME Credits for Scientific Program

* 4.5 CME Credits for Scientific Poster Sessions

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CEC CREDIT

Physician's Assistants can receive up to 28.25 credit hours toward Continuing Education Credits. AAPA accepts American Medical Association Category I, Level 1 CME credit for the Physician's Recognition Award from organizations accredited by the ACCME.

CME NOTE

To receive CME credit, you are required to turn in your completed CME Record Form at the end of your participation in the Sessions; otherwise your CME Credits cannot be certified. **(CME Credit Records, Needs Assessment, and Course Evaluation Forms are in the back of this program, pages 119-127.)**

Attendees are requested to complete a course evaluation for use in developing future SOA 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 SOA. 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 SOA Annual Meeting has been made available by the Southern Orthopaedic Association 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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FDA STATEMENT

Some drugs or medical devices demonstrated at the SOA 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

July 21-23, 2011

Salon I (unless otherwise specified)

Thursday, July 21, 2011

(Presenters and times are subject to change.)

6:00am–6:30am	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.	7:04am–7:10am	Comparison of Perioperative Cost-Utility for Conventional and Customized Total Knee Arthroplasty <i>Ryan M. Nunley, MD, Washington University, St. Louis, MO</i>
6:30am	Welcome, Introduction of Program, and Announcements <i>Paul F. Lachiewicz, MD</i> <i>H. Clayton Thomason III, MD</i>	7:10am–7:16am	SOA Resident Award Inpatient Enoxaparin and Outpatient Aspirin Thromboprophylaxis Regimen Following Primary Hip and Knee Arthroplasty <i>Stephen Hamilton, MD, Emory University, Atlanta, GA</i> <i>*Presented by Michael S. Sridhar, MD</i>
GENERAL SESSION 1: Adult Reconstruction I — Knee Osteoarthritis and Total Knee Arthroplasty			
Moderators: C. Lowry Barnes, MD George W. Brindley, MD			
6:40am–6:46am	Dynamic Soft Tissue Balancing in Total Knee Arthroplasty <i>Douglas G. Nuelle, MD, Fannin Regional Hospital, Blue Ridge, GA</i>	7:16am–7:22am	Assessment of Accuracy of Robotically Assisted Unicompartamental Arthroplasty <i>Ali Mofidi, MD, Wake Forest University Baptist Medical Center, Winston-Salem, NC</i> <i>*Presented by Riyaz H. Jinnah, MD</i>
6:46am–6:52am	Tantalum Cones for Severe Tibial and Femoral Bone Loss <i>Michael P. Bolognesi, MD, Duke University Medical Center, Durham, NC</i>	7:22am–7:28am	Body Mass Index, Lateral Thrust to the Knee and Lateral Compartment Lift-Off, A Challenge in Total Knee Replacement <i>Edward MacMahon, MD, Fairfax Hospital, Annandale, VA</i>
6:52am–6:58am	Incidence of Acute Kidney Injury Following Placement of Antibiotic-Impregnated Cement Spacers: A Retrospective Review <i>John Koethe, MD, Vanderbilt University Medical Center, Nashville, TN</i> <i>*Presented by Andrew A. Shinar, MD</i>	7:28am–7:42am	Discussion and Questions
6:58am–7:04am	Robot-Assisted Unicompartamental Knee Arthroplasty: Outcomes of 500 Consecutive Procedures <i>Maria S. Goddard, MD, Wake Forest University School of Medicine, Winston-Salem, NC</i> <i>*Presented by Riyaz H. Jinnah, MD</i>	SYMPOSIUM 1: Frontiers in Sports Medicine	
		Moderator: Champ L. Baker Jr., MD	
		7:43am–7:51am	Meniscal Repair <i>Claude T. Moorman III, MD, Duke University Medical Center, Durham, NC</i>
		7:51am–7:59am	ACL Injuries <i>Darren L. Johnson, MD, University of Kentucky, Lexington, KY</i>

(Location listed by an author's name indicates the institution where the research took place.)

Thursday, July 21, 2011

(Presenters and times are subject to change.)

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|---------------|---|----------------|---|
| 7:59am–8:07am | Biceps Tendon/Labral Complex Injuries
<i>Spero G. Karas, MD, Emory Healthcare Sports Medicine, Atlanta, GA</i> | 9:30am–9:36am | Shoulder Arthroplasty for the Treatment of Proximal Humerus Non-Unions
<i>John Sperling, MD, MBA, Mayo Clinic Rochester, Rochester, MN</i> |
| 8:07am–8:15am | Articular Cartilage Repair/Regrowth
<i>Jocelyn R. Wittstein, MD, Bassett Healthcare, Oneonta, NY</i> | 9:36am–9:42am | Limited Fasciotomy for Early Dupuytren's Contracture
<i>Michael S. Sridhar, MD, Emory University Department of Orthopaedic Surgery, Atlanta, GA</i> |
| 8:15am–8:23am | Hip Arthroscopy
<i>Tally E. Lassiter, MD, MHA, Bassett Healthcare, Oneonta, NY</i> | 9:42am–9:48am | Interpreting Proximal Ulna Anatomy on Static Fluoroscopic Images
<i>Anna Babushkina, MD, Georgetown University Hospital, Washington, DC</i>
<i>*Presented by Scott G. Edwards, MD</i> |
| 8:23am–8:40am | Discussion and Questions | 9:48am–10:05am | Discussion and Questions |
| 8:40am–9:00am | Break — Please visit exhibitors and posters | | |

GENERAL SESSION 2: Upper Extremity and Hand: — Pain and Arthritis

Moderators: Donald K. Bynum, MD
Henry A. Backe, MD

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|---------------|--|
| 9:00am–9:06am | Accuracy of Thumb Carpometacarpal Joint Injection
<i>John Mowbray, MD, Vanderbilt University Medical Center, Nashville, TN</i> |
| 9:06am–9:12am | Pyrolytic Carbon Arthroplasty Versus Silicone Arthroplasty
<i>Raul Curiel, MD, University of South Alabama Department of Orthopaedic Surgery, Mobile, AL</i> |
| 9:12am–9:18am | Accuracy of Carpal Tunnel Injections
<i>John Mowbray, MD, Vanderbilt University Medical Center, Nashville, TN</i> |
| 9:18am–9:24am | SOA Presidents' Resident Award
Combat Related Major Upper Extremity Amputations
<i>Lt Scott M. Tintle, MD, Walter Reed Army Medical Center, Washington, DC</i> |
| 9:24am–9:30am | Supraclavicular Long Thoracic Nerve Decompression for Acute Traumatic Scapular Winging
<i>Zhongyu Li, MD, PhD, Wake Forest University Baptist Medical Center, Winston-Salem, NC</i> |

GENERAL SESSION 3: Trauma and Basic Science

Moderators: Laurence E. Dahners, MD
Langdon A. Hartsock, MD

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|-----------------|---|
| 10:06am–10:12am | Clinical Orthopaedic Society Resident Award
Incidence of Femoral Neck Fractures in Floating Knee Injuries
<i>Brett Beavers, MD, John Peter Smith Hospital, Fort Worth, TX</i> |
| 10:12am–10:18am | Results of a New Multi-Planar Intramedullary Implant Treating Transverse and Comminuted Olecranon Fractures and Nonunions
<i>Scott G. Edwards, MD, Georgetown University Hospital, Washington, DC</i> |
| 10:18am–10:24am | Ultrasound-Guided Femoral Nerve and Lateral Femoral Cutaneous Nerve Blocks for Intramedullary Nail Fixation in High Risk Elderly Patients with Hip Fractures
<i>Norman E. Stone III, MD, Maimonides Medical Center, Brooklyn, NY</i> |
| 10:24am–10:30am | Biomechanical Comparison of Multi-Directional Nail and Locking Plate Fixation in Unstable Olecranon Fractures
<i>Evan Argintar, MD, Georgetown University Hospital, Washington, DC</i>
<i>*Presented by Scott G. Edwards, MD</i> |

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Thursday, July 21, 2011

(Presenters and times are subject to change.)

10:30am–10:36am Knee Stiffness after Treatment of Femoral Shaft Fractures in Victims of the 2010 Haiti Earthquake
Eric Angermeier, MD, Medical University of South Carolina, Charleston, SC

10:36am–10:42am Fixation of Unstable Inter-Trochanteric Hip Fractures in Internal Rotation: An Important Predictor of Fracture Union
Parthiv Rathod, MD, Lenox Hill Hospital, New York, NY

10:42am–10:48am Comparison of Intraoperative C-Arm Fluoroscopy to Postoperative Radiographs in Operative Fracture Fixation
Taylor A. Horst, MD, Medical University of South Carolina, Charleston, SC

10:48am–11:05am **Discussion and Questions**

11:05am–11:25am **Break — Please visit exhibitors and posters**

GENERAL SESSION 4: Guest Speakers

Moderator: Paul F. Lachiewicz, MD

11:25am–11:26am Introduction of Presidential Guest Speaker
Paul F. Lachiewicz, MD

11:26am–12:05pm **Presidential Guest Speaker**
Biological Implications of Metal on Metal Bearings
Joshua J. Jacobs, MD, Rush-Presbyterian Medical Center, Chicago, IL

12:05pm–12:10pm **OREF Presentation**
Ramon L. Jimenez, MD

12:11pm–12:30pm **First Business Meeting**

12:30pm **Adjourn**

1:00pm–2:30pm **Instructional Course Lecture**
Revision Total Knee Arthroplasty
Paul F. Lachiewicz, MD, Chapel Hill Orthopedics Surgery and Sports Medicine, Chapel Hill, NC; Duke University Medical Center, Durham, NC

2:30pm–3:30pm **Scientific Poster Session (Salon Foyer)**
Note: Presenters will be available to answer questions.

3:30pm–5:00pm **Multimedia Education Session (Salon Foyer)**

(Location listed by an author's name indicates the institution where the research took place.)

Friday, July 22, 2011

(Presenters and times are subject to change.)

6:00am–6:30am **Scientific Poster Session** (*Salon Foyer*)

Note: Presenters will be available to answer questions.

6:30am–6:35am **Announcements**

H. Clayton Thomason III, MD

GENERAL SESSION 5: Sports Medicine

Moderators: Alison P. Toth, MD
Christian Lattermann, MD

6:35am–6:41am Outcomes of Grade I and II Hamstring Injuries in an Intercollegiate Athletic Population Using a Novel Rehabilitation Protocol

Kelly G. Kilcoyne, MD, United States Naval Academy, Annapolis, MD

6:41am–6:47am Primary ACL Surgery Using Non-Anatomic (Tibial Tunnel) Tibialis Anterior Allograft Versus Anatomic (Medial Portal) Autograft in Patients Under 25 Years of Age: Failure and Re-Operation Rate Analysis

Darren L. Johnson, MD, University of Kentucky, Lexington, KY

6:47am–6:53am Biomechanical Analysis of Single-Tunnel–Double-Bundle Posterior Cruciate Ligament Reconstruction

Amar Mutnal, MD, Cleveland Clinic Florida, Weston, FL

6:53am–6:59am Incidence of Radiographic Findings Consistent with Femoral Acetabular Impingement in Military Personnel with Femoral Neck Stress Fractures

Timothy Carey, DO, Dwight D. Eisenhower Army Medical Center, Fort Gordon, GA

6:59am–7:05am Open Subpectoral Biceps Tenodesis: An Anatomical Evaluation of At-Risk Structures

CPT Jonathan F. Dickens, MD, United States Naval Academy, Bethesda, MD
*Presented by Daniel G. Kang, MD

7:05am–7:17am **Discussion and Questions**

SYMPOSIUM 2: Update on Hip Fractures

Moderators: John J. McGraw, MD
William C. Andrews Jr., MD

7:18am–7:26am Epidemiology and Prevention
Evan F. Ekman, MD, Southern Orthopaedic Sports Medicine, Columbia, SC

7:26am–7:34am Internal Fixation vs. Hemiarthroplasty for Femoral Neck Fractures
Riyaz H. Jinnah, MD, Wake Forest University Health Sciences, Winston-Salem, NC

7:34am–7:42am Total Hip Arthroplasty for Femoral Neck Fractures
Andrew A. Shinar, MD, Vanderbilt Orthopaedic Institute, Nashville, TN

7:42am–7:50am Intertrochanteric Fractures — IM Device vs. Screw-Plate
Laurence E. Dahners, MD, University of North Carolina, Chapel Hill, NC

7:50am–7:58am Total Hip Arthroplasty after Failure of Fixation
Daniel J. Berry, MD, Mayo Clinic Rochester, Rochester, MN

7:58am–8:10am **Discussion and Questions**

SYMPOSIUM 3: Update on Ankle/Foot Fractures

Moderator: Robert D. Zura, MD

8:11am–8:19am Bimalleolar Ankle Fractures
Robert D. Zura, MD, Duke University Medical Center, Durham, NC

8:19am–8:27am Pilon Fractures
Langdon A. Hartsock, MD, Medical University of South Carolina, Charleston, SC

8:27am–8:35am Lisfranc Injuries
Mark Perry, MD, University of South Alabama, Mobile, AL

8:35am–8:43am Calcaneus Fractures
James A. Nunley II, MD, Duke University Medical Center, Durham, NC

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Friday, July 22, 2011

(Presenters and times are subject to change.)

8:43am–8:55am **Discussion and Questions**

8:55am–9:15am **Break — Please visit exhibitors and posters**

GENERAL SESSION 6: Spine and Pediatric

Moderators: Shawn R. Gilbert, MD
James F. Mooney III, MD

9:15am–9:21am Anterior Diagonal Osteotomy for Bladder and Cloacal Exstrophy
Michael J. Conklin, MD, Children's Health System, Birmingham, AL

9:21am–9:27am Patient Perception of Breast Asymmetry in Adolescent Idiopathic Scoliosis (AIS)
Jeannie Huh, MD, Texas Scottish Rite Children's Hospital, Dallas, TX

9:27am–9:33am Static vs. Dynamic Foot Abduction Orthoses for Clubfeet
Shawn R. Gilbert, MD, University of Alabama at Birmingham, Birmingham, AL

9:33am–9:39am Preparing the Lumbar Intervertebral Disk Space for Interbody Procedures: A Comparison Between the Traditional Method and a New Automated Method
CPT Keith Jackson, MD, Landstuhl Regional Medical Center, Landstuhl, Germany

9:39am–9:45am Safety and Validity of Limited MRI Evaluation of the Lumbar Spine
Austin Hill, MD, MPH, Greenville Hospital Systems – University of South Carolina, Greenville, SC

9:45am–9:51am The Biomechanical Consequences of Rod Reduction on Pedicle Screws: Should It Be Avoided?
Daniel G. Kang, MD, Walter Reed Army Medical Center, Washington, DC

9:51am–10:05am **Discussion and Questions**

GENERAL SESSION 7: Basic Science

Moderators: Claude T. Moorman III, MD
Spero G. Karas, MD

10:06am–10:12am Defining the Impaction Frequency and Threshold Force Required for Femoral Impaction Grafting in Revision Hip Arthroplasty — A Human Cadaveric Biomechanical Study
Fionnan Cummins, MB, BCh, BAO, MCh, Trinity College, Dublin, Ireland; Cappagh National Orthopaedic Hospital, Finglas, Dublin, Ireland

10:12am–10:18am An Unusually Large Number of Coracoclavicular Joints Seen in Patients Living in a Small American Town
Jose Ramon, MD, Touchette Regional Hospital, Centerville, IL

10:18am–10:24am **Harley & Betty Baxter Resident Award**
Augmentation of Rotator Cuff Repairs Using a Bioengineering Approach and Myostatin Inhibitors
Gregory P. Colbath, MD, MS, Medical University of South Carolina, Charleston, SC

10:24am–10:30am Promoting Angiogenesis to Improve Healing of Segmental Bone Defects
Shawn R. Gilbert, MD, University of Alabama at Birmingham, Birmingham, AL

10:30am–10:36am Local Elution Profiles of a Highly Purified Calcium Sulfate Pellet at Physiologic PH, Loaded with Vancomycin and Tobramycin, in the Treatment of Infected Total Joints
Gerhard E. Maale, MD, Dallas Ft. Worth Sarcoma Group/Presbyterian Hospital Dallas, Dallas, TX

10:36am–10:42am **Clinical Orthopaedic Society Resident Award**
Cost Effectiveness Analysis of the Fixation of Intertrochanteric Hip Fractures
Adam M. Kaufman, MD, Duke University Medical Center, Durham, NC

10:42am–10:54am **Discussion and Questions**

10:54am–11:14am **Break — Please visit exhibitors and posters**

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Friday, July 22, 2011

(Presenters and times are subject to change.)

GENERAL SESSION 8: Presidential Address

Moderator: George W. Brindley, MD

11:14am–11:15am Introduction

George W. Brindley, MD

11:15am–11:30am **Presidential Address**

What is the Formula for Happiness?

Paul F. Lachiewicz, MD, Chapel Hill Orthopedics Surgery and Sports Medicine, Chapel Hill, NC; Duke University Medical Center, Durham, NC

11:30am–11:45am **Report from the AAOS**

Current Status of National Orthopaedic Issues

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

GENERAL SESSION 9: Pain Management and Miscellaneous Topics

Moderators: Frederick C. Flandry, MD, FACS

H. Clayton Thomason III, MD

11:46am–11:52am Perioperative Management of Obstructive Sleep Apnea Among Patients Undergoing Total Joint Replacement Surgery: A

Method for Screening and Treatment

Jason W. Thomason, MD, FCCP, D-ABSM, Southeastern Sleep Disorders Center of Salem Chest Specialists/Orthopaedic Specialists of the Carolinas/Forsyth Medical Center, Winston-Salem, NC

11:52am–11:58am Compliance with Incentive Spirometry Use

Hamid Hassanzadeh, MD, Johns Hopkins University/Orthopaedic Surgery at Good Samaritan Hospital, Baltimore, MD

11:58am–12:04pm Practices and Physician Satisfaction with Perioperative Pain Management in Hip Fracture Patients

Micah Lissy, MD, Montefiore Medical Center, Bronx, NY

12:04pm–12:10pm Managing Your Reputation on the Internet

Joy Tu, BS, Greensboro, NC

12:10pm–12:16pm Survey of Practice Variation Among Orthopaedic Surgeons

Guy Foulkes, MD, Mercer University School of Medicine, Macon, GA
*Presented by J. Casey Spivey, MS

12:16pm–12:22pm The Long Term Safety and Efficacy of Intrathecal Therapy Using Sufentanil in Chronic Pain

Jose J. Monsivais, MD, Hand and Microsurgery Center of El Paso, El Paso, TX

12:22pm–12:30pm **Discussion and Questions**

12:30pm

Adjourn

1:00pm–2:30pm

Instructional Course Lecture

Hip Impingement, Hip Pain and Early Osteoarthritis

Frederick C. Flandry, MD, FACS, Hughston Clinic, Columbus, GA
Langdon A. Hartsock, MD, Medical University of South Carolina, Charleston, SC

2:30pm–3:30pm

Scientific Poster Session (Salon Foyer)

Note: Presenters will be available to answer questions.

3:30pm–5:00pm

Multimedia Education Session (Salon Foyer)

(Location listed by an author's name indicates the institution where the research took place.)

Saturday, July 23, 2011

(Presenters and times are subject to change.)

6:00am–6:30am **Scientific Poster Session (Salon Foyer)**

Note: Presenters will be available to answer questions.

6:30am–6:35am **Announcements**

H. Clayton Thomason III, MD

SYMPOSIUM 4: Clinical Orthopaedic Society — Update on Common Upper Extremity Problems

Moderator: Frederick N. Meyer, MD

6:40am–6:48am Basal Joint Arthritis of the Thumb
J. Donald Opgrande, MD, University of North Dakota, Fargo, ND

6:48am–6:56am Dupuytren's Contracture
Frederick N. Meyer, MD, University of South Alabama, Mobile, AL

6:56am–7:04am Distal Radius Fractures
L. Andrew Koman, MD, Wake Forest University Baptist Medical Center, Winston-Salem, NC

7:04am–7:12am Children's Elbow Fractures
Frederick N. Meyer, MD, University of South Alabama, Mobile, AL

7:12am–7:24am **Discussion and Questions**

GENERAL SESSION 10: Foot & Ankle and Tumors

Moderators: Angus M. McBryde Jr., MD
James A. Nunley II, MD

7:25am–7:31am Changes in Gait Mechanics Two Years Following Total Ankle Replacement
Robin M. Queen, PhD, Duke University Medical Center, Durham, NC

7:31am–7:37am Detachment of the Achilles Tendon and Repair with Suture Anchors for Extensile Exposure of the Posterior Ankle
Robert Henshaw, MD, Washington Hospital Center, Washington DC

7:37am–7:43am Comparing the Effectiveness of Eccentric Training Along with Conventional Physical Therapy as Treatment for Insertional Achilles Tendinosis
Margaret Kedia, PhD, DPT, Campbell Clinic Orthopaedics, Germantown, TN
**Presented by G. Andrew Murphy, MD*

7:43am–7:49am A Modified Mason-Allen Technique for Repairing Acute Achilles Tendon Rupture Using Fiberwire Sutures
Jong Taek Kim, MD, Medical University of South Carolina, Charleston, SC

7:49am–7:55am Talar Mosaicplasty
Angus M. McBryde Jr., MD, American Sports Medicine Institute, Birmingham, AL
**Presented by Dominic J. Lewis, MD*

7:55am–8:01am Simultaneous Intramedullary Nailing of Skeletal Metastases
Bryan Moon, MD, MD Anderson Cancer Center, Houston, TX

8:01am–8:07am Radiographic Response of Giant Cell Tumor of Bone During Treatment with Denosumab
Robert Henshaw, MD, Washington Hospital Center, Washington, DC

8:07am–8:20am **Discussion and Questions**

8:20am–8:45am **Break — Please visit exhibitors and posters**

GENERAL SESSION 11: Distinguished Southern Orthopaedist

Moderator: Paul F. Lachiewicz, MD

8:45am–8:47am Introduction of Distinguished Southern Orthopaedist
Paul F. Lachiewicz, MD

8:47am–9:16am **Distinguished Southern Orthopaedist Presentation**
Practical Applications of Translational Research and Collection of Outcome Data: Positive Impact on Clinical Care
L. Andrew Koman, MD, Wake Forest University Baptist Medical Center, Winston-Salem, NC

GENERAL SESSION 12: Adult Reconstruction II — Hip Arthritis and Arthroplasty

Moderators: Michael P. Bolognesi, MD
Riyaz H. Jinnah, MD

9:17am–9:23am Complications Following Hip and Knee Replacement: Does Race Matter?
Muyibat Adelani, MD, Vanderbilt University, Nashville, TN

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Saturday, July 23, 2011

(Presenters and times are subject to change.)

- 9:23am–9:29am **Harley & Betty Baxter Resident Award**
Mid Term Survival of Head and Liner Exchange Revision for Well-Fixed Acetabular Components: The Effect of Cup Position and Polyethylene Type
Nathan A. Mall, MD, Washington University School of Medicine, St. Louis, MO
- 9:29am–9:35am Ten-to-Sixteen Year Results of a 2nd Generation Modular Acetabular Component
Paul F. Lachiewicz, MD, Chapel Hill Orthopedics Surgery and Sports Medicine, Chapel Hill, NC
- 9:35am–9:41am Return to Work and Recreation Following Hip Resurfacing
Paul Balthrop, MD, University of Tennessee-Memphis, Memphis, TN
- 9:41am–9:47am Ischemic Fasciitis and ‘Pseudo-Tumor’ after Ceramic-on-Ceramic Total Hip Arthroplasty: A Case Report
George W. Brindley, MD, Texas Tech University Health Sciences Center, Lubbock, TX
- 9:47am–9:53am Metal Ion Levels after Hip Resurfacing in a Young Active Population
Ryan M. Nunley, MD, Washington University, St. Louis, MO
- 9:53am–9:59am 5-8 Year Clinical Experience with 621 Modular Neck (MN) Femoral Components in Total Hip Arthroplasty (THA)
Brad L. Penenberg, MD, Arthritis and Joint Replacement Institute of Southern California, Beverly Hills, CA
- 9:59am–10:10am **Discussion and Questions**
- 10:10am–10:25am **Break**
- GENERAL SESSION 13: Sports Knee and Shoulder**
- Moderators:** Darren L. Johnson, MD
Matthew J. Matava, MD
- 10:25am–10:31am Outcomes for Arthroscopic Repair of Type II SLAP Lesions in the Worker’s Compensation Population
- 10:31am–10:37am Previous Partial Meniscectomy Increases the Incidence of Knee Articular Cartilage Lesions Among College Football Athletes at the NFL Combine
Jeffrey J. Nepple, MD, Washington University, St. Louis, MO
*Presented by Matthew J. Matava, MD
- 10:37am–10:43am **SOA Resident Award**
Anatomic Landmarks Utilized for Physeal-Sparing, Anatomic Anterior Cruciate Ligament Reconstruction: An MRI Based Study
Kyle E. Hammond, MD, Emory University, Atlanta, GA
- 10:43am–10:49am Subacromial Hook Plate for Osteosynthesis of Type II–B Clavicle Fractures and AC Joint Separations
Steven Brantley, MD, Emory University, Atlanta GA
- 10:49am–10:55am Influence of the Anteromedial and Posterolateral Bundles of the ACL on the Stability of the Knee — A Cadaver Study
Radek Hart, Prof, MD, PhD, FRCS, General Hospital, Znojmo, Czech Republic
- 10:55am–11:04am **Discussion and Questions**
- SYMPOSIUM 5: New Frontiers in Total Hip and Knee Arthroplasty for Osteoarthritis**
- Moderator:** Daniel J. Berry, MD
- 11:05am–11:13am New Ingrowth Surfaces
Joshua J. Jacobs, MD, Rush-Presbyterian Medical Center, Chicago, IL
- 11:13am–11:21am Computer Navigation for Hip/Knee Surgery
Michael P. Bolognesi, MD, Duke University Medical Center, Durham, NC
- 11:21am–11:29am Highly Cross-Linked Polyethylene for Total Knees
Paul F. Lachiewicz, MD, Chapel Hill Orthopedics Surgery and Sports Medi-

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Saturday, July 23, 2011

(Presenters and times are subject to change.)

	<i>cine, Chapel Hill, NC; Duke University Medical Center, Durham, NC</i>	1:00pm–2:30 pm	Instructional Course Lecture Reverse Total Shoulder for Osteoarthritis and Severe Shoulder Pain <i>Tally E. Lassiter, MD, MHA, Bassett Healthcare, Oneonta, NY</i> <i>Spero G. Karas, MD, Emory Healthcare Sports Medicine, Atlanta, GA</i>
11:29am–11:37am	Metal-Metal Articulation for Total Hip: Past Its Prime? <i>C. Lowry Barnes, MD, Arkansas Specialty Orthopaedics, Little Rock, AR</i>		
11:37am–11:45am	Modular Prostheses: Help or Hindrance? <i>Joshua J. Jacobs, MD, Rush-Presbyterian Medical Center, Chicago, IL</i>	2:30pm–3:30pm	Scientific Poster Session (<i>Salon Foyer</i>) Note: Presenters will be available to answer questions.
11:45am–12:00pm	Discussion and Questions	3:30pm–5:00pm	Multimedia Education Session (<i>Salon Foyer</i>)
12:00pm–12:15pm	Second Business Meeting		
12:15pm	Adjourn		

(Location listed by authors' names indicates the institution where the research took place.)

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2011 Scientific Program Abstracts — Thursday Salon I (unless otherwise specified)

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

Thursday, July 21, 2011

GENERAL SESSION 1: Adult Reconstruction I — Knee Osteoarthritis and Total Knee Arthroplasty

Moderators: C. Lowry Barnes, MD
George W. Brindley, MD

6:40am–7:42am

6:40am–6:46am

Dynamic Soft Tissue Balancing in Total Knee Arthroplasty

Douglas G. Nuelle, MD

Introduction: Soft tissue balancing in TKA relies on subjective feel by the surgeon. This study aims to quantify balance to eliminate subjectivity in the soft tissue part of the operation.

Method: Fifty consecutive patients undergoing primary TKA were studied using a simple calibrated tensioning device that correlated flexion and extension gap distances with the amount of force applied. Stress strain diagrams were made and compared.

Results: Symmetrical tensioning can guide the surgeon's releases. The amount of force on the entire soft tissue envelope is 40 to 80 lbs. Diagrams will be presented.

Discussion and Conclusion: The dynamic behavior of the soft tissue envelope in TKA is similar from patient to patient. The soft tissues will stretch from 30 lbs to about 60 lbs and then they begin to lose their elasticity and produce a "stiff" knee. The implications of these diagrams will be discussed.

Notes:

6:46am–6:52am

Tantalum Cones for Severe Tibial and Femoral Bone Loss

Michael P. Bolognesi, MD
Paul F. Lachiewicz, MD
Thomas P. Vail, MD

Introduction: The optimal method for managing large bone defects during revision knee arthroplasty is not known. Metaphyseal fixation using porous tantalum tibial and femoral cones has been proposed as a new method for the treatment of severe bone loss in revision knee arthroplasty. We reviewed a two center series of patients who had revision knee arthroplasty with large bone defects reconstructed with porous tantalum cones.

Methods: This was a retrospective review of 33 tantalum cones (9 femoral, 24 tibial) implanted during 27 revision knee arthroplasties in 14 women and 13 men with a mean age of 64.6 years. The preoperative diagnosis was reimplantation for infection in 13 knees, aseptic loosening in 10, and wear-osteolysis in 4. Patients were evaluated clinically and radiographically using the score systems of the Knee Society.

Results: The patients were followed for a mean of 3.3 years (range, 2–5.7 years). The mean Knee Society pain score improved from 40 points preoperatively to 79 points postoperatively, and the mean function score improved from 19 points to 47 points. There was one knee, with both femoral and tibial cones, removed for infection (3.7%) and one knee revised for femoral cone and component loosening. All but one cone showed osseointegration. There was one reoperation for femoral shaft fracture, and one for wound dehiscence.

Conclusions: There was a high rate of osseointegration and a low rate of infection in these 27 revision patients with severe bone loss. At two to 5.7 year follow-up, these results of metaphyseal fixation with tantalum cones are promising, but longer term follow-up is required. Level of Evidence: Therapeutic Level IV.

Notes:

6:52am–6:58am

Incidence of Acute Kidney Injury Following Placement of Antibiotic-Impregnated Cement Spacers: A Retrospective Review

John Koethe, MD

*Andrew A. Shinar, MD

Sydney Hester, MD

Ginger E. Holt, MD

Cathy Jenkins

Geraldine G. Miller, MD

Patty Wright, MD

Introduction: The use of antibiotic-impregnated cement spacers during the revision of infected total knee arthroplasties is associated with impaired renal function in case reports. However, the actual incidence of acute kidney injury (AKI) following spacer placement has been previously reported as being less than 3%. We hypothesized that our incidence of AKI was significantly higher, and thus endeavored to determine our rate and its associations.

Methods: We reviewed all cases of antibiotic-impregnated spacers placed for infected knee arthroplasties between January 1998 and November 2009 at our institution. AKI was defined as a >50% rise in serum creatinine from baseline to a level >1.4 mg/dL within 90 days of the procedure. Logistic regression was used to assess associations between AKI and covariates.

Results: Eighty-five subjects met inclusion criteria; median age was 63 years and median baseline creatinine was 0.91 mg/dL. Spacers contained aminoglycosides (93%), vancomycin (82%), and other antibiotics (6%), and all subjects received concomitant intravenous antibiotics (vancomycin and/or a beta-lactam [n=82], or an aminoglycoside alone [n=3]). The incidence of AKI was 16% (n=14; 95% CI 10–26%), and 25% (n=21; 95% CI 17–35%) of subjects had a >30% creatinine rise from baseline. AKI was associated with the spacer tobramycin dose (odds ratio 1.24 per 1g increase [95% CI 1.00 to 1.52]; p=0.05), as was a >30% serum creatinine rise from baseline (odds ratio 1.30 per 1g tobramycin increase [95% CI 1.07 to 1.59]; p=0.008) in a univariate logistic regression, but not with age, race, baseline serum creatinine, or vancomycin dose.

Discussion and Conclusion: The incidence of AKI exceeded previous estimates of nephrotoxicity related to long-term intravenous vancomycin alone, and previous reports involving spacers. AKI was associated with spacer tobramycin dose, but not age or baseline renal function. Prospective trials to moni-

tor renal function and eluted spacer antibiotic serum levels are warranted.

Notes:

6:58am–7:04am

Robot-Assisted Unicompartmental Knee Arthroplasty: Outcomes of 500 Consecutive Procedures

Maria S. Goddard, MD

*Riyaz H. Jinnah, MD

Joseph S. Bircher, BS

Jason E. Lang, MD

Bo Lu, MD

Gary G. Poehling, MD

Introduction: Osteoarthritis of the knee is a debilitating condition affecting millions. 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: 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.

Discussion and 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.

Notes:

7:04am–7:10am

Comparison of Perioperative Cost-Utility for Conventional and Customized Total Knee Arthroplasty

Ryan M. Nunley, MD
Robert L. Barrack, MD
Bradley Ellison, MD
Adrienne Ford, MPH
Keith A. Foreman, RN, BS

Introduction: Increased focus has been directed towards optimizing the efficiency and cost–utility associated with total knee arthroplasty (TKA). The purpose of this study was to compare perioperative time, material resource allocation, and sterile processing required for conventional instrumentation verses customized cutting guides for TKA.

Methods: The full cycle of sterile processing for TKA instrumentation was analyzed and divided into the following phases: instrument collection, transportation, decontamination (manual and mechanical washing), instrument tray assembly, and sterilization. Each phase was timed for five conventional and five customized TKA cases by an independent observer, not involved with the surgical procedure, using standard industrial efficiency methodology.

Results: On average, 4 fewer trays of instruments were needed to perform a customized TKA compared with conventional TKA. Timed measurements were averaged for the following phases of processing for conventional and customized TKA, respectively: instrument collection (11.0 vs. 7.4min; $p = 0.031$), transportation (8.8 vs. 6.4 min; $p = 0.06$), manual washing (40.0 vs. 29.8 min; $p = 0.007$), mechanical washing (41.0 vs. 41.0), tray assembly (86.4 vs. 17.6 min; $p = 0.0002$), sterilization (60.0 vs. 60.0 min). Total processing times for conventional and customized TKA were 4.2 and 2.8 hours ($p = 0.0004$), which only resulted in an actual hospital cost savings of \$24.59 per case.

Discussion and Conclusion: Customized TKA cutting guides reduced perioperative processing time significantly compared with conventional TKA instrumentation, however, custom cutting blocks did not achieve substantial hospital savings in instrument processing.

Notes:

7:10am–7:16am

SOA Resident Award

Inpatient Enoxaparin and Outpatient Aspirin Thromboprophylaxis Regimen Following Primary Hip and Knee Arthroplasty

Stephen Hamilton, MD
*Michael S. Sridhar, MD
William Whang, MD

Introduction: Thromboembolic disease is a recognized complication following hip and knee arthroplasty. Our institution has employed a thromboprophylaxis regimen using inpatient enoxaparin and outpatient aspirin for patients at standard risk for venous thrombosis following arthroplasty. Our hypothesis is that inpatient enoxaparin followed by a 28 day course of aspirin is a safe and effective means of chemical thromboprophylaxis.

Methods: We performed a retrospective review of primary hip and knee arthroplasties performed at our institution. 500 primary hip and knee arthroplasties were identified who received enoxaparin beginning on postoperative day 1. Enoxaparin was continued until discharge then the patients completed a 28 day course of aspirin 325 mg twice daily. For comparison, a control group of 500 hip and knee arthroplasty cases was selected. The control group received enoxaparin for a total of 2 weeks postoperatively, and then aspirin 325 mg twice daily for an additional 2 weeks. Review of records for deep venous thrombosis, pulmonary emboli, postoperative transfusion requirements, infection, and readmission within 3 months was performed.

Results: In the study group, there was one documented DVT and two pulmonary emboli. Nine patients required 3 or more transfused units. There were 15 infections, 1 of which was

deep. In the control group, there were 7 DVTs and 2 pulmonary emboli. Fourteen patients required 3 or more transfused units. There were 27 infections, four of which were deep.

Discussion and Conclusion: Our protocol of inpatient enoxaparin and outpatient aspirin proved safe and effective in standard risk patients following hip and knee arthroplasty. When combined with mechanical compression devices and early mobilization, a low rate of symptomatic thromboembolic disease was noted. There were significant cost savings with a low complication rate and no deaths.

Notes:

7:16am–7:22am

Assessment of Accuracy of Robotically Assisted Unicompartmental Arthroplasty

Ali Mofidi, MD

*Riyaz H. Jinnah, MD

Michael Conditt, PhD

Maria S. Goddard, 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 unicompartmental 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:

7:22am–7:28am

Body Mass Index, Lateral Thrust to the Knee and Lateral Compartment Lift-Off, A Challenge in Total Knee Replacement

Edward MacMahon, MD

Introduction: Patients with high BMI requiring Total Knee Replacement (TKR) have the choice of a normal alignment and later lateral lift-off or excessive tibia valgus and no lift off. During single leg stance, the eccentrically placed center of body mass above the hip produces a lateral thrust to the knee. The mechanism of how this lateral thrust is generated and normally compensated for has not been previously described.

Methods: Tekscan pressure sensors were inserted in the two compartments of two fresh frozen cadaver lower extremities with normal alignment. A load cell was placed against the lateral femoral epicondyle. Variable eccentric loads were applied onto the femoral head to create lateral thrust to the knee. The lateral thrust was measured on the load cell as the amount of medial thrust required to restore a balanced pressure between the two compartments. A separate study measured the amount of compensating vertical pressure on the lateral compartment needed to restore the balance.

Results: The cadaver data showed that a linear relationship exists in the pathway from the eccentric body mass to the lateral thrust. This lateral thrust created an increase in the joint pressure in the medial compartment and a corresponding decrease in the lateral compartment. This imbalance in joint pressure could be corrected by either generating a medial thrust equal to the lateral thrust or a vertical compressive force on the lateral compartment.

Discussion: Increased BMI will linearly increase lateral thrust to a knee with normal mechanical axis alignment. It may produce unrecognized overload medially or in cases with high BMI produce lateral lift-off soon after surgery. The alternative is to compensate for the lateral thrust by creating a medial thrust by a high valgus tibial alignment.

Conclusion: Patients with high BMI give the surgeon two poor alignment choices in TKR.

Notes:

Thursday, July 21, 2011

GENERAL SESSION 2: Upper Extremity and Hand — Pain and Arthritis

Moderators: Donald K. Bynum, MD
Henry A. Backe, MD

9:00am–10:05am

9:00am–9:06am

Accuracy of Thumb Carpometacarpal Joint Injection

John Mowbray, MD
Randolph J. Ferlic, MD
Donald H. Lee, MD

Introduction: This study was designed to investigate the accuracy of thumb carpometacarpal (CMC) injections. The investigators hypothesized that thumb CMC injection without fluoroscopic guidance will result in inconsistent injection delivery to the joint.

Methods: Nineteen frozen cadaveric upper limbs were injected with 1 mL of bacteriostatic normal saline and 1 mL of radio-opaque dye. The procedure was performed by inserting the needle into the joint space via a dorsal trajectory. Following injection, mini c-arm fluoroscopy was used to obtain 2 images (AP, lateral) of each thumb CMC joint. Fluoroscopic images were later reviewed by a musculoskeletal radiologist, three attending hand surgeons, and a hand surgery fellow for stage of arthritis and validation or rejection of placement in the joint space.

Results: Review of fluoroscopic images after injection revealed that eighteen of nineteen (95%) thumb CMC joints were accurately injected. The single miss in this study occurred in a relatively normal joint (Eaton I) with injection into the scaphotrapezotrapezoid (STT) joint.

Discussion and Conclusion: This study suggests that the trapeziometacarpal joint may be reliably injected without the need for fluoroscopic guidance.

Notes:

9:06am–9:12am

Pyrolytic Carbon Arthroplasty Versus Silicone Arthroplasty

Raul Curiel, MD
Dennis K. Jorgensen, MD
Fredrick N. Meyer, MD
J. Grant Zarzour, BS

Introduction: This study was performed to compare outcomes after proximal interphalangeal (PIP) joint arthroplasties using silicone and pyrolytic carbon implants.

Methods: The study is a retrospective review of 30 arthroplasties in 15 patients performed by a single surgeon. Twenty-four primary arthroplasties were performed using 12 pyrolytic carbon implants in 9 patients and 12 silicone implants in 6 patients. Six revision arthroplasties were performed, and all were with silicone implants. All patients had failed conservative management and followed the same postoperative rehabilitation protocol. Patient assessment included range of motion, level of satisfaction, complications and radiographic evaluation.

Results: For primary arthroplasties the average age at time of primary arthroplasty was similar in both implant groups. The average durations of post-operative follow-up in the pyrolytic and silicone groups were 15.8 and 41.3 months, respectively. Average post-operative active arc of motion (AAOM) was 50.6 in the pyrolytic carbon group and 55.2 in the silicone group. Nine of 12 patients in both groups had satisfactory results. Three arthroplasties failed in each group. All 3 failures in the pyrolytic carbon group were experienced by laborers with post-traumatic arthritis. Six revision arthroplasties were

performed. All were with silicone implants, and 5 of these failed. In all there were 8 failed silicone implant arthroplasties, and 5 of these were secondary to fracture.

Discussion and Conclusion: Postoperative ranges of motion and complication rates are similar in patients undergoing PIP arthroplasties with silicone and pyrolytic carbon implants. Laborers are likely poor candidates for implant arthroplasty and should be treated with primary arthrodesis, especially in the face of post-traumatic arthritis. Index finger arthroplasty provides lasting pain relief and function in appropriately selected patients. Either implant may be a practical option in cases where appropriate patient selection is performed.

Notes:

9:12am–9:18am

Accuracy of Carpal Tunnel Injections

John Mowbray, MD
Randolph J. Ferlic, MD
Donald H. Lee, MD

Introduction: This study tested the null hypothesis that there is no difference in carpal tunnel injection accuracy with ulnar or radial-sided technique.

Methods: Nineteen frozen cadaveric upper limbs underwent carpal tunnel injection by one of two techniques. Each injection contained 1 mL of saline and 1 mL of radio-opaque dye. The ulnar-sided technique utilized a starting point ulnar to the palmaris longus and radial to the hook of the hamate. The radial-sided technique was performed through the flexor carpi radialis tendon. Following injection, fluoroscopy was used to obtain 3 images (AP, lateral, carpal canal view) of each wrist. As a correlate to the images, an open dissection of two cadaveric limbs was performed. In these instances, the cadaver limbs were injected with 1 mL of radio-opaque dye and 1 mL of methylene blue.

Results: All injections (19/19) were successfully placed in the carpal canal. Nine were injected from the ulnar side, ten from a radial trajectory. Accurate placement was confirmed in three-plane fluoroscopy. In the radial-sided injection group, eight of the ten (80%) specimens revealed a detectable, often substantial load of dye tracking down the flexor pollicis longus tendon sheath into the thumb.

Discussion and Conclusion: The carpal tunnel may be reliably injected from either an ulnar or radial-sided technique. The ulnar-sided injection is easier to position and results in more uniform dispersion. The radial-sided technique results in carpal tunnel deposition, but the injector may expect to encounter more resistance and may have the unanticipated effect of FPL tendon sheath dispersion.

Notes:

9:18am–9:24am

SOA Presidents' Resident Award

Combat Related Major Upper Extremity Amputations

Lt Scott M. Tintle, MD
LTC Martin F. Baechler, MD
LCDR Jonathan A. Forsberg, MD
CDR George P. Nanos, MD
MAJ Benjamin K. Potter, MD

Introduction: Complications following major upper extremity amputations have not been previously reported in a large cohort of patients. We hypothesized that the complication rates following major upper extremity amputation were higher than the existing literature would suggest, and that surgical treatment of upper extremity amputation complications would lead to improved outcomes.

Methods: A retrospective analysis of a consecutive series of combat wounded personnel sustaining major upper extremity amputations from Operation Iraqi Freedom and Operation Enduring Freedom was performed. 100 amputations through or proximal to the radiocarpal joint were identified in 96 patients with a mean follow-up of two years (range 2 months–6.5 years). Injury and treatment-related data, operative revision rates, types of complications, and complication treatment data were recorded. Additionally, pre-complication and post-revision data were identified for all patients to include prosthesis use, type of prosthesis, the presence of phantom and residual limb pain, and pain medication use.

Results: All amputations were the result of high-energy trauma, with 87% occurring secondary to blast mechanisms

of injury. There were 11 wrist disarticulations, 47 transradial amputations, 36 transhumeral amputations, and 4 shoulder disarticulations. Forty-two residual limbs (42%) experienced a total of 56 complications leading to 103 repeat surgical interventions. Revision surgery was performed for six types of complications: heterotopic ossification (19%), wound infections (13%), symptomatic neuromas (9%), sterile wound dehiscence (6%), symptomatic scars (5%), and joint contractures (4%). Compared to all other levels of amputation, transradial amputations were 3.4 times more likely to have phantom pain and 2.8 times more likely to require neuropathic pain medications. Among patients treated surgically for complications, regular prosthetic use increased from 19% to 87%.

Conclusions: Complications following major upper extremity combat-related amputations are common. The surgical treatment of these complications improved the overall prosthesis acceptance and led to outcomes equivalent to amputations that did not experience a complication.

Notes:

9:24am–9:30am

Supraclavicular Long Thoracic Nerve Decompression for Acute Traumatic Scapular Winging

Zhongyu Li, MD, PhD

Introduction: Scapular winging caused by long thoracic nerve palsy is rare but is often associated with pain, weakness, limited shoulder range of motion and disability. Several authors have advocated conservative therapy for 6–24 months to allow for spontaneous recovery. However, scapular winging due to acute trauma often does not respond to conservative treatment, and reconstructive surgery is the only option when conservative measures fail. In the past two years, we have initiated treatment for post-traumatic medial scapular winging with surgical decompression of the long thoracic nerve. We

report the early encouraging results of supraclavicular long thoracic nerve decompression for painful scapular winging.

Methods: From 2008–2010, 6 patients (M:F = 4:2) with a mean age of 24 years (range: 14–43 years) were treated with a surgical decompression of the involved long thoracic nerves. Symptoms in four patients occurred after traumatic insults, one after crutch use, and one patient's symptoms were idiopathic. The surgical approach involved a supraclavicular decompression of the long thoracic nerve including the nerve branches originating from the C5, C6 and C7 roots and a partial tenotomy of the middle scalene muscle. All patients presented with painful resting scapular winging with a mean duration of symptoms for 9 months (range: 4–14 months).

Results: Four patients experienced a complete resolution of scapular winging after surgery. Two patients had partial recovery with one patient improved from resting painful winging to nonpainful winging under stress. The visual analog pain scale decreased from an average of 5.5 to 1.7. The shoulder forward elevation and abduction improved from 126 and 127 degrees to 178 and 178 degrees, respectively. The mean DASH score decreased from 47 to 24.

Conclusion: Supraclavicular decompression of the long thoracic nerve is effective in resolving scapular winging associated with acute traumatic long thoracic nerve palsy.

Notes:

9:30am–9:36am

Shoulder Arthroplasty for the Treatment of Proximal Humerus Non-Unions

John Sperling, MD, MBA
Robert Cofield, MD
Thomas Duquin
Justin Jacobson

Introduction: Currently, there is minimal information available on the outcome of shoulder arthroplasty for the treatment of proximal humerus non-unions. Therefore, the purpose of this study was to determine the results, risk factors for an unsatisfactory outcome, and rates of revision among patients who have undergone shoulder arthroplasty for a proximal humerus non-union.

Methods: From 1976 to 2007, eighty-four patients underwent shoulder arthroplasty for proximal humeral non-union. Sixty-seven patients had a minimum 2 year follow-up or until the time of revision surgery (mean, 9 years). The fracture type according to the Neer classification was 2-part in 36 (54%), 3-part in 16 (24%) and 4-part in 15 (22%). Hemiarthroplasty was performed in 54 patients with the remaining 13 undergoing total shoulder arthroplasty.

Results: Average active elevation and external rotation improved from 46 and 26 to 104 and 50 degrees at final follow-up ($p=0.0001$). VAS pain scores improved from 8 to 4 at final follow-up ($p=0.0001$). There were 11 (16%) excellent, 22 (33%) satisfactory, and 34 (51%) unsatisfactory results using the modified Neer score. Improved active elevation was present when there was anatomic healing of tuberosities compared with tuberosity non-unions ($p=0.02$). The presence of a rotator cuff tear at the time of arthroplasty resulted in less active elevation at final follow-up ($p=0.04$). There were 15 complications; 13 patients with 12 re-operations including 5 revisions.

Discussion and Conclusion: Shoulder arthroplasty for proximal humeral fracture non-unions results in improvement in pain and function with unsatisfactory results in greater than half of patients. Difficulty in obtaining tuberosity healing in arthroplasty for proximal humeral non-unions contributes to compromised functional outcomes.

Notes:

9:36am–9:42am

Limited Fasciotomy for Early Dupuytren's Contracture

Michael S. Sridhar, MD
Gary R. McGillivray, MD
Colyn Watkins, MS

Introduction: Modern surgical treatments for early-stage Dupuytren's contracture include percutaneous needle fasciotomy (PNF), limited fasciectomy (LF), and collagenase injection. Documented complications of these modalities include recurrence requiring revision surgery, skin tears, edema, hematoma, superficial infection, inadvertent flexor tendon rupture, and transection of a digital nerve or artery. We hypothesize that short-term results of our novel surgical tech-

nique, limited fasciotomy, will at least be comparable to those of PNF, LF, and collagenase injection with minimal to no complications.

Methods: Our minimally invasive technique involves a small longitudinal incision centered over the pathologic central cord. With adequate visualization to ensure no crossing, adjacent, or subjacent neurovascular or tendinous structures, a scalpel is used to divide the cord. Motion is begun immediately postoperatively. We retrospectively reviewed 11 patients and 22 joints at the long, ring, and small fingers including 10 metacarpophalangeal (MCP) and 11 proximal interphalangeal (PIP) joints. Our minimum follow-up was 12 weeks.

Results: Our percentage of intraoperative angular extension gain (AEG) at the MCP was 100% and at the PIP was 71%. At minimum follow-up our percentage AEG remained 100% at the MCP and 66% at the PIP joints. Complications included 2 patients with subjective fingertip numbness with intact static 2-point discrimination and 3 patients with minor skin disruptions, all treated nonoperatively. No repeat surgery for recurrence was required.

Discussion and Conclusion: Our modest surgical technique case series describes a safe, effective, percutaneous approach to the management of early, less extensive Dupuytren's contracture, avoiding inadvertent neurovascular and flexor tendon rupture and minimizing recurrence requiring revision surgery.

Notes:

9:42am–9:48am

Interpreting Proximal Ulna Anatomy on Static Fluoroscopic Images

Anna Babushkina, MD
*Scott G. Edwards, MD
Grigory Gershkovich, BS

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 hardware in suboptimal locations, perhaps even within the joint. The purpose of this study is to delineate the borders of the trochlea 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. 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, medial facet lip, and lateral facet lip from the center of the trochlea were 10.2mm (± 0.52), 13.6mm (± 1.33), and 11.2mm (± 0.34) respectively. The large specimens had average distances of 11.9mm (± 0.63), 16.6mm (± 0.93), and 14mm (± 0.76) respectively. Interobserver and intraobserver reliabilities were excellent (above 0.94 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 hardware about the sigmoid notch of the proximal ulna.

Notes:

Thursday, July 21, 2011

GENERAL SESSION 3: Trauma and Basic Science

Moderators: Laurence E. Dahners, MD
Langdon A. Hartsock, MD

10:06am–11:05am

10:06am–10:12am

Clinical Orthopaedic Society Resident Award

Incidence of Femoral Neck Fractures in Floating Knee Injuries

Brett Beavers, MD
Terry Rives, PhD

Introduction: Our hypothesis was that patients with ipsilateral femoral shaft and tibia plateau/shaft fractures (floating knees) would have an increased incidence of femoral neck fractures, higher ISS scores, and longer hospital stays.

Methods: Utilizing our institution's trauma registry, we identified patients from April 2002 to September 2010 with femoral shaft fractures. We retrospectively reviewed these patient's medical records to identify mechanism of injury, Gustilo-Anderson grade for open injuries, fracture type & location, associated injuries, presence of a femoral neck fracture, fixation method, length of hospital stay, and the presence or absence of an ipsilateral tibia fracture.

Results: Our study group consisted of 458 femoral shaft fractures in 427 patients with an average age of 30 years (range 13–89). Of these 458 femoral shaft fractures, we identified 66 patients with 71 extremities that had a fracture of the ipsilateral tibial plateau or shaft (Group 1). Our internal control group, Group 2, consisted of 387 isolated femoral shaft in 373 patients. There were 8 of 66 (12%) deaths in Group 1 versus 9 of 373 (2.7%) in Group 2. Femur fractures were treated with a retrograde approach in 68% of extremities in group 1 versus 46% in group 2. Femoral neck fractures were identified in 11 of 71 (15.5%) extremities in group 1 versus 27 of 387 (7%) extremities in group 2. There was a significant difference between the two groups when comparing the incidence of femoral neck fractures. There was also a significant difference in ISS scores (26 vs. 16) and hospital stays (21 vs. 10 days) between the two groups.

Conclusion: We found an increased incidence of femoral neck fractures in floating knee injuries as well as higher ISS scores, and longer hospital stay. This highlights the high-energy nature of patients with this injury constellation.

Notes:

10:12am–10:18am

Results of a New Multi-Planar Intramedullary Implant Treating Transverse and Comminuted Olecranon Fractures and Nonunions

Scott G. Edwards, MD

Introduction: Hardware irritation and removal has been a common complication of traditional olecranon fixation. The theoretical advantages of intramedullary nailing for olecranon fractures is less risk of soft-tissue irritation and resulting hardware removal. The purpose of this study is to evaluate a new multi-planar 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 multi-directional intramedullary implant and were followed for an average 22 months (range: 18 to 31 months). Of the 28 fractures, 15 were transverse, 7 were comminuted, 3 of which also involved the coronoid, and 6 were nonunions. Average patient age was 45 years (range: 25 to 65 years). Patients were immobilized for 3-5 days postoperatively, after which motion was allowed. Strengthening was initiated at 6 weeks. Motion was measured at 4 weeks and 8 weeks. Strengthening was tested at 8 weeks using a triceps extension maneuver with resistance. Radiographs were taken at each follow-up visit until union. Operative time, complications and subjective complaints were noted.

Results: Average operative time as 25 minutes. At four weeks, patients demonstrated average extension-flexion of 20° to 115° with full supination and pronation compared to the

contralateral side. At 8 weeks, all patients were within 10° of full extension-flexion and were able to extend 85% of weight compared to the contralateral side. All fractures progressed to radiographic union by six weeks. There were no incidences of infection, triceps extension problems, or hardware failure or irritation. No patients were lost to follow-up.

Discussion and Conclusions: This new multi-planar intramedullary implant appears to be a safe and effective method to stabilize transverse and comminuted olecranon fractures and nonunions. It allows for early motion for both stable and unstable fracture patterns without loss of fixation. Good outcomes in terms of motion, strength, and union may be expected within 8 weeks after surgery.

Notes:

10:18am–10:24am

Ultrasound-Guided Femoral Nerve and Lateral Femoral Cutaneous Nerve Blocks for Intramedullary Nail Fixation in High Risk Elderly Patients with Hip Fractures

Norman E. Stone III, MD
Piyush M. Gupta, MD
David P. Hardeksi, MD

Introduction: Of the 350,000 hip fractures in the United States every year, many occur in elderly patients with contraindications to both general and neuraxial anesthesia. For such patients, peripheral nerve blocks (PNB) can be an excellent alternative. This study investigates the use of ultrasound-guided femoral nerve (FN) and lateral femoral cutaneous nerve (LFCN) blocks as the anesthetic regimen for high risk elderly patients undergoing short cephalomedullary femoral nailing (CMN) for a proximal femur fracture.

Methods: A cohort of elderly patients with basicervical or intertrochanteric femur fractures was assembled. Following Institutional Review Board (IRB) approval, patients with contraindications to both general and neuraxial anesthesia were approached for participation. Informed consent was obtained

by the patient or health care proxy. Patients received ultrasound-guided PNB of the FN and LFCN, conscious sedation, and peri-incisional injection of 1% lidocaine. Decision to proceed with surgery was made 20 minutes post-injection after determining adequacy of the blocks. All patients received a short CMN with no reaming of the intramedullary canal.

Results: Fourteen patients with a mean age of 87.3 ± 6.3 years were enrolled. Seven patients (50%) had a contraindication to neuraxial anesthesia; 3 patients (21%) had high post-operative ventilation risks; 4 patients (29%) had both. In 2 cases (14%), the PNB was inadequate and the procedure was converted to general anesthesia. The mean pain score was 1.6 at 24 hours, 1.1 at 48 hours, and 0.8 at 72 hours. Patients were discharged 8.6 days post-operatively. One patient (7%) expired on post-operative day 3 due to cardiac arrest.

Conclusion: Elderly hip fracture patients with contraindications to general and neuraxial anesthesia are a challenge to surgeons and anesthesiologists. This study demonstrates that ultrasound-guided FN and LFCN blocks, in conjunction with conscious sedation and a peri-incisional local anesthetic, can be a safe and effective anesthesia regimen.

Notes:

10:24am–10:30am

Biomechanical Comparison of Multi-Directional Nail and Locking Plate Fixation in Unstable Olecranon Fractures

Evan Argintar, MD

* Scott G. Edwards, MD

Background: One of the main theoretical advantages of intramedullary nailing for olecranon fractures focuses on less risk of soft-tissue irritation and resulting hardware removal. While clinical results of one particular multi-directional locking intramedullary nail have been promising, questions remain whether this new device is capable of controlling unstable, comminuted olecranon fractures to the same extent as a locking olecranon plate. This study aims to evaluate the ability of

this novel multi-directional locking nail to stabilize comminuted fractures and directly compare its biomechanical performance to that of a locking olecranon plate.

Methods: Eight stainless steel locking plates and eight stainless steel intramedullary devices were implanted to stabilize a simulated comminuted fracture pattern in 16 fresh-frozen and thawed cadaveric elbows. All specimens were evaluated with DXA scans to divide specimens into two groups of similar bone densities. Flexion-extension, varus-valgus, gap distance and rotational three-dimensional angular displacement analysis was conducted over a 60-degree motion arc (30° to 90°) to assess fragment motion through physiologic cyclic arcs of motion and failure loading. Displacements in flexion-extension, varus-valgus, internal-external rotation, and fracture gapping were compared between implants.

Results: The average DXA bone mineral density was $0.714 \text{ g/cm}^2 \pm .029 \text{ g/cm}^2$ for the nailed specimens and $0.718 \text{ g/cm}^2 \pm .029 \text{ g/cm}^2$ for the plated specimens. The average DXA T-score for the nailed specimens was -2.42 (range: -0.1 to -4.4). The average DXA T-score for the plated specimens was -2.35 (range: -0.2 to -3.8). Both implants less than one degree of motion in flexion-extension, varus-valgus, and internal-external rotations, and allowed less than one millimeter gapping through physiologic and super-physiologic loading until ultimate failure; all failures occurred by sudden, catastrophic means rather than loosening. The average failure weight for the nail was 14.4 kg (range: 3.6 to 19.6) compared to 8.7 kg (range: 4.6 to 12.6) for the plate ($p=0.02$). The nail survived 1102 cycles, while the plate survived 831 cycles ($p=0.06$).

Conclusion: In simulated comminuted olecranon fractures, the multidirectional locking intramedullary nails sustained significantly higher maximum loads than the locking plates. The two implants demonstrated no measured significant differences in terms of fragment control and number of cycles survived. Surgeons can expect the multidirectional locking nails to stabilize comminuted fractures at least as well as locking plates.

Notes:

10:30am–10:36am

Knee Stiffness after Treatment of Femoral Shaft Fractures in Victims of the 2010 Haiti Earthquake

Eric Angermeier, MD
Gregory P. Colbath, MD, MS
Langdon A. Hartsock, MD
Rudolph Richeime, MD

Introduction: The 2010 Haiti earthquake resulted in over 200,000 deaths and more than 300,000 injuries. Many survivors sustained severe crush injuries to their extremities from the falling rubble. Multiple surgical teams from our institution traveled to Hospital Lumiere in Bonne Fin, Haiti to treat these injuries in the months following the earthquake. These teams began to notice a high incidence of severe knee stiffness in patients who had been treated for femoral shaft fractures. The purpose of this study was to document knee range of motion in earthquake victims who had been treated for femoral shaft fractures, and to determine any potentially modifiable risk factors for the development of knee stiffness.

Methods: All earthquake victims who had been treated for femoral shaft fractures, and who were available for follow-up evaluation at four months after their initial injury, were included in the study. Passive knee range of motion measurements were made using a goniometer. Radiographs and medical records were reviewed.

Results: Five earthquake victims (3 males, 2 females) who had been treated for femoral shaft fractures were available for follow-up. Average age was 40 (range 22-77). Treatments included spica casting, skeletal traction, external fixation, retrograde intramedullary nailing, and bladeplating. All 5 patients were able to achieve full knee extension. Average passive knee flexion was 43 degrees (range 25-90 degrees). Review of the records revealed that these patients received prolonged bedrest and minimal, if any, physical therapy.

Discussion and Conclusion: To our knowledge this is the first report of objective outcome data following the orthopaedic response to the 2010 Haiti earthquake. Knee stiffness appears to have been a significant complication of the treatment of femoral shaft fractures in this austere environment, possibly related to prolonged immobilization. Future orthopaedic disaster response efforts should include greater emphasis on physical therapy and early mobilization.

Notes:

10:36am–10:42am

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

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

Introduction: Inter-trochanteric fractures of the femur are among the most common long bone fractures. Although non union is relatively uncommon, it can be quite debilitating. Failure of union can be influenced by the complexity of the fracture, the position of the implant, and other patients characteristics. We investigated the importance of internal rotation 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 in calendar years 2004-2008. 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, the overhang of the lag screw with respect to the lateral femoral wall, the position of the implant, the presence of distal locker (when applicable) were evaluated. These fractures 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 non-union before or at the one year follow-up period, compared to one out of 44 patients (2.2%) fixed in internal rotation had in same time interval. Fisher exact test was used and 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.

Conclusion and Discussion: 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. Consequently we concluded that such fractures should be fixed in internal rotation with good or acceptable reduction.

Notes:

10:42am–10:48am

Comparison of Intraoperative C-Arm Fluoroscopy to Postoperative Radiographs in Operative Fracture Fixation

Taylor A. Horst, MD

William R. Barfield, PhD

John A. Glaser, MD

Jennifer A. Hooker, MD

James F. Mooney III, MD

Introduction: Image intensification (C-arm) is used routinely to assess intraoperative fracture alignment and implant position. Postoperative radiographs occasionally appear significantly different compared with the C-arm image used during surgery. The purpose of this study is to evaluate the differences between intraoperative C-arm images and postoperative plain film radiographs, and the utility of each in assessing fracture fixation and determining postoperative management.

Methods: Fractures of varying type and location were collected for review. C-arm images were compared to postoperative plain film radiographs. Two orthopaedic surgeons reviewed both sets of images by answering 9 questions relating to image adequacy and quality, as well as the quality and reduction of fixation. Image sets were reviewed twice by each surgeon, in random order, so intra-observer and inter-observer variability could be assessed.

Results: 101 fractures were enrolled in the study. Intraobserver agreement between reads was found to be 84.6% and 92.0% for Surgeons 1 and 2. Overall, the two surgeons were found to agree 84.8% of the time. Grading for intraoperative images and postoperative images were found to differ 16.5% of the time for Surgeon 1 and 7.0% of the time for Surgeon 2. The overall difference between the two images was found to be 11.8%. Information was apparent on the postoperative radiographs that was not seen on the c-arm images, such that a reviewer felt that the postoperative treatment plan should change in 8.2% of cases. Fracture gap, rotation, and angulation were found to be the strongest predictors for change, with angulation having the largest difference between c-arm and postoperative images.

Discussion and Conclusion: While surgeon interpretation may differ, the ability of intraoperative and postoperative images to reflect fracture gap, rotation, and angulation may also vary between images. Orthopaedic surgeons particularly concerned about angulation of the fracture after fixation may want to consider obtaining postoperative radiographs if they do not do so routinely.

Notes:

2011 Scientific Program Abstracts — Friday

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

Friday, July 22, 2011

GENERAL SESSION 5: Sports Medicine

Moderators: Alison P. Toth, MD
Christian Lattermann, MD

6:35am–7:17am

6:35am–6:41am

Outcomes of Grade I and II Hamstring Injuries in an Intercollegiate Athletic Population Using a Novel Rehabilitation Protocol

Kelly G. Kilcoyne, MD
Ray Chronister, ATC
CPT Jonathan F. Dickens, MD
CAPT David J. Keblish, MD
CDR John–Paul Rue, MD

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.

Notes:

6:41am–6:47am

Primary ACL Surgery Using Non-Anatomic (Tibial Tunnel) Tibialis Anterior Allograft Versus Anatomic (Medial Portal) Autograft in Patients Under 25 Years of Age: Failure and Re-Operation Rate Analysis

Darren L. Johnson, MD

Objectives: Young athletes (< 25 years of age) who participate in Level 1 sports are at high risk for failure and re-operation after ACL surgery. Graft selection (autograft vs. allograft) as well as anatomic (medial portal) versus non-anatomic (tibial tunnel) remain controversial. The purpose of this study is

to compare outcome of anatomic autograft versus non-anatomic tibialis anterior (TA) allograft in high risk ACL reconstructed patients. Our hypothesis was that ACL graft failure requiring revision and total reoperation rate would be significantly higher for the non-anatomic TA allograft patients.

Methods: We performed a retrospective review of 97 consecutive young patients who underwent anatomic (medial portal) ACL reconstruction with patellar tendon (PT) or hamstring (HS) autograft performed by a single surgeon. 63 patients (66 knees) were available for follow-up. Mean age was 17.3 years and mean follow-up was 35.1 months. 56 PT and 10 HS autografts were used. ACL revision and total reoperation rates were assessed. We obtained Lysholm knee scores, Tegner activity scores, and subjective IKDC ratings. Ability to return-to-play and level of play were documented. These results were compared to those from a previous published study of 125 consecutive patients who underwent non-anatomic (tibial tunnel) ACL reconstruction with TA allograft performed by a single surgeon. 69 of those patients were available for follow-up at a mean of 55 months. 31 of those patients were < 25 years of age and were compared to the 63 patients (66 knees) in the current study.

Results: Of the 66 anatomic autograft patients, 5 required ACL revision (8%). Of the 31 non-anatomic allograft patients in the previous study, 11 required ACL revision (35%). This difference was statistically significant ($p=.001$), and odds ratio was 6.7 (95% C.I. 2.1-21.6). 11 of the 66 autograft patients required re-operation (17%), compared to 17 of 31 allograft patients (55%). This difference was also statistically significant ($p<.001$), and odds ratio was 6 (95% C.I. 2.3-15.8). Mean Lysholm and Tegner scores for the autograft patients were 92.2 and 8.6, respectively (85.6 and 4.4 for the allograft patients). For the IKDC ratings, 98.5% of autograft patients rated their knees as normal or nearly normal (compared to 86.2% for the allograft patients). 91% of autograft patients were able to return-to-play (compared to 58% of allograft patients).

Conclusions: Young patients who participate in high risk Level 1 sports had 6 times greater odds of both ACL graft failure requiring revision and total reoperation rate when non-anatomic TA allograft ACL reconstructions were performed compared to use of an anatomic technique using autogenous tissue. We strongly recommend the use of an anatomic technique and autogenous tissue in this high risk population.

Notes:

6:47am–6:53am

Biomechanical Analysis of Single-Tunnel – Double-Bundle Posterior Cruciate Ligament Reconstruction

Amar Mutnal, MD

Brian M. Leo, MD

John Uribe, MD

There are several techniques for double-bundle posterior cruciate ligament (DB PCL) reconstruction, each with its own advantages and disadvantages. The method to be investigated in this study uses a transtibial single femoral tunnel DB soft tissue PCL reconstruction with a novel all-inside femoral fixation device. This technique is reproducible, reduces operative time, and lowers morbidity for double-bundle PCL reconstruction. It also allows for differential tensioning of each bundle to better replicate normal knee kinematics and functional anatomy of the native PCL. This is a controlled laboratory study using a total of 8 knees (size determined by power analysis). Specimens are prepared and mounted to servo-hydraulic universal testing machine that has up to 6 degrees of freedom. Kinematics and in-situ forces of the knee joint are measured under different external loading conditions comparing knees with (1) native PCL, (2) transected PCL, (3) single-bundle PCL reconstruction and (4) single-tunnel-double-bundle PCL (ST DB) reconstruction with differential bundle tensioning. Quantitative assessment of stability and in-situ graft forces is performed at various flexion angles. Femoral displacement and in-situ forces are measured using the robotic manipulator and universal force-moment sensor system. Based on prior studies, The data will be analyzed using methods of repeated measures mixed models. Pairwise comparisons between least squares means of different conditions will be assessed using Tukey-Kramer adjustments for multiple comparisons. We hypothesize that both reconstruction groups will provide adequate AP stability at higher ranges of flexion, but group 4 (ST DB) will perform better at lower flexion angles, provide better mediolateral stability, and have better in-situ graft force profile due to more physiologic bundle tensioning.

Notes:

6:53am–6:59am

Incidence of Radiographic Findings Consistent with Femoral Acetabular Impingement in Military Personnel with Femoral Neck Stress Fractures

Timothy Carey, DO

Introduction: Stress fractures in the femoral neck are a potentially serious condition that affects military personnel and endurance athletes. This study investigates the incidence of radiographic abnormalities associated with FAI in military personnel treated for femoral neck stress fractures compared to asymptomatic historical controls.

Methods: A retrospective review was performed on soldiers treated for femoral neck stress fractures. All patients had MRI's consistent with femoral neck stress changes. MRI's were reviewed independently by three physicians. The femoral neck was graded based on percentage of the femoral neck involved (25%, 50%, 75%, 100%). AP pelvis and frog leg lateral radiographs were reviewed in the same manner to determine the center edge angle, alpha angle, neck shaft angle, and presence or absence of a crossover sign. Patients were excluded for radiographs with excessive pelvic tilt or rotation. The average of the measurements was compared to normal historical controls.

Results: Sixty nine patients (33 male and 36 females) treated for femoral neck stress fracture were identified. Sixteen of these patients were excluded secondary to excessive pelvic tilt or rotation on their AP pelvis radiographs. Among our cohort the average incidence of a cross over sign was 51% (27/53). The incidence of a center edge angle greater than 40° was 47%. The alpha angle was greater than 50° in 55% and greater than 55° in 30%. All of these findings were significantly higher than the same measurements in historical controls.

Conclusion: Young patients with femoral neck stress fractures have a high incidence of radiographic abnormalities suggestive of FAI when compared to asymptomatic patients. One can conclude that these radiographic findings lead to abnormal stress across the hip joint, specifically the femoral neck. This adds evidence to the growing body of work demonstrating the deleterious effect of FAI on hip function.

Notes:

6:59am–7:05am

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

CPT Jonathan F. Dickens, MD

*Daniel G. Kang, MD

Kelly G. Kilcoyne, MD

CDR John–Paul Rue, MD

Richard A. Schaefer, MD

Lt Scott M. 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:

Friday, July 22, 2011

GENERAL SESSION 6: Spine and Pediatric

Moderators: Shawn R. Gilbert, MD
James F. Mooney III, MD

9:15am–10:05am

9:15am–9:21am

Anterior Diagonal Osteotomy for Bladder and Cloacal Exstrophy

Michael J. Conklin, MD
Michael J. Goodwin, PA
David B. Joseph, MD

Various osteotomies have been used to facilitate urologic closure for bladder and cloacal exstrophy. McKenna described the anterior diagonal osteotomy (ADO) after creating a model of the exstrophic pelvis from 3D CT reconstruction of a patient with exstrophy but did not report on its clinical use. Jones et al was the first to report the results of a series of patients undergoing ADO. Twenty nine patients were immobilized with external fixation and 17 with broomstick plasters. Since 1997 we have used ADO to treat 12 patients with bladder or cloacal exstrophy. A retrospective clinical and radiographic review was performed. Average age was 9 months at the time of surgery and average follow-up was 23 months. Immobilization was by external fixation in 2 patients, spica cast in 2 patients and skin traction in 8 patients. Radiographs were evaluated for pre-operative, post-operative and final follow-up diastasis and the percent pubic approximation was calculated as described by Sponseller. Pre-op diastasis averaged 4.4 cm, post-op 3.1 cm and final follow-up 4.6 cm. Percent pubic approximation was 47% post-op and -5.9% at follow-up. No patient suffered dehiscence of the abdominal closure, neurovascular injury or non-union. One patient treated with external fixation had pin tract infection that resolved with pin removal and antibiotics. One patient treated with spica casting suffered minor skin excoriation. No patient had complications related to traction. We report the first series of ADO employing post-operative traction as the primary form of immobilization. All patients achieved the urologic goal of bladder and abdominal wall closure without dehiscence and none suffered major orthopedic complications. We conclude that the anterior diagonal osteotomy with post-operative traction is safe and efficacious for the treatment of bladder and cloacal exstrophy.

Notes:

9:21am–9:27am

Patient Perception of Breast Asymmetry in Adolescent Idiopathic Scoliosis (AIS)

Jeannie Huh, MD

Introduction: While various aspects of the physical deformity in Adolescent Idiopathic Scoliosis (AIS) are recognized, little attention is given to the anterior chest. The purposes of this study were to report the incidence of AIS patients concerned with breast asymmetry and to identify clinical and radiographic parameters that correlate with their concern.

Methods: A retrospective analysis of 608 AIS patients from a single pediatric orthopedic institution who completed the Spinal Appearance Questionnaire (SAQ) preoperatively was performed. The SAQ measures patients' perception of several aspects of their spinal deformity's appearance and includes specific questions about breast and anterior chest wall symmetry. Responses are based on a 5-point Likert scale, ranging from "not true" to "very true." Associations between responses and clinical and radiographic parameters were investigated using chi-squared and t-tests.

Results: There were 498 females and 110 males (mean age: 14 years, mean Cobb angle: 58°). Preoperatively, 307 (50.5%) patients, including 32.7% (36) of males, identified with the statement "I want to have more even breasts." 333 (54.8%) patients, including 60% (66) of males, identified with the statement "I want to have a more even chest in the front." 5% of patients chose either of the above statements as "most important" to them. Those who were more likely to indicate concern about breast asymmetry were females (271, 88.3%) and patients with Nash-Moe grade ≥ 2 . No significant difference in response was found with age, menarchal status, body mass index, major curve direction, coronal or sagittal curve magnitude, or Lenke class.

Discussion and Conclusion: Although breast asymmetry was not perceived as the most important deformity in AIS, it was a concern for over half of AIS patients, including an important percentage of males. Higher incidence was seen in females and with greater rotational deformity of the spine. Increasing awareness of this historically neglected aspect of AIS is warranted and may help surgeons better tailor their treatment algorithms for the most optimal outcome in their patients. Further research to determine if and how perception of breast asymmetry in AIS changes with current treatment are underway.

Notes:

9:27am–9:33am

Static vs. Dynamic Foot Abduction Orthoses for Clubfeet

Shawn R. Gilbert, MD

Introduction: Talipes equinovarus (TEV) or clubfoot remains a common congenital musculoskeletal condition affecting 1 in 1000 live births. The Ponseti method of serial manipulation and casting followed by abduction bracing has become the preferred treatment in much of the world. The bracing phase of the treatment remains challenging due to poor brace tolerance and compliance. Failure of bracing is associated with a high rate of recurrence. The most critical time for brace compliance is initial acceptance and most recurrences occur in the first year.

Methods: We have undertaken a prospective randomized clinical trial to compare two styles of abduction braces with respect to efficacy and patient satisfaction. Both braces use Mitchell style shoes with one brace utilizing a standard static bar and the other incorporating a hinged bar. We present preliminary results with respect to recurrence, compliance, and caregiver satisfaction.

Results: 21 patients have been enrolled. Average follow-up is 10 months. Five patients required additional intervention after initiation of bracing. Four of these patients had difficult courses with casting and likely represent incomplete correction rather than true recurrence. Two families were non-compliant with bracing, one in each group. Of the families who completed satisfaction surveys, one reported dissatisfaction and brace intolerance, in the static bar group. All other families report that they were very or extremely satisfied with the brace.

Discussion and Conclusion: Overall initial compliance and satisfaction is high with abduction orthoses using Mitchell shoes, especially in comparison to previous reported series using Markell shoes. We have insufficient data to effectively compare the two types of bars or to evaluate long term compliance and recurrence. Since many of the problems with brace intolerance and non-compliance present early in the treatment, we find these initial results encouraging.

Notes:

9:33am–9:39am

Preparing the Lumbar Intervertebral Disk Space for Interbody Procedures: A Comparison Between the Traditional Method and a New Automated Method

CPT Keith Jackson, MD

Brett A. Freedman, MD

John M. Rhee, MD

Introduction: Removal of nucleus pulposus to prepare a disk space for interbody fusion is performed by various techniques. The purpose of this study was to quantify and compare the process of disk-space preparation with traditional versus automated methods.

Methods: This cadaveric study was conducted in two phases. In the phase 1 safety trial, “maximal” force was applied to the automated shaver against the annulus and endplates until flexion of the shaft occurred to determine the risk of creating an incidental cortical or annular defect. In phase 2, 27 disk-spaces from lumbar spines of seven deceased donors were randomized to traditional or automated disk-space preparation techniques through a standard transforaminal lumbar interbody fusion approach. Paddle shavers, pituitary rongeurs, and curettes were used for traditional disk-space preparation. Automated technique involved insertion of an 8-mm paddle shaver into the disk space, followed by straight and angled hand pieces to remove nucleus pulposus and endplate cartilage. Unintended cortical and annular breaches, preparation time, instrument insertions, percentage area of exposed endplate underlying the nucleus pulposus, and percentage volume of nuclear space cleared were measured and compared between groups.

Results: In phase 1, the “maximal” force applied for 10 seconds to each site produced no full-thickness annular or cortical defects. In phase 2, the automated technique produced fewer endplate cortical defects (three vs seven) and full-thickness annular breaches (zero vs one), required fewer instrument insertions (twenty-nine vs six), exposed a higher percentage of endplate (65% versus 52%), and removed more nucleus pulposus volume (83% vs 59%) with no significant increase in time (4:01 minutes vs 3:34 minutes) when compared with traditional methods.

Conclusions: Automated shaving decreased instrument insertions and more effectively prepared the disk space with fewer cortical or annular defects when compared with traditional methods. This technique holds promise for improved outcomes in spinal fusion surgery.

Notes:

9:39am–9:45am

Safety and Validity of Limited MRI Evaluation of the Lumbar Spine

Austin Hill, MD, MPH
Timothy McHenry, MD
Kathleen G. Oxner, MD

Introduction: Our purpose was to evaluate whether a limited MRI evaluation of the lumbar spine would be safe and effective in identifying a variety of pathologic findings.

Methods: An orthopedic spine surgeon and a musculoskeletal radiologist reviewed 40 lumbar spine MRI's using single sequence (T2 Sagittal images only), modified sequence (Sagittal STIR and Axial T2), and then the full MRI scan (T1, T2, & Stir Sagittal, T1 & T2 Axial). Each MRI was evaluated using standardized terminology for degenerative disc disease (DDD), herniation, and stenosis. Additional findings such as infection, fracture, neoplasm, and recommended additional imaging were recorded. The interpretation of the single and modified scans were compared to the full MRI scans. Percent agreement, sensitivity, specificity, intra-observer and inter-observer kappa values were calculated.

Results: Values for percent agreement were nearly identical for both the single and modified limited scans for DDD (0.985 and 0.99) and stenosis (range 0.87 - 0.97 versus 0.83 - 0.95). The sensitivity of the modified scan was significantly better for lateral recess stenosis only. Single sequence scans had a higher rate of false positive findings, consistently missed extraforaminal herniations than the modified scans. STIR sequences were frequently recommended by the reviewers of the single sequence scans.

Discussion and Conclusion: The single sequence protocol consistently missed extra-foraminal disc herniations and had false positives that could affect surgical decision making. A fast scan protocol incorporating 2 sequences is efficacious and safe in the evaluation of adult lumbar spine disorders. Both limited protocols had acceptable accuracy in the routine evaluation of DDD, stenosis, and herniations compared to published MRI reliability studies. A limited fast scan protocol would reduce the scan time by sixty percent without sacrificing patient safety or reliability. This reduction in scan time could result in significant cost savings for a healthcare organization.

Notes:

9:45am–9:51am

The Biomechanical Consequences of Rod Reduction on Pedicle Screws: Should It Be Avoided?

Daniel G. Kang, MD
Divya Ambati, BS
Anton E. Dmitriev, PhD, MSc
Rachel E. Gaume, BS
Ronald A. Lehman Jr., MD
Haines Paik, MD

Introduction: Rod contouring is frequently required to allow appropriate alignment of pedicle screw-rod constructs. When residual mismatch remains after contouring, a rod persuasion device is often utilized to reduce the rod to the pedicle screw head. Our study evaluates the biomechanical effect of the rod reduction technique on pedicle screw pull-out resistance.

Methods: Fifteen three-segment, fresh-frozen human cadaveric thoracic specimens were prepared and DEXA scanned for bone mineral density (BMD). Six osteoporotic and nine normal specimens were instrumented with titanium pedicle screws and the left side served as the control with perfect screw-rod alignment. On the right side, the rod was intentionally contoured with a 5 mm residual gap between ventral aspect of the rod and the inner bushing of the pedicle screw, followed by a rod reduction technique. As an alternative option to rod reduction, one of the proximal vertebra pedicle screws was removed and re-inserted through the same trajectory to simulate screw depth adjustment. The pedicle screws were pulled out "in-line" with the screw axis at a rate of 0.25 mm/sec, with peak pull-out strength (POS) measured in Newtons (N).

Results: After rod reduction, pedicle screws had significantly decreased POS compared to controls (495 ± 379 N versus 954 ± 237 N), with 48% lower mean POS. Nearly half ($n = 7$; 46.7%) of the pedicle screws had visible pull-out during the reduction attempt, and occurred irrespective of BMD. There was no significant difference in POS between re-inserted to control screws (1013 ± 348 N versus 941 ± 316 N).

Discussion and Conclusion: The rod reduction technique significantly decreases overall pedicle screw POS and typically resulted in outright failure. Therefore, the rod reduction technique should be performed with caution, and further rod contouring, screw depth adjustment or redirection of pedicle screw trajectory may be warranted to obtain perfect alignment of the pedicle screw-rod construct.

Notes:

Friday, July 22, 2011

GENERAL SESSION 7: Basic Science

Moderators: Claude T. Moorman III, MD
Spero G. Karas, MD

10:06am–10:54am

10:06am–10:12am

Defining the Impaction Frequency and Threshold Force Required for Femoral Impaction Grafting in Revision Hip Arthroplasty — A Human Cadaveric Biomechanical Study

Fionnan Cummins, MB, BCh, BAO, MCh
Daniel Kelly
Patrick J. Kenny

Introduction: The two most common complications of femoral impaction bone grafting are femoral fracture and massive implant subsidence. This is a laboratory based study investigating fracture forces and implant subsidence rates in embalmed human femurs undergoing impaction grafting. The study comprised of two arms, the first examining at what force femoral fracture occurs in the embalmed human femur, the second examining if significant graft implant/subsidence occurs following impaction at a set force at two different impaction frequencies.

Methods: Human femurs were harvested from cadavers for destructive impaction testing. An initial group of 17 femurs underwent complete destructive impaction testing, using a standardized impaction grafting technique with modifications, allowing sequentially increased, controlled impaction forces to be applied until femoral fracture occurred. A second group of 8 embalmed human femurs underwent impaction bone grafting at constant force, at an impaction frequency of 1Hz or 10Hz. A femoral stem was cemented into the neo-medullary canals. These constructs underwent subsidence testing simulating the first 2 months post-operative weight-bearing.

Results: No fractured below a 0.5kN impaction force. 82% of the femurs fractured at or above 1.6kN of applied force. No massive implant subsidence occurred in the second group of 8 femurs, all undergoing femoral impaction grafting at 1.6kN. There was no correlation between implant subsidence and frequency of impaction. Average subsidence was 3.2mm.

Interpretation: It is possible to calculate a force below which no fracture occurs in the embalmed human femur undergoing impaction grafting. Higher impaction frequency, at constant force, doesn't decrease rates of implant subsidence, in this experiment.

Notes:

10:12am–10:18am

An Unusually Large Number of Coracoclavicular Joints Seen in Patients Living in a Small American Town

Jose Ramon, MD

Introduction: A rare anatomical anomaly is found in unusually large numbers in one small American city.

Methods: A random screening for the coracoclavicular joint (CCJ) was carried out by examining the shoulder and chest x-ray images of patients presented to the 2 hospitals located in a small town, over a period of 2 years. All the films stacked up for radiologist's reading and all the x-rays that were brought into orthopedic office were studied on some days randomly. Strict radiological criteria were laid down for identifying the CCJ. Symptoms and signs were recorded.

Results: A total of 1328 x-rays were seen. A 47 patients with CCJ were identified. All patients are African Americans. F:M = 26:21. Age ranges from 30-91. Eight were bilateral. Six shoulders were symptomatic, 4 of them from rotator cuff related symptomatology. One had a completely formed CCJ with CCJ arthritis and had obtained significant relief with steroid infiltration under fluoroscopy. None had surgeries. None had restricted range of motion from CCJ.

Discussion and Conclusion: Firstly, from a thorough literature search it is confirmed that in this study, globally a highest number of CCJs are collected from one small North American town with a total of 29,000 population, of whom 91% are African Americans. Whilst acknowledging the shortcoming that this was not designed to be a comparative study, we feel African Americans are more likely to have this congenital anomaly. Secondly, sporadic case reports have shown that only a minimal few shoulders were symptomatic and had undergone surgery. Our study findings advocate a high threshold for any surgical intervention. Other pathologies may need to be thoroughly investigated and excluded, whilst ignoring

this conspicuous anomaly that tantalizingly seeks attention of the surgeon.

Notes:

10:18am–10:24am

Harley & Betty Baxter Resident Award

Augmentation of Rotator Cuff Repairs Using a Bioengineering Approach and Myostatin Inhibitors

Gregory P. Colbath, MD, MS
Peter Cheng-te Chou, BA
John DesJardins, PhD
Qian Kay Kang, MD
Xuejen Wen, MD, PhD
Benjamin R. Whatley, BS

Introduction: Myostatin (GDF-8) is a negative regulator of muscle and has demonstrated positive effects within the acute healing phases of tendon remodeling. Conversely, myostatin inhibition has been shown to increase muscle hypertrophy, while decreasing the amount of fatty infiltration, two of the hallmarks of rotator cuff tendinopathy. Our purpose was to determine the potential role of myostatin or myostatin inhibitors during the remodeling and healing of acutely repaired rotator cuff defects, with the eventual aim of biologically augmenting rotator cuff repairs.

Methods: 72 Sprague Dawley rats underwent acute supraspinatus detachment and repair on the left shoulder. In the control group (n=18), a modified Mason-Allen suture was placed in the supraspinatus tendon and then secured to the humerus through a bone tunnel. Subsequent groups (n=18) underwent similar repairs with the addition of 150 µg of hydrogel loaded plain, with myostatin, or with a myostatin propeptide inhibitor. All animals were sacrificed at 4 and 8 weeks for biomechanical testing, histology, and MRI analysis.

Results: MRI analysis revealed a larger cross-sectional volume within the myostatin inhibitor group, although not statistically significant. Biomechanical testing revealed no statistical difference between the four tested groups at the 4 or 8 week time point, with respect to ultimate strength (load vs. displacement). The myostatin group had the lowest ultimate strength. Histology has been completed and will be indepen-

dently evaluated by a histo-pathologist to correlate with MRI imaging.

Conclusions: There appeared to be a detrimental effect with the addition of myostatin propeptide to the repair site. Myostatin inhibitor addition did not alter the ultimate strength compared to the control group at 4 and 8 weeks. MRI analysis showed increased hyperintense signaling in the regions where growth factors were placed. This is the first study to utilize MRI imaging of rat rotator cuff morphology following tendon repair.

Notes:

10:24am–10:30am

Promoting Angiogenesis to Improve Healing of Segmental Bone Defects

Shawn R. Gilbert, MD

Introduction: Segmental bone loss remains a challenging clinical problem. A frequent mitigating factor is inadequate blood supply. Small molecules that activate the hypoxia inducible factor pathway (HIF) can be used to stimulate angiogenesis. We investigated an approach to promote healing using angiogenic and osteogenic compounds in combination with a biodegradable, weight bearing scaffold.

Methods: Adult rats underwent removal of a 5mm segment of femur stabilized by a cylindrical biodegradable implant and intramedullary fixation. Treatment groups included (1) saline (negative control), (2) desferrioxamine (DFO) a HIF activator, (3) low dose rh-BMP-2 (5µg), (4) DFO and rh-BMP-2 low dose (5µg) or (5) rh-BMP (10µg). Angiography was used to evaluate vascularity. Bone healing was assessed by radiographs, micro CT, histology and biomechanical testing.

Results Increased vascularity was seen at 6 weeks in the groups including DFO treatment, and to a lesser extent in the low dose BMP group. Bone healing was increased as assessed by Faxitron radiographs in the treatment groups and by microCT in the BMP group. Biomechanical testing revealed improved strength in the treatment groups.

Discussion and Conclusion DFO improved angiogenesis and strength of bone healing in segmental defects. Combining

DFO and BMP improved results over either strategy alone. Use of angiogenic compounds in segmental bone loss is promising. This approach may prove useful for impaired bone healing, particularly where impaired blood supply exists. Further, using an inexpensive small molecule such as DFO may have synergistic effects and may allow use of lower doses of BMP which may lower costs and improve safety.

Notes:

10:30am–10:36am

Local Elution Profiles of a Highly Purified Calcium Sulfate Pellet at Physiologic PH, Loaded with Vancomycin and Tobramycin, in the Treatment of Infected Total Joints

Gerhard E. Maale, MD
John J. Eager, MS

Introduction: Local antibiotic delivery systems for biofilms related infections, have been popularized since the early 1980's. These have included PMMA delivery of antibiotics for infected total joints. Unfortunately, delivery by this mechanism is by surface bleaching and local levels of the antibiotic are below MIC at 2 weeks. The spacer concept with 2 stage revision was published by us in the 90's, requires removal of the spacer and/or beads and is associated with 2 surgical procedures. PMMA has been associated with serum levels that been sustained and can be associated with allergic reactions. Presented is a highly purified Calcium Sulfate crystal, at neutral PH, loaded with tobramycin and vancomycin. The crystal is hydrophilic, soft after hydration, disappears on X-rays after 2-3 weeks, and doesn't scratch total joints.

Methods: Drain and serum levels of vancomycin and tobramycin levels were assessed at days 1-5 post-op in infected total joint arthroplasties or complex failed total joints.

Results: 50 patients undergoing revision arthroplasty for infected total joints or major multiple revisions were analyzed. There were 33 knees (1 bilateral), 16 hips, 1 elbow, 1 elbow, humerus and shoulder, and 1 hip, femur and elbow replacements. 2 cases with hips had no exchange. Local post-op average levels were days 1-5: 265, 172, 146, 146, 104 for vancomycin, and 31, 9.4, 6.4, 5.3, 4.6 for tobramycin. Most

of the cases assayed for greater than 400 on day 1 for vancomycin. This is at least 50 times greater MIC. Only 6 patients had detectable serum levels.

Conclusion: This local delivery system provides an adequate means of administering high doses of vancomycin and tobramycin locally in infected total joints, without systemic levels and disappears in 2 weeks, without damaging the total joints.

Notes:

10:36am–10:42am

Clinical Orthopaedic Society Resident Award

Cost Effectiveness Analysis of the Fixation of Intertrochanteric Hip Fractures

Adam M. Kaufman, MD
Robert D. Zura, MD

Introduction: Optimal resource utilization in the operative treatment of intertrochanteric hip fractures can be achieved through cost effectiveness analysis using Markov decision modeling. The purpose of this study was to determine the most cost effective implant, the sliding hip screw (SHS) or the intramedullary hip screw (IMHS), for the operative treatment of extracapsular hip fractures. The hypothesis was that the SHS would be a more cost effective implant.

Methods: A Markov decision model was constructed for a cost-utility analysis of SHS compared to IMHS for standard obliquity intertrochanteric hip fractures in a representative cohort of patients. Outcome probabilities and effectiveness were derived from the literature or estimated by expert opinion where necessary. Costs were estimated from the payer and provider perspective. Effectiveness was expressed in quality-adjusted life years gained (QALY). Principal outcome measures were average incremental costs, incremental effectiveness, and net health benefits. Sensitivity analysis was used to determine the relative risk of reoperation necessary to favor the use of each implant.

Results: In the base case, IMHS resulted in a lower number of average quality-adjusted life-years gained (5.19 vs 5.21 for SHS) at a higher average cost to the payer and provider (\$362,

\$1,515) and was therefore dominated by the SHS strategy for the treatment of stable intertrochanteric hip fractures. Sensitivity analysis revealed that if the relative risk of reoperation due to cut-out reaches 0.62 and 0.15 for IMHS compared to SHS when considering societal and provider costs respectively, it will be the preferred implant.

Conclusion: Using current, level I data, the SHS is preferred cost effective strategy for standard obliquity intertrochanteric hip fractures when compared to the IMHS. This may have a profound economic impact, considering the rising utilization of IMHS and incidence of hip fractures.

Notes:

Friday, July 22, 2011

GENERAL SESSION 9: Pain Management and Miscellaneous Topics

Moderators: Frederick C. Flandry, MD, FACS
H. Clayton Thomason III, MD

11:46am–12:30pm

11:46am–11:52am

Perioperative Management of Obstructive Sleep Apnea Among Patients Undergoing Total Joint Replacement Surgery: A Method for Screening and Treatment

Jason W. Thomason, MD, FCCP, D-ABSM
David J. Howe, MD

Introduction: Obstructive sleep apnea (OSA) affects a large number of patients in the general population, and a substantially higher percentage of patients undergoing total joint replacement surgery. However, most patients and surgeons remain unaware of the condition, which can increase the risk for such perioperative complications as hypoxemia, cardiac arrhythmias, myocardial injury, unanticipated admission to the ICU, and sudden unexpected death.

Methods: Beginning in 2008, we partnered a high volume total joint replacement program with an AASM accredited sleep center, directed by a pulmonary/critical care physician.

Our focus has been to identify patients at risk for OSA early in the course of his/her operative planning to better facilitate care both short and long term.

Results: Data from 218 patients who were screened as “at risk for OSA” have been prospectively collected in terms of polysomnography results, surgical outcomes including length of stay and adverse events, and adherence to treatment plans. These data show substantial improvement in comparison to historical controls. Delays in surgery were not seen among participating patients.

Conclusion: A simple, yet comprehensive approach to screening and treating OSA among patients undergoing total joint replacement surgery can improve outcomes without delays in surgery.

Notes:

11:52am–11:58am

Compliance with Incentive Spirometry Use

Hamid Hassanzadeh, MD
Amit Jain, BS
Mesfin A. Lemma, MD
Benjamin E. Stein, MD
Nadine Stewart, RN
Eric W. Tan, MD
Megan Vanhoy, RN

Introduction: Use of an incentive spirometry device (ISD) is often recommended to decrease pulmonary complications following a major surgical procedure. We hypothesize that ISD use in the orthopaedic ward is far more limited than recommended.

Methods: From September, 2010 to November, 2010, we prospectively surveyed all patients who underwent elective spine or total joint arthroplasty (TJA) surgery. All patients received ISD education prior to surgery and recommended usage was

10 per hour. Total ISD usage during one-hour periods in the mornings and evenings of postoperative days 1 through 3 were recorded and analyzed.

Results: Study included 182 consecutive patients with average age 64.5 years (32 to 88). Overall average ISD use was 4.1 per hour. Postoperative day 1 ISD use is 3.6 per hour, day 2 use is 4.4 per hour and day 3 use is 4.6 per hour. In spine surgery patients, ISD use per hour was 3.52, with day 1 use 3.6 per hour, day 2 use 3.3 per hour, and day 3 use 3.9 per hour. In TJA patients, ISD use per hour was 4.3, with day 1 use 3.6 per hour, day 2 use 4.8 per hour, and day 3 use 4.8 per hour. Difference between the two groups was statistically significant. Average morning use is 3.7 per hour and evening use 4.6 per hour; difference is significant. The correlation between patient age and average ISD use was not significant.

Discussion and Conclusion: Patients did not meet the recommendation of ISD use at 10 per hour. Use increased with recovery time and with having TJA. This maybe because these patients avoid the core muscle, body pain that the spine patient tend to experience as well as use of regional anesthesia for a subset of these patients. There is a need for objective measures and further patient education for increasing ISD use.

Notes:

11:58am–12:04pm

Practices and Physician Satisfaction with Perioperative Pain Management in Hip Fracture Patients

Micah Lissy, MD
David S. Geller, MD

Introduction: The surgical management of hip fractures is a common and familiar orthopaedic scenario. However, perioperative pain control in the elderly population can be particularly challenging. Given the expected increase in the elderly population in the coming years, optimal management of perioperative hip fracture pain is increasingly relevant. Improved management may facilitate better patient experience, earlier rehabilitation and discharge, decreased perioperative morbidity, and decreased cost. In an attempt to improve pain management within this orthopaedic cohort, an evaluation and analysis of current practices and physician satisfaction was performed.

Methods: A 5-question survey 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. It was also posted on the Orthopaedic Trauma Association’s web site and sent out to their membership. The questions evaluated current pain control practices for hip fracture patients and practitioner satisfaction.

Results: Of the 350 individuals who responded to the survey, 61.4% were attending surgeons with the rest being either residents or physician extenders. 69.6% of respondents reported treating >15 hip fractures per year. Overall only 42% of respondents were very satisfied with their pain control. When stratified by age, for patients over 85, this fell to 36% satisfaction. IV and PO narcotics were less often used for pain control in patients over 85 than for those under 85 and conversely acetaminophen was more often used in those over 85. Half of respondents reported managing their patient’s pain without assistance from other services.

Conclusion: Survey respondents were practitioners who treat a large number of hip fracture patients per year, many without assistance. Given the apparent dissatisfaction with current pain management practices, alternative modalities and algorithms may be warranted for this patient population.

Notes:

12:04pm–12:10pm

Managing Your Reputation on the Internet

Joy Tu, BS

Introduction: Patients are now using the internet to find, compare and rate doctors just as they do restaurants, hotels and cars. Pew Internet and American Life Project released numbers in 2010 that document just how important of a source of information regarding medicine and physicians the Internet has become. Forty-seven percent (47%) of Americans report seeking information about their physician or other healthcare professionals from on-line sources. Internet usage is an integral part of all US demographic segments—one notable area expanding rapidly in popularity is rating sites—in this case

physician rating sites. The Internet gives anyone an opportunity to express their opinion, often anonymously, well-beyond any other venue previously available. Patients can publish statements and articles across the world in an instant, without the guidelines or checks and balances of traditional publishing.

Methods/Solution: As the demographics of and motivations behind physician rating site participation evolves, foundational relationships become considerably more nuanced. This coupled with the highly complex and legally regulated relationship between physicians and patients creates unique rules of online engagement. The following online reputation management & practice promotion strategies will be discussed including: a) proactive tactics to control your online identity b) how to turn a 'poor' rating into a neutral one c) utilizing rating sites to grow practice consultations d) how to monitor / grow practice efficiencies based on online feedback. We will also discuss how physicians can lobby rating sites to develop fair standards. At Medical Justice (www.medicaljustice.com), we are actively working with specific rating sites to create a set of standards. Medical Justice has outlined four minimum industry standards we are encouraging health rating sites to follow.

Discussion/Conclusion: Come hear two industry-leading experts discuss the latest trends, which sites patients are using the most and how to:

- Manage and control the information displayed about you on the internet
- Make sure that patients find you online
- Monitor and improve your practice and efficiencies
- Grow your practice and acquire new patients.

Notes:

12:10pm–12:16pm

Survey of Practice Variation Among Orthopaedic Surgeons

Guy Foulkes, MD

*J. Casey Spivey, MS

Introduction: Informal observation revealed a wide variety of surgical technique, aftercare methods, and activity resumption

among individual surgeons. In this study we attempt to quantify these practice variants with respect to four common orthopaedic procedures.

Methods: In October 2010, we surveyed 77 attendees of the Georgia Orthopaedic Society Annual Meeting regarding post-operative care and return to common sports activities and activities of daily living following four common procedures (rotator cuff repair, total knee arthroplasty, anterior cruciate ligament reconstruction, and carpal tunnel release). Fifty-one surveys were returned.

Results: Surgeon age averaged 51 years. Average years in practice were 18. Thirty-one were fellowship trained in one of nine different fellowships. Rotator cuff repair (33 surgeons): Slings were required for 3.5 weeks following small tears and 5 weeks following large tears. Driving was permitted at 4 weeks and unrestricted activity at 14 weeks. Total knee arthroplasty (31 surgeons): Ninety percent of surgeons performed open TKA, 72% using a standard medial parapatellar approach. Surgeons generally allowed driving and sedentary work at 4 weeks, and vigorous work at 12 weeks. ACL reconstruction (25 surgeons): Most (67%) surgeons used a single-bundle transtibial approach, while 33% performed a medial transfemoral approach. Sports were permitted with a brace by 77% of respondents at an average 22 weeks. Carpal tunnel release (38 surgeons): Less than 10% of surgeons used endoscopic technique, but this number rose to 33% of hand fellowship trained orthopedists. Return to work for both groups was nearly identical at 1 week for sedentary and 5.5 weeks for vigorous work.

Discussion and Conclusion: Much of the practice variation observed among a cross-section of orthopedic surgeons can be attributed to surgeon age and fellowship training. However, there are wide variations of surgical technique, aftercare, and return to activities of daily living, sports, and work even when these variables are excluded.

Notes:

12:16pm–12:22pm

The Long Term Safety and Efficacy of Intrathecal Therapy Using Sufentanil in Chronic Pain

Jose J. Monsivais, MD

Diane B. Monsivais, PhD, CRRN

Introduction: The purpose of the study is to describe the long term safety and efficacy of intrathecal therapy using sufentanil for the management of chronic neuropathic pain including failed back surgery syndrome.

Methods: This was a prospective cohort study of 19 (long-term follow-up on 12) chronic pain patients who failed other treatments. Follow-up is 2-25 years, with average 7 year follow-up. Standardized psychological screening was used to assess suitability. The Brief Pain Inventory (BPI), Disabilities of the Arm, Shoulder and Hand (DASH), and pain scales were used for post-treatment assessment. BPI, DASH, and pain scale scores at baseline and regular intervals throughout treatment were compared using repeated measures design.

Results There was a marked improvement in functional outcomes and the multi-dimensional assessment of pain. Pain scales showed a modest improvement. The complication rate was low and limited to catheter recall (1) and pump recall (1). One pump had to be replaced earlier for motor stall. There were no other complications (toxicity, withdrawals, granulomas, or deaths). Four patients terminated therapy. Reasons included psychiatric diagnosis (1), discontinued after 2 years because got married and said she felt she didn't need it anymore (1), died from unrelated causes after 4 years of therapy (1), had it removed because he did not wish to return to work because he was getting a large pension (1).

Discussion and Conclusion Intrathecal therapy with sufentanil therapy offers a good treatment alternative for those cases that have failed surgery and standard pain treatment. Strict patient selection based on psychological screening, control of co-morbidities, a proper pain management may contribute to successful outcome.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 43).*

Notes:

2011 Scientific Program Abstracts — Saturday

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

Saturday, July 23, 2011

GENERAL SESSION 10: Foot & Ankle and Tumors

Moderators: Angus M. McBryde Jr., MD
James A. Nunley II, MD

7:25am–8:20am

7:25am–7:31am

Changes in Gait Mechanics Two Years Following Total Ankle Replacement

Robin M. Queen, PhD
Robert J. Butler, DPT, PhD
Justin De Biasio, BA
James K. DeOrio, MD
Mark E. Easley, MD
James A. Nunley II, MD

Introduction: Total ankle replacement (TAR) continues to grow as an alternative to arthrodesis for patients who suffer from end-stage arthritis. The purpose of this study was to assess the changes in ankle kinetics and kinematics from a pre-operative (PRE) time point to 1-year (1yr) and 2-years (2yr) post-operative time points in patients following a TAR.

Methods: Fifty-one patients who received a primary fixed-bearing TAR were selected from a larger database of subjects. A motion capture system and four force plates were used to collect three-dimensional joint mechanics and ground reaction forces (GRF) during self-selected speed level walking. Gait mechanics data was collected for each subject PRE as well as 1yr and 2yr post-operatively. The data was analyzed using a 1 (subject) X 3 (time) repeated measures ANOVA to determine significant differences between the time points ($\alpha=0.05$).

Results: Surgical-side single-leg support time, double-leg support time, stride length, stride width, walking speed, peak anterior GRF and peak posterior GRF demonstrated significant improvements from the PRE to 1yr post-operative ($p<0.002$) time points and between the 1yr and 2yr post-opera-

tive, ($p<0.040$) time points. Surgical-side stance time, step length, peak vGRF from both the first half and second half of stance, as well as peak plantar flexion moment demonstrated significant changes from PRE to 1yr ($p<0.019$) but not between the 1yr and 2yr time points.

Discussion: All of the observed changes suggest improved or maintained functioning in TAR patients. The greatest improvement occurred between the PRE and 1yr time points. The goal of TAR is to decrease pain while hopefully increasing joint range of motion. The results of this study indicate that patients with end-stage osteoarthritis demonstrate improves in ankle mechanics and walking mechanics following TAR through the 2yr time point while maintaining ankle range of motion.

Notes:

7:31am–7:37am

Detachment of the Achilles Tendon and Repair with Suture Anchors for Extensile Exposure of the Posterior Ankle

Robert Henshaw, MD

Introduction: Posterior approaches to the ankle typically utilize a posterolateral or posteromedial skin incision, dissection of the skin off the Achilles tendon, coronal or sagittal splitting of the Achilles tendon, or calcaneal osteotomy. However, such approaches may limit exposure needed for safe resection of extensive tumors of posterior ankle/subtalar joints and may be associated with wound complications. We describe our experience with an extensile posterior approach to the ankle with detachment of the Achilles tendon for extensive tumors involving the posterior ankle. To the best of our knowledge, this approach and its results have not been reported for oncologic indications.

Methods: Of the 180 cases of foot and ankle tumors treated between 1986-2008 at a single institution, 6 patients underwent direct posterior approach to the ankle joint with complete detachment of Achilles tendon from its calcaneal insertion, tumor resection and reconstruction of the Achilles tendon with suture anchors. Preoperative diagnosis was pigmented villonodular synovitis (5) and chondroblastoma of the tibia (1).

Results: At a mean of 6 years (1-10) follow-up, all patients are free from tumor. All patients can walk unlimited without any support. There were no problems with Achilles incompetence. The mean Musculoskeletal Tumor Society score was 96.7% (range 90-100%, SD 4.2) and the mean Achilles Tendon Total Rupture Score was 95 (range 87-100, SD 5.7). One patient with screwed suture anchors had backing out of two anchors along with deep infection, requiring surgical debridement and anchor removal. One other patient had a traumatic minor wound dehiscence which responded to local wound care.

Discussion and Conclusion: Excellent exposure, tumor control and patient function were achieved by this approach in a select group of patients. The surgical technique described in this report offers another alternative for an extensile posterior approach to the ankle and/or subtalar joints.

Notes:

7:37am-7:43am

Comparing the Effectiveness of Eccentric Training Along with Conventional Physical Therapy as Treatment for Insertional Achilles Tendinosis

Margaret Kedia, PhD, DPT

*G. Andrew Murphy, MD

Marie Barron, PT, OCS, CMP

Nicholas T. Bird, MPT

David R. Richardson, MD

Michael Williams, PT, OCS, CMP

Purpose: Several studies have reported the efficacy of eccentric training for mid-portion Achilles tendinosis (2-6 cm), but have been inconclusive for tendinosis located at the tendon's

insertion. This study investigates if eccentric training is an effective intervention for treating chronic insertional Achilles tendinosis (within 2 cm from insertion) when combined with a conventional physical therapy regimen.

Methods: This study utilized a single-blinded, randomized clinical trial conducted at an orthopedic practice. Thirteen subjects in the control group received conventional physical therapy that involved stretching, heel lifts, and cryotherapy, whereas 12 subjects in the experimental group performed eccentric training of the Achilles tendon and received the conventional therapy. Patient outcome scores were collected on pain (Visual Analog Scale [VAS]) and function (Short Form-36 [SF-36] & Foot Ankle Outcome Questionnaire [FAOQ]) at initial evaluation, 6 weeks, and 12 weeks follow ups by participating physicians who were blinded to the intervention utilized. The 12-week improvement in outcome scores was compared between the two protocols using a Mann-Whitney test and within each protocol using Wilcoxon signed ranks tests.

Results: Subjects following the conventional physical therapy protocol experienced statistically significant improvements in pain (VAS scores) and function (SF-36 and FAOQ scores). Subjects following the eccentric training and the conventional physical therapy also improved to statistically significant levels in the VAS pain scale and the SF-36. Although they also showed improved scores of the FAOQ functionality scale, it was not statistically significant. However, the significance in the decreased VAS pain score is larger between baseline and 12 weeks among those who followed the eccentric training protocol than among those who did not.

Conclusion: Conventional physical therapy intervention alone and in combination with eccentric training is effective for treating insertional Achilles tendinosis. Eccentric training appears to have added benefit in decreasing pain but not on increasing physical functionality.

Notes:

7:43am–7:49am

A Modified Mason-Allen Technique for Repairing Acute Achilles Tendon Rupture Using Fiberwire Sutures

Jong Taek Kim, MD
William R. Barfield, PhD
Qian Kay Kang, MD

Introduction: Controversy exists in the proper management of acute Achilles tendon rupture. Research has yet to elucidate definitively whether surgical management or nonsurgical management is best. At our institution, the modified Mason-Allen technique has been used successfully for repairing acute Achilles tendon rupture. The primary purpose of this study was to describe this technique and compare to the exact repair techniques used in two 2010 RCT publications. We hypothesize that our repair construct (modified MA, 6 core-strands) will have a greater ultimate tensile strength and maintain a significantly smaller gap at the repair site under cyclic load compared to the repair constructs used in two RCTs (Krackow with 4 core-strands and modified Kessler with 4 core-strands).

Method: Group 1 was repaired with modified Mason-Allen technique using 6 core-strands. Group 2 was repaired with modified Kessler technique using 4 core-strands. Group 3 was repaired with Krackow technique using 4 core-strands. Each repaired specimen was loaded to failure at 1mm/sec using a servohydraulic testing machine.

Results: The average tensile load at failure was $292.5 \pm 17.67\text{N}$ for Group 1, $124.5 \pm 9.12\text{N}$ for Group 2, and $145 \pm 7.07\text{N}$ for Group 3. Cyclic loading results are pending.

Discussion and Conclusion: In a bovine Achilles tendon model, our construct (modified MA, 6 core-strands) can withstand significantly greater ultimate tensile load at failure compared to exact repair techniques used in two 2010 RCTs. Although cyclic load experimental results are pending, we believe suture technique and number of core strands will impact the integrity of Achilles tendon repair with regard to tendon end gapping and ultimate repair strength. We recommend repair methods that have superior biomechanical test results when repairing Achilles tendon rupture. The current research findings may determine which Achilles surgical repair technique is best to resist tendon end gapping and ultimate tensile loading.

Notes:

7:49am–7:55am

Talar Mosaicplasty

Angus M. McBryde Jr., MD
*Dominic J. Lewis, MD

Introduction: This biomechanical study focuses on medial talar wall breakout/pullout strength using fresh cadaver tali. The hypothesis is that violation of the medial talar wall causes significant increase in the possibility of graft breakout through the medial wall.

Methods: Nineteen (19) specimens were potted into an aluminum cylinder with PMMA. Two graft positions (posterior and anterior) in the talus were randomized. 2.7 mm screws were attached to each "plug" graft for testing. The Bionics 858 MTS device was utilized. Pull out failure was the point of decline in the force/velocity curve. Central graft locations were 2 and 7 mm within the medial talar dome wall. Paired T-test for pull out/breakout strength of the two graft locations were analyzed.

Results: Results showed a statistically significant difference in breakout/pullout strength with wall violation versus non violation.

Discussion and Conclusion: There is a risk with wall involvement during placement, after placement, and at any time before complete consolidation - i.e. compliance, injury, too aggressive rehab, angled or canted graft, etc. It takes roughly ~4 times more for breakout with the more centrally located plugs. There appears to be a real difference between the two medial talar wall thicknesses and the pullout/breakout force (p force quite small) This data could or might translate to a recommendation to maintain a certain medial talar dome wall thickness (~2mm) or simply call attention to the potential problem with a thin wall.

Notes:

7:55am–8:01am

Simultaneous Intramedullary Nailing of Skeletal Metastases

Bryan Moon, MD
Patrick P. Lin, MD
Valerae O. Lewis, MD
Robert L. Satcher, MD, PhD

Introduction: The safety of simultaneous nailing of pathologic and impending fractures in patients with metastatic disease is occasionally brought into question. In fact, the risk is felt to be so high that some authors have advocated a staged approach especially for impending fractures. Actually, there is actually very little data to support the staging of multiple impending or pathologic fractures. The purpose of this study is to review our series of patients who underwent simultaneous nailings and evaluate the associated perioperative pulmonary morbidity and mortality.

Methods: Sixteen patients were retrospectively reviewed who underwent simultaneous intramedullary nailing of impending or pathologic fractures between 1993 and 2009. There were ten males and six females. The mean age was sixty years (range 40-78 years). The intramedullary nailings included fifteen femurs, seventeen humeri, and one tibia. Thirty one nails were reamed and two nails were unreamed.

Results: Three patients (18.8%) died prior to discharge home. Two of these deaths were presumed to be the direct result of acute pulmonary complications related to simultaneous nailing. One of these patients died intra-operatively, resulting in an intraoperative death rate of 6.25%. For the thirteen patients that survived beyond discharge, there were three pulmonary complications (23%). There were no intraoperative or perioperative deaths in the prophylactic nailing group.

Conclusion: Simultaneous nailing of impending and pathologic fractures can be performed safely, although appropriate patient selection is critical. Patients with impending fractures did not appear to be in a higher risk group than patients with pathologic fractures.

Notes:

8:01am–8:07am

Radiographic Response of Giant Cell Tumor of Bone During Treatment with Denosumab

Robert Henshaw, MD

Introduction: Giant cell tumor of bone (GCT) is an aggressive lesion characterized by destruction of epiphyseal and metaphyseal bone. Denosumab, a human monoclonal antibody which targets RANKL, a mediator of osteoclast activity overexpressed in GCT, has been used investigationaly in the treatment of GCT. We review the radiographic and CT findings of patients treated with denosumab to evaluate tumor appearance during therapy.

Methods: Pre-treatment films and imaging on treatment was obtained prospectively for 11 consecutive patients treated with denosumab in an open-label, phase 2 study for recurrent or unresectable GCT. Studies included radiographs (n=7) and CT (n=8), which were reviewed by three musculoskeletal radiologists with agreement by consensus. Demographics, lesion size, lesion morphology, lesion location and evidence of lesional sclerosis and internal calcification in response to denosumab treatment was noted.

Results: There were 5 males and 6 females, with an average age of 33 years (20-52). Lesion size ranged from 3-10 cm located in the distal femur (n=4), proximal humerus (n=2), proximal fibula (n=1), distal radius (n=1), finger (n=1), cervical spine C2 (n=1) and sacrum (n=1). Prior to treatment, all tumors were predominantly lytic with a narrow zone of transition. Changes seen during treatment included peripheral sclerosis with central progressive mineralization as seen in 7 of 11 (64%) patients. CT findings were similar to radiographs demonstrating increased peripheral calcification with central mineralization. Additionally, 3 of 5 (60%) of patients with known pulmonary GCT metastases showed significant reduction in the size and number of pulmonary lesions following initiation of therapy.

Discussion and Conclusion: Denosumab shows early promise in the treatment of GCT of bone. Common radiologic findings include peripheral calcification of tumor with progressive central mineralization after treatment. Pulmonary metastases show decrease in size and number following treatment. Further study with longer term evaluation is ongoing.

** The FDA has not cleared this drug and/or medical device for the use described in this presentation. (Refer to page 43.)*

Notes:

Saturday, July 23, 2011

GENERAL SESSION 12: Adult Reconstruction II — Hip Arthritis and Arthroplasty**Moderators:** Michael P. Bolognesi, MD
Riyaz H. Jinnah, MD

9:17am–10:10am

9:17am–9:23am

Complications Following Hip and Knee Replacement: Does Race Matter?Muyibat A. Adelani, MD
Ginger E. Holt, MD
Yanna Song, MS
Kristin R. Archer Swygert, PhD, DPT

Introduction: Black race has been associated with complications following total joint arthroplasty, including infection, deep vein thrombosis, pulmonary embolism, and death. These complications have also been associated with medical comorbidities, including hypertension, diabetes and obesity, which are known to be more prevalent in the African American population. We hypothesized that the association between race and adverse outcome is a reflection of racial disparities in the aforementioned medical comorbidities, and thus, would be insignificant after adjusting for the presence of these comorbid conditions.

Methods: With data from the Nationwide Inpatient Samples from 1998 to 2005, multivariate logistic regression analysis was used to assess the significance of Black race as a predictor of adverse outcome in total hip and total knee arthroplasty patients. Rates of postoperative complication and mortality were regressed against patient- and provider-related variables, including race, age, gender, insurance type, urban or rural location, teaching status, average annual arthroplasty volume, and the presence of hypertension, diabetes mellitus, and obesity.

Results: Black race was significantly associated with postoperative complication and death. Other significant associations with complication include obesity, treatment in an urban hospital and treatment in a teaching hospital. In addition to Black race, Medicaid insurance, diabetes, and treatment in an urban hospital were associated with postoperative mortality.

Discussion and Conclusion: After adjusting for the presence of hypertension, diabetes, and obesity, Black race was significantly associated with postoperative complication and mortality. Our findings suggest that racial differences in our selected comorbidities do not account for the racial differences in outcomes demonstrated in this study. This emphasizes the need for further research so that interventions to reduce racial disparities in outcome may be implemented. Ultimately, as the volume of joint replacement is expected to increase dramatically, the resolution of this racial disparity will be a critical step in the optimization of outcomes.

Notes:

9:23am–9:29am

Harley & Betty Baxter Resident Award**Mid Term Survival of Head and Liner Exchange Revision for Well-Fixed Acetabular Components: The Effect of Cup Position and Polyethylene Type**Nathan A. Mall, MD
Muyibat A. Adelani, MD
Robert L. Barrack, MD
John C. Clohisy, MD
Ryan M. Nunley, MD

Introduction: Aseptic loosening and osteolysis are common problems. Performing a head and liner exchange (HLE) rather than full acetabular revision (AR) provides multiple advantages. We determined the importance of acetabular component position and the type of polyethylene (convention or highly crosslinked) liner used at the time of revision on mid- to long-term survival of HLE.

Methods: 144 patients underwent HLE for aseptic loosening, osteolysis, or polyethylene wear with minimum 3-year follow-up (avg 7.8 years). Anteversion and inclination of the acetabular component were measured on pre-revision radiographs. Implant records were reviewed to determine if conventional or HXLPE polyethylene liners were used at the time of revision.

All dislocations were recorded and patients requiring additional revisions were deemed failures.

Results: Average Harris Hip Score (81.4) and UCLA score (5.4) were both significantly improved from pre-operative values. There were 42 (30%) and 64 (46%) hips outside of the safe zones for inclination and anteversion, respectively. 19 of 144 hips (13%) were outside of the safe zone in both planes, 6 of which required a repeat revision (32%). Fifty-two hips were inside both safe zones, only two of which required repeat revisions (4%). There were 13 (9%) repeat revisions; five for instability, seven for progression of lysis, and one for infection. Seven hips that were originally revised with conventional polyethylene required additional revision surgery for progression of lysis.

Discussion and Conclusion: Patients with appropriately positioned, well-fixed acetabular components can be treated with an isolated HLE rather than AR with good long term outcomes and survival. Acetabular components placed outside the safe zone for inclination and anteversion were at highest risk for failure and should be an indication for complete acetabular revision regardless of fixation. Highly-crosslinked liners when compared to conventional liners seem to halt or at least markedly slow the lytic process following HLE.

Notes:

9:29am–9:35am

Ten-to-Sixteen Year Results of a 2nd Generation Modular Acetabular Component

Paul F. Lachiewicz, MD

Introduction: First-generation modular acetabular components had high rates of wear, pelvic osteolysis and liner dissociation. There is little long-term data of the results of 2nd generation modular acetabular components.

Methods: This is a prospective, consecutive single surgeon series of 116 hips performed using one 2nd generation modular titanium acetabular component with routine screw fixation and conventional polyethylene (50 irradiated in air, 66 in N2). The mean patient age was 59.6 years and follow-up time was 10-16 years (mean, 12 years). Head size selection was based

on the outer size of the acetabular shell. Clinical and radiographic evaluation and measurement of 2-D polyethylene wear (head penetration) were performed.

Results: At most recent follow-up, the mean Harris hip score was 89, with 64 hips rated as excellent, 40 good, 10 fair and 2 poor. All acetabular components were well-fixed and none had been revised or removed. No liner had dissociation. Two liners (at 11 and 14 years) were exchanged for wear-pelvic osteolysis. There was pelvic osteolysis in 8 hips (6.7%), all but one first noted in the 2nd decade. There were 3 reoperations for dislocation (head-liner exchange only) and 3 loose femoral components revised. The mean linear wear rate was 0.09mm/yr.

Discussion and Conclusion: This 2nd generation modular acetabular component with screw fixation had excellent fixation with a low rate of pelvic osteolysis at 10-16 years. These results question the need for newer, more expensive ingrowth surfaces and monoblock components. This component, with highly cross-linked polyethylene, continues to be used in all patients.

Notes:

9:35am–9:41am

Return to Work and Recreation Following Hip Resurfacing

Paul Balthrop, MD
Eric M. Cohen, BS
James L. Guyton, MD
David G. LaVelle, MD

Introduction: Total hip arthroplasty has been shown to be one of the most reliably successful surgeries performed. Within the last two decades, this success has led to the expansion of operative indications to include younger patients, and hip resurfacing surgery has become more popular for treating symptomatic arthritis in this population. To date, there is little data on the expectations patients should reasonably have about returning to typical activities following hip resurfacing.

Methods: All hip resurfacing patients from a single institution over a four-year period were asked to complete questionnaires detailing their occupational duties and recreational activities, and the time elapsed from surgery to resumption of duties and activity.

Results: Fifty patients consented and returned questionnaires; 90% were males, the average age of the study group was 50 years, with an average follow-up of 22 months. Forty-seven (94%) of the 50 patients returned to their pre-operative occupations. The average time to return to part-time duty was 5.79 weeks, with return to full-time duty at 9.36 weeks. Thirty-seven patients (74%) either resumed pre-operative levels of recreation or increased their activities post-operatively. Within one year of surgery, 97% had begun vigorous activities.

Discussion and Conclusion: Although data are sparse, a previous series on total hip patients' return to work reported 10 weeks, which is consistent with this population of resurfacing patients. The ability of resurfacing patients to engage in recreational activities has been well-documented in numerous studies. This cohort of patients demonstrated excellent rates of return to recreation, consistent with previously reported series. The timeline for return to these activities showed quick resumption of recreational activities. This study suggests that hip resurfacing patients can expect a relatively brief recovery period, with a good success rate in returning to full work and recreational activities.

Notes:

9:41am–9:47am

Ischemic Fasciitis and 'Pseudo-Tumor' after Ceramic-on-Ceramic Total Hip Arthroplasty: A Case Report

George W. Brindley, MD

Case Presentation: A forty-eight year old Caucasian female underwent an uncomplicated primary right total hip arthroplasty in 2005 for degenerative arthritis utilizing a porous ingrowth implant with a ceramic-on-ceramic articulation. Four years later she began to notice progressive swelling and pain in her right thigh with decreasing function in the sciatic and femoral nerves of that extremity. Eight months after onset

of these symptoms MRI and CT scan revealed a large soft tissue mass in the right thigh extending into the right hemi-pelvic region. Core needle biopsy of the lesion was performed and microscopic analysis revealed eosinophils with no evidence of malignancy. This was interpreted as a soft tissue reaction to probable total hip wear debris and she was scheduled to undergo total hip revision. At the time of surgery the thigh soft tissue mass was measured at 25 x 15 x 10 centimeters and appeared to affect the entire hip abductor and flexor muscle groups as well as the sciatic nerve with intrapelvic extension along the iliopsoas tendon. The extremity mass was excised excluding the sciatic nerve. Microscopic analysis of the soft tissue component was consistent with ischemic fasciitis and the proximal one-third femur was completely avascular. Revision hip arthroplasty with a proximal femoral replacement, a porous trabecular metal acetabular shell and a constrained acetabular polyethylene liner was performed.

Discussion: Recent reports in orthopaedic journals have described the occurrences of pseudo-tumors, soft tissue destruction and the presence of arthroprosthetic cobaltism in association with metal-on-metal articulating total hip arthroplasty. To our knowledge this is the first case presentation of a soft tissue reaction similar to that which has been noted in association with some metal-on-metal articulating prostheses adjacent to a ceramic-on-ceramic articulation. We asked for extramural consultation with the Division of Anatomic Pathology at the Mayo Clinic in Rochester, Minnesota for further evaluation of the microscopic specimens and they confirmed, "Necrosis, granulomatous inflammation and eosinophils-rich infiltrate, consistent with prosthetic implant reaction." No metal or ceramic debris was identified on microscopic analysis; but, it is our opinion that the soft tissue reaction was in response to the metal-on-metal opposition of the metal backing on the ceramic acetabular liner and the metal acetabular shell. Metal debris was noted in the capsular tissue and structures adjacent to the acetabular implant on another patient who recently underwent revision of the same ceramic-on-ceramic articulating implant for symptomatic femoral component loosening.

Conclusion: In some cases total hip arthroplasty with a metal-on-metal articulation has been observed in association with severe inflammatory soft tissue reaction. We present the case of a total hip arthroplasty with a ceramic-on-ceramic articulation that included metal-on-metal apposition in the acetabular component construction. We believe this was associated with severe soft tissue and bone necrosis in our patient. Awareness of this extreme complication after total hip arthroplasty is important to those physicians who evaluate these types of patients or who are performing this type of surgery.

Notes:

9:47am–9:53am

Metal Ion Levels after Hip Resurfacing in a Young Active Population

Ryan M. Nunley, MD
Robert L. Barrack, MD
John C. Clohisy, MD
Erin L. Ruh, MS

Introduction: Modern metal on metal hip surface replacement arthroplasty (SRA) is an alternative to total hip arthroplasty in young, active patients. Recent concerns about metal ion levels and early failure have limited data to support the notion that activity levels are related to metal ion levels and risk for early failure. The purpose of this study is to determine the metal ion levels in young, active patients following SRA.

Methods: We prospectively enrolled 36 young, active patients (average age 49.3; 86.1% males) scheduled to receive unilateral SRA. Inclusion criteria: Age < 60, UCLA score ≥ 6 , BMI ≤ 35 , and a desire to return to high impact activities. Cobalt (Co) and chromium (Cr) levels were tested from whole blood samples collected preoperatively, one year postoperatively for all patients, and two years postoperatively for 16 patients. Blood samples were analyzed by the same independent laboratory using a high-resolution inductively-coupled plasma mass spectrometer.

Results: Co and Cr levels increased significantly from pre-operative to one-year postoperative (Co, $p=0.002$; Cr, $p=0.015$). At one year postoperative the average Co level was 1.81 parts per billion (ppb) and average Cr level was 1.82 ppb. Only 2 patients had Co or Cr levels greater than 5ppb postoperatively. There was no significant change in Co and Cr levels between one and two years postoperative (Co, $p=0.320$; Cr, $p=0.141$).

Discussion and Conclusion: Young, active patients with SRA have an increase in whole blood Co and Cr levels after surgery that remains elevated at 2 years postoperatively, but very few crossed the 5ppb threshold for concern.

Notes:

9:53am–9:59am

5-8 Year Clinical Experience with 621 Modular Neck (MN) Femoral Components in Total Hip Arthroplasty (THA)

Brad L. Penenberg, MD
Michelle Riley, PA-C

Introduction: Modular neck femoral components offer a unique means of adjusting limb length, offset, and version in THA. These adjustments are independent of stem position and ball length. During trial range of motion, neck length, neck valgus angle and neck version are all adjustable. It is the purpose of this study to evaluate whether modular necks offer greater precision and reduced risk of dislocation when performing THA.

Methods: A retrospective review of 621 consecutive press fit MN femoral components was performed at 5 to 8 years following index operation. All hips were implanted using a soft tissue sparing posterior approach. At the time of intra-operative radiographic evaluation and stability testing, neck adjustments were routinely made. 211 long and 410 short necks were implanted. BMI ranged from 17-50kg/m². Harris hip scores were calculated. Pre-operative and post-operative radiographs were reviewed and measured for limb length and offset.

Results: Limb length was within 5mm in all patients. Offset was reproduced within 4mm of the opposite hip when measurable. 8 stems were revised for loosening at 2-5 yrs, and 1 stem for deep infection at 5 years. The remaining 612 hips averaged 95.3 on the Harris Hip Score. Limb length was within 5mm in 100% of patients. There were no dislocations, DVT's, nerve injuries, or wound infections.

Conclusion: The use of modular neck femoral components in THA contributes to greater precision in limb length restoration and offset and dislocation is dramatically reduced.

Notes:

Saturday, July 23, 2011

GENERAL SESSION 13: Sports Knee and Shoulder**Moderators:** Darren L. Johnson, MD
Matthew J. Matava, MD

10:25am–11:04am

10:25am–10:31am

Outcomes for Arthroscopic Repair of Type II SLAP Lesions in the Worker's Compensation PopulationRandall Murphy, MD
Timothy R. Brown, MD
Stephanie L. Tanner, MS

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 (Baltimore Therapeutic Equipment Company, Hanover, MD), 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:

10:31am–10:37am

Previous Partial Meniscectomy Increases the Incidence of Knee Articular Cartilage Lesions Among College Football Athletes at the NFL CombineJeffrey J. Nepple, MD
*Matthew J. Matava, MD

Introduction: Although articular cartilage lesions of the knee are a common finding among elite athletes, little is known about the risk factors for these lesions. The purpose of this study was to better define the prevalence of articular cartilage lesions in elite college football players undergoing knee MRI at the National Football League's (NFL) Invitational Combine and to test the hypothesis that previous knee surgery is a risk factor for these lesions.

Methods: We reviewed all participants of the NFL Combine undergoing a knee MRI from 2005 to 2009. Each MRI was reviewed for evidence of articular cartilage disease. History of previous knee surgery including ACL reconstruction, meniscal procedures, and articular cartilage surgery was recorded for each athlete.

Results: A total of 594 players (723 knee MRIs) were reviewed. Full-thickness articular cartilage lesions were associated with a history of any previous knee surgery and specifically, previous meniscectomy. Full-thickness lesions were present in 27% of knees with a previous meniscectomy compared to 12% of knees without previous meniscal surgery and 11% of knees with a history of meniscal repair. The location of the full-thickness lesion was also associated with the location of the meniscus tear, as full-thickness lesions in the lateral compartment were associated with previous lateral meniscectomy; the same relationship was seen in the medial compart-

ment. Previous ACL reconstruction was not associated with an increased risk of full-thickness articular cartilage lesions.

Discussion and Conclusions: Articular cartilage lesions of the knee are a common finding among college football athletes at the NFL Combine. Previous partial meniscectomy increases the risk for these lesions while meniscal repair does not. Future research should investigate the effect of these lesions on athlete performance and longevity, as well as potential methods of chondral protection and optimal treatment strategies for this patient cohort.

Notes:

10:37am–10:43am

SOA Resident Award

Anatomic Landmarks Utilized for Physeal-Sparing, Anatomic Anterior Cruciate Ligament Reconstruction: An MRI Based Study

Kyle E. Hammond, MD
Dane C. Todd, BS
John W. Xerogeanes, MD

Introduction: ACL injury and reconstruction are becoming more common in the skeletally immature patient. The purpose of the study was to develop a reproducible, anatomic reconstructive technique using intra- and extra-articular landmarks, which can reliably produce a femoral tunnel of adequate length and diameter, while avoiding the femoral physis.

Methods: 188 MRI studies were evaluated for children aged 6 to 17. The extra-articular landmarks were the femoral origin of the popliteus tendon and the lateral epicondyle. The intra-articular landmark was the central portion of the femoral ACL origin. Using computer software, points were plotted at the landmarks in all three planes. Lines, depicting potential femoral tunnels were then drawn connecting the ACL origin to the popliteal insertion and the lateral epicondyle. Distances were then calculated for the lengths of these tunnels, the shortest distance from the physis to these tunnels, and the height of the lateral femoral condyle. 3D MRI reconstruction was used to confirm that the chosen landmarks spared the physes after tunnel placement.

Results: The average distance to the femoral physis from the tunnel, which was from the ACL origin to the popliteus was 12mm, independent of sex or age; the shortest distance was 8mm. This tunnel length averaged 30.1mm in males and 27.4mm in females, with an average of 25.6mm in age 6 and 30.2mm in age 17. Average distance to the femoral physis from the tunnel, which was from the ACL origin to the lateral epicondyle, was 8.8mm in males and 8.9mm in females; this tunnel's average length was 34.3mm in males and 31.6mm in females.

Conclusion: Drilling from the ACL origin to the popliteal insertion will produce an average tunnel length of 27-30mm, and safely allow at least an 8-10 mm diameter tunnel in a patient 6 to 17 years old. Using the easily identifiable landmarks discussed in this paper will allow safe, reproducible anatomic ACL reconstructions without the need for x-ray utilization.

Notes:

10:43am–10:49am

Subacromial Hook Plate for Osteosynthesis of Type II–B Clavicle Fractures and AC Joint Separations

Steven Brantley, MD
Spero G. Karas, MD

Introduction: Numerous techniques have been described for the treatment of high grade acromioclavicular (AC) separations and Type II-B distal clavicle fractures. Each technique has its limitations, with dependable results often evading the surgeon. We postulate that a more rigid construct will improve outcomes and decrease post-op subluxation of the AC joint. We report the surgical technique, results, and complications of our series of patients who have undergone subacromial hook plate fixation for the treatment of AC joint separations and Type II-B distal clavicle fractures.

Methods: From 2008-2010, 15 patients underwent subacromial hook plate fixation for AC joint separation and Type II-B distal clavicle fractures. There were nine AC separations and six Type II-B distal clavicle fractures. The mean age of the patients was 30.6 years (range 18-58). There were 12 men and 3 women treated. In the series, two patients with a Type II-B

distal clavicle fracture and seven patients with AC separation underwent coracoclavicular (CC) ligament reconstruction with tendon allograft. The operation was performed in the beach chair position, utilizing a longitudinal incision over the distal clavicle. Once down on the clavicle and AC joint, the fracture and or separation were reduced and held in position with a subacromial hook plate. If the CC ligaments were felt to be incompetent, an allograft reconstruction underneath the coracoid was performed. Post-operatively the patients were placed in a sling for comfort but allowed to come out for unlimited range of motion when comfortable. The hook plate was removed on an average of 4.2 months from the procedure (range 3-7 months).

Results: There were two post-operative complications. One patient suffered a transacromial acromial erosion of the hook plate, while another patient had hook plate failure after a fall. The average active and passive range of motion of the patients post operatively was 173° and 178° respectively. The average external rotation active and passive was 60° and 69°. The internal rotation ranged from the L1 to T7. Final post-operative radiographs demonstrated three patients with AC joint subluxation. AC joint subluxation did not correlate with decreased range of motion.

Discussion and Conclusion: Subacromial hook plate fixation for AC joint separations and Type II-B distal clavicle fractures is a safe and reproducible procedure, with a complication rate that is similar to other techniques. Patients require minimal immobilization and routinely return to all activities within one month of plate removal. A major limitation of this technique is that it requires a second procedure to remove the plate. However, the advantages of rigid and dependable fixation makes the hook plate our preferred technique for these injuries.

Notes:

10:49am–10:55am

Influence of the Anteromedial and Posterolateral Bundles of the ACL on the Stability of the Knee — A Cadaver Study

Radek Hart, Prof, MD, PhD, FRCS

Introduction: Anterior cruciate ligament (ACL) consists of the anteromedial (AM) and the posterolateral (PL) bundle. The purpose of this study is to evaluate the influence of both bundles on the knee stability—anterior-posterior translation (APT) and internal (IR) and external (ER) rotation.

Methods: Knee stability was measured on 48 knees of 24 fresh whole-body cadavers using an image-free computer navigation system. APT, IR, and ER of the tibia in relation to the femur were recorded in the intact condition, in the AM-deficient condition, in the PL-deficient condition, and in the ACL-deficient condition. KT-1000 was used to evaluate APT. Rotation measurements were done with the rollimeter by torsion moment of 2,5 Nm. All testings were performed at 30°, 60°, 90°, and 120° of flexion.

Results: were evaluated statistically. Results At 30° of flexion: In the intact knee APT was 6,3 mm on average. After AM cut APT increased to 9,1 mm and after PL cut APT increased to 6,4 mm. After AM and PL cuts mean APT was 10,2 mm. In the intact knee IR was 11,1° on average. After AM cut IR increased to 13,9° and after PL cut IR increased to 13,1°. After AM and PL cuts mean IR was 15,7°. In the intact knee ER was 10,1° on average. After AM cut ER increased to 12,6° and after PL cut ER increased to 10,6°. After AM and PL cuts mean ER was 12,9°. At 60°, 90°, and 120° of flexion similar values were measured without statistically significant difference; all values gradually decreased with increased flexion.

Discussion and Conclusions: AM is more important for APT than PL (with statistical significance). IR is more controlled by both bundles than ER—it is generally accepted. But we cannot agree with many other authors that PL controls IR more than AM.

Notes:



Southern Orthopaedic Association

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Poster Abstracts

(Salon Foyer)

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

Poster 1

In-Vitro Closed Chain Kinematics of a New Medially Pivoting Cruciate Retaining, Cruciate Sacrificing, and Posterior Stabilized Total Knee Replacement Compared to the Normal Knee

J. David Blaha, MD

*C. Lowry Barnes, MD

Introduction: The purpose of this study was to compare knee kinematics of the normal knee to those after implantation of a new medially pivoting (MP) primary TKA. Three different MP tibial insert configurations were analyzed (cruciate retaining (CR), cruciate substituting (CS) and posterior stabilized (PS)) to evaluate anterior/posterior tibio-femoral translation in both the medial and lateral compartments.

Methods: Six lower extremity cadaver limbs with no prior surgeries, deformities, or disease were obtained. Each was outfitted with radio-opaque markers on the femur, tibia and patella and were scanned with CT to generate 3D CAD models. During experimentation, the foot and femur were securely fixed in the custom closed-chain knee device designed to record loads and simulate a squatting motion. A motion capture system was used to track the motion of the knee.

Results: While the location of tibio-femoral contact was not equivalent between the normal, CR, CS, and PS trials, the overall behavior of the contact points was similar within each specimen. Lateral compartment AP translation throughout the entire range of motion was significantly larger in the intact normal knees compared to the new MP CR and CS implanted knees, while the intact knee medial compartment AP translation was significantly larger than all of the new MP design configurations tested. Additionally, AP translation within the lateral and medial compartments of the implanted knees moved in the same direction as the normal knee from both extension to flexion and flexion to extension.

Discussion and Conclusion: Decreased tibio-femoral translation in the implanted trials suggests that stability was

increased after implantation with all insert options of the new primary TKA.

Poster 2

Case Report: Bilateral Discoid Medial Menisci

Timothy Carey, DO

Introduction: An 18 year old male presented with BL knee pain for six month duration. Pt described anterior knee pain bilaterally that increased with ROTC training. Pain was insidious in onset and was occurring with walking and occasionally with standing alone. He denied any previous trauma.

Methods: He had full ROM with a mild effusion. Medial joint line tenderness was present bilaterally. Ligaments were stable. Pain was elicited with McMurray's bilaterally. No palpable click or snap appreciated on exam.

Results: Plain radiographs were obtained showing subtle widening of the medial compartment BL. His MRI was significant for bilateral discoid menisci.

Discussion/Treatment: Medial discoid meniscus have an estimated incidence ranging from 0.06 – 0.3%. Bilateral discoid medial menisci is a rare phenomenon with only 11 previously reported cases in the literature. The altered shape, increased thickness and weak structure make them biomechanically weak to resist normal stresses. Given the patient's significant pain it was decided to perform saucerization of his medial menisci. As his symptoms were worse on the left, saucerization was performed first on the left followed by the right 6 months later. One month following surgery the patient was found to have quadriceps weakness but was able to return to running without pain. His knee was normal in appearance without effusion and was non-tender to palpation. He had full range of motion without pain. McMurray and Apley's compression tests were negative bilateral. The patient had a mild valgus movement at the knee but otherwise gait was normal in appearance. Six months status post second saucerization, the patient reported 0/10 pain in his knees. This ankle pain was

not inhibiting him from activities of daily living or his ROTC training. It was recommended he wear supportive shoes, and no additional restrictions were necessary.

Poster 3

Onchogenic Osteomalacia: A Tumor Induced Phosphate Wasting Disorder Without an Identified Tumor

Timothy Carey, DO

Introduction: A 61-year old male with right knee and ankle pain that did not respond to bracing and steroid injections. He was a active person with no inciting incident.

Methods: Physical exam revealed ligamentously stable joints with mild effusions. Radiographs demonstrated periarticular osteopenia. MRI showed chronic osteonecrosis of the articular surface of the medial and lateral femoral condyles. Ankle MRI revealed chronic stress injuries involving the tibia and posterior talus. The patient was made non-weight bearing for 6 weeks, but his symptoms progressed to the left lower extremity and he was no longer ambulatory. Repeat radiographs demonstrated stress fractures of the right femoral head and neck, and bilateral stress fractures of the talus and tibia.

Results: A metabolic disorder was suspected. Laboratory studies revealed an alkaline phosphatase of 430, phosphate level of 1.4, and elevated Fibrinogen GF 23. His DEXA had t-score of -1.9 to -2.5. Based on the information collected the patient was diagnosed with onchogenic osteomalacia.

Conclusion: These tumors secrete factors causing phosphaturia and inhibition of 25-hydroxyvitamin D3-1-alpha-hydroxylase. By interrupting the calcium-phosphate homeostasis, this disorder interferes with bone remodeling. Individuals affected by this disorder will present with hypophosphatemia, osteomalacia, bone pain, proximal muscle weakness, fractures and functional disability. Once the diagnosis is made, phosphate supplementation is typically used to temporarily treat this disorder until a mesenchymal or mixed connective tissue tumor can be identified. Five months after starting this patient on phosphate replacement therapy, the patient was clinically improving. He was able to walk with two canes and phosphorus was within normal range. Symptoms usually resolve upon tumor removal, however in this case phosphate and vitamin D replacement lead to a full recovery of symptoms and a tumor was never detected. To our knowledge, this is the first report of this disease process resolving with supplements alone.

Poster 4

A Novel Arthroscopic Classification System of Chronic Lateral Ankle Ligament Injuries with MRI Correlation

CPT Jonathan F. Dickens, MD

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Introduction: Few studies report the arthroscopic findings of the lateral ankle ligament complex and there is no standardized arthroscopic classification system of the lateral ligament complex. The purpose of this study is to classify lateral ankle ligament injuries using an arthroscopic classification system and determine the reliability of MRI in detecting these injuries.

Methods: Patients with chronic lateral ankle instability receiving a preoperative MRI and ankle arthroscopy prior to reconstruction were enrolled. The following arthroscopic classification scheme was devised based on a predictable pattern of injury to the lateral ligament complex: Grade I- intrasubstance ATFL tear, Grade II- complete ATFL tear from the fibular origin, Grade IIS- complete ATFL tear from the fibular origin with periosteal elevation, Grade III-complete ATFL and CFL tears, Grade IIIS- complete ATFL and CFL tears with periosteal elevation. The senior orthopaedic surgeon and radiologist graded the lateral ligament complex using arthroscopy and MRI respectively.

Results: Eighty-seven lateral ligament reconstructions were performed with 20 (23%) Grade I, 42 (48%) Grade II, 12 (14%) Grade II-S, 5 (6%) Grade III, and 8 (9%) Grade III-S tears. MRI showed a sensitivity of 73%, specificity of 37%, and PPV of 80% for detecting ATFL tears. There was a sensitivity of 17%, specificity of 81%, and NPV of 86% for detecting combined ATFL and CFL tears. There was no agreement or correlation between arthroscopic and MRI grading.

Discussion/Conclusion: This study describes a novel arthroscopic morphologic classification scheme of lateral ankle ligament injuries. MRI has a moderate sensitivity for detecting ATFL tears but a poor sensitivity and improved specificity for detecting combined ATFL and CFL tears. This suggests that a symptomatic patient with negative results on MRI must be viewed with caution and arthroscopy may be required for definitive diagnosis and treatment.

Poster 5

Surgeon Perceptions of Patient Outcomes Regarding Proximal Ulna Internal Fixation

Scott G. Edwards, MD

Introduction: To define actual removal rates of proximal ulna fixation, assess patient overall satisfaction with their fixation, and compare these realities with current surgeon perception.

Methods: 556 surgeons from three orthopaedic subspecialty societies completed an online survey investigating their beliefs regarding proximal ulna internal fixation. 148 patients who underwent internal fixation for proximal ulna fractures at three trauma centers during 2003-2005 were retrospectively evaluated in a chart review. These patients were contacted by phone and asked questions regarding their proximal ulna fixation. Patient-reported results were compared to surgeon perceptions.

Results: 67% of surgeons believe their fixation removal rates are the same at other surgeons, while 31% believe their rates are lower. The majority of surgeons (71%) believe that patients require removal of hardware less than 30% of the time. Actual patient removal rates were 82%. The majority of these patients (68%) elected to remove their hardware between 2 and 5 years after implantation. 74% of patients report that the surgeons that eventually removed their fixation were not the surgeons that implanted the fixation. 35% of patients reported that they were never offered removal as an option. Of the patients that still retain their hardware, 92% reported irritation; 54% of these patients plan on having it removed sometime in the future.

Discussion and Conclusions: Most surgeons vastly underestimate the actual irritation of fixation and consequent removal rates (73-84%). Most patients elect to remove hardware several years after implantation and choose a different surgeon to perform the removal, which may lead the implanting surgeons to believe that their patients are more satisfied than they really are. Even patients that do not elect to remove their fixation appeared to be bothered by its presence. The authors challenge surgeons to become more aware of this problem in their practices.

Poster 6

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

Maria S. Goddard, MD

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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 templated ligament balance and that obtained at surgery.

Methods: Data were prospectively collected on 43 patients (44 knees) undergoing robot-assisted unicompartmental knee arthroplasty by a single surgeon. For pre-operative planning, images were obtained of the operative knee under valgus stress. Final intra-operative images with the prosthesis in place were taken without valgus stress. Positive values denoted loose ligamentous balancing while negative values indicated component 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 -0.37 mm (range, -4.40 to 2.20 mm), at 30 degrees -0.62 mm (range, -5.30 to 1.80 mm), at 60 degrees -0.15 mm (range, -3.10 to 2.30 mm) and at 90 degrees 0.09 mm (range, -2.70 to 2.00 mm).

Discussion and 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.

Poster 7

The Evolution of Orthopaedic Surgery Data Collection: The Utility of Healthcare Informatics

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Introduction: With healthcare reform on the horizon, medical informatics can provide easy access to patient information. Patient-outcome measures are important tools in evaluating surgical outcomes and patient satisfaction. However, given the constraints of a paper-based environment, important data may be missed or lost. With the need for an orthopaedic registry in the United States, providing surgeons with a means to quickly and accurately maintain patient records is essential. The aim of this study was to examine the efficiency of utilizing a web-based database to collect, maintain and analyze patient data.

Methods: Research electronic data capture (REDCap) was used to create databases for a retrospective review and also a longitudinal clinical trial. After attending one formal training session with available supplemental support, a single member of the orthopaedic surgery research staff designed the databases. A survey portion was designed for patient outcome measures. Once the database was produced, data were entered including demographics, operative information and follow-up schedules.

Results: Creation of the databases was intuitive and user-friendly with technical support available both via web-based tutorials and live technicians. Selected members of the study team maintained control of the information. Technicians resolved database changes in less than 24 hours. The web-based format allowed outcome responses to either be completed in clinic on a tablet computer by the patient or via an email link provided prior to their appointment.

Discussion and Conclusion: The incorporation of informatics into the clinical practice of orthopaedic surgery can provide practitioners with the ability to easily evaluate outcomes. A data collection system is especially critical in the United States where almost 65% of the orthopaedic population functions in either a group or solo private practice setting, without academic institutional support. A provider-created and controlled electronic database will allow for accurate collection of the data needed for a national registry.

Poster 8

Femoral Tunnel Lateral Wall “Blowout” During ACL Reconstruction: A Biomechanical Analysis

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Introduction: Suspensory femoral fixation is commonly used for soft-tissue graft ACL reconstruction. Anatomic, single and double-bundle femoral tunnel techniques lead to shorter tunnels and thus, are susceptible to an increased incidence of cortical breaching, or “blowout.” The purpose of our study was to determine if secondary fixation is needed when femoral “blowout” occurs, and whether the diameter of the femoral tunnel affects the cyclical and ultimate load to failure of three different suspensory fixation devices.

Methods: Sixty fresh-frozen porcine femora were dissected to isolate the ACL footprint. Femoral ACL tunnels were then drilled at 7, 8, 9 and 10mm diameters. Five separate cyclical and ultimate-load testing trials, at each tunnel diameter were conducted for three different cortical suspension devices.

Results: The mean load to failure decreased as the tunnel size enlarged for all three devices. In 7mm tunnels - mean failure load ranged from 1163.7 to 1455.0 N; in 8mm tunnels – 1154.7 to 1643.2 N; in 9mm tunnels - 820.8 to 1125.21 N; and with 10mm tunnels – 314.7 to 917.8 N across the three devices. Methods of failure also varied as the tunnel sizes enlarged. The ultimate load was not different between the 3 Companies, but there was a statistical difference in the ultimate load across the four tunnel diameters, except when comparing the 7mm tunnel to the 8mm tunnel.

Conclusion: With 7mm and 8mm diameter tunnels, failure loads with each of the suspensory devices tested, exceeded that of documented interference screw load to failure. When using suspensory fixation, secondary fixation is not always needed when the lateral cortex has been breached. In pediatric and double bundle ACL reconstructions where smaller and shorter tunnels are routinely used, breaching the lateral cortex when using suspensory fixation, may be acceptable and increase tunnel length, while still achieving stable fixation.

Poster 9

Computer Navigation Analysis of Valgus Knee Kinematics Before TKR

Radek Hart, Prof, MD, PhD, FRCS

Introduction: In a “true” valgus knee the lateral femoral condyle is smaller in both the vertical and anteroposterior dimensions and lateral soft tissue structures are contracted. In a “false” valgus knee there is no mismatch between anteroposterior dimensions of both condyles. The aim of the study was to preoperatively analyse patterns of passive movement of valgus knees with imageless navigation system to optimise surgical approach during subsequent total knee replacement (TKR).

Methods TKR were prospectively performed in 50 valgus knees. After the data registration process the kinematic analysis was performed by passive movement of the knee. The mechanical axis was recorded at 0°, 30°, 60°, 90°, and 120° of flexion. The valgus deformity persistent through the whole range of motion was called “true” and the valgus deformity passing into varus with flexion was called “false.”

Results The pre-operative valgus deformity in extension ranged from 13° to 4° (mean 7.8°). We observed “true” valgus type deformity during passive range of movement in 34 cases (68 %) and “false” type of kinematics in 16 cases (32 %). The average value of valgus deviation in extension in “true” group was 7.9° (range, 13° to 4°) and in “false” group 7.5° (range, 9° to 6°). The mean difference between axis deviation in 0° and 120° of flexion was 5.5° (range, 10° to 1°) in the “true” valgus group. In the “false” valgus group the varus deviation was observed in 90° of flexion in all cases and mean difference between axis deviation in 0° and 120° of flexion was 12.0° (range, 14° to 10°).

Discussion and Conclusions Computer navigation can easily help to identify the character of valgus deformity (“true” or “false”) just before skin incision. In “true” valgus deviation lateral approach may be necessary for appropriate soft tissue balancing during TKR surgery.

Poster 10

Mechanisms of Mechanical Failure Seen in Children Reconstructed with a Custom Expandable Repiphysis Endoprosthesis

Robert Henshaw, MD

Introduction: The expandable endoprosthesis features an innovative non-invasive mechanism for expansion that offers significant advantages over other expandable implants. The purpose of this paper was to describe the modes of failure of this prosthesis.

Methods: Retrospective review of all expandable implants performed by the author with analysis of modes of failure.

Results: 17 implants in 15 patients were used between 2003 and 2010 at a single institute. To date, there have been 4 failures; 3 mechanical and one due to infection. The first mechanical failure was noted in a 15 yo female during conversion of her fully expanded femoral implant 6 years after index surgery. Gross metallosis and wear debris in the soft tissues was present, requiring an extensive capsulectomy. No wear of the hinge mechanism was seen, implying that debris was generated internal to the implant. The second failure occurred in a 15 yo female who presented with spontaneous shortening of her tibial implant 4 years postop. Radiographs showed fracture of the expansion mechanism leading to acute collapse of the previously expanded implant past its original non-expanded length. Extensive wear debris surrounding the collapsed implant was found and removed via an extensive capsulectomy. The third case was a 3 yr old male who presented with spontaneous acute lengthening 3 months after a total femoral replacement. Radiographs showed the failure of the internal restraining mechanism leading to uncontrolled expansion of the internal spring.

Discussion and Conclusions: Failures of expandable implants are much more common than modular implants. The expandable implant design is thought to be more durable than other expandable systems due to the lack of moving parts in the expansion mechanism. These cases demonstrate that expandable implants can have catastrophic failures. These findings call for increased awareness, regular follow-up and quality control.

Poster 11

Mechanical Testing of Thoracolumbar Pedicle Screw Fixation

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Introduction: Pedicle screw fixation is readily used for internal fixation of the spine. Polymethylmethacrylate (PMMA) has been used to augment pedicle screw fixation in osteoporotic bone. While effective in reinforcing the fixation, there are potential problems with using PMMA, including the exothermic curing reaction that can cause thermal necrosis of the surrounding tissue. A non-exothermic bone void filler may be effective in reinforcing pedicle screw fixation while enhancing biologic ingrowth. The purpose of this study was to compare the axial tensile load in thoracic and lumbar spine pedicle screw fixation with and without PMMA and the non-exothermic bone void filler.

Methods: Two fresh frozen human unpreserved cadaveric spines were obtained. Bone density was measured with a DEXA scanner for both prior to fixation. Pedicles were randomized to one of five groups: (1) normal tap pedicle with no augmentation, (2) normal tapped pedicle with PMMA augmentation, (3) normal tapped pedicle with the non-exothermic bone void filler augmentation, (4) overtapped pedicle with PMMA augmentation, (5) overtapped pedicle with the non-exothermic bone void filler augmentation. Each specimen was loaded to failure at 5 mm/min on an MTS machine. Failure was defined as the greatest axial load immediately prior to significant change in the slope of the impulse curve.

Results: The overtapped the non-exothermic bone void filler group in spine 2 was shown to have a significantly greater axial load to failure (498.60 ± 220.48 N) compared with the normal tap the non-exothermic bone void filler group (231.75 ± 172.46 N). The overtapped the non-exothermic bone void filler group in Spine 2 also showed statistical significance when compared to the normal tapped group without augmentation in Spine 2 (273.17 ± 122.17 N). All other paired comparisons in both spines showed no statistically significant differences.

Discussion and Conclusion: Pedicle screw fixation axial loading using the non-exothermic bone void filler was compared to more conventional PMMA in normal and overtapped holes. Results indicate minimal significant differences statisti-

cally between the two augmentors and between fixation type (normal and overtapped). However, due to the small number of pedicles tested the risk for a Type II error is present.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 43).*

Poster 12

Performance of Military Tasks After Clavicle Plating

Jeannie Huh, MD
Joseph R. Hsu, MD
Brett Owens, MD

Introduction: Operative fixation of displaced midshaft clavicle fractures has become more routine as increasing literature has demonstrated the functional limitations of nonoperative management in the general population. However, little is known about the outcomes of this treatment method in populations that necessitate frequent load-bearing on the shoulders, such as the military. Soft tissue irritation related to hardware prominence is a cited complication of clavicle plating, with reports as high as 74%. The purpose of this study was to report the military-relevant functional outcomes and complication rate after plate fixation for displaced midshaft clavicle fractures in active duty service-members.

Methods: We performed a nested cross-sectional analysis of military service-members enrolled in an ongoing multicenter, randomized trial on clavicle plating for displaced midshaft clavicle fractures. For this analysis, we included subjects with at least 6 months follow-up. Outcome measures were assessed at standard time intervals and included: radiographic appearance; physical examination; responses to a military-specific questionnaire; scores from validated shoulder surveys (Constant and DASH); and complication rate.

Results: Mean follow-up for 28 clavicle fractures was 13 months (9-24 months). Union rate by 12 weeks was 93% (26/28). There was one case (3.5%) of soft-tissue irritation requiring hardware removal. At latest follow-up: 75% of patients reported satisfaction with their outcome; 68% had mild/no pain; 79% had full range of motion; 71% could wear their military body armor; 75% could perform pushups; 21% have deployed; mean Constant and DASH scores were 84 and 9.6, respectively.

Discussion and Conclusion: For the majority of active-duty personnel, rapid healing, return to military-specific tasks, and satisfaction with outcome is possible after plate fixation of clavicle fractures. However, approximately 1/4 report some

functional limitations at one year. Rate of hardware removal for soft tissue irritation is not necessarily higher for this shoulder-bearing population, compared to historic controls at one year.

Poster 13

Do Skin Pigment and Hair Affect Near-Infrared Spectroscopy Assessment of Leg Compartment Perfusion?

CPT Keith Jackson, MD
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Brett A. Freedman, MD
Michael S. Shuler, MD

Introduction: ACS is a clinical diagnosis, with poor inter/intra-rater reliability. Currently, patients with ACS are being missed, and patients without ACS are being unnecessarily fasciotomized. This study is part of a multi-phased DoD research project, seeking to validate a continuous, noninvasive NIRS ACS monitor for military-use. The purpose of this study is to evaluate the impact of skin pigment and hair on NIRS values in normal controls.

Methods: Forty-four healthy volunteers (14 M; 30 F) were monitored for two 1-hour continuous sessions, using a standardized protocol, which placed NIRS leads over the 4 compartments of each leg, recording NIRS values (% saturation) every 30sec. Additionally, the dorsal and volar forearm compartments and deltoid were monitored. Colorimeter readings of skin pigmentation from two probes were used to document skin pigmentation. The NIRS values for each compartment were then compared to NIRS readings from corresponding compartments and colorimeter values.

Results: NIRS values in left and right leg are highly conserved. The data is very reproducible with an insignificant (<1%) average difference between day 1 and 2. Upper extremity NIRS values were strongly correlated to leg values in the following order volar ($r=0.65$ to 0.71), dorsal ($r=0.36$ to 0.60) and deltoid ($r=0.42$ to 0.51). A moderate negative correlation was observed between melanin and NIRS values, while "L" values were positively correlated. Shaving did not affect NIRS values.

Conclusions: This study confirms that the contralateral uninjured leg or, in patients with bilateral leg injuries, the volar forearm, are the ideal control sites to compare to the traumatized leg. These data suggest that NIRS values may be affected by a patient's skin pigmentation. However, shaving

the leg hair of male patients does not appear to affect NIRS values.

Poster 14

Anterior Lumbar Interbody Fusion — 2-Year Results with a Modular Interbody Device

CPT Keith Jackson, MD
Brett A. Freedman, MD

Introduction: To date, the radiological outcomes from a modular ALIF interbody device have not been reported.

Methods: The purpose of this study was to review the 2-year radiological outcomes (at the 6 weeks, 3 months, 6 months, 1 and 2 year intervals) following ALIF with a modular interbody device (1-4 levels/patient) with (31) and without (13) posterior instrumentation in 44 patients with primarily axial LBP from a single surgeons practice. A single surgeon used a standard surgical technique with (8.4-12mg) rh-BMP-2/level for bone graft. The primary outcome measure was fusion as assessed by postoperative CT scan, which was defined as at least one continuous bone bridge seen on two consecutive reconstructed images (coronal or sagittal). Additional outcomes measured were lordosis, interlordotic angle (ILA), subsidence, Bridwell fusion grade, technical complications. Nineteen cases were re-reviewed by a separate independent observer to determine interobserver reliability of the measures.

Results: Forty-two patients had 73 levels fused (average, 1.7 levels/patient). Three were revised posterior nonunions, the remaining were primary fusions. There were 9 complications: 3 major (1 reoperation for nonunion, 2 implant migration) (7%); 6 minor (4 subsidence, 2 malposition) (14%). One patient (2.4%) had 1 level (1.4%) not fuse. The intra-class coefficient for ILA and subsidence and the kappa statistic for CT measures were $>.75$, demonstrating excellent inter-observer reliability for these measures. There was 74% agreement for Bridwell fusion status.

Conclusions: ALIF using a modular interbody cage yields excellent radiological results with a fusion rate of 95%. The large endplate and modular design may contribute to lower rates of subsidence and well-maintained ILA and lordosis. The radiological measures all demonstrated excellent inter-observer reliability.

Poster 15

Accuracy of the Free-Hand Technique for Three Fixation Methods Into the C2 Vertebrae

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Ronald A. Lehman Jr., MD
K. Daniel Riew, MD

Introduction: Because intraoperative imaging often does not provide adequate visualization to ensure safe placement of screws, we evaluated the ability of a free-hand technique to insert C2 pars, pedicle and intralaminar screws.

Methods: Sixteen cadaveric specimens were instrumented free-hand by two experienced cervical spine surgeons with either a pars or pedicle screw, and bilateral intralaminar screws. The technique was based upon anatomic starting points and published screw trajectories. A pedicle finder was used to establish the trajectory, followed by tapping, palpation and screw placement. After placement of all screws (16 pars screws, 16 pedicle screws, and 32 intralaminar screws), the C2 segments were disarticulated, radiographed in AP, lateral and axial planes and meticulously inspected by another spine surgeon to determine the nature and presence of any defects.

Results: A total of 64 screws were evaluated in this study. Pars screws (n=16) exhibited two critical defects (1-foramen transversarium, 1-C2/3 facet, and an insignificant dorsal cortex breach) for an overall accuracy of 81.3%. Pedicle screws demonstrated only one insignificant violation (inferior facet/medial cortex intrusion of 1 mm) with an accuracy of 93.8%, and intralaminar screws demonstrated three insignificant violations (2-ventral canal, 1-caudad lamina breach) and an accuracy of 90.6%. Pars screws had significantly more critical violations than intralaminar screws.

Discussion and Conclusion: Instrumentation of the C2 vertebrae using the free-hand technique for insertion of pedicle and intralaminar screws showed a high success rate with no critical violations. Pars screw insertion was not as reliable with 2/16 critical violations. The freehand technique appears to be a safe and reliable method for insertion of C2 pedicle and intralaminar screws.

Poster 16

Do Stand-Alone Interbody Spacers with Integrated Screws Provide Adequate Segmental Stability for Multi-Level Cervical Arthrodesis?

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Haines Paik, MD
Michael Rosner

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.

Methods: Thirteen human cadaveric cervical spines (C2-T1) were non-destructively tested with a custom six-degree-of-freedom spine simulator 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. However, only ACP significantly reduced operative level ROM compared to intact. 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 and Conclusion: Stand-alone interbody spacers with integrated screws may be a reasonable option for single-level fixation. However, stand-alone interbody spacers should be used with careful consideration in the setting of multi-level

cervical fusion. In the setting of supplemented posterior fixation, stand-alone interbody spacers are a sound biomechanical alternative to the anterior cervical plate.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 43).*

Poster 17

Predictive Ability of Tapping Insertional Torque on Pedicle Screw Fixation Strength and Optimal Screw Size

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Scott J. Luhmann

Introduction: Several studies have evaluated screw insertional torque (IT) and its direct correlation with pullout strength; however, no study has assessed the optimum IT associated with tapping in the thoracic spine, as this provides the surgeon with more tactile feedback intraoperatively. Therefore, we investigated the correlation between screw tapping IT and pedicle screw fixation strength.

Methods: Initially, a pilot study was performed to determine a threshold for tapping IT, and its correlation to optimal screw size. In each pilot specimen, the tapping IT for the optimal screw size exceeded 2.5 in-lbs; therefore, we selected this value as the threshold value for tapping IT. A value of 1.5 in-lbs. was selected for paired comparison of the left and right pedicles. All thoracic pedicles (n=30) were measured with digital calipers, probed and tapped in the following sequence until the threshold value (Group 1: 1.5 in-lbs; Group 2: 2.5 in-lbs) was reached: 3.75 mm, 4.00 mm, 4.50 mm, 5.50 mm. Screw size was determined by adding 1 mm to the tap size which crossed the threshold torque value. Torque was measured with each revolution during insertion of the tap or screw.

Results: The mean screw IT was significantly greater in Group 2 (5.5+1.0in-lbs) compared to Group 1 (4.3+1.6in-lbs). Similarly, the peak screw IT was significantly greater in Group 2 (8.9+2.3in-lbs) versus Group 1 (7.5+2.9 in-lbs). In both groups, the mean and peak IT of the last tap used significantly correlated with the mean and peak screw IT ($r=0.705$ and $r=0.544$, respectively). Additionally, the pedicle width determined by direct caliper measurement had a significant direct correlation with the diameter of the screw selected in Group 2 ($r=0.699$) and Group 1 ($r=0.605$).

Discussion and Conclusion: Tapping IT directly correlates with the screw IT, and therefore can be used intraoperatively to judge fixation strength. Additionally, sequential tapping offers further guidance towards determining optimal screw size. Surgeons should sequentially increase the tap size until the IT reaches a threshold value of 2.5 in-lbs for optimal screw fixation strength in the thoracic spine.

Poster 18

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

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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 measurements 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.

Poster 19

Proximal Femoral Locking Plates: Clinical Outcomes at a Level One Trauma Center

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Introduction: Complex fractures of the proximal femur including comminuted and unstable inter or subtrochanteric fractures, and displaced femoral neck fractures in younger patients remain a challenge to orthopaedic surgeons. While there are many options for fixation, including dynamic hip screws (DHS), dynamic condylar screw (DCS), angular blade plates and cephalomedullary nails; complications associated with these fractures remains relatively high. As a result, there has been increased use of proximal femoral locking plates (PFLP) as a method of fixation in these complex fractures. There are biomechanical studies that conclude that the newer generation proximal femoral locking plates are biomechanically superior to DCS plates, biomechanically equivalent to angular blade plates, and present less of a technical challenge than cephalomedullary nails in the treatment of complex subtrochanteric, intertrochanteric and displaced femoral neck fractures. To our knowledge there are no studies that present clinical outcomes of proximal femoral locking plates in the treatment of complex proximal femur fractures in the literature. The purpose of our study is to determine the radiographic and clinical outcomes of proximal femoral locking plates in patients with complex or unstable proximal femur fractures at a level one trauma center.

Methods: From 2004-2009 42 patients with comminuted and unstable inter or subtrochanteric femur fractures, or displaced femoral neck fractures were treated with one of three proximal femoral locking plates. Radiographs and clinic notes were retrospectively reviewed with malunion, nonunion, hardware failure, infection, need for revision and hardware removal secondary to pain used as determiners of outcome.

Results: In our analysis of complications, we found no statistically significant variable, including patient age, fracture classification, type of plate, or patient co-morbidities, that were a predictor of secondary procedures. Of the 34 patients with follow up included in the study, 56% percent required a second-

ary procedure. Over 1/3 of the required secondary procedures were a result of a malunion or nonunion.

Discussion and Conclusion: Proximal femoral locking plates are associated with a high complication rate, and high rate of revision, in the treatment of complex proximal femur fractures. The treating surgeon must be aware of a high potential for complication when applying these plates to complex proximal femur fractures.

Poster 20

Changes in Functional Performance During Physical Activity One Year After Autologous Chondrocyte Implantation (ACI)

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Introduction: While self-report outcomes are well reported following ACI, functional outcome data is largely lacking for the immediate postop-period following ACI. Purpose of this study was to evaluate this immediate recovery period in order to provide the clinician and patient with meaningful feedback to guide clinical decision making.

Methods: 18 patients (37.6yrs, 172cm, 90.03kgs) undergoing ACI to the knee. All patients completed functional tests designed to simulate daily activities of walking, squatting, rising from sitting, stepping-up and stepping-down using a long forceplate, preop. and 3, 6, and 12 months postoperatively. Repeated Measures ANOVAs were performed ($p < .05$).

Results: improvements from preoperative levels were seen in stride length, width, and speed as early as 3 months post ACI with significant increases in stride length (19%) and decreases in stride width (8%) at 6 months. During squatting (30° 60° & 90° of knee flexion.), asymmetries in weight distribution were minimal preoperatively (3%, 5 %, -2%, respectively) but increased significantly 3 months post-operatively (8%, 10%, 8%) and continued 6 months postoperatively (6%, 7%, 5%). The force generated bilaterally to rise from sitting did not change at 3 months, but increased significantly at 6 months (22% > preoperative levels). Side to side comparison of rise force demonstrated greater force production by the uninvolved limb relative to the involved limb by 5% preoperatively, 14% at 3 months, and 11% at 6 months. There were significant increases in force generated when stepping-up at 3 months (24%) and at 6 months (33%) as compared to preoperative force production. Step-down impact forces increased above preoperative measures at both 3 (13%) and 6 (21%) months

representing a loss of eccentric control as patients lowered themselves from the step. Preliminary data of 8 subjects at the 12 month point suggests continued improvements in walking speed and stride length and a reduction of side to side differences during squatting, rising, and stepping; however, between limb discrepancies for weight distribution and force production remain greater than what was observed preoperatively.

Conclusions: Patients demonstrated significant improvements in functional performance for walking and stepping up as early as 3 months following ACI. However at the 6 month time point side-to-side differences in weight distribution and force production during squatting, rising, and stepping persisted. Preliminary data suggests that even 12 months postoperatively some elements of function, particularly those associated with eccentric strength control and limb symmetry may remain below preoperative levels, and further emphasis of these activities during rehabilitation may be necessary.

Poster 21

The Use of a High Dose Local Delivery Mechanism Utilizing a Purified, Synthesized, Calcium Sulfate as an Antibiotic Carrier in the Treatment of Osteomyelitis and Infected Total Joints

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Introduction: Local antibiotic delivery systems for biofilms related infections, have been popularized since the early 1980's. These have included PMMA delivery of antibiotics for infected total joints. Unfortunately, delivery by this mechanism is by surface bleaching and local levels of the antibiotic are below MIC at 2 weeks. The spacer concept with 2 stage revision was published by us in the 90's, requires removal of the spacer and/or beads and is associated with 2 surgical procedures. PMMA has been associated with serum levels that been sustained and can be associated with allergic reactions. Presented is a highly synthesized, purified Calcium Sulfate crystal, at neutral ph, loaded with tobramycin and vancomycin. The crystal is hydrophilic, soft after hydration, disappears on X-rays after 2-3 weeks, and doesn't scratch. Wound complications with less pure varieties have been presented as high as 25%.

Methods 100 patients with infected total joint arthroplasties or who were at high risk for infection were studied. These patients received 500 mg vancomycin and 240mg tobramycin

loaded in 10 gram mixtures of a synthesized, highly purified calcium sulfate at physiologic ph. Radiographs have been examined at 2-3 weeks post-op and pellets disappear. Examination of the surrounding tissue at 2 weeks shows a histiocytic, fibrovascular membrane with perivascular lymphocytic infiltrates. These patients were examined for adverse side effects.

Results: The patients' average age was 55. 54% were infected TKA's and 19 THA's, and 27% were considered high risk for infections. Complications were analyzed and only 2% showed signs of persistent drainage related to the calcium sulfate carrier. This is as opposed to the 25% related to our own experience and reported by others with less pure calcium. There were no systemic side effects appreciated.

Conclusion: The use of a purified, synthesized calcium sulfate at a neutral ph, for a local delivery mechanism for vancomycin and tobramycin, has lower wound complications than less purified calcium sulfate carriers.

Poster 22

The Effect of Circumferential Ring Retraction on Wound Cosmesis in Direct Anterior Total Hip Arthroplasty: A Prospective, Randomized Study

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With smaller incisions in total hip arthroplasty, there is potential for excessive soft tissue trauma from the vigorous retraction needed for adequate visualization. One retrospective study found significantly higher rates of wound complications, including infection and poor wound healing, in minimally invasive compared to standard approaches. A novel device that may address these problems is the ring retractor. Its proponents claim reduced surgical site infection rates, increased wound edge moisture, less bruising, and reduced local trauma compared to standard metal retractors. Although routinely used by some surgeons in the direct anterior approach, there is no study that validates its usefulness. All patients undergoing primary direct anterior total hip arthroplasty have been enrolled starting 10/12/2010. Pertinent demographic and perioperative data are recorded. Block stratified randomization (sex/BMI) is used for blinded patient allocation with goal of 50 patient sample size. Photographs are taken prior to and after wound closure, and at each post-operative visit (2 wk, 6 wk, and 3 months). Scar assessment by plas-

tic surgeons will include the following objective and subjective categories: color, contour, distortion, Fitzpatrick classification, and overall appearance. Each patient will be asked via questionnaire if they had a problem with healing of their wound and their assessment of their scar cosmesis. A two-tailed student's t test for continuous variables and a chi-square contingency test for nominal data will be used. In addition, we will perform multivariate analysis to determine if any pre-operative variable is significantly associated with outcome. Given the theoretical benefits of minimized soft tissue trauma from forceful use of metal retractors and femoral broaching, we believe that use of the ring retractor improves wound cosmesis and reduces the rate of superficial wound complications. We also anticipate that patients with higher BMI will benefit most from the ring retractor.

Poster 23

Comparison of Coronal Alignment Using Conventional Versus Patient Specific Instrumentation

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Introduction: Coronal alignment has been previously shown to impact clinical outcomes and survivorship of total knee arthroplasty (TKA). The objective of our study was to evaluate the coronal alignment for primary TKA patients using conventional instrumentation and two different customized cutting guides based on preoperative MRI.

Methods: 144 total knee arthroplasties were performed through the same operative approach (mid-vastus) with the same CR knee. Conventional instrumentation was used in group 1 (n= 50), customized cutting guides based on traditional mechanical axis in group 2 (n=50), and customized "shape matching" cutting guides in group 3 (n=44). Scout CT images were obtained for all patients postoperatively and the femorotibial angle (FTA), hip-knee-ankle angle (HKA), and the mechanical axis deviation (MAD) were measured.

Results: The FTA was within 2-8° valgus for 72.0%, 72.0% and 81.8% of groups 1, 2 and 3, respectively. The HKA was between 3° varus and 3° valgus for 86.0%, 82.0%, and 65.9% of groups 1, 2 and 3, respectively. The MAD was in the central zone for 60.0%, 70.0%, and 43.2% of groups 1, 2, and 3, respectively.

Discussion and Conclusion: Conventional instrumentation showed no advantage compared to customized guides based on traditional mechanical axis for the FTA (p=1.0), HKA (p=0.786), or being in the central zone (p=0.402). However, the "shape matched" cutting guides had a significant number of outliers for the HKA (p=0.028) and MAD being in the central zone (p=0.012).

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 43).*

Poster 24

Is There Any Benefit of Hip Resurfacing Over Mini-Incision Total Hip Replacement

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Introduction: Hip replacement options in young, active patients remains controversial, especially with regards to the ideal bearing surface and implant selection. The purpose of this study was to determine if surface replacement arthroplasty (SRA) has any immediate benefits over mini-posterior approach total hip replacement (THA) in young, active patients.

Methods: We retrospectively reviewed the medical records for 100 consecutive SRA patients and a case matched cohort of 100 patients with THA performed through a posterior mini-incision (less than 10 cm). Patients were case matched for gender, age at surgery, and UCLA activity score. Data included for review: Patient demographics, duration of surgery, estimated blood loss, transfusion requirements, drain output, pain scores, narcotic requirements, distance ambulated, assistive device used, and time to discharge.

Results: Duration of surgery was 72.7 ± 17.4 minutes in the THA group and 109.9 ± 20.0 minutes in the SRA group (p<0.0001). Estimated blood loss was 577.4 ± 305.8 mL in the THA group and 732.2 ± 319.8 in the SRA group (p=0.0004). All narcotics were converted to equianalgesic milligrams of oral morphine for comparison but were not found to be statistically different. Average hospital stay was 54.3 ± 13.3 hours for THA patients and 63.4 ± 18.4 hours for SRA patients (p<0.0001). 36% of THA patients were discharged the day after surgery compared to 17% of SRA patients (p=0.0011). There were no differences between groups for pain score at discharge.

Discussion and Conclusion: Compared to SRA, THA performed through a posterior mini-incision resulted in shorter surgery, less blood loss, and earlier hospital discharge.

Poster 25

Mid-Term Results of Primary Total Knee Arthroplasty with a Medial Pivot Implant Design

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Introduction: The medial pivot total knee arthroplasty was designed to more closely simulate natural knee kinematics. The unique features of this design include a near constant radius of curvature of the femoral component, a highly congruent and asymmetric tibia, and a medial pivot motion during knee flexion. There is very limited information regarding the clinical performance and efficacy of medial pivot total knee arthroplasty beyond early follow-up. The purpose of this study was to analyze the mid-term clinical and radiographic results of primary total knee arthroplasty with a medial pivot implant design.

Methods: 105 medial pivot knee replacements (85 patients) were retrospectively reviewed at an average 6.7 years (range, 4-10.6). Average patient age was 59 years (range, 29-82), 34 were males (43 knees) and 51 females (67 knees). Surgeries were performed by one surgeon. Cases were reviewed independent of the treating surgeon. Knee Society scores were used to assess function and standard radiographic criteria used for implant fixation status and osteolysis.

Results: The average Knee Society scores improved by 37.1 points ($p < 0.0001$). The functional score improved by 20.4 points ($p < 0.0001$). The range of motion arc improved an average $7.8^\circ \pm 16$ ($p < 0.0005$). There was one revision due to tibi-afemoral subluxation and 2 deep infections requiring surgery. All other implants were well-fixed without osteolysis at the most recent follow-up visit.

Discussion and Conclusion Primary TKA with a medial pivot implant design is associated with major improvement in knee function, an improved range of motion arc and excellent fixation at mid-term follow-up.

Poster 26

Minimum 2 Year Outcome & Survivorship of the Birmingham Hip Resurfacing System in the United States

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Introduction: Previous data on survivorship of the Birmingham Hip Resurfacing (BHR) system come from the design surgeons and large national databases outside the United States. The purpose of this study was to determine the survivorship of this implant at 2-4 year follow-up in the United States.

Methods: A multicenter, retrospective review of 1265 patients treated with a BHR implant at six high volume total joint centers with established joint registries from June 2006 until August 2008 was undertaken. Charts were reviewed and patient demographics, Harris Hip Scores (HHS) and radiographic findings were recorded. Patients without a 2 year follow-up clinic visit were contacted by phone. All patients were asked about complications, re-operations, or failure of their implants.

Results: There were 1138 patients with minimum 2 year follow-up. Average age was 52.5 years and 79.2% were males. Average HHS improved from 55.8 pre-operatively to 97.4 ($p < 0.0001$) at follow-up. Of all patients reviewed, there were 13 (1.03%) revisions to total hip arthroplasty: 1 pseudotumor, 5 fractures, 2 early dislocations, 1 infection, 1 femoral loosening, 3 malpositioned acetabular components with pain (metallosis noted in 1). There were 15 additional complications (1.19%) not requiring revision, which included 2 late dislocations treated closed, 2 fractures, 2 symptomatic DVTs, 4 nerve injuries, 1 pseudotumor formation, and 4 possible radiographic impending failures due to loosening.

Discussion and Conclusion: At 2-4 year follow-up the revision rate and major complication rate of the BHR was similar to primary THA as reported by total joint centers. Only two pseudotumors (0.16%) were seen at this short-term follow-up.

Poster 27

Step Activity Levels After Hip Resurfacing and THA in a Young Active Population

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Introduction: There has been recent interest in surface replacement arthroplasty (SRA) as an alternative to total hip arthroplasty (THA), although there is limited objective data to support claims that SRA allows patients to be more active postoperatively. The purpose of this study was to objectively determine the functional outcomes following SRA compared to THA using a step activity monitoring device.

Methods: We prospectively enrolled 51 young, active patients (26 SRA and 25 THA) to wear an activity monitor, which measures duration and level of activity, total number of steps taken per day, and distinguishes between patterns of activity and inactivity. Inclusion criteria: Age < 60, UCLA score ≥ 6 , BMI ≤ 35 , and a desire to return to high impact activities. THA group consisted of patients meeting the inclusion criteria but with a contraindication precluding SRA (e.g., large cyst; AVN > 50%). Patients wore the activity monitor on their ankle for one week pre-operatively and at one year postoperatively.

Results: Both groups increased their activity after surgery: average number of steps per day (SRA $p=0.0277$; THA $p<0.0001$), percentage of time at medium (THA $p=0.0096$) and high levels of activity (SRA $p=0.0289$; THA $p=0.0005$), and a decrease in the percentage of inactivity (THA $p<0.0001$). The only significant difference between the two groups was change in inactivity after surgery ($p=0.0473$).

Discussion and Conclusion: Step activity monitoring data indicates that both SRA and THA patients increase activity levels following surgery, although there was no evidence to support the claim that SRA patients are more active than THA patients.

Poster 28

When to Release Patients to High Impact Activities Following Hip Resurfacing

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Introduction: The purpose of this study was to measure the effect of surface replacement arthroplasty (SRA) on bone mineral density (BMD) of the proximal femur to determine when patients may return to high impact activities.

Methods: We prospectively enrolled 86 young, active patients (49 SRA and 37 THA) to receive dual energy x-ray absorptiometry (DEXA) scans. Inclusion criteria: Age < 60, UCLA score ≥ 6 , BMI ≤ 35 , and a desire to return to high impact activities. THA group consisted of patients meeting the inclusion criteria but with a contraindication precluding SRA (e.g., large cyst; AVN > 50%). DEXA scans were performed post-operatively at 6 weeks, 6 months, and one year for both cohorts.

Results: There was a significant difference between the SRA and THA cohorts in Gruen zones 1, 6, and 7 at 6 months ($p<0.0001$) and 1 year ($p<0.004$). SRA patients had significant increase in BMD between 6 weeks and 6 months ($p=0.033$) on the tension side of the femoral neck and no significant difference between 6 months and 1 year ($p=0.28$).

Discussion and Conclusion: BMD was significantly higher in SRA patients compared to THA patients at all time periods ($p<0.001$) and there was minimal change in BMD in the SRA group between 6 months and one year.

Poster 29

Analysis of the Tibial Insert Micromotion During the Gait Cycle of a Second Generation Medially Pivoting Total Knee Arthroplasty System

Brad L. Penenberg, MD

Introduction: The locking detail of a second generation medially pivoting (MP) total knee arthroplasty (TKA) was designed to reduce the force required to assemble the tibial components while providing comparable insert micromotion to a first generation MP TKA. The locking detail in both gen-

erations feature a central and peripheral dovetail capture. The first and second generation MP designs and another commercially available TKA (central dovetail capture) were tested to measure anterior-posterior (AP) micromotion induced by direct shear load. Second generation cruciate-retaining (CR) and cruciate-substituting (CS) tibial inserts were also tested during simulated gait to determine the amount of insert motion.

Methods: All tibial bases were mounted in a custom fixture and a direct AP shear load (600 N) was applied to the inserts. The AP micromotion of the second generation CR and CS inserts were also measured during simulated gait (ISO14243-3).

Results: The insertion forces were 291 ± 46 N for the second generation MP design, 451 ± 85 N for the first generation MP design, and 538 ± 23 N for the other commercially available design. The second generation design demonstrated significantly lower insertion force and no difference in micromotion. The average micromotion of the new CR inserts during simulated gait was 12.1 ± 4.4 μ m and 4.1 ± 1.7 μ m for the medial and lateral compartments, respectively. The average micromotion for the new CS inserts was 33.9 ± 8.2 μ m and 3.7 ± 1.4 μ m for the medial and lateral compartments, respectively.

Discussion and Conclusion: The new design required a lower insertion force than the lock details of the two other designs, and did not have statistically different total AP micromotion compared to either system. The gait analysis showed the dynamic micromotion of the tibial insert is considerably less than the total possible range allowed by the lock detail.

Poster 30

Percutaneously Assisted Micro Posterior Total Hip Arthroplasty (THA)

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Introduction: Attempts at soft tissue sparing THA have been associated with a high complication rate. Early results have suggested the possibility of accelerated recovery and a reduced dislocation rate. A steep learning curve and the use of expensive equipment have limited the application of the direct anterior approach. This study was undertaken to assess the results of a soft tissue sparing “micro-posterior” approach. A transgluteal approach with piriformis release, preservation of the remainder of the short external rotators and ITB, is utilized. Acetabular preparation is facilitated by placing a working cannula through a distal portal.

Methods: A consecutive retrospective cohort of 435 hips in 427 patients was studied. Follow-up ranged from 2-6 years. There were 267 females and 160 males ranging in age from 27 to 86. BMI ranged from 17-50kg/m². Immediate weight bearing was permitted and no hip precautions were used.

Results: Harris hip scores improved from a pre-op mean of 84 to 96 at minimum 2 year follow-up. 85% of patients were discharged after 3 nights or less and no narcotic medication was used after discharge. 87% received no blood transfusion. 88% transitioned to a cane or no support within 10 days. Acetabular component abduction was between 38 and 50 degrees in 98% of hips. There were no dislocations, nerve injuries, wound problems, or DVT. 2 femoral components were revised for loosening.

Conclusion: This study shows the efficacy and safety of a “micro-posterior” approach and new instrumentation. The surgeon can gradually scale down the standard posterior approach and remain in a “comfort zone” throughout the entire learning curve. The reported results are comparable to, if not superior to, those reported for the less familiar and higher risk direct anterior approach.

Poster 31

Effect of Surgical Approach on Gait Mechanics Following Total Hip Arthroplasty

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Introduction: The effect of total hip arthroplasty (THA) surgical approach on post-operative changes in walking mechanics is unknown. Therefore, we examined the effect of surgical approach (Direct Lateral (DL) – modified Hardinge, Posterior (P), and Anteriolateral (AL) – Rottinger) on changes in walking mechanics during THA recovery.

Methods: This study examined 38 patients (DL=9, P=14, AL=8), tested pre-operatively, six weeks and six months following THA. Patients with contralateral hip pain or contralateral joint degeneration were excluded. Patients were evaluated at a self-selected walking pace for spatial-temporal gait variables, hip joint kinematics and kinetics, and vertical ground reactions force (vGRF). A 3X3 (time X approach) ANOVA was used for analysis ($\alpha=0.05$).

Results: A significant interaction existed between approach and time for the peak hip abduction (ABD) moment. Step length, stride length, walking speed, and peak hip extension angle were all significantly improved at each time point. Peak hip adduction (ADD) angle was significantly improved post-op, but no difference existed between the two post-op time points. Peak ABD angle and vGRF were improved 6 weeks post-op from the pre-op time point. Peak hip flexion moment was greater in AL when compared to P. Peak hip extension and ADD moment were significantly greater in AL when compared to P and DL approaches.

Discussion and Conclusion: Independent of the surgical approach THA patients demonstrate improving function (spatial variables, walking speed and peak extension angle) up to six months following surgery. In addition, improvements in peak hip ADD, ABD angle and vGRF were observed at six weeks post-op. The AL group appears to have increased loading of the hip, as suggested by the peak flexion moment, when compared with both the P and DL approaches. Continued follow-up for up to two years will allow for a better understanding of changes in gait mechanics based on surgical approach.

Poster 32

Hip Joint Mechanics During Stair Ascending and Descending Following Total Hip Replacement and Hip Replacement Arthroplasty

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Introduction: Proponents of large femoral head hip arthroplasty (THA) and hip resurfacing arthroplasty (HRA) have touted the potential for restoration of normal hip kinematics. Three-dimensional mechanics have quantified gait after THA, however, scant data exists examining changes after large head THA or HRA. We evaluated post-operative stair climbing 1+ yrs after surgery, hypothesizing that subjects would show no procedure based difference and be statistically similar to a control group.

Methods: This study examined 10 THA and 10 HRA patients an average of 18 months following THA and 10 control subjects. Subjects with no history of lower extremity surgery who were treated with a HRA or a large bearing metal-on-metal THA (>36mm) were included. Subjects with contralateral hip pain or diagnosis of contralateral lower extremity joint degenerative disease were excluded. Harris Hip Scores (HHS) were

obtained pre-operatively and postoperatively. Subjects were evaluated while ascending and descending three stairs. Three-dimensional hip kinematics and kinetics as well as ground reactions forces (GRF) were collected. A 1X3 ANOVA was used for analysis ($\alpha=0.05$).

Results: HHS improved significantly in both groups from pre-operative to postoperative time points. No significant difference in the outcome measures existed between the two groups. No significant differences existed between the THA and HRA groups for any of the study variables. The control group ascended the stairs with a significantly lower peak hip flexion angle and increased hip extension angle than either the THA or the HRA groups. The control group also descended the stairs with a significantly greater hip flexion moment when compared with the THA and HRA groups.

Discussion and Conclusion: Subjects did not demonstrate significant differences in stair ascending and descending mechanics based on surgical procedure (THA and HRA). However, one year following THA or HRA subjects display gait mechanics that differ from a healthy control group.

Poster 33

Stair Climbing Symmetry Following Total Hip Arthroplasty Based on Surgical Approach

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Introduction: Following total hip arthroplasty (THA), patients demonstrate improvements in gait. It is unknown whether surgical approach is a factor in post-operative gait symmetry and limited work has been published on differences in mechanics during stair climbing. We examined the effect of surgical approach (Direct Lateral (DL) – modified Hardinge, Posterior (P), and Anteriolateral (AL) – Rottinger) on early post-operative stair climbing gait symmetry.

Methods: This study examined 38 patients (DL=13, P=19, AL=10), tested six weeks following THA. Patients with contralateral hip pain or joint degeneration were excluded. Patients were evaluated while ascending a flight of three stairs for bilateral hip joint kinematics and kinetics as the vertical ground reaction force (vGRF). A 2X3 (limb X approach) ANOVA was used for analysis ($\alpha=0.05$).

Results: No limb or approach differences existed for peak hip flexion moment or hip adduction moment. The surgical side demonstrated decreased peak hip flexion angle, extension moment, abduction angle, adduction moment, and all vGRF variables. DL approach demonstrated significantly greater peak hip extension angle when compared with P approach. AL demonstrated increased peak vGRF and propulsion vGRF when compared with DL approach.

Discussion and Conclusion: Regardless of the surgical approach, these patients did not display symmetrical stair climbing. These early results indicate that patients who have a THA demonstrate restricted hip flexion, and abduction as well as reduced limb loading on the surgical limb during stair climbing, regardless of the surgical approach. The P approach group appears to have limited hip extension when compared with the DL group, while the AL group appears to load the joint more when stair climbing when compared with the DL group. Due to small sample sizes on the different approaches these results are preliminary in nature and need to be supported with increased subject numbers.

Poster 34

Patterns of Osseointegration and Remodeling in Femoral Revision with Bone Loss Using a Modular, Fluted, Tapered Titanium Stem

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Introduction: Studies have documented encouraging results with the use of fluted, tapered, modular, titanium stems in revision hip arthroplasty with bone loss. However, actual radiographic signs of osseointegration and patterns of reconstitution have not been previously categorized for these stems.

Methods: 64 consecutive hips with index femoral revision using a particular stem of this design formed the study cohort. Serial radiographs were retrospectively reviewed by a blinded observer. Bone loss was determined by Paprosky's classification. Osseointegration was assessed by a slight modification of the criteria of Engh et al. Femoral restoration was classified according to Kolstad et al. Stress shielding was defined as an area of decreased radiodensity between 2 spot-welds. Pain and function was documented using Harris Hip Score (HHS).

Results: Mean patient age was 68.3 years and radiographic follow-up 6.2 years. 74% femora had type 3 or 4 bone loss. All distal segments were radiographically osseointegrated. Proximal segment radiolucent lines were frequent (40%). Early minor subsidence occurred in 4 (6.2%) hips. Definite bony regeneration was documented in 73% femora and stress-shielding in 26%. HHS improved from a pre-operative mean of 50.1 points to 86.2 at most recent follow-up.

Discussion and Conclusion: A consistent pattern of bony remodeling and osseointegration occurred which could be applied for assessment of fixation and stability of this implant. The well-established criteria of osseointegration for cylindrical cobalt-chrome stems may have to be altered for application to these stems as the mechanism of load transfer is entirely different. Stems with diameter of 18mm or greater are clearly predisposed to stress shielding, predominantly at the mid-diaphyseal region.

Poster 35

The "Sulcus Sign" as a New Clinical Marker of Flexion Instability in Total Knee Replacements

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Jose A. Rodriguez, MD

Introduction: Symptomatic flexion instability has been well documented in cruciate-retaining as well as posterior stabilized (PS) Total Knee Arthroplasty (TKA). Diagnosis requires a high element of suspicion and is mostly clinical. The purpose of this report is to describe a new clinical sign and the results of revision surgery in this condition.

Methods: From 2007 through 2010, the senior author evaluated ten patients (10 knees) with symptomatic flexion instability after PS TKA. There were 6 men and 4 women with mean age of 59 years. All knees were evaluated by anterior drawer test, varus-valgus test in 90 degrees knee flexion, a distraction maneuver (sulcus test) as part of physical exam. Knee Society Scores (KSS) were used to document pain and function.

Results: Management included complete revision in 4 knees and isolated tibial insert exchange in 6 knees. Average time from primary TKA to revision was 14 months. Preoperatively, all knees demonstrated at least 5mm translation with the anterior drawer test and 3 knees (30%) had reducible condylar lift-off at 90 degrees flexion. All knees had a positive "sulcus sign" with the patient sitting, leg by the side of the exam table

and knee 90 degrees flexed and distracted. Postoperatively, all knees demonstrated less than 5 mm anterior tibial translation, absence of condylar lift-off and negative sulcus sign. This corroborated with improvement in mean KSS (59 to 90 and 60 to 84).

Discussion and Conclusion: Careful history taking and clinical examination can correctly identify flexion instability in well fixed and aligned TKAs. A positive sulcus sign reliably occurs in this patient cohort suggesting its usefulness in clinical practice. Revision surgery with careful gap balancing and restoration of posterior offset was successful in alleviating signs and symptoms of flexion instability in this cohort.

Poster 36

Stemmed Non-Hinged Revision Arthroplasty for Supracondylar Periprosthetic Knee Fractures

Parthiv Rathod, MD
Ajit Deshmukh, MD
Vijay J. Rasquinha, MD
Jose A. Rodriguez, MD

Introduction: Periprosthetic distal femoral fractures are difficult to manage due to osteolysis, poor bone stock and comminution. The goal of treatment is to restore the pre-fracture functional status by achieving fracture union and maintaining proper limb alignment and range of motion. The purpose of this study was to report the outcomes of stemmed non-hinged revision knee arthroplasty in this situation.

Methods: We retrospectively analyzed the outcomes of 13 consecutive patients with 14 periprosthetic supracondylar fractures. Fractures were categorized using the classification of Lewis and Rorabeck and bone loss was assessed as per the AORI classification. Fracture union and alignment was assessed on radiographs, the later using the criteria of Rorabeck and Taylor, and clinical outcomes were evaluated on the basis of Knee Society and Function Scores.

Results: The average age of patients was 70 years at the time of revision arthroplasty. Fractures occurred at an average of 4.1 years after primary TKA. Intra-operatively, six femoral components were found to be loose. 13 fractures united without angular malalignment in the sagittal and coronal planes at an average of 4.8 months. Constrained insert was required to obtain adequate stability in majority of the cases. Average knee arc of motion was 101.5°. Mean Knee Society and Function scores were 87.4 and 62 respectively at a mean follow up of 4.45 years (2.1- 8.3 years). The goals of surgery were

achieved in all cases. One patient had revision for functional instability. There were no other complications in the study group.

Discussion and Conclusion: This method appears to be suitable for the management of these fractures, especially low supracondylar fractures with poor distal bone stock, with accurate fracture reduction, high fracture union rate, low complication rate, and advantages of early rehabilitation and quick return of knee function. The final option of using a hinged distal femoral replacement is preserved, should it be needed in the future.

Poster 37

In-Vitro Wear Assessment of a New Medially Pivoting Total Knee Arthroplasty System

Robert Schmidt, MD
*Riyaz H. Jinnah, MD

Introduction: Improvements in materials and manufacturing processes, along with an increased understanding of knee joint kinematics, has led to newer generation Total Knee Replacements (TKR) with low reported in-vitro wear rates. The objective of this study was to determine the in-vitro wear performance characteristics of new medially pivoting cruciate-retaining (CR) and cruciate-substituting (CS) TKRs.

Methods: Five medially pivoting CR and five medially pivoting CS tibial inserts machined from compression molded GUR1020 UHMWPE were tested using a six-station knee wear simulator in displacement control for five million cycles (Mc). Two of each insert design were used as load soak controls. The femoral component was common to both insert designs. All bearing couples were tested according to ISO 14243-3, with the exception of the CS group, for which the AP profile was abbreviated to 1.0 mm from 5.8 mm to reflect the increased constraint of the medial condyle geometry.

Results: The cumulative wear after five Mc was 10.4 ± 0.8 mg for the CS group and 37.6 ± 3.9 mg for the CR group. The average wear rates, calculated using a linear regression, were 1.9 ± 0.2 mg/Mc and 7.1 ± 0.5 mg/Mc for the CS and CR groups, respectively. The wear rate for the CS insert is not statistically different from that of a similar medially pivoting insert with 5 Mrad crosslinked UHMWPE (1.4 ± 0.6 mg/Mc) tested under the same modified ISO displacement profile. The wear rate of the CR insert was lower than published data for four commercially available TKRs.

Discussion and Conclusion: The CS inserts have a wear rate comparable to that of a crosslinked UHMWPE, and both the

CS and CR inserts have lower rates than other commercially available implant systems when tested under the same conditions.

Poster 38

Revision Total Shoulder Arthroplasty for Painful Glenoid Arthrosis Following Humeral Head Replacement: The Post-Traumatic Shoulder

John Sperling, MD, MBA
Robert Cofield, MD
Adam Sassoon

Background: Humeral head replacement (HHR) for complex fractures of the proximal humerus is very challenging due to significant distortion of anatomy. Soft tissue damage, greater tuberosity complications, and component malpositioning can lead to progressive glenoid arthrosis. The purpose of this study is to determine the results of conversion total shoulder arthroplasty (TSA) for glenoid arthrosis in the post-traumatic hemiarthroplasty patient.

Methods: We reviewed the clinical and radiographic results of 35 patients (35 shoulders) with HHR after a proximal humerus fracture, who required revision TSA for glenoid arthrosis performed by one surgeon from 1981 to 2005. There were 10 men and 24 women who were followed for a minimum of 2 years (mean, 9.4 years).

Results: Patients had reduction in pain (pre-op: 4.15, post-op: 2.26, p -value = 0.0001) with improved active abduction (pre-op: 69°, post-op 87°, p -value = 0.05) and external rotation (pre-op: 23°, post-op: 45°, p -value = 0.0005). There were 3 excellent (9%), 9 satisfactory (26%), and 22 unsatisfactory (65%) results based on the modified Neer score. Kaplan Meier survival analysis for revision TSA free of re-revision was 100% at 1 year, 96.8% at 5 years (95% CI: 90.1 to 100), and 92.2% at 10 years (95% CI: 82.1 to 100).

Discussion and Conclusion: Conversion TSA remains a valid salvage operation for painful glenoid arthrosis after primary humeral head replacement for a proximal humerus fracture. Revision to a TSA can significantly improve pain and range of motion regardless of the need for humeral stem extraction. However, patients with a greater tuberosity nonunion, malunion, or resorption may not recover their active range of motion after conversion TSA.

Poster 39

Biomechanical Analysis of C2 Intralaminar Fixation Technique Using a Crosslink and Offset Connector for an Unstable Atlantoaxial Joint

Kevin W. Wilson, MD
*Daniel G. Kang, MD
Anton E. Dmitriev, PhD, MSc
Ronald A. Lehman Jr., MD

Introduction: C2 intralaminar screws in atlantoaxial fixation constructs offer the advantage of avoiding the risk to the vertebral artery; however, biomechanical studies have demonstrated inferiority of C2 intralaminar screw fixation compared to C2 intrapedicular fixation in the presence of an odontoid fracture. Transverse connectors require lateral offset connectors, but may restore adequate stability. The aims of this In vitro human cadaveric biomechanical study are to evaluate whether transverse crosslinks can add adequate stability to atlantoaxial constructs using C1 lateral mass and C2 intralaminar screw fixation. The secondary objective is to determine the biomechanical contribution of the C2 offset connectors.

Methods: Ten cadaveric specimens underwent nondestructive testing in axial rotation, flexion/extension (FE), and lateral bending. Specimens were then instrumented with C1 lateral mass, C2 pedicle, and C2 intralaminar screws in order to compare C2 intrapedicular technique to intralaminar techniques with and without the addition of offset connectors and a transverse crosslink. The odontoid was then resected and analyses were repeated.

Results: Post-reconstruction ROM in axial rotation, flexion/extension, and lateral bending showed no significant differences between the four fixation constructs in the stable specimens. Transpedicular fixation at C2 proved superior to intralaminar techniques without a crosslink in axial rotation and lateral bending after destabilization with an odontoidectomy. The addition of a crosslink to the intralaminar construct improved segmental stability to the level afforded by the transpedicular fixation in the unstable model with axial rotation and lateral bending. Offset connectors appeared to marginally weaken the intralaminar fixation, but the findings were not significant.

Discussion and Conclusion: Coupled with an offset connector and a crosslink, C2 intralaminar screws offer similar segmental stability to intrapedicular fixation in the presence of an unstable dens fracture. Lateral offset connectors at C2 do not significantly compromise stability of C1 lateral mass – C2 intralaminar fixation.

Individual Orthopaedic Instruction/ Multimedia Education

Schedule:

Thursday, July 21, 2011	3:30–5:00 pm
Friday, July 22, 2011	3:30–5:00 pm
Saturday, July 23, 2011	3:30–5:00 pm

The following AAOS DVDs are available for individual viewing at the above times (stop at SOA registration desk—sign up required):

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 M. Nogler, MD; Stefan Kreuzer, MD; and Martin Krismer, MD
5. **Imageless Navigation in Hip Resurfacing Arthroplasty** (15 minutes)
Michael L. Swank, MD and Amy L. Hallock, MEd
6. **Basics of Computer Navigation in Total Knee Arthroplasty** (11 minutes)
James B. Stiehl, MD
7. **Lateral Approach for Valgus Total Knee Arthroplasty** (12 minutes)
James B. Stiehl, MD
8. **Molded Articulating Cement Spacers for Treatment of Infected Total Knee Arthroplasty** (12 minutes)
Adolph V. Lombardi Jr., MD, FACS; Keith R. Berend, MD; and Joanne B. Adams, BFA
9. **Arthroscopic Suprascapular Nerve Release** (23 minutes)
Laurent Lafosse, MD
10. **Open Repair of Acute and Chronic Distal Biceps Ruptures** (25 minutes)
James Michael Bennett, MD; Thomas Lynn Mehlhoff, MD; and James Burlin Bennett, MD
11. **Arthroscopic Acetabular Labral Repair: Surgical Technique** (9 minutes)
Marc J. Philippon, MD; Michael J. Huang, MD; Karen K. Briggs, MPH, MBA; 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 A. Sweitzer, MD
14. **Revision ACL Reconstruction Using the Anatomic Double Bundle Concept** (14 minutes)
Freddie H. Fu, MD; Nicholas J. Honkamp, MD; Wei Shen, MD, PhD; Anil S. Ranawat, MD; and Fotios Tjoumikas, MD
15. **The Krukenberg Procedure for Children** (25 minutes)
Hugh Godfrey Watts, MD; John F. Lawrence, MD; and Joanna Patton, ROT
16. **Single Incision Direct Anterior Approach to Total Hip Arthroplasty** (13 minutes)
William J. Hozack, MD; Michael M. Nogler, MD; Javad Parvizi, MD, FRCS; Eckart Mayr, MD; and Krismer Martin, MD
17. **Medial Patellofemoral Ligament Reconstruction** (13 minutes)
Ryan E. Dobbs, MD; Patrick E. Greis, MD; and Robert T. Burks, MD
18. **Hip Arthroscopy: Operative Set-Up and Anatomically Guided Portal Placement** (8 minutes)
Allston Julius Stubbs, MD; Karen K. Briggs, MPH, MBA; and Marc J. Philippon, MD
19. **Anatomy of the Shoulder** (24 minutes)
Donald F. D'Alessandro, MD
20. **Anterolateral Approach in Minimally Invasive Total Hip Arthroplasty** (18 minutes)
Leonard Remia, MD
21. **Patient Specific Knee Design: An Evolution in Computer-Assisted Surgery** (22 minutes)
Adolph V. Lombardi Jr., MD; 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

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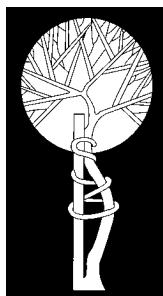
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Southern Orthopaedic Association

28th Annual Meeting

Fairmont Orchid Hotel
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July 21–23, 2011

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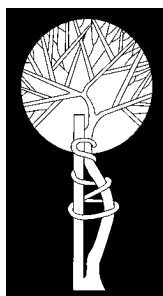
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Thursday, July 21, 2011

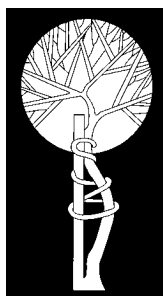
Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my education needs	Will enhance performance of my duties	Will improve practice/ profession outcomes
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<i>Symposium 1</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 2</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 3</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 4</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Instructional Course</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Friday, July 22, 2011

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my education needs	Will enhance performance of my duties	Will improve practice/ profession outcomes
<i>General Session 5</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 2</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 3</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 6</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 7</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 8</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 9</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Instructional Course</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1

Saturday, July 23, 2011

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my education needs	Will enhance performance of my duties	Will improve practice/ profession outcomes
<i>Symposium 4</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 10</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 11</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 12</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>General Session 13</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Symposium 5</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1
<i>Instructional Course</i>	<input type="checkbox"/>	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1	5 4 3 2 1



Southern Orthopaedic Association

28th Annual Meeting

July 21-23, 2011

Fairmont Orchid Hotel
Big Island, Hawaii

2011 CME Credit Record

Poster Presentations

Instructions: To ensure correct CME credit is awarded, please complete this form, indicating the posters viewed. Return this form to the SOA Registration Desk or in a box located near the Scientific Program Area at the conclusion of the meeting. You may also mail this form to Southern Orthopaedic Association, 110 West Road, Suite 227, Towson, MD 21204. CME certificates will be awarded to all participants. All other health professionals will receive a certificate of attendance. Unless you have provided a legible email address, please allow up to 30 days to receive your CME certificate.

Please Print:

Name: _____ AAOS Member #: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Email Address: _____

Thank you for your cooperation.

2011 CME Credit Record

Poster Presentations

Please indicate posters viewed and include comments or suggestions you had regarding the posters. Each poster viewed will account for 10 minutes of CME credit. There is a maximum of 4.5 CME credits available during the course of the meeting for viewing posters (or a total of 27 posters).

Poster Viewed	Check if Viewed	Comments:
Poster 1	<input type="checkbox"/>	
Poster 2	<input type="checkbox"/>	
Poster 3	<input type="checkbox"/>	
Poster 4	<input type="checkbox"/>	
Poster 5	<input type="checkbox"/>	
Poster 6	<input type="checkbox"/>	
Poster 7	<input type="checkbox"/>	
Poster 8	<input type="checkbox"/>	
Poster 9	<input type="checkbox"/>	
Poster 10	<input type="checkbox"/>	
Poster 11	<input type="checkbox"/>	
Poster 12	<input type="checkbox"/>	
Poster 13	<input type="checkbox"/>	
Poster 14	<input type="checkbox"/>	
Poster 15	<input type="checkbox"/>	
Poster 16	<input type="checkbox"/>	
Poster 17	<input type="checkbox"/>	
Poster 18	<input type="checkbox"/>	
Poster 19	<input type="checkbox"/>	
Poster 20	<input type="checkbox"/>	
Poster 21	<input type="checkbox"/>	
Poster 22	<input type="checkbox"/>	
Poster 23	<input type="checkbox"/>	
Poster 24	<input type="checkbox"/>	
Poster 25	<input type="checkbox"/>	
Poster 26	<input type="checkbox"/>	
Poster 27	<input type="checkbox"/>	
Poster 28	<input type="checkbox"/>	
Poster 29	<input type="checkbox"/>	
Poster 30	<input type="checkbox"/>	
Poster 31	<input type="checkbox"/>	
Poster 32	<input type="checkbox"/>	
Poster 33	<input type="checkbox"/>	
Poster 34	<input type="checkbox"/>	
Poster 35	<input type="checkbox"/>	
Poster 36	<input type="checkbox"/>	
Poster 37	<input type="checkbox"/>	
Poster 38	<input type="checkbox"/>	
Poster 39	<input type="checkbox"/>	

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 Program	<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 Program 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"/>

CME FORMS

The program content was:

Just Right	<input type="checkbox"/>	Too Advanced	<input type="checkbox"/>	Too Basic	<input type="checkbox"/>
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How much of the content was new to you? Almost All ☐ About 75% ☐ About 50% ☐
About 25% ☐ Almost None ☐

Would you recommend this meeting to colleagues? Yes ☐ No ☐

Did you perceive industry (commercial) bias in this meeting? **Yes** ☐ **No** ☐

If yes, describe: _____

What I liked best about this meeting: _____

How I would improve this meeting: _____

Overall, did we deliver what you came to learn? Yes ☐ No ☐

What did you learn from attending this meeting? List an example of something you learned that can be applied to your practice: _____

2012 Needs Assessment Survey

Please list any medical topics that you would like included in future programs planned by SOA.

Please list any Office Management Topics that you would like included in the program.
