



Southern Orthopaedic Association

30th Annual Meeting

July 17-20, 2013

The Breakers

Palm Beach, Florida

2013 Meeting Program

Chuck Freitag

Executive Director, Data Trace Management Services, a Data Trace Company

Cynthia Lichtefeld

Director of Operations, Data Trace Management Services, a Data Trace Company

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Visit us at www.soaassn.org

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



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SOA President's Message



Fred C. Flandry, MD, FACS

Dear Colleagues:

Donna and I take great pleasure in inviting and welcoming you to our 30th Annual Meeting of the Southern Orthopaedic Association. Our “pearl” anniversary is shaping up to be one of our best meetings ever. Speaking of pearls, the venue for this year is the fabulous Breakers Hotel in Palm Beach, Florida. The Breakers is the enduring tribute to the network of southern Florida coastal rail resorts developed in the early 1900s by Henry Flagler. A legendary winter playground for the influential of the eastern seaboard, the hotel is steeped in history and tradition, awaiting your exploration. Lounge poolside in your private family cabana, enjoy 18 holes of golf, play tennis on the Har-Tru courts, shop on the world-famous Worth Avenue, dine in one of the many fine restaurants, and enjoy deep sea fishing or scuba diving. There is also a family entertainment center and kids’ camp. The outlets for recreation and fellowship abound.

I am indebted to our Program Chair, Matt Matava, for crafting an excellent scientific program. We have been given approval for 28.5 CME credits for our scientific sessions, posters, and multimedia throughout the meeting. Thanks in large measure to T. Moorman, Matt Matava, and Chuck Freitag, this year we will inaugurate our first SOA Self-Assessment Exam, which will enable you, based on information presented in the didactic program, to earn SAE credits toward your MOC requirements.

Our Distinguished Southern Orthopaedist is a man who needs little introduction. James Andrews, MD embodies the finest in sports medicine and arthroscopy and has revolutionized our thinking on shoulder and elbow surgery and the care of the throwing athlete. Dr. Andrews was one of my personal mentors early in my career and I am thrilled to have him speak to us this year.

I met Tom Price, MD, an orthopaedic surgeon from Marietta, GA, when I first began practice in Georgia. Tom and I served in the Medical Association of Georgia together. He has gone on to serve in the Georgia State assembly and, ultimately, in the U.S. House of Representatives, where he is now a ranking Republican and on the forefront of healthcare legislation issues. He will speak to us regarding the upcoming challenges we face.

Josh Jacobs, MD, our Presidential Guest Speaker from the 2011 Annual Meeting, will return this year as the AAOS President. We are also honored to have presidential representatives of the EOA, WOA, and MAOA participating. Our industry sponsors will offer a technical exhibit area that should serve as a great resource to your practice needs. Lunch-time symposia on Thursday will present ConvaTec and Cadence, makers of wound care and pharmaceutical products and on Friday will feature a presentation by Reinhold Schmeiding, CEO and founder of Arthrex, Inc., a leading innovator in arthroscopic surgery.

Our social program will feature a spouses’ hospitality Thursday morning, a Welcome Reception on Thursday night, an Exhibitor Reception and Silent Auction Friday evening, followed by a casual meal and a charity concert, and culminate in our Saturday Night Gala. Donna and Stacy Wald have collaborated on an exciting social agenda, which in addition to the above, includes a guided tour of The Breakers, deep sea fishing, scuba diving, golf clinics, garden tours, and our golf and tennis tournaments.

My daughters, Nicole and Andrea, my son-in-law Justin, and grandson Jackson will join us this year in perpetuating our family tradition of a “summer vacation with the Southern.” We look forward to you and your family joining us for sun, fun, fellowship, and learning that continues to embody the SOA.

Fred Flandry

Fred Flandry, MD, FACS
President, Southern Orthopaedic Association

Meeting Information

FORMAT

The educational sessions will be held Thursday, Friday, and Saturday, July 18-20, from approximately 6:30am until 2:30pm at The Breakers in Palm Beach, Florida.

TARGET AUDIENCE

The 30th 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. Must show ID/badge to be admitted after hours.

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.

REGISTER FOR THE EXHIBITORS DRAWING

Registered physicians will receive a raffle ticket every day during the meeting to register with the exhibitors. 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.

PHYSICIAN REGISTRATION FEE

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

CME ACCREDITATION

The American Academy of Orthopaedic Surgeons designates this live activity for a maximum of 28.5 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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

To ensure correct CME credit is awarded, please complete the form in the back of this program, indicating the Sessions you attended or go online to www.soaassn.org to complete the SOA 2013 Annual Meeting CME Credit Records. CME certificates will be awarded to all registered participants.

MANAGEMENT

The Southern Orthopaedic Association is managed by Data Trace Management Services, a Data Trace Company, 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.

WEDNESDAY, JULY 17, 2013

12:00 pm – 5:00 pm	Speaker Ready Room (<i>Gulfstream 5</i>)
12:00 pm – 5:00 pm	Meeting Registration (<i>S. Venetian Ballroom Foyer</i>)
12:00 pm – 5:00 pm	Exhibit Setup (<i>Venetian Ballroom</i>)
12:00 pm – 5:00 pm	Scientific Poster Setup (<i>Magnolia Room</i>)
2:00 pm – 5:00 pm	SOA Board of Directors Meeting (<i>Gulfstream 1 & 2</i>)

THURSDAY, JULY 18, 2013

5:45 am – 6:30 am	SOA Councilors Meeting (<i>Gulfstream 4</i>)
5:45 am – 2:40 pm	Meeting Registration (<i>S. Venetian Ballroom Foyer</i>)
6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:00 am – 2:40 pm	Speaker Ready Room (<i>Gulfstream 5</i>)
6:00 am – 2:40 pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Venetian Ballroom</i>)
6:30 am – 6:45 am	First Business Meeting (<i>Mediterranean Ballroom</i>)
6:45 am – 2:40 pm	Scientific Sessions and Symposia (<i>Mediterranean Ballroom</i>)
9:00 am – 10:30 am	Spouse/Children's Hospitality* (<i>Gold Room</i>)
9:20 am – 10:10 am	Presidential Address (<i>Mediterranean Ballroom</i>)
10:45 am – 11:45 am	Tour of the Breakers* (<i>Meet in Lobby</i>)
11:30 am – 12:30 pm	Industry Sponsored Workshop Luncheon* — Cadence Pharmaceuticals, Inc. and ConvaTec (<i>Mediterranean Ballroom</i>) *CME credit not available
1:15 pm – 5:15 pm	Deep Sea Fishing* (<i>Meet at Ponce Porte Cochere</i>)
1:30 pm – 4:30 pm	Scuba Diving* (<i>Meet at the beach at Whitecaps Kiosk</i>)
2:40 pm – 3:40 pm	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
3:40 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)
6:00 pm – 7:00 pm	New Member Reception* (<i>Mediterranean Courtyard</i>)
7:00 pm – 9:30 pm	Welcome Reception* (<i>Ocean Lawn</i>)

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

FRIDAY, JULY 19, 2013

6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:00 am – 7:00 am	Regional and AAOS President's Breakfast Meeting with State Presidents and Board of Councilors* (<i>Gulfstream 3 & 4</i>)
6:00 am – 2:50 pm	Speaker Ready Room (<i>Gulfstream 5</i>)
6:00 am – 2:50 pm	Meeting Registration (<i>S. Venetian Ballroom Foyer</i>)
6:00 am – 2:50 pm	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Venetian Ballroom</i>)
6:30 am – 2:50 pm	Scientific Sessions and Symposia (<i>Mediterranean Ballroom</i>)
9:00 am – 10:00 am	Adult Golf Clinic* (<i>Meet outside the Pro Shop</i>)
9:00 am – 12:00 pm	Garden Tour* (<i>Meet at Ponce Porte Cochere</i>)
9:15 am – 10:00 am	Distinguished Southern Orthopaedist (<i>Mediterranean Ballroom</i>)
10:15 am – 11:15 am	Children's Golf Clinic* (<i>Meet outside the Pro Shop</i>)
11:20 am – 12:20 pm	Special Educational Luncheon Presentation — The History of Arthroscopic Surgery Product Development (<i>Mediterranean Ballroom</i>) *CME credit not available
1:00 pm – 5:30 pm	Golf Tournament* (<i>Meet outside the Pro Shop</i>)
2:00 pm – 3:30 pm	Tennis Round Robin* (<i>Meet at Tennis Courts</i>)
2:50 pm – 3:50 pm	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
3:50 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)
5:30 pm – 7:30 pm	Kids' Movie Party and Arts & Crafts* (<i>Gulfstream 3 & 4</i>)
5:30 pm – 7:30 pm	Exhibitor Reception and SOA Silent Auction* (<i>Venetian Ballroom</i>)
7:30 pm – 10:00 pm	SOA's Charity Benefit* (<i>The Circle Ballroom</i>)

SATURDAY, JULY 20, 2013

6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:00 am – 10:00 am	Technical Exhibits, Continental Breakfast, Coffee Breaks, and Daily Drawing (<i>Venetian Ballroom</i>)
6:00 am – 2:30 pm	Speaker Ready Room (<i>Gulfstream 5</i>)
6:00 am – 2:30 pm	Meeting Registration (<i>S. Venetian Ballroom Foyer</i>)
6:30 am – 2:30 pm	Scientific Sessions and Symposia (<i>Mediterranean Ballroom</i>)
10:00 am – 10:45 am	Presidential Guest Speaker (<i>Mediterranean Ballroom</i>)
10:45 am – 10:55 am	Break (<i>Mediterranean Ballroom</i>)
12:45 pm – 1:00 pm	Second Business Meeting (<i>Mediterranean Ballroom</i>)
1:00 pm – 1:20 pm	Lunch Break

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

2:30 pm – 3:30 pm	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
3:30 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)
7:00 pm – 11:00 pm	Kids' Movie Party and Arts & Crafts (<i>Gulfstream 3 & 4</i>)
7:00 pm – 11:00 pm	Gala Dinner Dance (<i>Venetian Ballroom</i>)

SUNDAY, JULY 21, 2013

8:00 am – 9:30 am	Fellowship and Worship (<i>Gold Room</i>)
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* See Activities Information on pages 10-12 for more details.

Scientific Program Agenda
Mediterranean Ballroom (unless otherwise specified)
Presenters and times are subject to change.

THURSDAY, JULY 18, 2013

6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:30 am – 6:45 am	First Business Meeting
6:45 am – 7:36 am	General Session 1: Arthroplasty
7:36 am – 8:10 am	General Session 2: Trauma
8:10 am – 8:30 am	Break — Please visit exhibitors and posters (<i>Venetian Ballroom</i>)
8:30 am – 9:15 am	Symposium 1: Common Orthopaedic Tumors: When to Treat, When to Refer
9:15 am – 10:10 am	General Session 3: OREF Report and Presidential Address
10:10 am – 10:30 am	Break — Please visit exhibitors and posters (<i>Venetian Ballroom</i>) The drawing will take place in the exhibit area at the end of the break.
10:30 am – 11:30 am	Symposium 2: Fundamentals and Challenges in Revision Total Knee Arthroplasty
11:30 am – 12:30 pm	Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals Inc. and ConvaTec CME credit not available
12:30 pm – 1:30 pm	General Session 4: Sports Medicine
1:30 pm – 2:40 pm	Instructional Course Lecture 1: Total Joint Arthroplasty and Common Fractures in the Elderly
2:40 pm – 3:40 pm	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
3:40 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)

FRIDAY, JULY 19, 2013

6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:30 am – 7:12 am	General Session 5: Total Hip Arthroplasty
7:12 am – 8:05 am	General Session 6: Total Knee Arthroplasty
8:05 am – 8:25 am	Break — Please visit exhibitors and posters (<i>Venetian Ballroom</i>)
8:25 am – 9:15 am	Symposium 3: Update on Orthopedic Trauma: Getting Through the Night
9:15 am – 10:10 am	General Session 7: Distinguished Southern Orthopaedist and AAOS Report
10:10 am – 10:30 am	Break — Please visit exhibitors and posters (<i>Venetian Ballroom</i>) The drawing will take place in the exhibit area at the end of the break.
10:30 am – 11:20 am	Symposium 4: Current Concepts in the Young Adult Hip

11:20 am – 12:20 pm	Special Educational Luncheon Presentation — The History of Arthroscopic Surgery Product Development CME credit not available
12:20 pm – 1:20 pm	General Session 8: Upper Extremity
1:20 pm – 2:50 pm	Instructional Course Lecture 2: Foot & Ankle Review and Tumor Update
2:50 pm – 3:50 pm	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
3:50 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)

SATURDAY, JULY 20, 2013

6:00 am – 6:30 am	Scientific Poster Session (<i>Magnolia Room</i>) Note: Presenters will be available to answer questions.
6:30 am – 7:40 am	General Session 9: General Orthopedics/Foot & Ankle
7:40 am – 8:30 am	Symposium 5: Athletic Conditions of the Foot & Ankle
8:30 am – 9:35 am	General Session 10: Arthroplasty
9:35 am – 10:00 am	Break — Please visit exhibits and posters (<i>Venetian Ballroom</i>) The drawing will take place in the exhibit area at the end of the break.
10:00 am – 10:45 am	General Session 11: Presidential Guest Speaker
10:45 am – 10:55 am	Break
10:55 am – 11:47 am	General Session 12: Sports Medicine/Trauma
11:47 am – 12:45 pm	General Session 13: Spine
12:45 pm – 1:00 pm	Second Business Meeting
1:00 pm – 1:20 pm	Lunch Break
1:20 pm – 2:30 pm	Instructional Course Lecture 3: Common Sports Medicine Issues
2:30 pm – 3:30 pm	Scientific Poster Session (<i>Magnolia Room</i>) Notes: Presenters will be available to answer questions.
3:30 pm – 5:00 pm	Multimedia Education Session (<i>Gulfstream 5</i>)

Activities Information

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

Thursday, July 18, 2013

Spouse/Children's Hospitality

9:00 am – 10:30 am (*Gold Room*)

Southern Ladies of Style: Lilly and Lulie

Please join us for a special event. The morning breakfast will feature a fashion showing of Lilly Pulitzer clothing and accessories with the opportunity to receive a 15% discount on all Lilly purchases made at The Breakers. Rising Charleston, South Carolina artist and designer Lulie Wallace products will also be showcased along with a video greeting by the artist with a reflection on her design concepts. It's a morning I am sure you will enjoy.

Price: *Included in registration fee or \$40 per unregistered adult guest; \$20 per unregistered child (5-17 years)*

Tour of the Breakers

10:45 am – 11:45 am (*Meet in Lobby*)

An official historian of the Breakers will be giving this exclusive tour which shares the history of the hotel and many fun and informative stories about former guests and legends that have graced the halls.

Price: *\$35 per person (minimum 20 people)*

Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals Inc. and ConvaTec

11:30 am – 12:30 pm (*Mediterranean Ballroom*)

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

*Presented by: C. Lowry Barnes, MD, Arkansas Specialty Orthopaedics, Little Rock, AR
Paul F. Lachiewicz, MD, Chapel Hill Orthopaedics, Chapel Hill, NC*

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

CME credit not available

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

Deep Sea Fishing

1:15 pm – 5:15 pm (*Meet at Ponce Port Cochere*)

You will enjoy fishing in Sailfish Alley, the closest point to the Gulf Stream in Florida. Among countless other species, Kingfish, Wahoo, Pompano, Dolphin, Amberjack, and of course, Sailfish, flourish in these waters. Includes: license, beverages, and dry snacks (lunch not included).

Price: *\$275 per person (minimum 6 people)*

Scuba Diving

1:30 pm – 4:30 pm (*Meet at the beach at Whitecap Kiosk*)

The Breakers is located just inland from a two mile-long coral reef system that shares its name with the hotel. The system is one of the most heavily dived reefs in the area, as many divers claim it's the best reef around. Every form of native sea life can be found on the reef, and often in great numbers.

Price: *\$250 per person (must have current PADI card) (minimum 4 people)*

New Member Reception

6:00 pm – 7:00 pm (*Mediterranean Courtyard*)

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

Price: *Included in registration fee*

Welcome Reception

7:00 pm – 9:30 pm (*Ocean Lawn*)

Enjoy the return performance of the Southern Orthopaedic Band (SOB's). Have a wonderful evening with family and friends relishing the sunset with refreshing cocktails along with delicious food offerings!

Attire: Resort Casual (no jacket required)

Price: *Included in registration fee or \$100 per unregistered adult guest; \$50 unregistered child*

Friday, July 19, 2013

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

5:45 am – 6:30 am (*Gulfstream 3 & 4*)

Adult Golf Clinic

9:00 am – 10:00 am (*Meet outside the Pro Shop*)

Learn the fundamentals from the pro. Full swing clinic will use woods and irons. Must wear golf attire (collared shirt, Bermuda shorts, sneakers).

Price: \$50 per person (*minimum 6 people*)

Garden Tour

9:00 am – 12:00 pm (*Meet at Ponce Porte Cochere*)

Come meander through the lushly landscaped garden paths of some of South Florida's most exotic gardens. Heighten your senses through the unforgettable fragrances of gardenias, jasmine, orchids, honey-suckle and roses. Marvel at original works of art created by world-renowned sculptors. Relax in a serene setting by water lily ponds inhabited by colorful Japanese Koi fish. Tour destinations include The Society of the Four Arts Botanical Gardens, The Preservation Foundations Pan's Garden, and The Ann Norton Sculpture Garden.

Price: \$105 per person (*minimum 9 people*)

Children's Golf Clinic

10:15 am – 11:15 am (*Meet outside the Pro Shop*)

Learn the fundamentals from the pro. Full swing clinic will use woods and irons. Must wear golf attire (collared shirt, Bermuda shorts, sneakers).

Price: \$40 per person (*minimum 6 people*)

Special Educational Luncheon Presentation

11:20 am – 12:20 pm (*Mediterranean Ballroom*)

The History of Arthroscopic Surgery Product Development

Presented by: Reinhold Schmieding, Founder & President, Arthrex, Inc.

CME credit not available

Price: *Included in registration; lunch provided*

Golf Tournament

1:00 pm – 5:30 pm (*Meet outside the Pro Shop*)

SOA's Golf Tournament will take place on The Breakers' Ocean Course. This is Florida's oldest 18-hole course located on site at The Breakers, a 6,100-yard, par 70 course redesigned by Brian Silva in 2000. The course is

beautifully landscaped with manicured greens and is a constant test for all skill levels. 1:00 pm shotgun start with scramble format.

Price: \$170 per person (*Includes greens fee, lunch and beverage cart*)

Tennis Round Robin

2:00 pm – 3:30 pm (*Meet at Tennis Courts*)

Price: \$35 per person

Kids' Movie Party and Arts & Crafts

5:30 pm – 7:30 pm (*Gulfstream 3 & 4*)

(Time will be extended for parents attending concert only.) 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. This is not a babysitting service but provided for parents attending the Exhibitor Reception and children must be registered.

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

Exhibitor Reception

5:30 pm – 7:30 pm (*Venetian Ballroom*)

Start your evening off with drinks and hors d'oeuvres with SOA. Continue your evening with us at the SOA Silent Auction & Charity Concert for a casual dinner and concert by guitarist Leo Kottke.

Price: *Included in registration fee or \$75 per unregistered adult guest*

SOA Silent Auction

5:30 pm – 7:30 pm (*Venetian Ballroom*)

Plan to attend the evening with SOA's one night charitable trifecta of fun, fellowship, and "philanthropy." Join in spirited bidding in a silent auction featuring sports and entertainment memorabilia, jewelry, rare gifts, and fabulous vacations during the Exhibitor Reception. The silent auction will benefit the SOA Education Fund and winners will be announced at the SOA Charity Concert.

SOA's Charity Benefit

7:30 pm – 10:00 pm (*The Circle Ballroom*)

The fun continues, following the Exhibitor Reception/Silent Auction with a Charity Benefit. Fill your plate for casual dining from tables of gastronomic delights prepared by The Breaker's culinary staff. Top off the evening with a live concert by world famous guitarist and recording artist Leo Kottke. Winners of the silent

auction will be announced. The charity benefit will also benefit the SOA Education Fund.

Price: *Included in registration fee (suggested minimum \$100 per person tax deductible contribution)*

Saturday, July 20, 2013

Gala Dinner Dance

7:00 pm – 11:00 pm (*Venetian Ballroom*)

Dinner will be an event to remember with a delicious meal, good company, and dancing to the sounds of Big Band music performed by a 19-piece Orchestra.

Attire: Coat and Tie Preferred

Price: *Included in registration fee or \$150 for unregistered adult guest; \$75 surcharge for registered child (5-17 years)*

Kids' Movie Party and Arts & Crafts

7:00 pm – 11:00 pm (*Gulfstream 3 & 4*)

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

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

Sunday, July 21, 2013

Fellowship and Worship

8:00 am – 9:30am (*Gold Room*)

Grab your breakfast and then come join us for Sunday morning worship. Claude T. Moorman III, MD will lead the worship.

Price: *Included in registration fee*

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

2012 - 2013 SOA Leadership

Officers and Board of Trustees

*PRESIDENT***Frederick C. Flandry, MD, FACS***PRESIDENT-ELECT***William C. Andrews Jr., MD***SECRETARY/VICE-PRESIDENT***Langdon A. Hartsock, MD***TREASURER***Darren L. Johnson, MD***IMMEDIATE PAST PRESIDENT***Claude T. Moorman III, MD***BOARD OF TRUSTEES***Samuel I. Brown, MD****Spero G. Karas, MD****Ryan M. Nunley, MD****Ana K. Palmieri, MD****Andrew A. Shinar, MD****H. Clayton Thomason III, MD***HISTORIAN, EX-OFFICIO***James H. Armstrong, MD***EDITOR, EX-OFFICIO***L. Andrew Koman, MD***SOA BOC REPRESENTATIVE***James A. Nunley II, MD**

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DO***VIRGINIA***Preston Waldrop, MD***WEST VIRGINIA***Stanley Tao, MD**

2012-2013 SOA Committees

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2013 SOA New Active Members

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

Oscar E. Aguero Jr., MD
Valdosta, GA

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

Wright Medical Technology, Inc.

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

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

Zimmer

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

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

SOA Business Meetings

Southern Orthopaedic Association

**Mediterranean Ballroom
The Breakers
Palm Beach,
Florida**

Thursday, July 18, 2013
6:30 am – 6:45 am

First Business Meeting

AGENDA

- I. Call to Order, Fred C. Flandry, MD, FACS
- II. Approval of Minutes, Thursday and Saturday, July 19 and 21, 2012, White Sulphur Springs, West Virginia
- III. Report of the President, Fred C. Flandry, MD, FACS
 - (a) Update on Association Status
 - (b) Review of Annual Meeting Activities
 - (c) Report on Actions of the Board of Trustees
 - (d) Review of Future SOA Meetings
- IV. Report of the Membership Chair, Samuel I. Brown, MD
- V. Report of the Treasurer, Darren L. Johnson, MD
- VI. Old Business
- VII. New Business
 - (a) Presentation of 2013-2014 Slate of Nominees
 - (b) Election of 2014 Nominating Committee Members at Large
- VIII. Announcements
- IX. Adjournment

Minutes of the 2012 First Business Meeting of the Southern Orthopaedic Association

Chesapeake Room, The Greenbrier
White Sulphur Springs, West Virginia
Thursday, July 19, 2012

CALL TO ORDER

Claude T. Moorman III, MD, President, called to order the First Business Meeting of the Southern Orthopaedic Association. The meeting took place in the Chesapeake Room, The Greenbrier, White Sulphur Springs, West Virginia. The meeting began at 6:30 am.

APPROVAL OF MINUTES

A copy of the Minutes for the 2011 First Business Meeting held at the Fairmont Orchid Hotel, Big Island, Hawaii, Thursday, July 21, 2011 were distributed for review and approval in the 2012 Meeting Program.

ACTION: It was moved by Dr. Lachiewicz and seconded by Dr. Henry that the Minutes for the 2011 First Business Meeting be approved. The motion carried.

REPORT OF THE PRESIDENT

Dr. Moorman reported that the SOA is doing well. He stated that The Greenbrier is a great venue for the 29th Annual Meeting and that registration for the meeting is very positive. Dr. Moorman informed the membership that SOA is developing an SAE program that will be included in the Scientific Program during next year's Annual Meeting. He said that the 30th Annual Meeting will be at The Breakers in Palm Beach, FL, July 17-20, 2013 and that Dr. Flandry would have more to report on 2013 at the Second Business Meeting on Saturday.

REPORT OF THE MEMBERSHIP CHAIR

Dr. Samuel I. Brown stated that SOA has 821 Active Members and recruited 90 new members into the association this year. He said that there are approximately 140 members that have not yet renewed and that efforts would be made to get these members to renew. He encouraged the membership to tell their colleagues about SOA and that there will be an MOC addition to the member benefits at the Annual Meeting next year.

REPORT OF THE TREASURER

Dr. Langdon A. Hartsock reported that SOA is in excellent financial shape with total assets of \$1,077,446. A slide of the

Income Statement and Current Financial Statement were presented for review. Dr. Hartsock related that new investment strategies are being put into place and that the Association is being well managed.

NEW BUSINESS

Dr. Moorman presented the following Slate of Officers for 2013 that had been prepared by the SOA Nominating Committee:

President	Frederick C. Flandry, MD, FACS
President-Elect	William C. Andrews Jr., MD
Secretary/Vice President	Langdon A. Hartsock, MD
Treasurer	Darren L. Johnson, MD
Two Trustees	H. Clayton Thomason III, MD
	Ana Palmieri, MD

Dr. Moorman informed the Membership that the Slate would be voted on at the Second Business Meeting.

Dr. Moorman stated that two members at large needed to be elected from the floor to serve on the 2013 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 2013 Nominating Committee: Christopher A. Heck, MD and C. Lowry Barnes, MD.

ACTION: It was moved and seconded to elect Christopher A. Heck and C. Lowry Barnes to serve on the 2013 Nominating Committee. The motion carried.

Dr. Moorman related that John McGraw, SOA's BOC Representative is moving up in the AAOS and that a new representative needed to be nominated.

ACTION: It was moved and seconded that James A. Nunley, MD be included on the Slate as the SOA BOC Representative. The motion carried.

ADJOURNMENT

There being no further business, Dr. Moorman adjourned the First Business Meeting at 6:45 am.

Minutes of the 2012 Second Business Meeting of the Southern Orthopaedic Association

Chesapeake Room, The Greenbrier
White Sulphur Springs, West Virginia
Saturday, July 21, 2012

CALL TO ORDER

Claude T. Moorman III, MD, President, called to order the Second Business Meeting of the Southern Orthopaedic Association. The meeting took place in the Chesapeake Room, The Greenbrier, White Sulphur Springs, West Virginia. The meeting began at 12:00 pm.

APPROVAL OF MINUTES

A copy of the Minutes for the 2011 Second Business Meeting held at the Fairmont Orchid Hotel, Big Island, Hawaii, Saturday, July 23, 2011 were distributed for review and approval in the 2012 Meeting Program.

ACTION: It was moved by Dr. Shinar and seconded by Dr. Armstrong that the Minutes for the 2011 Second Business Meeting be approved. The motion carried.

ELECTION OF OFFICERS AND TRUSTEES

Dr. Moorman presented for approval the proposed Slate of Officers and Board of Trustee Members for 2012-2013.

President	Frederick C. Flandry, MD, FACS
President-Elect	William C. Andrews Jr., MD
Secretary/Vice President	Langdon A. Hartsock, MD

Treasurer

Two Trustees

BOC Representative

Darren L. Johnson, MD

H. Clayton Thomason III, MD

Ana Palmieri, MD

James A. Nunley II, MD

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

2013 ANNUAL MEETING

Dr. Flandry began his report by giving a round of applause to Drs. Alison P. Toth and Claude T. Moorman III for a great meeting. He reviewed the meeting venue for SOA's 2013 Annual Meeting, which will be held at The Breakers in Palm Beach, Florida, July 17-20. He informed the membership that the Distinguished Southern Orthopaedist will be James R. Andrews, MD and that Tom Price, MD, the Representative from Georgia, had tentatively agreed to serve as the Presidential Guest Speaker. Dr. Flandry stated that Dr. Matthew Matava would serve as Program Chair. He concluded his report by inviting everyone to attend the 2013 Annual Meeting and to bring one or two colleagues with them to the meeting.

ADJOURNMENT

There being no further business, Dr. Moorman adjourned the Second Business Meeting at 12:10 pm.

Southern Orthopaedic Association

**Mediterranean Ballroom
The Breakers
Palm Beach,
Florida**

Saturday, July 20, 2013
12:45pm–1:00pm

Second Business Meeting

AGENDA

- I. Call to Order, Fred C. Flandry, MD, FACS
- II. Election of Officers and Trustees, Fred C. Flandry, MD, FACS
 - President William C. Andrews Jr., MD
 - President-Elect Langdon A. Hartsock, MD
 - Secretary/Vice-President Darren L. Johnson, MD
 - Treasurer Samuel I. Brown, MD
 - Trustees Andrew A. Shinar, MD
 - Jeffrey A. Guy, MD
- III. Report of the 2014 Annual Meeting, July 16-19, The Park Hyatt, Beaver Creek, Colorado, William C. Andrew Jr., MD
- IV. Announcements
- V. New Business
- VI. Adjournment

Past Annual Meetings of the Southern Orthopaedic Association 1984–2013

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

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

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

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

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

Distinguished Orthopaedist Award:

J. Leonard Goldner, MD
Durham, North Carolina

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

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: 166

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

Twenty-ninth Annual Meeting

President: Claude T. Moorman III, MD

President-Elect: Frederick C. Flandry, MD,
FACS

Secretary/Vice-President: William C. Andrews Jr., MD

Treasurer: Langdon A. Hartsock, MD

Dates: July 18-21, 2012

Location: The Greenbrier
White Sulphur Springs, West
Virginia

Physician Attendance: 252

Guest Speaker: Richard J. Hawkins, MD
Greenville, SC

Distinguished Orthopaedist Award:
Angus M. McBryde Jr., MD,
FACS
Columbia, SC

Harley and Betty Baxter Resident Award Winners:
Samuel Adams, MD
Durham, NC
Anil K. Gupta, MD, MBA
Durham, NC

SOA Presidents' Resident Award Winner:
Daniel G. Kang, MD
Bethesda, MD

SOA Resident Award Winners:
Lindsay Hickerson, MD
Richmond, VA
Maxwell K. Langfitt, MD
Winston-Salem, NC

SOA Resident Travel Grant Award Winners:
Melissa Bickett, MD
Lexington, KY
Juan S. Contreras, MD
Miami, FL
Phillip Horne, MD, PhD
Durham, NC
Jesus M. Villa, MD
Miami, FL

Thirtieth Annual Meeting

President: Frederick C. Flandry, MD,
FACS

President-Elect: William C. Andrews Jr., MD

Secretary/Vice-President: Langdon A. Hartsock, MD

Treasurer: Darren L. Johnson, MD

Dates: July 17-20, 2013

Location: The Breakers
Palm Beach, Florida

Physician Attendance: TBA

Guest Speaker: Congressman Thomas Price, MD
Atlanta, GA

Distinguished Orthopaedist Award:
James R. Andrews, MD
Gulf Breeze, FL

SOA Presidents' Resident Award Winner:
John S. Lewis Jr., MD
Durham, NC

Harley and Betty Baxter Resident Award Winners:
Joshua S. Griffin, MD
Temple, TX
Adam Sassoon, MD, MS
Orlando, FL

SOA/OREF Resident Award Winners:
Mihir J. Desai, MD
Atlanta, GA
Mark A. Tait, MD
Little Rock, AR
Robert Tracey, MD
Rockville, MD

SOA Resident Travel Grant Award Winners:
Michael Gottschalk, MD
Atlanta, GA
Kushal V. Patel, MD
Temple, TX
Elizabeth Polfer, MD
Bethesda, MD
Rabah Qadir, MD
New Orleans, LA

* 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"

In Memoriam

SOA Remembers Founding Member and Past President

Dr. William Collins (Bill) died peacefully at his Sandy Springs home, Rivermist, on February 25, 2013, of complications from pneumonia.

Bill was awarded the first General Motors Scholarship, and he graduated from the University of Georgia with a BS degree in 1959, while jointly enrolled at the Medical College of Georgia.

Dr. Collins became a proud graduate of the Medical College of Georgia in 1962, obtaining his medical degree. Following medical school, he completed his training with an internship at Floyd Hospital in Rome, Georgia (1962-3), military service in the United States Air Force, 1360th USAF Hospital (1963-5), orthopedic residency at Georgia Baptist and Scottish Rite hospitals, and a hand surgery fellowship at Duke University Medical Center.

Dr. Collins opened his orthopedic practice, Northside Orthopedic Clinic, in Sandy Springs in 1970, becoming one of the first orthopedists in Sandy Springs and at Northside Hospital and becoming board certified in 1972. His accomplishments and positions in the profession are too numerous to list in their



William Collins, MD

entirety, but those of which he was most proud include: Medical Association of Georgia, President; Medical Association of Atlanta, Chairman; Academy of Medicine Restoration Committee, Co-chairman; American Medical Association, Delegate; Northside Hospital, Executive Committee; Atlanta Outpatient Surgery Center, Chief of Staff; Michael Hoke Society, President and Founder; Georgia Orthopedic Society, President; Southern Orthopedic Association, President and Co-founder; Orthopedic Research and Education Foundation, President; and Medical College of Georgia Alumni Association, President.

Dr. Collins is survived by Jan Williams Collins, his wife of 53 years, and their children and children-in-law, Courtenay Collins (Michael) Eckardt and William "Chip" (Gigi) Collins, Jr. He was also blessed to leave a legacy of six grandchildren: William Coppedge "Liam" Collins, III; Collins Wilburn Vise; Aidan McLarty Collins; Benjamin Spencer Vise; Henry Bernard Collins; and Grace Olivia Collins. Bill loved dogs, and his Boston Terrier, Roxie, was his loyal companion in his later years.

Presidents' Gift Fund

\$31,500

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

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The Harley and Betty Baxter Fund

\$30,000

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. Mrs. Baxter has continued to grow the Fund providing additional opportunities for the future. 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.

SOA Educational Program

The SOA Board created an Educational Program in which the Board pledged to participate 100%. The purpose of the Educational Program is to provide educational opportunities for our young orthopaedists by offering 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 or cfreitag@datatrace.com. The opportunity to contribute to the Educational Program is also available on your dues renewal notices.

Contributions to the SOA Educational Program may be tax-deductible. Contributions to the Educational 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 since the 2012 meeting in West Virginia.

Diamond - \$5,000 and above

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Fredrick C. Flandry, MD, FACS

Ruby - \$1,000

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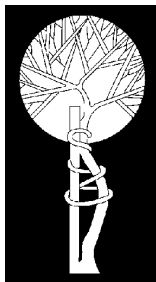
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Southern Orthopaedic Association

Scientific Program

July 18-20, 2013

The Breakers
Palm Beach, Florida

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

2013 Program Chairman



Matthew J. Matava, MD

Chesterfield, MO

Matthew Matava, MD is a Professor of Orthopedic Surgery and Physical Therapy at Washington University in St. Louis. He is also the Co-Chief of the Sports Medicine Section and Director of the Sports Medicine Fellowship program.

Dr. Matava received his undergraduate and medical degrees from the University of Missouri-Kansas City's, Six-Year Combined BA/MD Program. He completed his internship and orthopaedic residency at Emory University in Atlanta, Georgia and finished a one-year Sports Medicine Fellowship under the guidance of Frank Noyes, MD at the Cincinnati Sports Medicine and Orthopedic Center.

Since joining the Washington University faculty, Dr. Matava has written over 100 peer-reviewed publications and book chapters related to orthopaedic sports medicine and knee surgery. He is the Head Team Physician for the St. Louis Rams football team, assistant team physician for the St. Louis Blues hockey team, and Head Physician for the Washington University Varsity Athletic program. He is a member of a number of orthopaedic and sports medicine societies and is currently President of the NFL Physician Society.

Dr. Matava resides in Creve Coeur, Missouri with his wife of 25 years, Michelle, and their three children: Sarah (20), Christian (15), and Matthew (11).

2013 Presidential Guest Speaker



Congressman Thomas Price, MD

Marietta, GA

SOA is pleased to have Congressman Thomas Price, MD as the Presidential Guest Speaker at the 30th Annual Meeting in Palm Beach, Florida. Congressman Price was first elected to represent Georgia's 6th district in November 2004. Prior to going to Washington, Price served four terms in the Georgia State Senate – two as Minority Whip. In 2002, he was a leader in the Republican renaissance in Georgia as the party took control of the State Senate, with Price rising to become the first Republican Senate Majority Leader in the history of Georgia.

In Congress, Rep. Price has proven to be a vibrant leader, tireless problem solver and the go-to Republican on quality health care policy. He serves on the House Ways and Means and the Budget Committees. In the 112th Congress, Price was elected by his colleagues to serve as the fifth ranking Republican in the House as the Chairman of the Republican Policy Committee. In the preceding Congress, he served as Chairman of the Republican Study Committee. Committed to advancing positive solutions under principled leadership, Price has been a fierce opponent of government waste and devoted to limited government and lower spending.

For nearly twenty years, Rep. Price worked in private practice as an orthopaedic surgeon. Before going to Washington he returned to Emory University School of Medicine as an Assistant Professor and Medical Director of the Orthopaedic Clinic at Grady Memorial Hospital in Atlanta, teaching resident doctors in training. He received his Bachelors and Doctor of Medicine degrees from the University of Michigan and completed his Orthopaedic Surgery residency at Emory. Congressman Price and his wife, Elizabeth, reside in Roswell, GA. They have one son who is in college.

2013 Distinguished Southern Orthopaedist Award



James R. Andrews, MD
Gulf Breeze, FL

SOA is delighted to have James R. Andrews, MD as the recipient of the 2013 Distinguished Southern Orthopaedist Award. He currently practices at the Andrews Institute in Gulf Breeze, Florida.

Dr. Andrews is a founder of Andrews Sports Medicine and Orthopaedic Center and the American Sports Medicine Institute in Birmingham, Alabama and the Andrews Institute in Gulf Breeze, Florida. He has mentored more than 250 Orthopaedic Sports Medicine Fellows and 50 Primary Care Sports Medicine Fellows.

He graduated from Louisiana State University in 1963, completed LSU School of Medicine in 1967 and his orthopaedic residency at Tulane Medical School in 1972.

He is a member of the American Board of Orthopaedic Surgery and the American Academy of Orthopaedic Surgeons and is Past-President of the American Orthopaedic Society for Sports Medicine. He is Clinical Professor of Orthopaedic Surgery at the University of Alabama Birmingham Medical School. He serves as Medical Director for several collegiate and professional teams.

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 <i>In Memoriam</i>	Pine Bluff, Arkansas
2011	L. Andrew Koman, MD	Winston-Salem, North Carolina
2012	Angus M. McBryde Jr., MD, FACS	Columbia, South Carolina

2013 Resident/Fellow Paper Award Winners

SOA Presidents' Resident Award Winner

John S. Lewis Jr., MD, Duke University Medical Center,
Durham, NC
*Outcomes After Total Ankle Replacement in Association with
Ipsilateral Hindfoot Arthrodesis*
Saturday, July 20, 2013, 7:11 am – 7:17 am

Harley & Betty Baxter Resident Award Winners

Joshua S. Griffin, MD, Scott and White Memorial Hospital,
Temple, TX
*The Impact of Age on Reoperation Rates for Femoral Neck
Fractures Treated with Percutaneous Pinning and
Hemiarthroplasty*
Thursday, July 18, 2013, 7:36 am – 7:42 am

Adam Sassoon, MD, MS, Orlando Regional Medical Center,
Orlando, FL
*Open Femoral Shaft Fractures: A Difficult Problem in
Capable Hands*
Saturday, July 20, 2013, 11:19 am – 11:25 am

SOA/OREF Resident Award Winners

Mihir J. Desai, MD, Emory University School of Medicine,
Atlanta, GA
*A Biomechanical Comparison Between All-Arthroscopic
Knotless and Outside-In Triangular Fibrocartilage Complex
Repairs*
Friday, July 19, 2013, 12:26 pm – 12:32 pm

Mark A. Tait, MD, St. Vincent Infirmary Medical, Little Rock,
AR
*Preoperative Patient Education for Hip and Knee
Arthroplasty: Financial Benefit?*
Thursday, July 18, 2013, 6:56 am – 7:02 am

Robert Tracey, MD, Walter Reed National Military Medical
Center, Bethesda, MD
*Pulmonary Function Following Adult Spinal Deformity
Surgery: Minimum Two Year Follow-Up*
Saturday, July 20, 2013, 12:23 pm – 12:29 pm

SOA Resident Travel Grant Award Winners

Michael Gottschalk, MD, Emory University School of
Medicine/Grady Hospital, Atlanta, GA
Radiation Exposure in the Level I Trauma Patient
Thursday, July 18, 2013, 7:48 am – 7:54 am

Kushal V. Patel, MD, Scott and White Memorial Hospital,
Temple, TX
*Hemoglobin Trends After Primary Total Hip and Knee
Arthroplasty: Are Daily Post-Operative Hemoglobin
Phlebotomies Necessary?*
Thursday, July 18, 2013, 7:08 am – 7:14 am

Elizabeth Polfer, MD, Walter Reed National Military Medical
Center, Washington, DC
*Split-Thickness Skin Grafts for Residual Limb Coverage and
Preservation of Amputation Length*
Thursday, July 18, 2013, 7:42 am – 7:48 am

Rabah Qadir, MD, Ochsner Clinic Foundation, New Orleans,
LA
*Infection Rate in Total Knee Arthroplasty in "High Risk"
Patients Using Antibiotic Bone Cement: Preliminary Results*
Saturday, July 20, 2013, 8:54 am – 9:00 am

(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 a member of their immediate family:

1. Receive royalties for any pharmaceutical, biomaterial, or orthopaedic product or device;
2. Within the past twelve months, served on a speakers' bureau or have been paid an honorarium to present by any pharmaceutical, biomaterial, or orthopaedic product or device company;
- 3a. Paid Employee for any pharmaceutical, biomaterial, or orthopaedic device and equipment company, or supplier;
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4. Own stock or stock options in any pharmaceutical, biomaterial, or orthopaedic device and equipment company, or supplier (excluding mutual funds);
5. Receive research or institutional support as a principal investigator from any pharmaceutical, biomaterial, orthopaedic device and equipment company, or supplier;
6. Receive any other financial/material support from any pharmaceutical, biomaterial, or orthopaedic device and equipment company or supplier;
7. Receive any royalties, financial/material support from any medical and/or orthopaedic publishers;
8. Serve on the editorial or governing board of any medical and/or orthopaedic publication;
9. Serve on any Board of Directors, as an owner, or officer on a relevant committee of any health care organization (e.g., hospital, surgery center, medical).
- 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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Accreditation Information for the Scientific Program

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MISSION

The Southern Orthopaedic Association was founded in 1983 solely to develop and foster scientific medicine in the specialty of orthopaedic surgery. Annual meetings of the Association are dedicated to disseminating current clinical, research, and practice innovations in orthopaedic medicine.

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, lectures and workshops in plenary 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.

These educational objectives will be obtained through paper presentations, instructional courses, guest lectureships, symposia, multimedia educational sessions, and poster exhibits.

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. **Please note on the Scientific Program Schedule the designated times the poster presenters will be available for discussion.**

MULTIMEDIA EDUCATION SESSIONS

Multimedia education materials will be offered on Thursday, Friday, and Saturday, July 18-20, following the Poster Sessions. 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 28.5 *AMA PRA Category 1 Credits*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

* 20 CME Credits for Scientific Program

* 4.5 CME Credits for Scientific Poster Sessions

* 4 CME Credits for Multimedia Education Sessions

To ensure correct CME credit is awarded, please complete the form in the back of this program, indicating the Sessions you attended or go online to www.soaassn.org to complete the SOA 2013 Annual Meeting CME Credit Records. CME certificates will be awarded to all registered participants.

CEC CREDIT

Physician's Assistants can receive up to 28.5 credit hours toward Continuing Education Credits. AAPA accepts American Medical Association Category I, Level 1 CME credit for the Physician's Recognition Award from organizations accredited by the ACCME.

CME NOTE

To receive CME credit, you are required to turn in your completed CME Credit 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.)**

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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Some pharmaceuticals 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 the pharmaceuticals or medical devices he or she wishes to use in clinical practice.

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

2013 Scientific Program

July 18-20, 2013

Mediterranean Ballroom (unless otherwise specified)

Thursday, July 18, 2013

(Presenters and times are subject to change.)

Disclosure Information is listed on pages 42-47.

6:00 am – 6:30 am **Scientific Poster Session**

(Magnolia Room)

Note: Presenters will be available to answer questions.

6:30 am – 6:45 am **First Business Meeting**

6:45 am **Welcome, Introduction of Program, and Announcements**

Fred Flandry, MD, FACS, President
Matthew J. Matava, MD, Program Chair

Kushal V. Patel, MD, Scott and White Memorial Hospital, Temple, TX

7:14 am – 7:20 am **Preintervention Pain in Total Joint Arthroplasty: Do We Wait Until It's Intolerable?**

Carlos J. Lavernia, MD, FAAOS, Orthopaedic Institute at Mercy Hospital/Arthritis Surgery Research Foundation, Miami, FL

7:20 am – 7:26 am **Effect of Preoperative Intravenous Methocarbamol and Intravenous Acetaminophen on Opioid Use After Primary Total Hip and Knee Replacement**

Thomas D. Looke, MD, PhD, Winter Park Memorial Hospital, Winter Park, FL
*Presented by Cameron Kluth, MBA, M2

7:26 am – 7:36 am **Discussion**

General Session 1: Arthroplasty

Moderator: Paul F. Lachiewicz, MD

6:50 am – 6:56 am **Race and Outcome in Arthroplasty Surgery**
Jesus M. Villa, MD, Orthopaedic Institute at Mercy Hospital/Arthritis Surgery Research Foundation, Miami, FL

6:56 am – 7:02 am **SOA/OREF Resident Award Winner**
Preoperative Patient Education for Hip and Knee Arthroplasty: Financial Benefit?
Mark A. Tait, MD, St. Vincent Infirmary Medical, Little Rock, AR

7:02 am – 7:08 am **Mobile Compression Devices Are Efficacious for VTE Prophylaxis Following Total Joint Arthroplasty**
Ryan M. Nunley, MD, Washington University School of Medicine, St. Louis, MO

7:08 am – 7:14 am **Resident Travel Grant Award Winner**
Hemoglobin Trends After Primary Total Hip and Knee Arthroplasty: Are Daily Post-Operative Hemoglobin Phlebotomies Necessary?

General Session 2: Trauma

Moderator: Langdon A. Hartsock, MD

7:36 am – 7:42 am **Harley and Betty Baxter Resident Award Winner**
The Impact of Age on Reoperation Rates for Femoral Neck Fractures Treated with Percutaneous Pinning and Hemiarthroplasty
Joshua Griffin, MD, Scott and White Memorial Hospital, Temple, TX

7:42 am – 7:48 am **Resident Travel Grant Award Winner**
Split-Thickness Skin Grafts for Residual Limb Coverage and Preservation of Amputation Length
Elizabeth Polfer, MD, Walter Reed National Military Medical Center, Washington, DC

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

Thursday, July 18, 2013

(Presenters and times are subject to change.)
Disclosure Information is listed on pages 42-47.

7:48 am – 7:54 am **Resident Travel Grant Award Winner**
Radiation Exposure in the Level I Trauma Patient
Michael Gottschalk, MD, Emory University School of Medicine/Grady Hospital, Atlanta, GA

7:54 am – 8:00 am Ballistic Fractures of the Lower Extremity: A Review of Soft Tissue Complications from a Level I Trauma Center
James Black, MD, Emory University School of Medicine/Grady Memorial Hospital, Atlanta, GA

8:00 am – 8:10 am **Discussion**

8:10 am – 8:30 am **Break — Please visit exhibits and posters (Venetian Ballroom)**

Symposium 1: Common Orthopaedic Tumors — When to Treat, When to Refer

Moderator: Cynthia L. Emory, MD

8:30 am – 8:39 am Imaging Pearls in the Diagnosis of Orthopedic Tumors
H. Thomas Temple, MD, University of Miami Miller School of Medicine, Miami, FL

8:39 am – 8:48 am Soft Tissue Lumps and Bumps: How to Stay Out of Trouble
Sheila A. Conway, MD, University of Miami Miller School of Medicine, Miami, FL

8:48 am – 8:57 am Malignant and Benign Bone Tumors You Are Likely to Encounter
Corey Montgomery, MD, University of Arkansas, Fayetteville, AR

8:57 am – 9:06 am Medical-Legal Considerations in Managing Patients with Musculoskeletal Tumors
William G. Ward, MD, Guthrie Clinic, Sayre, PA

9:06 am – 9:15 am **Discussion**

General Session 3: OREF Report and Presidential Address

Moderator: Fred Flandry, MD, FACS

9:15 am – 9:20 am OREF Report
Ramon L. Jimenez, MD, Monterey, CA

9:20 am – 9:25 am Introduction of SOA President
Matthew J. Matava, MD, Washington University School of Medicine, Chesterfield, MO

9:25 am – 10:10 am **Presidential Address**
Orthopaedic Immortality
Fred Flandry, MD, FACS, Columbus, GA

10:10 am – 10:30 am **Break — Please visit exhibits and posters (Venetian Ballroom)**

Symposium 2: Fundamentals and Challenges in Revision Total Knee Arthroplasty

Moderator: C. Lowry Barnes, MD

10:30 am – 10:42 am Preoperative Planning
Paul Edwards, MD, St. Vincent's Institute/Arkansas Specialty Orthopaedics, Little Rock, AR

10:42 am – 10:54 am A Treatment Algorithm for the Painful Total Knee
Michael P. Bolognesi, MD, Duke University Medical Center, Durham, NC

10:54 am – 11:06 am Dealing with Segmental Bone Loss
James A. Browne, MD, University of Virginia, Charlottesville, VA

11:06 am – 11:18 am Periprosthetic Infection: An Evidence-Based Approach
C. Lowry Barnes, MD, St. Vincent's Institute/Arkansas Specialty Orthopaedics, Little Rock, AR

11:18 am – 11:30 am Discussion

11:30 am – 12:30 pm **Industry Sponsored Workshop Luncheon — Cadence Pharmaceuticals Inc. and ConvaTec**
*CME credit not available

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Thursday, July 18, 2013

(Presenters and times are subject to change.)
Disclosure Information is listed on pages 42-47.

General Session 4: Sports Medicine

Moderator: Allison P. Toth, MD

- 12:30 pm – 12:36 pm Precision and Accuracy of Identifying Anatomic Surface Landmarks Amongst 30 Expert Hip Arthroscopists
Jeffrey M. DeLong, BS, University of Pittsburgh, Pittsburgh, PA
- 12:36 pm – 12:42 pm Knot Strength Varies Widely Among Expert Arthroscopists
Bryan T. Hanypsiak, MD, Arthrex, Inc., Naples, FL
- 12:42 pm – 12:48 pm Micheli ACL Reconstruction in Prepubescent Youths: A Retrospective Outcomes Study
S. Clifton Willimon, MD, Children's Healthcare of Atlanta/Children's Orthopaedics of Atlanta, Atlanta, GA
- 12:48 pm – 12:54 pm Access to Outpatient Care for Adult Rotator Cuff Patients with Private Insurance Versus Medicaid
Brendan Mackinnon-Patterson, MD, MPH, University of North Carolina Hospital, Chapel Hill, NC
- 12:54 pm – 1:00 pm Analysis of Subjective and Objective Fatigue in Fast-Pitch Softball Pitchers During a Single Season
Justin S. Yang, MD, Washington University School of Medicine, St. Louis, MO
- 1:00 pm – 1:06 pm Preoperative Factors Associated with Post-Operative Outcomes Among Patellofemoral Stabilization and Realignment Patients
Jennifer S. Howard, PhD, University of Kentucky, Lexington, KY
**Presented by Nicholas A. Kenney, MD*

1:06 pm – 1:12 pm Early Detection of Movement Related Risk Factors for Second Knee Injuries in ACL Reconstruction Patients
Robin M. Queen, PhD, Duke University Medical Center, Durham, NC

1:12 pm – 1:18 pm A Predictive Model of Outcomes After Anterior Cruciate Ligament Reconstruction — What Graft and Technique for My Patient?
Jonathan A. Godin, MD, MBA, Duke University Medical Center, Durham, NC

1:18 pm – 1:30 pm **Discussion**

Instructional Course Lecture 1

Moderator: Andrew A. Shinar, MD

1:30 pm – 2:30 pm **Total Joint Arthroplasty and Common Fractures in the Elderly**
Richard C. Mather III, MD, Duke University Medical Center, Durham, NC
Langdon A. Hartsock, MD, Medical University of South Carolina, Charleston, SC

2:30 pm – 2:40 pm Discussion

2:40 pm – 3:40 pm **Scientific Poster Session**
(Magnolia Room)
Note: Presenters will be available to answer questions.

3:40 pm – 5:00 pm **Multimedia Education Session**
(Gulfstream 5)

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

Friday, July 19, 2013

(Presenters and times are subject to change.)
Disclosure Information is listed on pages 42-47.

6:00 am – 6:30 am Scientific Poster Session

(Magnolia Room)

Note: Presenters will be available to answer questions.

6:30 am

Announcements

Matthew J. Matava, MD, Program Chair

Tamara N. Huff, MD, Ochsner Clinic Foundation, New Orleans, LA

7:18 am – 7:24 am Do Patients Return to Work After Total Knee Arthroplasty?

Ryan M. Nunley, MD, Washington University School of Medicine, St. Louis, MO

General Session 5: Total Hip Arthroplasty

Moderator: Michael P. Bolognesi, MD

6:35 am – 6:41 am Total Joint Replacement in Patients Over 90 Years of Age is a Viable Option but Requires Risk Adjustment

James A. Browne, MD, University of Virginia, Charlottesville, VA

*Presented by Michele R. D'Apuzzo, MD

6:41 am – 6:47 am Performance of Highly Cross-Linked Polyethylene in Total Hip Arthroplasty in Young and Active Patients

Morteza Meftah, MD, Hospital for Special Surgery, New York, NY

6:47 am – 6:53 am WOMAC and the Cost-Utility of Total Hip Arthroplasty

David A. Iacobelli, MD, Orthopaedic Institute at Mercy Hospital/Arthritis Surgery Research Foundation, Miami, FL

6:53 am – 6:59 am Cementless THA Has Higher Incidence and Severity of Thigh Pain Than Surface Replacement

Ryan M. Nunley, MD, Washington University School of Medicine, St. Louis, MO

6:59 am – 7:12 am Discussion

General Session 6: Total Knee Arthroplasty

Moderator: C. Lowry Barnes, MD

7:12 am – 7:18 am Cost Analysis of Topical Tranexamic Acid Use in Reducing Perioperative Blood Loss in TKA

7:24 am – 7:30 am Gender Specific Design in TKR: Does It Matter?

Carlos J. Lavernia, MD, FAAOS, Orthopaedic Institute at Mercy Hospital/Arthritis Surgery Research Foundation, Miami, FL

7:30 am – 7:36 am Does CTPA Lead to Overdiagnosis of PE and Subject Patients to Iatrogenic Harm Following Total Joint Arthroplasty?

James A. Browne, MD, University of Virginia, Charlottesville, VA

7:36 am – 7:42 am 12 Year Survival and Osteolysis with a Modern Posterior-Stabilized Total Knee Arthroplasty

Paul F. Lachiewicz, MD, Chapel Hill Orthopedic Surgery & Sports Medicine, Chapel Hill, NC

7:42 am – 7:48 am Assessment of Particle Induced Reactive Synovitis in Fixed and Mobile Bearing M Posterior-Stabilized Designs: A 10-Year Prospective Matched-Pair MRI Study

Morteza Meftah, MD, Hospital for Special Surgery, New York, NY

7:48 am – 8:05 am Discussion

8:05 am – 8:25 am Break — Please visit exhibits and posters (Venetian Ballroom)

Symposium 3: Update on Orthopaedic Trauma: Getting Through the Night

Moderator: Andrew N. Pollak, MD

8:25 am – 8:35 am Principles of Damage Control Orthopedics

Andrew N. Pollak, MD, University of Maryland Medical Center, Baltimore, MD

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

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- 8:35 am – 8:45 am Treatment of Open Fractures: Is Time of the Essence?
Andrew N. Pollak, MD, University of Maryland Medical Center, Baltimore, MD
- 8:45 am – 8:55 am Displaced Femoral Neck Fractures in Young Adults
Langdon A. Hartsock, MD, Medical University of South Carolina, Charleston, SC
- 8:55 am – 9:05 am Supracondylar Humerus Fractures in Children
Joshua M. Abzug, MD, University of Maryland School of Medicine, Baltimore, MD
- 9:05 am – 9:15 am **Discussion**

General Session 7: Distinguished Southern Orthopaedist and AAOS Report

Moderator: Fred Flandry, MD, FACS

- 9:15 am – 9:20 am Introduction of Distinguished Southern Orthopaedist
Fred Flandry, MD, FACS, Columbus, GA
- 9:20 am – 10:00 am **Distinguished Southern Orthopaedist Sports Medicine and Success**
James R. Andrews, MD, The Andrews Institute, Gulf Breeze, FL
- 10:00 am – 10:10 am AAOS Report
Joshua J. Jacobs, MD, President, American Academy of Orthopaedic Surgeons, Rush University Medical Center, Chicago, IL
- 10:10 am – 10:30 am **Break — Please visit exhibits and posters (Venetian Ballroom)**

Symposium 4: Current Concepts in the Young Adult Hip

Moderator: Ryan M. Nunley, MD

- 10:30 am – 10:40 am Imaging Studies in the Evaluation of Hip Disorders in the Young Adult
Richard C. Mather III, MD, Duke University Medical Center, Durham, NC
- 10:40 am – 10:50 am Hip Arthroscopy in 2013: Femoroacetabular Impingement and Labral Repair: Indications, Techniques, and Outcomes
J. W. Thomas Byrd, MD, Nashville Sports Medicine and Orthopaedic Center, Nashville, TN
- 10:50 am – 11:00 am Osteotomies of the Hip
Steven A. Olson, MD, Duke University Medical Center, Durham, NC
- 11:00 am – 11:10 am Hip Resurfacing vs. Hip Replacement in the Young Adult
Ryan M. Nunley, MD, Washington University School of Medicine, St. Louis, MO
- 11:10 am – 11:20 am **Discussion**
- 11:20 am – 12:20 pm **Special Educational Luncheon Presentation**
The History of Arthroscopic Surgery Product Development
Reinhold Schmieding, Founder & President, Arthrex, Inc.
*CME credit not available
- General Session 8: Upper Extremity**
- Moderator:** L. Andrew Koman, MD
- 12:20 pm – 12:26 pm Use of Photography on Patient Rehabilitation After Shoulder Manipulation Under Anesthesia
Jared A. Brummel, DO, The Hughston Clinic, Columbus, GA

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

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Disclosure Information is listed on pages 42-47.

12:26 pm – 12:32 pm	SOA/OREF Resident Award Winner A Biomechanical Comparison Between All-Arthroscopic Knotless and Outside-In/Triangular Fibrocartilage Complex Repairs <i>Mihir J. Desai, MD, Emory University School of Medicine, Atlanta, GA</i>	1:02 pm – 1:08 pm	Treatment Outcomes of Acute Middle Third Clavicle Fractures Following Fixation with a 2.7 mm DC Plate: A Retrospective Analysis <i>John A. Tanksley, MD, Greenville Hospital System, Greenville, SC</i>
12:32 pm – 12:38 pm	Biomechanical Comparison of Screw Trajectory to Fracture Pattern for Unstable Scaphoid Fractures <i>Gregory Faucher, MD, Emory University School of Medicine, Atlanta, GA</i>	1:08 pm – 1:14 pm	Outcomes of Biceps Tenodesis in an Active Duty Population <i>Jeremy M. Jacobs, MD, Dwight D. Eisenhower Army Medical Center, Fort Gordon, GA</i>
12:38 pm – 12:44 pm	The Effect of Age on Patient Satisfaction After Arthroscopic Rotator Cuff Repair <i>Clay G. Nelson, BS, Jordan Young Institute, Virginia Beach, VA</i>	1:14 pm – 1:20 pm	Discussion
12:44 pm – 12:50 pm	A Positive Tangent Sign Predicts the Repairability of Rotator Cuff Tears <i>Michael J. Kissenberth, MD, Steadman Hawkins Clinic of the Carolinas/Greenville Hospital System, Greenville, SC</i>	Instructional Course Lecture 2 Moderator: Samuel I. Brown, MD	
12:50 pm – 12:56 pm	Outcomes of Ulnar Shortening Osteotomy for the Treatment of Ulnar-Sided Wrist Pain <i>Ryan Mitchell, MD, University of South Alabama, Mobile, AL</i>	1:20 pm – 2:40 pm	Foot & Ankle Review and Tumor Update <i>James A. Nunley II, MD, Duke University Medical Center, Durham, NC</i> <i>Cynthia L. Emory, MD, University of Maryland Medical Center, Baltimore, MD</i>
12:56 pm – 1:02 pm	Locked Intramedullary Total Wrist Arthrodesis <i>Jorge L. Orbay, MD, The Miami Hand and Upper Extremity Institute, Miami, FL</i>	2:40 pm – 2:50 pm	Discussion
		2:50 pm – 3:50 pm	Scientific Poster Session (Magnolia Room) Note: Presenters will be available to answer questions.
		3:50 pm – 5:00 pm	Multimedia Education Session (Gulfstream 5)

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

Saturday, July 20, 2013

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6:00 am – 6:30 am **Scientific Poster Session**

(Magnolia Room)

Note: Presenters will be available to answer questions.

6:30 am

Announcements

Matthew J. Matava, MD, Program Chair

Rebecca C. Whitesell, MD, University of Alabama Birmingham, Birmingham, AL

7:11 am – 7:17 am

Presidents' Resident Award Winner

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

General Session 9: General Orthopaedics/Foot & Ankle

Moderator: Ana. K. Palmieri, MD

6:35 am – 6:41 am Surgical Site Infection: A Comparison of Multispecialty and Single Specialty Outpatient Facilities

Michael Gottschalk, MD, Emory University School of Medicine/Grady Hospital, Atlanta, GA

6:41 am – 6:47 am The Relationship Between Residency Selection Criteria and Subsequent Performance in an Orthopaedic Surgery Residency

Amit Sood, MD, UMDNJ-New Jersey Medical School, Newark, NJ

6:47 am – 6:53 am Intraoperative Monitoring of Epiphyseal Perfusion in Slipped Capital Femoral Epiphysis

Christopher R. Jones, MD, Children's Healthcare of Atlanta, Atlanta, GA

6:53 am – 6:59 am Prognosticators of Local Recurrence in High-Grade Soft Tissue Sarcomas: Hydrogen Peroxide as a Local Adjuvant

Adam N. Wooldridge, MD, MPH, The Wexner Medical Center/Ohio State University, Columbus, OH

6:59 am – 7:05 am Muscle Viability Revisited: Are We Removing Normal Muscle? A Critical Evaluation of Dogmatic Debridement

Adam Sassoon, MD, MS, Orlando Regional Medical Center, Orlando, FL

7:05 am – 7:11 am Fracture Displacement Following Initial Radiographs of Mid-Shaft Clavicle Fractures Changes Treatment Recommendation

7:17 am – 7:23 am

Early to Mid-Term Outcomes of Fixed-Bearing Total Ankle Using a Modular Intramedullary Tibial Component

Samuel B. Adams Jr., MD, Duke University Medical Center, Durham, NC
*Presented by Robin M. Queen, PhD

7:23 am – 7:29 am

Allograft Reconstruction of Irreparable Peroneal Tendon Tears
William R. Mook, MD, Duke University Medical Center, Durham, NC

7:29 am – 7:40 am

Discussion

Symposium 5: Current Concepts in Sports Injuries Case Presentations

Moderator: Mark E. Easley, MD

7:40 am – 7:50 am

5th MT Fractures and Lisfranc Fracture-Dislocation
James A. Nunley II, MD, Duke University Medical Center, Durham, NC

7:50 am – 8:00 am

Achilles Tendon Rupture and Syndesmotic Injury
Ned Amendola, MD, University of Iowa, Iowa City, IA

8:00 am – 8:10 am

Ankle Instability, Both Lateral and Medial Ligament Injury and Navicular Fracture
Beat Hintermann, MD, Orthopaedic Clinic at Kantonsspital, Liestal, Switzerland

8:10 am – 8:20 am

Talar Process Injuries and Osteochondral Lesions of the Talus
Mark E. Easley, MD, Duke University Medical Center, Durham, NC

8:20 am – 8:30 am

Discussion

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

Saturday, July 20, 2013

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Disclosure Information is listed on pages 42-47.

General Session 10: Arthroplasty

Moderator: Andrew A. Shinar, MD

- 8:30 am – 8:36 am Fixation, Survival and Dislocation of Jumbo Acetabular Components in Revision Hip Arthroplasty
Paul F. Lachiewicz, MD, Chapel Hill Orthopedics Surgery & Sports Medicine, Chapel Hill, NC
- 8:36 am – 8:42 am Impact of Socioeconomic Factors on Results of Total Knee Arthroplasty
Ryan M. Nunley, MD, Washington University School of Medicine, St. Louis, MO
- 8:42 am – 8:48 am Correlation of Economic Factors and Outcomes in Total Knee Arthroplasty
Carlos J. Lavernia, MD, FAAOS, Orthopaedic Institute at Mercy Hospital/Arthritis Surgery Research Foundation, Miami, FL
- 8:48 am – 8:54 am Quantifying the Cost-Effectiveness of All-Polyethylene Tibial Components in Total Knee Arthroplasty
James A. Browne, MD, University of Virginia, Charlottesville, VA
- 8:54 am – 9:00 am **Resident Travel Grant Award Winner**
Infection Rate in Total Knee Arthroplasty in “High Risk” Patients Using Antibiotic Bone Cement: Preliminary Results
Rabah Qadir, MD, Ochsner Clinic Foundation, New Orleans, LA
- 9:00 am – 9:06 am Direct Anterior Approach vs. Posterior Approach in Restoring Leg-Length and Offset in Primary Total Hip Arthroplasty
Michael D. Smith, MD, Emory University School of Medicine, Atlanta, GA
- 9:06 am – 9:12 am Tritanium Jumbo Cups in Revision Total Hip Arthroplasty with Major Acetabular Defects: A New Look

Morteza Meftah, MD, Hospital for Special Surgery, New York, NY
**Presented by Chitranjan S. Ranawat, MD*

- 9:12 am – 9:18 am Dynamic Balance Differences Between Isolated TKA Patients and Patients with Multiple Arthroplasties One Year Following TKA
Robin M. Queen, PhD, Duke University Medical Center, Durham, NC
- 9:18 am – 9:24 am Static Balance Differences One Year Following a Single Joint Arthroplasty Compared to Patients Following Multiple Joint Arthroplasties
Robert J. Butler, DPT, PhD, Duke University Medical Center, Durham, NC
- 9:24 am – 9:35 am **Discussion**
- 9:35 am – 10:00 am **Break — Please visit exhibits and posters (Venetian Ballroom)**

General Session 11: Presidential Guest Speaker

Moderator: Fred Flandry, MD, FACS

- 10:00 am – 10:05 am Introduction of Presidential Guest Speaker
Fred Flandry, MD, FACS, Columbus, GA
- 10:05 am – 10:45 am **Presidential Guest Speaker Presentation**
Health Care Reform: A Current Perspective
Congressman Thomas Price, MD, Atlanta, GA
- 10:45 am – 10:55 am **Break (Venetian Ballroom)**

General Session 12: Sports Medicine/Trauma

Moderator: Claude T. Moorman III, MD

- 10:55 am – 11:01 am Functional Deficits Remain from 6 to 12 Months Following ACL Surgery
Robert J. Butler, DPT, PhD, Duke University Medical Center, Durham, NC

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

Saturday, July 20, 2013

(Presenters and times are subject to change.)
Disclosure Information is listed on pages 42-47.

- 11:01 am – 11:07 am Elbow Extension ROM Loss is Protective of Injury in Youth Baseball Pitchers
Michael J. Kissenberth, MD, Steadman Hawkins Clinic of the Carolinas/Greenville Hospital System, Greenville, SC
- 11:07 am – 11:13 am Effect of Pitching Restrictions and Mound Distance on Youth Baseball Pitch Counts
Nicholas Kenney, MD, University of Kentucky, Lexington, KY
- 11:13 am – 11:19 am Treatment of Isolated Posterior Malleolus Fractures
Shahin Sheibani-Rad, MD, Mclare-Flint/Michigan State University, East Lansing, MI
**Presented by Paul M. Charpentier, MD*
- 11:19 am – 11:25 am **Harley and Betty Baxter Resident Award Winner**
Open Femoral Shaft Fractures: A Difficult Problem in Capable Hands
Adam Sassoon, MD, MS, Orlando Regional Medical Center, Orlando, FL
- 11:25 am – 11:31 am Factors Affecting Spanning — Knee External Fixator Stiffness: A Biomechanical Study
Mihir J. Desai, MD, Emory University School of Medicine, Atlanta, GA
- 11:31 am – 11:37 am Failure of Cephalomedullary Fixation for Low-Energy Basicervical Fractures of the Proximal Femur: A Case Series
Scott Watson, MD, Greenville Hospital System, Greenville, SC
- 11:37 am – 11:47 am **Discussion**

General Session 13: Spine

Moderator: John J. McGraw, MD

- 11:47 am – 11:53 am What Is the Best Construct for Fusion Across the Cervicothoracic Joint?
Justin S. Yang, MD, Washington University School of Medicine, St. Louis, MO
- 11:53 am – 11:59 am Cervical Posterior Foraminotomy's Effect on Segmental Range of Motion in the Setting of Total Disc Arthroplasty
Adam J. Bevevino, MD, Walter Reed National Military Medical Center, Washington, DC
**Presented by John P. Cody, MD*
- 11:59 am – 12:05 pm Outcomes Following Cervical Disc Arthroplasty
Robert Tracey, MD, Walter Reed National Military Medical Center, Bethesda, MD
**Presented by John P. Cody, MD*
- 12:05 pm – 12:11 pm Does Spanning the Ring Apophysis Affect Lateral Lumbar Interbody Fusion Rates? A Preliminary Report
Bradford S. Waddell, MD, Ochsner Clinic, New Orleans, LA
- 12:11 pm – 12:17 pm A Less Invasive Transforaminal Approach to Lumbar Interbody Fusion
Jeffrey L. Katzell, MD, Lake Worth, FL
- 12:17 pm – 12:23 pm The Local Application of Vancomycin for the Prevention of Lumbar Spine Wound Infection
Radek Hart, Prof, MD, PhD, FRCS, General Hospital, Znojmo, Czech Republic

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

Saturday, July 20, 2013

(Presenters and times are subject to change.)
Disclosure Information is listed on pages 42-47.

12:23 pm – 12:29 pm **SOA/OREF Resident Award Winner**
Pulmonary Function Following Adult Spinal Deformity Surgery: Minimum Two Year Follow-Up
Robert Tracey, MD, Walter Reed National Military Medical Center, Bethesda, MD

12:29 pm – 12:35 pm Analysis of Postoperative Pain Reduction as a Function of Comorbidities in Elderly Patients
David Eidelson, BA, South Palm Orthospine Institute, Delray Beach, FL

12:35 pm – 12:45 pm **Discussion**

12:45 pm – 1:00 pm **Second Business Meeting**

1:00 pm – 1:20 pm **Lunch Break**

Instructional Course Lecture 3

Moderator: Claude T. Moorman III, MD

1:20 pm – 2:20 pm **Common Sports Medicine Issues**
Darren L. Johnson, MD, University of Kentucky Sports Medicine, Lexington, KY

2:20 pm – 2:30 pm Discussion

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

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

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

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2013 Scientific Program Abstracts — Thursday Mediterranean Ballroom

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

Thursday, July 18, 2013

General Session 1: Arthroplasty

Moderator: Paul F. Lachiewicz, MD

6:50 am – 6:56 am

Race and Outcome in Arthroplasty Surgery

Jesus M. Villa, MD
Carlos J. Lavernia, MD, FAAOS
David A. Iacobelli, MD

Introduction: Numerous articles have been written on racial disparities in health care. In arthroplasty surgery several small series have suggested worse outcomes in African Americans (AA). Our objective was to study the effects of race in a large case-series of arthroplasties.

Methods: A consecutive series of 2,435 total knee/hip replacements performed in a single hospital by a single surgeon was studied. To identify cases, a joint registry was utilized. Revisions due to infections were excluded. We compared the characteristics of AA vs. Whites on preoperative Charlson, ASA; length of stay (LOS), transfusion rate, discharge disposition (home vs. facility); preoperative and postoperative pain intensity measured by visual analogue scale (VAS), QWB-7, SF-36, WOMAC, Hip Harris and Hip Postel-D'Aubigne, HSS Knee score, and Knee Society Knee Score and Function Score (KSKS and KSFS). Mean age was 69.7 years. T-tests were used for continuous data and Chi-Square tests for categorical data, p-value of less than 0.05 was considered significant.

Results: Compared to Whites, AAs were significantly younger (70 vs. 64 years). Nevertheless, their preoperative VAS pain intensity (7.7 vs. 8.1); QWB-7 total (0.530 vs. 0.520); SF-36 pain (36.4 vs. 32.6), social (42.8 vs. 34.6), and physical component summary (25.7 vs. 23.5); WOMAC total (51.7 vs. 57.2); KSKS (50.1 vs. 42.7); KSFS (37.1 vs.

31.7); HSS Knee score (60.4 vs. 54.6) were significantly worse. Further, AA inpatient transfusion rate was significantly higher (28% vs. 42%). Postoperatively, AA had significantly worse SF-36 pain (69 vs. 60) and worse KSFS (59.2 vs. 49.3); WOMAC function (4.4 vs. 9.6), pain (0.8 vs. 1.9), stiffness (0.19 vs. 0.84), and total scores (5.4 vs. 12.3).

Discussion and Conclusion: We found that African-Americans underwent surgery at an early age when compared to Whites. They came to surgery later in the disease stage and had worse outcomes. Interventions need to be designed to avoid this.

Notes:

SOA/OREF Resident Award Winner

6:56 am – 7:02 am

Preoperative Patient Education for Hip and Knee Arthroplasty: Financial Benefit?

Mark A. Tait, MD
Carter L. Dredge, MD
C. Lowry Barnes, MD

Introduction: Total knee and hip arthroplasty is a commonly performed surgical procedure. As the population ages the numbers of these procedures are predicted to increase. Maximizing patient outcomes and decreasing healthcare delivery costs will be essential to creating a higher value U.S. healthcare system. The purpose of our study was to analyze the effect of a multidisciplinary preoperative education program (Joint Academy) on various outcomes that effect overall cost of primary hip and knee arthroplasty.

Methods: A retrospective review of 904 patients' charts that underwent primary total hip and knee arthroplasty from October 1, 2010 to September 31, 2011 at a single institution was performed. We then compared 102 patients who did not have preoperative education to 802 patients who did have preoperative education through the Joint Academy (JA). We looked at patient length of stay (LOS), discharge disposition, and internal hospital cost. Linear regression was performed on all data to look for statistical significance.

Results: We found that those patients that participated in JA had a length of stay that was 2.12 days less than those that did not participate in the Joint Academy. We also found that in the JA group, patients were 62% more likely to be discharged to home versus patients in the non-JA group. We also found that the JA group had lower internal hospital costs; with the JA group on average costing \$1,493 less than the non-JA group. All referenced findings were statistically significant.

Discussion and Conclusions: The Joint Academy decreased patient length of stay, improved their chances of discharge to home, and decreased internal hospital costs. Multidisciplinary preoperative patient education may provide a cost efficient means to reduce overall healthcare cost and improve a patient's ability to return home more quickly.

Notes:

7:02 am – 7:08 am

Mobile Compression Devices Are Efficacious for VTE Prophylaxis Following Total Joint Arthroplasty

Ryan M. Nunley, MD
Robert L. Barrack, MD
John C. Clohisy, MD
James A. Keeney, MD
Staci R. Johnson, MEd
Douglas J. McDonald, MD

Introduction: Venous thromboembolic events (VTE) are the most common complication following total joint replacements. Recent literature shows use of a mobile compression

device (MCD) is effective for VTE prevention, but efficacy is dependent on patient compliance. The purpose was to prospectively assess patient compliance with prescribed use of an MCD for VTE prophylaxis.

Methods: Adults undergoing elective primary or revision knee/hip arthroplasty were prospectively enrolled. Patients were ineligible if they had prior surgery within three months, current deep vein thrombosis, history of pulmonary embolism, on chronic anticoagulation, or required prolonged immobilization postoperatively. Patients were stratified to standard or high risk anticoagulation therapy by hospital protocol. Standard risk patients were instructed to wear an MCD 23 hours/day for 10 days post-operatively. Compliance was measured two ways: objectively from the MCD hard drive which records usage and patient reported compliance two weeks post-operatively.

Results: 747 joint replacements were enrolled (263 knees/484 hips). Four patients were missing compliance data due to malfunction/loss of MCD. Average daily use was 83% (19.92 hours). Patient compliance rates based on hourly usage were: 1.5% (11) used the device < 12 hours/day (considered noncompliant); 14% (104) used the MCD > 12 but < 18 hours/day (considered somewhat compliant); 84.5% (628) used the device = 18 hours/day (considered compliant). There was no difference in compliance based on gender or primary/revision surgery. Hip replacement patients were more compliant than knee replacement patients. 655 patients completed two week follow-up; 96% (629) reported compliance. Patient-reported compliance was higher than compliance captured on the MCD. Incidence of VTE was very low (n=3; 0.4%). All 3 patients who experienced a VTE were compliant.

Discussion and Conclusion: Use of an MCD is excellent for VTE prophylaxis in primary and revision total joint arthroplasty, and is associated with high efficacy and patient compliance.

Notes:

Resident Travel Grant Award Winner

7:08 am – 7:14 am

Hemoglobin Trends After Primary Total Hip and Knee Arthroplasty: Are Daily Post-Operative Hemoglobin Phlebotomies Necessary?

Kushal V. Patel, MD
Bryce Allen, MD
Daniel C. Jupiter, PhD
Lindsey Richards
Jeffery Knabe, MD

Introduction: Common practice is daily post-operative hemoglobin level evaluation in patients undergoing primary total arthroplasty of hip (THA) and knee (TKA). Frequently, no specific action is taken secondary to these lab results. Our study examined post-operative hemoglobin trends in primary joint arthroplasty patients. We hypothesize that post-operative hemoglobin values do not drop significantly enough to warrant daily phlebotomy in many patients and thereby, improve patient satisfaction and reduce costs.

Methods: Retrospective review of patients who underwent primary THA and TKA from 2009 to 2011. Data collected included laterality, age, gender, intra-operative estimated blood loss, body mass index, pre-operative hemoglobin level, and post-operative hemoglobin level 0-8, 8-24, 24-48, and 48 – 72 hours post-operative. Patients who underwent conversion to total joint arthroplasty were excluded.

Results: One thousand nine hundred and twenty-nine patients (497 (25.7%) THA and 1433 (74.3%) TKA) were included. Bilateral TKA accounted for 227 of 1433 TKA patients. Mean absolute drop in hemoglobin from pre-operative levels at 0-8, 8-24, 24-48 and 48-72 hours post-operative were, for unilateral TKA patients, -1.8 ± 0.9 , -2.4 ± 1.0 , -3.2 ± 1.1 , and -3.5 ± 1.2 ; for bilateral TKA patients, -2.4 ± 0.8 , -2.8 ± 1.2 , -3.9 ± 1.2 , and -4.4 ± 1.5 ; and for THA patients, -2.4 ± 1.0 , -2.81 ± 1.0 , -3.5 ± 1.1 , and -4.1 ± 1.8 . In THA patients at 24 hours post-operative 173 (34.8%), 72 (14.5%), and 29 (5.8%) patients had hemoglobin values below 10.0, 9.0, and 8.0, respectively. Corresponding numbers in TKA patients were 320 (22.3%), 92 (6.4%), and 17 (1.2%) patients.

Discussion and Conclusion: With projected rises in elective primary THA and TKA and greater focus on cost and patient satisfaction, daily phlebotomy for hemoglobin values is a

potential area of improvement. Our study provides trends in hemoglobin after THA and TKA and questions whether examination of daily hemoglobin values is necessary. In the appropriately selected patient, phlebotomy draws to examine hemoglobin can be forgone especially in the early post-operative period.

Notes:

7:14 am – 7:20 am

Preintervention Pain in Total Joint Arthroplasty: Do We Wait Until It's Intolerable?

Carlos J. Lavernia, MD, FAAOS
Larry Brooks, PhD
David A. Iacobelli, MD
Jesus M. Villa, MD

Introduction: Pain is usually the primary driver on the patient's decision to undergo total joint arthroplasty (TJA). Preintervention pain levels have received some attention in the outcome literature. Our objective is to assess the presurgical pain level on the outcome of TJA.

Methods: A consecutive series of 640 total joint replacement patients were interviewed prior to surgery and at minimum 2 years following surgery. Statistical analyses were conducted to examine the effect of premorbid pain and other patient characteristics on outcomes (WOMAC, SF-36, and QWB). A high pain (n = 248) and low pain (n = 267) group were determined by a median split of premorbid WOMAC pain scores. Additionally, a stepwise regression analyses was used to determine whether premorbid WOMAC pain scores predicted follow-up WOMAC function score when controlling for key demographic and clinical variables. A p-value of less than 0.001 was considered significant.

Results: After surgery, subjects with very high premorbid pain had significantly worse outcomes than non distressed subjects for Quality of Well Being-7, SF-36 Bodily Pain Score, SF-36 Physical Functioning, WOMAC Pain, and WOMAC Stiffness. Stepwise regression analyses found that age at follow-up, time since procedure, and baseline WOMAC pain scores significantly predicted follow-up WOMAC func-

tion scores. The premorbid WOMAC pain score was the strongest predictor of outcome.

Discussion and Conclusion: Preintervention pain significantly influences patient-reported outcomes after TJA. This suggests that waiting until a patient experiences extremes levels of pain before operating may lead to worse outcomes.

Notes:

7:20 am – 7:26 am

Effect of Preoperative Intravenous Methocarbamol and Intravenous Acetaminophen on Opioid Use After Primary Total Hip and Knee Replacement

Thomas D. Looke, MD, PhD

*Cameron Kluth, MBA, M2

Introduction: Between 2010 and 2011, a perioperative pain protocol for primary total hip and knee replacement at one Florida medical center replaced preoperative oral analgesics with intravenous methocarbamol and intravenous acetaminophen.

Method: This is a retrospective cohort study of 300 patients, with 150 patients using the new pain protocol and 150 patients using a 2008 pain protocol that did not include these medications.

Results: The 2 cohorts were similar in patient gender, age, and body mass index (BMI) but there were a greater number of American Society of Anesthesiology physical status 3 patients in the 2008 group. Opioid consumption, the primary outcome variable, was evaluated for a period of 48 hours after incision and was divided into 3 separate time intervals: operating room, postanesthesia care unit (PACU), and hospital floor, as well as total 48-hour consumption. All opioids were converted to hydromorphone milligram equivalents. Mean opiate use decreased significantly from 2008 to 2011 in all time intervals and total consumption (7.5 ± 3.4 mg to 6.1 ± 3.0 mg). Subgroup analysis suggested that changes to the hip protocol were responsible for decreased opioid use in the operating room and PACU, and changes to the knee protocol were responsible for decreased opioid use on the hospital floor and total consumption. The difference between the 2 protocol

groups was not due to differences in individual surgeon practice patterns. For secondary outcome variables, VAS pain scores increased from 2008 to 2011 (4.9 ± 1.0 to 5.5 ± 1.2), but the time to first opioid rescue and discharge time from PACU were unchanged. Physical therapy progress of knee flexion, average walking distance, and maximum walking distance were significantly improved. Hospital discharge was shorter in the 2011 group (4.0 ± 1.1 days in 2008 group and 3.6 ± 1.0 days in 2011 group).

Discussion: This study shows significant improvement in patient care from 2008 to 2011 that is at least partially due to the change to the use of preoperative intravenous methocarbamol and intravenous acetaminophen.

Conclusion: Based on these findings, a prospective randomized control trial is planned to determine if further improvement can be obtained with the postoperative use of these 2 intravenous medications.

Notes:

Thursday, July 18, 2013

General Session 2: Trauma

Moderator: Langdon A. Hartsock, MD

Harley and Betty Baxter Resident Award Winner

7:36 am – 7:42 am

The Impact of Age on Reoperation Rates for Femoral Neck Fractures Treated with Percutaneous Pinning and Hemiarthroplasty

Joshua S. Griffin, MD

Donavan K. Murphy, MD

Michael L. Brennan, MD

Kindyle L. Brennan, PhD

Daniel C. Jupiter, PhD

Introduction: As the prevalence of hip fractures continues to increase, the preferred method of surgical intervention for

femoral neck fractures (FNF) based on age remains a topic of debate. The primary aim of the study was to assess the effect of age on reoperation rates following FNF treated with closed reduction percutaneous pinning (CRPP) and hemiarthroplasty (HA).

Methods: A retrospective comparative study was performed at a level 1 trauma center at which electronic medical records and digital radiographs were reviewed for 949 FNF with minimum 2 year follow up. Age groups of 60-69, 70-79, and greater than or equal to 80 (octogenarians) were created within nondisplaced FNF treated with CRPP and displaced FNF treated with HA. For the primary outcome of reoperation based on age, Kaplan-Meier models were built and analysis applied.

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

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

Notes:

Resident Travel Grant Award Winner

7:42 am – 7:48 am

Split-Thickness Skin Grafts for Residual Limb Coverage and Preservation of Amputation Length

Elizabeth Polfer, MD
Scott Tintle, MD
Jonathan A. Forsberg, MD
Benjamin K. Potter, MD

Introduction: Historically, surgeons have gone to great measures to preserve length in amputations yet the threshold at which length preservation becomes deleterious to patient function remains unclear. When primary closure is not feasible, split-thickness skin grafting (STSG) can be performed to achieve soft tissue coverage while preserving residual limb length but there are concerns regarding durability and complication rates. We hypothesized that amputations with STSG would be associated with an increased rate of wound complications and reoperations as well as an increased rate of heterotopic ossification (HO) requiring excision, however the STSG would ultimately facilitate length and level preservation as anticipated.

Methods: We performed a retrospective review of 300 consecutive lower extremity and 100 consecutive upper extremity amputations treated at our facility from 2003 – 2009 comparing patients treated with STSG (study cohort) to those treated with delayed primary closure (controls). Principle outcomes measured included early (wound failure) and late (HO requiring excision and soft tissue revisions) complications requiring operative treatment.

Results: Statically significant differences were seen, with the STSG group having an increased incidence of wound failure, HO requiring excision, and soft tissue revisions. The risks of revision were higher for lower than upper extremity amputations undergoing STSG. However, amputation level salvage was successful for all residual limbs with STSG.

Discussion/Conclusion: STSG for closure of amputations results in significantly increased reoperation rates, but is ultimately successful in salvaging residual limb length and amputation levels. STSG in the carefully selected patients may be successful means of achieving definitive coverage when performed over robust, healthy muscle. In many patients, however, STSG should be viewed as a staging procedure in order

to maintain length and amputation level until swelling decreases and revision surgery for STSG excision with or without concurrent procedures can be performed without the need to substantially shorten the residual limb.

Notes:

Resident Travel Grant Award Winner

7:48 am – 7:54 am

Radiation Exposure in the Level I Trauma Patient

Michael Gottschalk, MD
Laura Bellaire, BS
Thomas J. Moore, MD
Adewumi Adekunle, BS

Introduction: Computed tomography (CT) has become an increasingly popular and powerful tool for clinicians managing trauma patients with life-threatening injuries, but the ramifications of increasing radiation burden on individual patients are not insignificant.

Methods: A continuous series of 337 young patients admitted to a Level 1 trauma center during a 4-month period ranging from October 2011 through January 2012 were included in the study. Primary outcome measures included: number of scans, effective dose of radiation from radiographs and CT's individually, and total effective dose of radiation from both sources over the entire hospital stay.

Results: 337 trauma patients less than 40 years old were included in this study. Several variables proved to be predictors of greater total radiation exposure. Each incremental increase in hospital length of stay (LOS) led to a greater total radiation exposure (3.3 ± 8.5 mSv amongst patients staying 0 nights up to 33.6 ± 40.3 mSv for 10+ night stays). Initial Glasgow Coma Scale (GCS) score showed significant predictive value, with patients with intermediate scores experiencing highest radiation levels. Injury Severity Scores ≥ 16 predicted greater radiation exposure (27.4 ± 33.1 vs 8.9 ± 15.5 mSv). Blunt trauma victims were more prone to higher levels of radiation than those with penetrating or combined penetrating/blunt trauma. Loca-

tion and mechanism of injury and were also found to correlate with radiation exposure.

Discussion/Conclusion: Trauma patients as a group are exposed to high levels of radiation from plain radiographs and CT's. CT's contribute a very high proportion ($91.3 \pm 11.7\%$) of that radiation. Certain subgroups of patients are at a particularly high risk of exposure, and greater attention to cumulative radiation dose should be paid to patients with the above mentioned risk factors. In the future, efforts should be made to utilize imaging modalities that minimize harmful ionizing radiation.

Notes:

7:54 am – 8:00 am

Ballistic Fractures of the Lower Extremity: A Review of Soft Tissue Complications from a Level I Trauma Center

James Black, MD
Thomas J. Moore, MD
Michael C. Yonz, MD
Whitney A. Barnes, BA, MPH
Laura Bellaire, BS

Introduction: Limited data exists to help orthopaedic surgeons correlate specific fracture locations with complications including compartment syndrome, vascular injury and infection. This study aims to predict which ballistic fractures to the lower extremity are at high risk for developing these complications.

Methods: A retrospective review at an urban, level I trauma center from 2006 to 2011 was conducted. A total of 488 lower extremity ballistic fractures in 418 patients were identified through the hospital trauma registry. All available medical records were reviewed. Documented cases of compartment syndrome, vascular injury, and infection were included in the study. Statistical analysis was performed using available software.

Results: Fifty-three (10.9%) of the 488 fractures developed compartment syndrome. All fibula fractures have a statistically significant increased rate of compartment syndrome

over all ballistic fractures. Forty-nine (10%) fractures are associated with a vascular injury. Proximal third fibula fractures have a significantly increased rate of associated vascular injury. Fifty-four (11.2%) fractures developed an infection. Fractures of the middle to distal third of the tibia and fibula have significantly increased rates of infection. Two-tailed fischer exact tests demonstrate a significant correlation between vascular injury and compartment syndrome, compartment syndrome and infection and vascular injury and infection.

Discussion and Conclusion: Ballistic fractures of the fibula are at an increased risk for compartment syndrome and vascular injury. Ballistic fractures of the middle to distal third of the tibia and fibula are at increased risk of developing an infection. The presence of a vascular injury is associated with a compartment syndrome, and both compartment syndrome and vascular injury are at an increased risk of developing an infection. The treating orthopaedic surgeon should account for these results when evaluating and treating patients with ballistic injuries to the lower extremity to prevent potential complications.

Notes:

Thursday, July 18, 2013

General Session 4: Sports Medicine

Moderator: Allison P. Toth, MD

12:30 pm – 12:36 pm

Precision and Accuracy of Identifying Anatomic Surface Landmarks Amongst 30 Expert Hip Arthroscopists

Jeffrey M. DeLong, BS
Bryan T. Hanypsiak, MD
Misty Suri, MD
John Christoforetti, MD

Introduction: Anatomic surface landmarks around the hip and lower abdomen are frequently referenced for placement of arthroscopic portals and office based injections. It is currently unknown to what degree surgeons are capable

of reproducibly identifying these landmarks. This study evaluates the ability of 30 independent expert hip arthroscopists to identify common surface landmarks used in the hip specialty practice by comparing examiner applied landmark tags with ultrasound verified anatomic tags. Five surface landmarks on a test patient were identified: anterior superior iliac spine, anterior inferior iliac spine, psoas tendon at the joint, superficial inguinal ring, tip of greater trochanter.

Methods: The subject was independently examined by each surgeon in the supine position and colored tags were applied corresponding to the anatomic surface landmark. Overhead and lateral digital photographs were taken to document the position. An expert ultrasonographer also completed an examination with a specialized musculoskeletal ultrasound and placed tags. All surgeons were compared with the ultrasound standard for accuracy and the precision of the group was also determined.

Results: Average distances from the examiner marks to ultrasonographer marks were: 31mm medial-distal for ASIS; 26mm medial-distal for AIIS; 35mm medial-distal for psoas tendon; 19mm lateral-distal for superficial inguinal ring; 24mm anterior-proximal for tip of greater trochanter. Statistical analysis demonstrated examiners were greater than 10mm from the ultrasound markers. Examiner distribution showed most precision for the ASIS with variance over 18mm x 36mm area and the least precision for the superficial inguinal ring (51mm x 74mm area). Scattergram plots of deviation patterns showed common directional miscues amongst examiners.

Discussion/Conclusions: The wide variance between ultrasound guided landmarks and examiner landmarks suggest a role for ultrasound in improving accuracy of identification. Experienced examiners demonstrate variable precision in identification of commonly referenced anatomic landmarks and this should be considered when describing arthroscopic techniques and portals.

Notes:

12:36 pm – 12:42 pm

Knot Strength Varies Widely Among Expert Arthroscopists

Bryan T. Hanypsiak, MD
 Jeffrey M. DeLong, BS
 Lillian Simmons
 John Konicek
 G. Joshua Karnes
 Walt Lowe
 Stephen S. Burkhart

Introduction: The purpose of the study was to evaluate and compare variations in maximum load to failure and 3 mm displacement (clinical failure) of arthroscopic suture knots tied by 73 independent expert orthopaedic arthroscopists.

Methods: Each surgeon tied 5 of the same type of their preferred arthroscopic knot and half-hitch locking mechanism. Each knot was mechanically tested for maximum load to failure and clinical failure.

Results: For the 365 knots tested, the average ultimate load was 231N (range, 29-360N) with a standard deviation of 104N (range, 6-133NN). The average clinical failure load was 139N (range, 16-328N) with a standard deviation of 62N (range, 6-87N). Subgroup analysis was conducted based on surgeons' years in practice. The ultimate and clinical failure load for surgeons with less than 10 years of practice (n=39) were 248±93N and 142±56N respectively. The ultimate and clinical failure load for surgeons with greater than 10 years of practice (n=34) were 211±111N and 136±69N, respectively. Significant differences existed in ultimate load (p=0.001); however, there were no differences in clinical failure load (p=0.329). Subgroup analysis based on number of arthroscopic shoulder cases performed annually was also performed. The ultimate and clinical failure load for surgeons whom performed greater than 200 cases annually (n=30) were 226±101N and 136±64N respectively. The ultimate and clinical failure load for surgeons whom performed less than 200 cases annually (n=43) were 239±103N and 141±61N respectively. There was no significant difference for either ultimate load or clinical failure load between the two groups (p=0.292 and 0.479, respectively).

Discussion/Conclusion: Considerable variations in knot strength exists between arthroscopic knots of the same type tied by the same surgeon. This variation has the potential to

affect the integrity of arthroscopic repairs. Independent objective testing of the ability to tie secure knots as part of a surgeons training may be necessary.

Notes:

12:42 pm – 12:48 pm

Micheli ACL Reconstruction in Prepubescent Youths: A Retrospective Outcomes Study

S. Clifton Willimon, MD
 Christopher R. Jones, MD
 Keith May, PT, DPT, SCS, ATC, CSCS
 Mackenzie Herzog, BA
 Melissa Leake, MS, ATC, OT-SC
 Michael Busch, MD

Introduction: Management of anterior cruciate ligament (ACL) tears in the skeletally immature patient remains controversial. Physeal injury from conventional surgical reconstruction risks creating a limb length inequality or angular deformity. Micheli has described a physeal sparing technique using the iliotibial band for a combined intra-articular and extra-articular ACL reconstruction. This study analyzes another surgeon's experience with this procedure.

Methods: Between 2005 and 2011, all patients who underwent Micheli ACL reconstruction, performed by a single surgeon were identified. Three or more years of growth remaining was a prerequisite for Micheli reconstruction. Functional outcome, graft survival, radiographic outcome, growth disturbance and additional procedures were evaluated.

Results: Twenty-one patients (22 knees) met the inclusion criteria for this study. Mean chronological age at time of surgery was 11.8 years (range: 9.9-14.3 years). There were four concomitant meniscal repairs and five concomitant partial meniscectomies performed at the index procedure. Of the included patients, 19 patients (20 knees) completed follow-up at mean postoperative duration of 3.1 years (range: 1.0-6.9 years). Two knees (9%) underwent revision ACL reconstruction for graft failure at 2.8 and 4.0 years postoperatively. Of the remaining 18 knees, the median patient satisfaction was 10 (range: 9 to 10). Mean pedi-IKDC knee score was 96.3±2.9 points. Mean

Lysholm score was 94.7 ± 6.2 points. Mean pre-injury Tegner activity level was 8 (range: 6-10) and mean postoperative Tegner activity level was 8 (range: 6-10). All patients had a grade 1A Lachman and a normal pivot-shift examination. At time of follow-up, 50% of patients had closed physes. There were no radiographic angular deformities or leg length discrepancies. 4/18 knees (22%) underwent subsequent procedures including 1 graft shrinkage, 2 partial meniscectomies and 1 meniscal repair.

Discussion and Conclusion: At mean follow-up of 3.1 years, our findings confirm excellent functional outcomes, a low revision rate and no growth disturbances associated with the Micheli ACL reconstruction.

Notes:

12:48 pm – 12:54 pm

Access to Outpatient Care for Adult Rotator Cuff Patients with Private Insurance Versus Medicaid

Brendan Mackinnon-Patterson, MD, MPH
Reid W. Draeger, MD
Erik C. Olsson, MD
Ganesh V. Kamath, MD
Jeffrey T. Spang, MD

Introduction: The purpose of this study was to determine if type of health insurance would have an impact on access to outpatient orthopaedic care for an adult patient with an acute rotator cuff tear.

Methods: Seventy-one orthopaedic surgery practices within the state of North Carolina were randomly selected and were contacted on two different occasions separated by three weeks. The practices were presented with an appointment request for a fictitious 42-year-old male with an acute rotator cuff tear. The patient's insurance status was reported as Medicaid for the first call, and as private insurance during the second call. Chi-square analysis was used to compare the proportion of practices offering each fictitious patient an appointment.

Results: Of the 71 practices that were included in this study, 49 (69%) offered the patient with Medicaid an appointment within two weeks, while 65 (91%) offered the patient with private insurance an appointment within this time frame. The difference in these rates was found to be statistically significant (P equal to 0.001). The likelihood of patients with private insurance obtaining an appointment was 8.8 times higher compared to those patients with Medicaid (95% CI: 2.5, 31.5). Although patients with Medicaid were less likely to obtain an appointment, the average time until appointment was not significantly different between groups, 6.9 days for Medicaid vs. 6.2 days for private insurance (P greater than 0.05).

Discussion and Conclusion: Access to outpatient orthopaedic care for pediatric and adolescent patients has been shown in previous studies to be decreased for patients with Medicaid. This is the first study of this kind in an adult population to show that patients with Medicaid have decreased access to outpatient orthopaedic care.

Notes:

12:54 pm – 1:00 pm

Analysis of Subjective and Objective Fatigue in Fast-Pitch Softball Pitchers During a Single Season

Justin S. Yang, MD
Jeffrey G. Stepan, BS
Lucas Dvoracek, BS
Rick W. Wright, MD
Randi Davis, DC
Robert H. Brophy, MD
Matthew V. Smith, MD

Introduction: There is little information that exists regarding the effects of the fatigue on fast-pitch softball pitchers. Recent biomechanical evidence suggests that the stress on the shoulder from the windmill pitch rivals that seen in baseball pitchers. We aim to characterize the effects of windmill pitching on pain, fatigue, range of motion (ROM) and strength in high school fast-pitch softball pitchers during a single season.

Methods: We evaluated shoulder and elbow strength (dynamometer), ROM (goniometer), pain (visual analog scale (VAS)) and fatigue (VAS-fatigue and Borg questionnaire) in 21 (ages 15-18) high school fast-pitch softball pitchers before and after games during the first and last week of the high school softball season. Pitch count and games pitched during the season were also recorded.

Results: The pitchers made 12 ± 5.7 pitching appearances during the season. On average, they threw 89 ± 25 pitches per game. Supraspinatus, biceps, and external rotation strength decreased significantly post-game compared to pre-game regardless of the time of the season, while pain and fatigue scores increased. Pre-game pain and fatigue at the end of the season correlated with the number games pitched during the season. There was an inverse linear relationship between games pitched and pre-game biceps, supraspinatus, and external rotation strength at the end of the season compared to beginning of season. Comparing pre-game values at the end and beginning of the season, players who pitched more than 10 games had more pain, fatigue, and less biceps, supraspinatus, and external rotation strength than players who pitched less than 10 games.

Discussion and Conclusion: Biceps and rotator cuff strength decrease significantly throughout the course of a game. Pitching more games during a season significantly increases pain and fatigue while significantly decreasing pre-game biceps and rotator cuff strength. Softball pitchers may be at increased risk of injury from fatigue during the course of a single game and over the entire season. Targeted strengthening as well as adequate rest intervals should be evaluated in these athletes.

Notes:

1:00 pm – 1:06 pm

Preoperative Factors Associated with Post-Operative Outcomes Among Patellofemoral Stabilization and Realignment Patients

Jennifer S. Howard, PhD

*Nicholas A. Kenney, MD

Christian Lattermann, MD

Objectives: Patients with patellofemoral (PF) pain and/or instability who fail to respond to non-operative treatment may be considered candidates for surgical stabilization/realignment of soft and bony structures. The purpose of this study was to investigate what preoperative factors are associated with patient reported outcomes (PROs) following PF joint stabilization/realignment.

Methods: Case series of patients minimum of 1-year post primary tibial tubercle transfer and/or MPFL reconstruction ($n = 47$, 32 female, age = 21.2 ± 8.3 yrs, Ht = 16 ± 10 cm, Mass = 79 ± 24 kg). All patients were enrolled prospectively into a larger patient outcomes registry and completed the IKDC, KOOS, and WOMAC PRO instruments pre-surgery and 3, 6, and 12 months and annually post-surgery. Spearman Rho Correlations were used to determine what preoperative factors (age, BMI, injury to surgery time, level of sport participation, preoperative PRO scores) were associated with PRO scores at an average of 1.2 years following surgery.

Results: Postoperative IKDC scores were correlated to the following preoperative factors; age ($r = -0.40$), injury to surgery time ($r = -0.58$), and preoperative IKDC ($r = 0.40$) and total WOMAC scores ($r = -0.37$). Lysholm scores were correlated to age ($r = -0.41$), BMI ($r = -0.37$), injury to surgery time ($r = -0.44$), and preoperative IKDC ($r = 0.34$) and total WOMAC scores ($r = -0.30$). Finally, postoperative total WOMAC score was correlated to age ($r = 0.47$), BMI ($r = 0.39$), injury to surgery time ($r = 0.51$), and preoperative IKDC ($r = -0.43$), Lysholm ($r = -0.33$) and total WOMAC scores ($r = 0.44$).

Discussion and Conclusion: Pre-operative age, BMI, injury to surgery time and PROs were associated with PF patient surgical outcomes. For all PROs investigated injury to surgery time correlated highly with patient outcomes with up to one-third of the variation in PRO scores explained by injury to surgery time. These findings underscore the impor-

tance of early identification of PF stabilization/realignment surgical candidates prior to progressing to a chronic pathology.

Notes:

1:06 pm – 1:12 pm

Early Detection of Movement Related Risk Factors for Second Knee Injuries in ACL Reconstruction Patients

Robin M. Queen, PhD
William E. Garrett Jr., MD, PhD
Dean C. Taylor, MD
Robert J. Butler, DPT, PhD

Introduction: Subsequent surgical procedures are one of the negative outcomes following Anterior Cruciate Ligament Reconstruction (ACL-R). One factor that has been associated with subsequent knee surgeries is asymmetry in lower extremity landing mechanics. The purpose of this study was to examine differences in landing mechanics 5 months following ACL-R in a case series of patients who eventually needed a secondary knee surgery (n =4: 3 ACL-R, 1 meniscectomy) compared to a group of gender and age matched controls who did not require a subsequent knee surgery.

Methods: Three-dimensional kinematics and kinetics were collected during a stop jump task 5 months following primary ACL-R. Landing mechanics were compared between the two groups. Data were analyzed using a limb by group repeated measures ANOVA ($\alpha=0.10$).

Results: The peak knee and hip extension moments and the peak vertical ground reaction force (vGRF) were all significantly lower on the surgical side compared to the non-surgical side. The group with a second surgery had a 29% asymmetry in the peak knee extension moment, while those that did not have a second surgery had 17% asymmetry. The peak hip extension moment was more asymmetrical in the subjects that had a second surgery (20%) compared to those that did not need a second surgery (10%). This relationship was observed in the peak vGRF with the subjects that needed a second surgery exhibited a 30% asymmetry, when compared to 20% asymmetry in the other group.

Conclusions: The results of this study suggest that patients with greater asymmetries in landing mechanics at 5 months following an ACL reconstruction may have a greater risk of requiring a second surgical procedure at the knee. During a stop-jump landing, landing mechanics were consistently lower on the surgical side, with greater asymmetrical between sides in the group that required a second surgery.

Notes:

1:12 pm – 1:18 pm

A Predictive Model of Outcomes After Anterior Cruciate Ligament Reconstruction — What Graft and Technique for My Patient?

Jonathan A. Godin, MD, MBA
Jonathan C. Riboh, MD
Dean C. Taylor, MD
Richard C. Mather III, MD

Introduction: Anterior cruciate ligament reconstruction (ACLR) is one of the most commonly performed procedures in orthopedics. We hypothesize that predictive modeling of the outcomes after ACLR can improve the quality of information available for treatment discussions. In this study, we describe a model that provides detailed outcome predictions based on patient demographics, graft choice, and reconstructive technique.

Methods: A Markov decision model of the natural history after ACLR was constructed. Patients were divided into four therapeutic categories: 1. Single-bundle, autologous hamstring reconstruction; 2. Single-bundle, autologous patellar tendon reconstruction; 3. Single-bundle, allograft reconstruction; and 4. Double-bundle reconstruction. The primary outcomes were graft failure requiring revision surgery and IKDC overall grade. Outcome probabilities and utilities were derived from the highest-level evidence available in the literature. Utilities range from 0 (failure) to 1 (normal knee).

Results: 45 studies (Level I-III), 24 of which were level I, were used to build the model. Monte Carlo micro-simulation on a population of 200,000 — the estimated yearly incidence of ACL rupture — was performed. The mean utilities were

0.88 for double-bundle reconstruction, 0.78 for single-bundle autologous hamstring reconstruction, 0.76 for allograft reconstruction and 0.75 for single-bundle autologous patellar tendon reconstruction. Re-rupture rates were higher in patients < 20 years, those returning to IKDC Level I/II activity, and those with a contact mechanism of injury. The probability of attaining an excellent (IKDC grade A) outcome was 66.1% for double-bundle reconstruction, 43.5% for single-bundle autologous hamstring reconstruction, 38.1% for single-bundle, autologous patellar tendon reconstruction, and 37.7% for single-bundle allograft reconstruction.

Discussion and Conclusion: Our model can predict risk of graft rupture, as well as expected IKDC grade for each of the common ACLR techniques. This information can be used to assist patients and surgeons in choosing between various surgical options.

Notes:

2013 Scientific Program Abstracts — Friday Mediterranean Ballroom

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

Friday, July 19, 2013

General Session 5: Total Hip Arthroplasty

Moderator: Michael P. Bolognesi, MD

6:35 am – 6:41 am

Total Joint Replacement in Patients Over 90 Years of Age Is a Viable Option but Requires Risk Adjustment

James A. Browne, MD

*Michele R. D'Apuzzo, MD

Andrew W. Pao, MS

Introduction: Limited evidence exists regarding morbidity and mortality rates in very elderly patients who undergo total joint arthroplasty (TJA). This demographic is increasing in size and data is needed to guide decision making when considering surgery in these patients. The purpose of this study was to compare complication rates, in-hospital mortality, length of stay, and hospital charges following TJA in patients older or younger than 90 years of age using a national database.

Methods: The Nationwide Inpatient Sample database was used to identify patients who underwent TJA between 1993 and 2008. Only 0.70% of these patients were 90 years of age or older; 58,085 patients were age 90 years or above (range, 90-113 years) compared to 8,251,218 patients who were between age 45 years and 89 years. Specific postoperative inpatient complications, hospital charges, and length of stay were compared between the two groups using bivariate and multivariate analysis with logistic regression modeling.

Results: Patients 90 years of age or older had higher baseline comorbidity than patients under 90 years of age (mean Deyo score 0.44 compared to 0.22, $p<0.001$). The elderly group had a higher proportion of females (74.8% versus 62.0%, $p<0.001$) and more commonly underwent total hip arthro-

plasty (65.0% versus 33.9%, $p<0.001$) compared to the younger group. Multivariate analysis revealed that older patients had significantly higher rates of postoperative morbidity including cardiac complications (odds ratio=2.44, 95% CI=2.33-2.56, $p<0.001$), respiratory complications (odds ratio=1.85, 95% CI=1.75-1.96, $p<0.001$), central nervous system complications (odds ratio=2.08, 95% CI=1.82-2.44, $p<0.001$), anemia (odds ratio=1.39, 95% CI=1.37-1.41, $p<0.001$), hematoma (odds ratio=1.47, 95% CI=1.39-1.56, $p<0.001$), and pulmonary embolism (odds ratio=1.41, 95% CI=1.25-1.59). In-hospital mortality was significantly higher in the older cohort compared to the younger group (2.9% versus 0.2%, $p<0.001$). Mean length of stay was over 1.5 days longer in the elderly cohort and total hospital charges were higher.

Discussion and Conclusion: Morbidity, mortality, length of stay, and hospital charges are all higher in patients 90 years of age or older compared to younger patients following total joint arthroplasty. Although age greater than 90 was an independent risk factor for adverse outcome, multiple other factors appeared to also independently contribute to complications, including gender and Deyo score. Age itself does not appear to be an absolute contraindication to joint replacement. This information is important for clinical decision making and risk adjustment in this patient population.

Notes:

6:41 am – 6:47 am

Performance of Highly Cross-Linked Polyethylene in Total Hip Arthroplasty in Young and Active Patients

Morteza Meftah, MD
Chitranjan S. Ranawat, MD
Amar S. Ranawat, MD
Danyal Nawabi, MD
Caroline Park, BS

Introduction: Hard-on-hard bearings and surface replacement (SR) have been used in young and active patients due to the reduced wear and lower rates of osteolysis. However, neither of these options resulted in survivorship higher than 90%-95% in this group of patients.

Questions/purposes: The purpose of this prospective study was to compare minimum 10-year survivorship of non-cemented total hip arthroplasty (THA) using 28mm metal head against highly-cross linked polyethylene (HXLPE) in our cohort as compared to published reports of other bearings, including surface replacements, in young-active patients.

Patients and Methods: From 1999 to 2003, 91 consecutive patients (112 hips; 57 males and 34 females) with average UCLA score of 8 and mean age 53 years (range 24-65 years), who received metal on HXLP (Crossfire), were included. At minimum 10-years follow-up, patients' clinical data was assessed. All level I, II studies, registry data, and prospective cohorts published in the literature with minimum 10 years of surface replacement (SR) and ceramic on ceramic (CoC) in young patients were included.

Results: There were no revisions for fracture, osteolysis or loosening. There were 2 revisions: one periprosthetic infection and one chronic dislocation. Kaplan-Meier survivorship was 97% for all cause failures and 100% for wear-related failures. In review of the literature, the 10-year results of metal on HXLPE in young patients as well as the registry data were similar or better than SR and CoC.

Discussion and Conclusion: This study demonstrates that 28mm metal head on HXLPE has lower revision rates as compared to other bearings and surface replacement in the published literature at a minimum 10-year follow-up in young-active patients, without the limitations of hard-on-hard bearings. This bearing should be considered as the gold standard for young and middle age patients. Oxidation of Crossfire is an overly stated limitation.

Notes:

6:47 am – 6:53 am

WOMAC and the Cost-Utility of Total Hip Arthroplasty

David A. Iacobelli, MD
Carlos J. Lavernia, MD, FAAOS
Larry Brooks, PhD
Jesus M. Villa, MD

Introduction: Allocation of healthcare resources is commonly done based on cost-utility analyses. These analyses help society understand the bang for the buck that costly surgical procedures give society. However, a procedure for the same disease could conceivably be cost-effective with one cohort (e.g., early pathology) and relatively ineffective with another (e.g., late pathology). Total hip arthroplasty (THA) has been demonstrated to be a cost-effective intervention. Our objective was to assess the effects of disease progression and age in the cost-effectiveness of THA.

Methods: We studied 159 unilateral primary THAs. Mean follow-up was 3.67 years (range: 1-7). Statistical analyses were conducted to estimate the cost of Quality Adjusted Life Year (QALY) gained according to the preoperative WOMAC scores. Median split of the groups according to WOMAC pain, function, and total scores was performed. Analyses by patient's age were also performed.

Results: In all groups the average QWB score improved postoperatively. The mean operating costs of primary THA were fairly similar for all groups regardless of age. Worse preoperative WOMAC scores were consistently related to a less cost-effective intervention. As patients aged, the cost-effectiveness of THA decreased. Patients with worse WOMAC total score that were 75 years of age or older had the least cost-effective intervention (\$25,937.33 per QALY gained). In contrast, the highest cost-effectiveness was achieved when primary THA was performed on younger patients with better WOMAC total score (\$8,256.32 per QALY gained).

Discussion and Conclusion: THA is most cost-effective when performed in younger patients with less disease severity in terms of pain and disability. However, despite being less

cost-effective when performed late, primary THA remains a cost-effective intervention in patients who are older and/or have greater disease severity.

Notes:

6:53 am – 6:59 am

Cementless THA Has Higher Incidence and Severity of Thigh Pain Than Surface Replacement

Ryan M. Nunley, MD
Peter Brooks, MD, FRCS(C)
John C. Clohisy, MD
Staci R. Johnson, MEd
Robert L. Barrack, MD

Introduction: The purpose of this study is to determine where young, active patients experience pain and at what intensity following hip resurfacing (SRA) and total hip replacement surgery (THA).

Methods: This multicenter study identified a cohort of young, active patients who were at least one year post SRA or THA. Young, active patients were defined as males age 18-60 and females age 18-55 with a pre-symptomatic UCLA score = 6. Potential participants were mailed a letter explaining the study and asking them to complete a questionnaire. Participants were asked to indicate whether or not they experienced pain and to what level in 8 anatomical areas of interest. Participants used a 0 – 5 pain scale, with 0 being 'No Pain' and 5 being 'Constant Pain'. Completed questionnaires were returned to their respective centers and de-identified data was sent to the coordinating center. For data analysis purposes, pain was considered to be 'mild' if scored with a 0 or 1 (no pain or pain only with extreme activity). Pain was considered to be 'moderate/severe' if scored between 2 and 5.

Results: Two hundred and fifty questionnaires were returned (163 SRA/87 THA) from two centers. Sixty-eight percent of patients reported pain in at least one area. There was no difference in groin pain as reported by both SRA and THA patients (SRA=52/163, 32%; THA=22/85, 26%). THA patients reported more anterior thigh pain (SRA=15/163, 9%; THA=23/85, 27%). In addition, this anterior thigh pain was

more severe for THA patients (Pain >1: SRA=5/163, 3%; THA=12/85, 14%).

Discussion and Conclusion: Most young, active patients experience pain after hip replacement. Patients with SRA and THA are equally likely to experience groin pain. Young, active patients with THA experience significantly more anterior thigh pain with a surprising number having severe anterior thigh pain.

Notes:

Friday, July 19, 2013

General Session 6: Total Knee Arthroplasty

Moderator: C. Lowry Barnes, MD

7:12 am – 7:18 am

Cost Analysis of Topical Tranexamic Acid Use in Reducing Perioperative Blood Loss in TKA

Tamara N. Huff, MD
George F. Chimento, MD
Sheena Babin, PharmD

Introduction: The use of topical tranexamic acid to decrease peri-operative blood loss following total knee arthroplasty (TKA) has increased. The purpose of this study was to evaluate the effectiveness of topical tranexamic acid in primary TKA from a clinical and economic standpoint.

Methods: We retrospectively reviewed 683 primary total knee arthroplasties performed by 3 surgeons at a single institution over a 2-year period. We compared 373 cases performed in 2010 without the application of tranexamic acid to 310 cases performed in 2011 with the application of tranexamic acid. Demographic data, pre-operative and post-operative hemoglobin, transfusion rates, hospital length of stay, cost, and perioperative complications during the first 3 months were collected. Statistical analysis was performed using two sample t-tests and Fisher's exact tests.

Results: There was no difference in age, sex, height, or pre-operative hemoglobin between the two groups. Patients treated with tranexamic acid had significantly higher post-operative hemoglobin, received significantly fewer transfusions, had decreased length of stay, decreased blood bank costs, increased pharmacy cost, and decreased total direct cost to the hospital. The average savings was approximately \$1500 per patient.

Discussion & Conclusion: There were no differences in thromboembolic events or infection between the 2 groups. Limitations of this study include the retrospective nature of the study and inherent variations between surgeons. In summary, the use of topical tranexamic acid in primary TKA is safe, effective, and results in significant cost savings of approximately \$1500 per patient.

Notes:

7:18 am – 7:24 am

Do Patients Return to Work After Total Knee Arthroplasty?

Ryan M. Nunley, MD
Adolph V. Lombardi Jr., MD, FACS
Keith R. Berend, MD
Erin L. Ruh, MS
John C. Clohisy, MD
William G. Hamilton, MD
Craig J. Della Valle, MD
Javad Parvizi, MD, FRCS
Robert L. Barrack, MD

Introduction: While there is extensive literature supporting a high success rate, there is limited data on return to work following TKA.

Methods: A multicenter study was conducted of patients of working age (18-60) who underwent TKA 1-4 years previously. An independent third party survey center with expertise in collecting health care data for state and federal agencies collected the data. Definitions from the United States Department of Labor's Dictionary of Occupational Titles were utilized to determine physical job demand categories of sedentary, light, medium, heavy, and very heavy.

Results: Complete data was collected on 661 TKA patients (average age 54.2, 61.3% female). Seventy-five percent (493/661) were employed in the 3 months prior to their TKA and 91% of those patients (449/493) returned to work after surgery, 94% (419/449) of which successfully returned to the same job. Prior to surgery, physical demand categories of the patients' jobs were sedentary 13%, light 11%, medium 24%, heavy 23%, and very heavy 29%. The return to work rate by labor category for those employed in the 3 months prior to surgery was sedentary 92%, light 79%, medium 89%, heavy 88%, and very heavy 78%. Males were more likely than females to have worked in the 3 months prior to TKA (83% vs. 70%), but of those patients there was no difference between genders in return to work after TKA.

Discussion and Conclusion: In this group of young, active patients, most returned to work at their usual occupation. While those with sedentary occupations had the highest rate of return to their usual work, even those with very heavy jobs returned to their same job 78% of the time.

Notes:

7:24 am – 7:30 am

Gender Specific Design in TKR: Does it Matter?

Carlos J. Lavernia, MD, FAAOS
Jesus M. Villa, MD
David A. Iacobelli, MD

Introduction: Gender specific implants were introduced into the arthroplasty armamentarium around a decade ago. Much debate and discussion was focused on the importance of matching anatomic features in female patients. Our objective was to assess the differences in outcomes among women when standard implants were used and when gender specific implants (GSI) were utilized.

Methods: 115 consecutive primary TKR's performed by a single surgeon using GSI devices were studied and compared to conventional (CONV) TKR devices with a minimum 2 year follow-up. Preoperative, latest and change in clinical out-

comes [QWB; SF-36; Knee Society Knee Score (KSKS); Hospital for Special Surgery (HSS) score; and WOMAC scores] were compared. A 2x2 ANOVA was used to assess the behavior of the dependent measures between groups over time. Alpha was set at 0.05.

Results: Groups were matched by age (GSI: 72.1; CONV: 72.9); BMI (GSI: 30.5; CONV: 31.4); severity of illness (Kellgren Lawrence and Ahlback scales); gender, race, and ethnicity. There was no difference preoperatively for any dependent measure. On average both groups improved in all dependent measures by follow-up. Postoperatively the GSI group reported better scores for most outcome measures and were significantly better for the QWB (GSI: 0.66; CONV: 0.57); and SF-36 bodily pain score (GSI: 77.35; CONV: 63.57). Regardless of evaluative period, those in the GSI group had significantly better overall scores for the QWB (GSI: 0.587; CONV: 0.541). Change in scores showed that both groups had similar improvement for all dependent measures except for the QWB where the GSI group had significantly greater improvement.

Discussion and Conclusion: While our results show that patients with GSI report better perceived function with the use of these implants, the differences are minimal and probably clinically insignificant.

Notes:

7:30 am – 7:36 am

Does CTPA Lead to Overdiagnosis of PE and Subject Patients to Iatrogenic Harm Following Total Joint Arthroplasty?

James A. Browne, MD
Wendy M. Novicoff, PhD
Michele R. D'Apuzzo, MD

Introduction: Since its introduction in 1998, computed tomographic pulmonary angiography (CTPA) has become widely adopted to detect pulmonary embolism (PE) following total joint arthroplasty (TJA). CTPA is a sensitive tool that has the ability to detect emboli that may be clinically insignificant and lead to iatrogenic harm from overtreatment. The purpose of

this study was to assess the changing incidence, mortality, treatment complications and resource consumption associated with PE following TJA before and after the introduction of CTPA.

Methods: The Nationwide Inpatient Sample (NIS) database was used to identify 2,335,248 patients undergoing total hip or total knee arthroplasty from 1993-1998 before the introduction of CTPA and 6,321,671 patients who underwent TJA from 1999-2008 after the introduction of CTPA. Bivariate and multivariate regression analysis was performed to compare the incidence of PE, mortality associated with PE, and potential treatment complications of anticoagulation.

Results: The in-hospital diagnosis of PE following TJA increased from 0.28% to 0.38% following the introduction of CTPA ($p<0.001$). The case-fatality (mortality associated with the diagnosis of PE) decreased substantially from 11.4% to 4.6% ($p<0.001$). The odds ratio of mortality with a PE decreased after the introduction of CTPA from 38.3 to 27.9. The diagnosis of PE was associated with substantially increased risks for hematoma/seroma, postoperative infection, gastrointestinal bleed, and drug thrombocytopenia (all $p<0.001$). In comparison to those patients who were not diagnosed with a PE, patients with a PE had increased lengths of stay (8.5 days versus 3.9 days) and total charges (\$60,408 versus \$35,592) (both $p<0.001$).

Conclusion: The widespread adoption of CTPA appears to be associated with increased diagnosis of PE following TJA. Case-fatality has decreased, raising the concern for overdiagnosis. This study demonstrates that the diagnosis of PE is associated with potential iatrogenic harm from anticoagulation while increasing length of stay and hospital charges. The role of CTPA needs to be carefully examined.

Notes:

7:36 am – 7:42 am

12 Year Survival and Osteolysis with a Modern Posterior-Stabilized Total Knee Arthroplasty

Paul F. Lachiewicz, MD
Elizabeth Soileau, BSN

Introduction: A high rate of failure of a modern posterior-stabilized total knee prosthesis with a 3° fluted, 4 hole tibial component has been reported. We looked at the 12 year survival and incidence of osteolysis of the modern posterior-stabilized total knee prosthesis with a 7° fluted, solid tibial component and conventional polyethylene. Using a single surgeon prospective database, we asked the following questions: (1) What is the 12 year survival of the modern posterior-stabilized total knee prosthesis with this tibial component? (2) What is the incidence and factors associated with osteolysis (surrogate for polyethylene wear) at a mean followup of 10 years?

Methods: Between May 1998 and July 2004, the senior surgeon performed 293 consecutive primary knees (220 patients) using the modern posterior-stabilized total knee prosthesis with a 7° fluted, solid tibial tray, conventional polyethylene, and cement. We obtained complete clinical and radiographic followup for 131 knees (93 patients) at a mean of 10 years (range, 8-13). Knees were evaluated using the standard Knee Society score and the Krackow LEAS score. Osteolysis was evaluated by standard radiographs, with oblique views as needed. Data was analyzed using Kaplan-Meier survival, cumulative incidence function analyses, and univariable generalized linear modeling.

Results: With the endpoint as reoperation for mechanical failure, the 12 year survival was 96.6% (CI 86.7-99), with cumulative incidence function 2.3% (0.4-7.6). With the endpoint as reoperation for any reason, the 12 year survival was 95.8% (CI 87-98.7), with cumulative incidence function 3% (0.8-8). Overall, there was one femoral component loosening, one knee revised elsewhere for pain, and one revision for polyethylene wear. There was no tibial component loosening or debonding. Osteolysis was seen in 16 knees (13 patients), [12.2%], more in the femur than tibia. There were significant associations between the presence of an effusion, male gender and Krackow LEAS score > 10 and the presence of osteolysis.

Discussion and Conclusion: There was a high survival of this prosthesis, and tibial component loosening or debonding was

not seen in this study. The incidence of osteolysis (12.2%) suggests that an improved bearing surface may be desirable in active male patients.

Notes:

7:42 am – 7:48 am

Assessment of Particle Induced Reactive Synovitis in Fixed and Mobile Bearing M Posterior-Stabilized Designs: A 10-Year Prospective Matched-Pair MRI Study

Morteza Meftah, MD
Chitranjan S. Ranawat, MD
Amar S. Ranawat, MD
Hollis G. Potter, MD

Introduction: Several knee simulator studies have shown a decrease in volumetric wear and particle burden in unidirectional mobile-bearing knees as compared to the fixed-bearing total knee arthroplasty (TKA). However, no significant clinical differences have been shown in level I and II studies. The earliest evidence of particle-induced response is found in the synovium, leading to osteolytic defect. The degree of synovitis can be quantified by magnetic resonance imaging (MRI). This is the first long-term, prospective, matched-pair study using MRI to analyze wear-induced synovitis and osteolysis between rotating-platform posterior-stabilized (RP-PS), fixed-bearing metal-back (FB-MB), and all-polyethylene tibial (APT) designs in active patients with identical femoral components and polyethylene.

Methods: From September 1999 to October 2001, a matched-pair analysis of 24 TKAs (18 patients, 3 groups: 8 RP-PS, 8 FB-MB, and 8 APT) was performed. TKAs were matched for age, sex, body mass index (BMI), and University of California Los Angeles (UCLA) activity scores. All patients underwent MRI using MAVRIC (multi-acquisition variable-resonance image combination) knee protocol designed to reduce metal susceptibility artifact. Images were evaluated for volumetric measure of synovitis and/or osteolysis and presence of fibrous membrane formation at the cement-bone interface.

Results: The mean age was 64 ± 5 years (59 – 72). The mean follow-up was 11.6 ± 0.7 years (10 – 13). The mean UCLA score at the time of surgery was 8.5 ± 2.6 (5 – 10). Reactive synovitis was observed in 6 RP-PS (75%), all 8 FB-MB (100%), and 6 APT (75%) knees. There was a significant difference between the RP-PS and FB-MB knees in volumetric synovitis. Osteolysis with bone loss more than 4 mm was seen in 3 FB-MB, 2 APT, and 0 RP-PS. There was no statistical difference for osteolysis between the three designs.

Conclusion: Based on this study, it appears that particle induced synovitis is evident in all 3 types of bearing surfaces, however, it is significantly less in the RP-PS group. This is in contradiction to the report of retrieval studies.

Notes:

Friday, July 19, 2013

General Session 8: Upper Extremity

Moderator: L. Andrew Koman, MD

12:20 pm – 12:26 pm

Use of Photography on Patient Rehabilitation After Shoulder Manipulation Under Anesthesia

Jared A. Brummel, DO
Champ L. Baker Jr., MD

Introduction: Shoulder ankylosis is a common problem that has various causes. The most common cause, however, is adhesive capsulitis. Recovery from adhesive capsulitis can be a lengthy process of rehabilitation lasting up to several years. The purpose of our study is to determine whether the addition of clinical photographs can be helpful as a form of patient motivation.

Methods: In this ongoing randomized prospective study, we compared function by measuring range of motion in 2 groups of patients who had undergone manipulation under anesthesia. Both groups had range of motion measured immediately preoperatively, during the manipulation, 6 weeks postmanipulation, and 3 months postmanipulation. Photographs were taken

of all patients during their manipulation under anesthesia procedure. During the procedure, photos were taken to demonstrate the range of motion achieved in 5 different positions. Half of the study patients were randomized into the investigational group who were shown these photos within the first 2 postoperative weeks to demonstrate potential range of motion as determined by the manipulation. The other half made up the control group who did not get to see their photos. Shoulder function scores using the Oxford Shoulder Score were also determined in both groups. We compared the premanipulation scores with those at the conclusion of the study.

Results: At 6 weeks postmanipulation, the percentage of regained passive motion was higher in the investigational group than in the control group: forward flexion, 95% versus 49%; abduction, 122% versus 44%; external rotation 100% versus 25%, external rotation at 90° abduction, 106% versus 50%; and internal rotation at 90° abduction, 92% versus 48%, respectively.

Discussion and Conclusion: Our study patients had greater improvement in range of motion and maintained their manipulated range of motion better when they were shown pictures of the attainable range of motion. Average Oxford shoulder scores improved in both groups. Although with manipulation and rehabilitation, most patients show full or nearly full recovery from adhesive capsulitis over time, our patients showed a more rapid improvement when confronted with visual evidence of their potential.

Notes:

SOA/OREF Resident Award Winner

12:26 pm – 12:32 pm

A Biomechanical Comparison Between All-Arthroscopic Knotless and Outside-in \Triangular Fibrocartilage Complex Repairs

Mihir J. Desai, MD
Claudius D. Jarrett, MD
William C. Hutton, DSc

Introduction: Traumatic Palmer 1B triangular fibrocartilage complex tears (TFCC) are amenable to surgical man-

agement following failed conservative treatment. The traditional outside-in technique utilizes a soft-tissue capsular repair. The structure of the TFCC lends itself to the use of suture anchors for repair, as it originates from the fovea of the distal ulna. Suture anchors provide a repair to bone instead of capsular structures. To date, there are no studies directly comparing the all-arthroscopic suture anchor repair to the traditional outside-in technique. We hypothesize that an all-arthroscopic TFCC repair is biomechanically stronger than an outside-in repair. With stronger repair, a patient may begin range of motion earlier avoiding the sequelae of lengthy long-arm cast immobilization following surgery.

Methods: The distal ulna and TFCC were dissected from 12 paired cadaveric wrists and peripheral TFCC “tears” were made. Six TFCC tears were randomized to receive the standard outside-in technique described by Whipple and Geissler, with two 2-0 PDS sutures placed in a vertical mattress fashion. The remaining six TFCC tears were repaired using mini-pushlock suture anchors to the fovea as described by Geissler. The repairs were stressed to a 2 mm diastasis of the repair and then to failure on a Mechanical Testing System.

Results: In withstanding 2 mm of diastasis, the all-arthroscopic repairs (10.0 +/- 3.0 N) were stronger than the outside-in repairs (1.8 +/- 0.8 N, $p < 0.05$). For load to failure, the all-arthroscopic repairs (72.5 +/- 3.3 N) were stronger than the outside-in repairs (54.3 +/- 6.4 N, $p < 0.05$). Catastrophic soft-tissue injury or suture pull-out accounted for all failures.

Discussion and Conclusion: The all-arthroscopic technique provides a biomechanically superior alternative to the traditional outside-in technique for TFCC repairs. The results of this study support an early-mobilization therapeutic program following all-arthroscopic repair of the TFCC.

Notes:

12:32 pm – 12:38 pm

Biomechanical Comparison of Screw Trajectory to Fracture Pattern for Unstable Scaphoid Fractures

Gregory Faucher, MD
Claudius D. Jarrett, MD
William C. Hutton, DSc
M. Leslie Golden, BA
Kyle R. Sweeney, MD

Introduction: Current recommendation for stabilizing scaphoid fractures is to place a long screw inserted along the central axis of the bone regardless of fracture pattern. We hypothesize that a screw placed perpendicular to the fracture line in an oblique fracture will provide fracture fixation strength that is comparable to that provided by a centrally placed screw.

Methods: Oblique osteotomies were made in 8 matched pairs of cadaveric scaphoids. One scaphoid from each pair was randomized to receive a screw placed centrally along the long axis of the scaphoid. In the other matched scaphoid, a screw was placed perpendicular to the osteotomy line. An MTS testing machine was used to apply cyclic loading to each scaphoid at a force of 120N and a rate of 1Hz until the fracture underwent 2mm of displacement, catastrophic failure, or 4000 cycles was reached. The scaphoids that survived 4000 cycles were then progressively loaded to failure. Screw size, fatigue strength, and load to failure were compared between the groups.

Results: We found no difference in number of cycles or load to failure between the two groups. The number of cycles was 3510.3 ± 1199.4 for a perpendicular screw and 3470.0 ± 1298.2 for a central screw ($P=1.00$). Load at failure was $258.4 \pm 84.6\text{N}$ for a perpendicular screw and $294.3 \pm 115.2\text{N}$ for a central screw ($P=0.92$). Screws placed perpendicular to the fracture line (18.5 mm) were significantly shorter in length than central screws (22.8 mm) ($p = 0.0089$).

Discussion and Conclusion: These results support a fracture specific approach to scaphoid fixation. We believe that a perpendicularly placed screw provides equivalent strength to one placed along the central axis. This approach provides a promising alternative, which will allow a technically easier, short screw to be placed while preserving more bone stock in both acute fractures and nonunions.

Notes:

12:38 pm – 12:44 pm

The Effect of Age on Patient Satisfaction After Arthroscopic Rotator Cuff Repair

Clay G. Nelson, BS
Ashlee P. MacDonald, BS
Kevin F. Bonner, MD

Introduction: It is important to evaluate prognostic factors and determine how they affect patient satisfaction post-operatively. The goal of this study was to investigate the relationship of age to post-operative outcomes and overall patient satisfaction.

Methods: A retrospective analysis of patients who underwent arthroscopic repair of full thickness rotator cuff tears from 2008-2009 who had completed pre-operative ASES and SST scores. Demographics, ASES and SST scores, concomitant pathology, tear size, tendon involvement, complications and worker's compensation status were identified. Likert scales for satisfaction were used along with a linear regression analysis to evaluate the relationship between Likert scores and ASES and SST scores. Patients were then stratified by age into four groups and differences were analyzed using student t-tests.

Results: 74 patients were identified with a mean follow-up time of 34.7 months. Likert satisfaction scores showed a strong correlation with functional shoulder scores. While concomitant diagnoses were similar in all four age groups, there were statistically smaller tears and a lower incidence of biceps pathology in the age group under 50, and there was a strong correlation between increasing age with increasing tear size. Despite all four groups having similar post-op ASES and SST scores, the under 50 age group reported significantly lower satisfaction scores, while the remaining three groups had similar Likert scores. None of the subjects in the under 50 age group received worker's compensation.

Discussion and Conclusion: Despite having similar ASES and SST scores, a smaller tear size and a lower incidence of biceps involvement, the age group under 50 reported lower post-operative satisfaction. No objective findings could be

identified to explain this decrease in satisfaction in patients less than fifty, but it is possible that these patients have higher expectations and/or higher functional demands post-operatively that lead to a decrease in satisfaction.

Notes:

12:44 pm – 12:50 pm

A Positive Tangent Sign Predicts the Repairability of Rotator Cuff Tears

Michael J. Kissenberth, MD
Richard J. Hawkins, MD
Gabriel J. Rulewicz, MD

Hypothesis: We hypothesize that patients with a positive tangent sign will have rotator cuff tears that are not able to be repaired primarily.

Methods: We did a retrospective review of the charts of patients who had undergone surgery for repair of a rotator cuff tear. The operative note was reviewed to determine if the cuff tear was primarily repaired. The MRI of each patient was reviewed to assess for a positive or negative tangent sign. The reviewer was blinded to the result of each measurement.

Results: Eighty one patients met inclusion criteria. Of the 81, 18 exhibited a positive tangent sign and 16 were deemed irreparable. The Cramér's V yielded a correlation of 0.85; p value < 0.05, which is nearly perfect. There was only 1 instance of a False Negative finding (negative Tangent sign, irreparable rotator cuff) for the Tangent sign and 3 instances of a False Positive finding (positive Tangent sign, repairable rotator cuff). The binary logistic regression findings suggest that those with a positive Tangent sign are 310 (95%CI-30.1, 3193.7) times more likely than those with a negative Tangent sign to have a rotator cuff tear that is not primarily repairable.

Conclusion: Our results showed that in patients with a positive tangent sign, the rotator cuff tear is 310 times more likely not to be repairable primarily than in patients with a negative tangent sign. The tangent sign is an easily performed and reproducible tool with good intraobserver and

interobserver reliability which is a powerful predictor of whether a rotator cuff tear will be repairable or not.

Notes:

12:50 pm – 12:56 pm

Outcomes of Ulnar Shortening Osteotomy for the Treatment of Ulnar-Sided Wrist Pain

W. Ryan Mitchell, MD
Frederick N. Meyer, MD

Introduction: This retrospective study investigated the long-term outcome of ulnar shortening osteotomy for the treatment of ulnar-sided wrist pain as well as union of the osteotomy site. The etiology of this pain included but was not limited to ulnar-carpal abutment, ulnar-lunate impingement, triangular fibrocartilage complex (TFCC) tears, Volar Intercalated Segment Instability (VISI) deformities or luno-triquetral instability.

Methods: Thirty-one patients who underwent ulnar-shortening osteotomy were respectively reviewed from 2001-2010. Patients presented complaining of ulnar-sided wrist pain. Plain radiographs, MRI, or diagnostic wrist arthroscopy confirmed the diagnosis. Conservative treatment included immobilization, NSAID medication, occupational therapy and corticosteroid injection. Surgery was performed if conservative measures failed to provide adequate pain relief. Mean age at surgery was 38 years, 4 months (17 years – 68 years). Mean duration of follow-up was 12 months (3 months – 64 months). Outcome was considered successful if there was significant improvement of ulnar-sided wrist pain and radiographic union of the ulna at the osteotomy site.

Results: Five of the thirty-one patients were lost to follow up. Twenty-four patients went on to union at an average of 5.8 months (5 weeks to 16 months) with two patients requiring the use of a bone-growth stimulator. Two patients developed nonunion. One patient developed tendonitis of the extensor carpi ulnaris secondary to the plate and required removal following union. Of the twenty-six patients, twenty-two (85%) reported an improvement in pain following osteotomy. Two patients (8%) reported no

change in pain while two patients (8%) said pain became worse – especially with repetitive motion, lifting, and gripping.

Discussion and Conclusions: Ulnar-shortening osteotomy achieved good pain relief for ulnar-sided wrist pain with 93% union at the osteotomy site. We recommend ulnar shortening osteotomy as an option for providing good pain relief and improved function for many causes of ulnar sided wrist pain.

Notes:

12:56 pm – 1:02 pm

Locked Intramedullary Total Wrist Arthrodesis

Jorge L. Orbay, MD
Eric Feliciano, BS
Maria-Carolina Orbay, BS

Introduction: Total wrist arthrodesis is commonly performed using fixation plates, which can produce soft tissue irritation, often require removal and limit the ability to position the hand in space. A new intramedullary total wrist fusion device has recently been introduced and is designed to provide stable fixation while avoiding the problems associated with plates. Radial and metacarpal locked intramedullary nails are inserted and joined by a connector. Desired hand placement is achieved by selecting the proper connector length and angle, then orienting it appropriately. Fusion mass compression is obtained by virtue of longitudinal threads on the radial nail that allow for length adjustment.

Methods: 7 wrists in 3 men and 4 women were treated with this device and followed for a minimum of 24 weeks. In all cases, local cancellous bone graft was used and the third CMC joint incorporated into the fusion. The median age was 49 (range, 28-71) years. Indications for fusion were 2 post-traumatic arthritis, 3 rheumatoid arthritis, 1 spastic deformity and 1 infection. Patients were evaluated before surgery and at final follow-up using the Fernandez pain score and grip strength measurements using a hand held dynamometer.

Results: All patients improved their grip strength and decreased their pain scores. All fusions united and none of the patients presented dorsal soft tissue problems nor required implant removal. One rheumatoid patient required secondary surgery for removal of a retained palmar osteophyte.

Discussion and Conclusion: This device delivers stable fixation, facilitates hand placement and does not require removal.

Notes:

1:02 pm – 1:08 pm

Treatment Outcomes of Acute Middle Third Clavicle Fractures Following Fixation with a 2.7 mm DC Plate: A Retrospective Analysis

John A. Tanksley, MD
David A. Hamilton Jr., MD
Stephanie L. Tanner, MS
Jeffrey B. Selby, MD
Raymond D. Wright Jr., MD
Brandon T. Bruce, MD
Eric S. Moghadamian, MD
J. Scott Broderick, MD

Introduction: This is a retrospective review of midshaft clavicular fractures and nonunions treated with 2.7 mm dynamic compression plates (DCP).

Methods: Ninety-seven patients (ninety-eight clavicles) underwent ORIF using 2.7mm DCP for acute midshaft clavicle fractures or non-unions at two level 1 trauma centers. One utilizes anteroinferior plate placement (45), and one utilizes superior plate placement (52). We reviewed medical records and radiographs to assess complication rates, radiographic healing, and fixation failure.

Results: Average age was 34 years (range 15-84) and 68.8% were male. Plate length ranged from 7 to 12 holes (60% were 12 hole). Clinical follow-up averaged 23 weeks (0-161). Sixty-three patients (sixty-four clavicles) completed recommended follow-up. Of these, all achieved radiographic union by an average of 19 weeks. No deep infections, non-unions or wound dehiscence were documented. In two cases fixation

failed (2/64, 3.1%). One in an obtunded patient who could not follow activity restrictions (anteroinferior placement). The other failure was in a patient with documented noncompliance to weight bearing restrictions (superior placement). Six plates in five patients (6/64, 9.4%, 3 anteroinferior, 3 superior) were removed due to symptomatic hardware. Patients who underwent plate removal had an average body mass index of 21.1 compared to 24.8 in patients whose plates were not removed.

Discussion and Conclusion: Operative treatment for clavicular fractures has reported rates of nonunion of 3%, wound infection or dehiscence of 5%, and irritating hardware requiring removal of 8%. Failure rates of 12% and plate removal rates of greater than 50% have been reported using 2.7mm plates. The low rate of failure, hardware removal, and complications in our series suggests that 2.7mm DCP in either anteroinferior or superior position are an effective option for treatment of clavicular fractures. However,

Notes:

1:08 pm – 1:14 pm

Outcomes of Biceps Tenodesis in an Active Duty Population

Jeremy M. Jacobs, MD
CPT Keith Jackson, MD
Joshua E. Pniewski, DPT
MAJ Brian Abell, DO
MAJ Terry L. Mueller, DO
LTC John A. Bojescul, MD

Introduction: Pathology affecting the long head of the biceps tendon and its insertion is a frequent cause of shoulder pain in an active duty population. While tenodesis of the biceps tendon is often employed to address conditions that are recalcitrant to nonoperative treatment, very little is known about postoperative functional and occupational outcomes among military service members. The purpose of this investigation was to evaluate the outcomes of biceps tenodesis in an active duty population.

Methods: A retrospective case series of 22 active duty service members who underwent biceps tenodesis between April 1, 2010 and May 31, 2011 at our institution was performed. All

subjects underwent subpectoral tenodesis at a single military institution by one of 3 surgeons. Shoulder Pain and Disability Indices (SPADI) and Disabilities of the Arm, Shoulder and Hand (DASH) scores were obtained preoperatively and at 6 months. Additionally a review of each subject's physical profile was performed 6 months after surgery to determine continued physical limitations and subject's ability to deploy. The primary outcomes were functional improvement as assessed by differences in pre and postoperative SPADI and DASH scores.

Results: 22 active duty personnel (male: 20, female: 2) met enrollment criteria. The average age of the population was 36.9 yrs. Mean preoperative SPADI and DASH scores were 47.9 and 40.4 respectively. These measures improved to 4.7 (SPADI) and 2.7 (DASH) at the 6 month visit. Though 5 subjects (22%) continued to have a restriction to performing pushups on the Army Physical Fitness Test, no subjects had sit-up restrictions and all were deemed deployable from a physical standpoint.

Discussion/Conclusion: The results of this review suggest that active duty personnel undergoing biceps tenodesis have significant functional improvement at 6 months. Additionally very few have long-term physical limitations or deployment restrictions.

Notes:

2013 Scientific Program Abstracts — Saturday Mediterranean Ballroom

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

Saturday, July 20, 2013

General Session 9: General Orthopedics/Foot & Ankle

Moderator: Ana K. Palmieri, MD

6:35 am – 6:41 am

Surgical Site Infection: A Comparison of Multispecialty and Single Specialty Outpatient Facilities

Michael Gottschalk, MD
Phillip Mitchell, BA
Geanie Butts, MA, ATC
John Xerogeanes, MD

Introduction: Reoperation secondary to surgical site infections can be a devastating complication in orthopaedic surgery. Infection rates in the ambulatory setting have been reported to be lower than those cited in a hospital setting. However, a direct comparative analysis of infection rates of orthopaedic procedures performed in a single specialty ambulatory surgical center (ASC) versus a multi-specialty ASC has, to our knowledge, not been performed. The purpose of this study was to directly compare the rates of deep infection in a single specialty versus a multi-specialty outpatient setting.

Methods: Four surgeons performed more than 10,000 orthopaedic surgeries in a multispecialty and single specialty ambulatory setting over 8 years. These procedures were reviewed for postoperative deep infection in accordance with CDC guidelines. There have been many variables associated with perioperative infections. This study has the unique ability to control for many of these variables such as patient preparation, patient comorbidities, and surgeon technique.

Results: The post surgical deep infection rate performed in a multi-specialty ASC was 0.81% in 2867 operations compared

with a rate of 0.38% in 7311 operations performed in a single specialty ASC which was found to be statistically significant at a p value of .007.

Discussion and Conclusions: Surgical site infections in orthopaedic procedures have been shown to increase cost, prolong hospitalization, and decrease health-related quality of life. Factors influencing the rate of SSI have been extensively studied and reported with both modifiable patient risk factors (smoking, diabetes, obesity, immunosuppression, etc.) and institutional factors (antimicrobial prophylaxis, UV light, hand scrubbing, hair shaving, and surgical duration). This study suggests that among the many factors which impact surgical site infection, the setting in which the operation takes place is another consideration which can be controlled by the surgeon to give the most optimal post-operative course and result.

Notes:

6:41 am – 6:47 am

The Relationship Between Residency Selection Criteria and Subsequent Performance in an Orthopaedic Surgery Residency

Amit Sood, MD
Tina Raman, MD
Paul Maloof, MD
Joseph Benevenia, MD
Wayne Berberian, MD

Introduction: Controversy remains as to which, if any, pre-residency selection factors will predict success during residency. The goal of our study is to focus on the pre-residency selection factors most commonly assessed at programs as pre-

dictors of success and examining whether these correlate with success as a resident.

Methods: Charts of 60 residents completing their orthopaedic residency at our institution from June 2001 to June 2010 were retrospectively reviewed. Pre-residency selection criteria examined included USMLE scores, MCAT scores, clinical clerkship grades, letters of recommendation, away rotations, AOA membership, 4th year sub-internship at our institution, and number of publications. Resident performance was assessed using ABOS Part I scores, OITE scores, Global Evaluation scores, and faculty rankings.

Results: AOA membership was associated with better performance on the Interpersonal Skills and Personal Appearance sections of Global Evaluations, and performance in the Medical Knowledge, Patient Care, and Teaching sections approached significance. Faculty ranked AOA residents significantly higher than non-AOA members within their classes. Residents scoring in the top quartile of the USMLE step II had significantly higher scores on the ABOS Part I and OITE exams, and greater scores on the Medical Knowledge section of Global Evaluations. The number of publications and abstracts published during medical school also had a positive correlation with performance in the Medical Knowledge section of Global Evaluations. The remaining pre-residency selection factors showed no correlation with success as a resident.

Discussion and Conclusion: Our results found greater USMLE step II scores and AOA membership to be associated with better performance as an orthopaedic surgical resident. We are the first to assess and find a correlation with USMLE step II scores and resident success and also the first to use an attending rank system from the input of multiple faculty members to assess resident success.

Notes:

6:47 am – 6:53 am

Intraoperative Monitoring of Epiphyseal Perfusion in Slipped Capital Femoral Epiphysis

Christopher R. Jones, MD
Timothy Schrader, MD
Adam Kaufman, MD

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

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

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

Discussion and Conclusion: Femoral head perfusion in patients with SCFE can be measured intra-operatively using this technique. Demonstrating perfusion before leaving the operating room has correlated with the absence of AVN post-operatively. Our pressure monitoring technique has application beyond SCFE; it is applicable in the orthopaedic trauma setting for AVN prone fracture sites such as the talar neck, femoral neck, proximal humerus or proximal scaphoid. If the pressure monitoring system indicates poor flow, the surgeon can tailor the operative plan appropriately (i.e. hemiarthroplasty for an elderly patient with a femoral neck fracture as opposed to cannulated screw fixation). Intra-operative ICP

monitoring data allows the surgeon to prognosticate outcomes and counsel patients accordingly.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 49).*

Notes:

6:53 am – 6:59 am

Prognosticators of Local Recurrence in High-Grade Soft Tissue Sarcomas: Hydrogen Peroxide as a Local Adjuvant

Adam N. Wooldridge, MD, MPH

Gregory P. Kolovich, MD, MPH

Martha K. Crist, RN

Joel L. Mayerson, MD

Thomas J. Scharschmidt, MD

Introduction: Soft-tissue sarcomas have a mortality rate of 40 – 60% with local recurrence being a poor prognostic factor for overall survival. 3% non-diluted hydrogen peroxide is hypothesized to be an effective local adjuvant. We sought risk factors for local recurrence in high-grade soft tissue sarcomas and asked whether hydrogen peroxide as a local adjuvant reduced the risk of local recurrence and surgical site infection.

Methods: Retrospective data were collected on 106 patients surgically treated for high-grade soft tissue sarcomas from 2002-2010. The primary endpoint was local recurrence. Associated risk for local recurrence was determined using multi-variable logistic regression.

Results: There were 18 incident cases of local recurrence (16.98%). Predictors of local recurrence included margin status, estimated blood loss, and histology (MPNST) with hazard ratios of 4.44 (95%CI 1.32, 14.95), 1.19 (95%CI 1.06, 1.35), and 9.21 (2.11, 40.16), respectively. Hydrogen peroxide yielded a statistically insignificant improvement in local recurrence with a hazard ratio of 0.81 (95%CI 0.27, 2.48) and reduced risk of surgical site infection with a hazard ratio of 0.52 (95% CI 0.15, 1.81)

Discussion and Conclusion: Margin status, increased blood loss, and histologic subtype are associated with increased risk

of local recurrence. The use of hydrogen peroxide improved local control and infection rates, but did not reach statistical significance.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 49).*

Notes:

6:59 am – 7:05 am

Muscle Viability Revisited: Are We Removing Normal Muscle? A Critical Evaluation of Dogmatic Debridement

Adam Sassoon, MD, MS

John Riehl, MD

Amy Rich, MD

Joshua R. Langford, MD

George J. Haidukewych, MD

Gary S. Pearl, MD, PhD

Kenneth Koval, MD

Purpose: Surgeon determination of muscle viability during debridement is an egregiously subjective process with potentially significant long-term functional consequences. The foundation for our current practice of grossly evaluating muscle color, consistency, contractility, and capacity to bleed (the 4 C's) was established based on the results of a rudimentary histopathologic study performed half a century ago. This work attempts to investigate these historical results using current histopathologic techniques.

Methods: Following IRB approval, 36 muscle biopsies were prospectively collected at a Level-1 trauma center by 4, fellowship-trained, traumatologists from 20 patients undergoing a debridement for open fracture (80.5%), compartment syndrome (11%), infection (5.5%), or soft-tissue injury (3%). The biopsies were obtained from the leg (56%), forearm (19%), arm (11%), ankle (8%), and thigh (6%). The treating surgeon graded the biopsies with respect the 4 C's and provided their impression of the overall viability of the biopsied muscle, rating it as healthy, borderline, or dead. Blinded pathologic analysis was performed on each biopsy specimen. Frozen section and paraffin embedded histologic preparations were evaluated

microscopically to determine the presence of edema, interstitial inflammation, myositis, and necrosis. Muscle fiber viability was determined using hemotoxin and eosin staining. Loss of normal cytologic architecture and fiber typing were assessed using trichrome and NADH staining, respectively. A correlation between surgeon impression and histopathologic diagnosis was sought.

Results: The surgeon's impression was dead muscle in 25 specimens, borderline in 10, and healthy in 1. Grading of muscle color yielded 20 purple, 10 brown, and 6 pink specimens. Thirty-three specimens were noted to be non-contractile, while three were contractile. Twenty-nine specimens demonstrated a friable consistency; the remaining 7 were firm. Twenty-eight specimens did not exhibit a capacity to bleed, while the remaining 8 did. Pathologic analysis of the 25 specimens considered dead muscle by the surgeon demonstrated normal muscle or mild interstitial inflammation in 14 specimens, moderate degenerative changes in 3, and varying degrees of necrosis in 8. Of the 10 specimens deemed borderline by the surgeon, 7 demonstrated normal muscle or mild interstitial inflammation, 2 demonstrated moderate degenerative changes, and 1 demonstrated necrosis. The single specimen thought to be healthy muscle by the treating surgeon was noted to have moderate degenerative changes on pathologic assessment.

Discussion and Conclusion: In the setting of acute trauma, a correlation between gross evaluation of the 4C's, and histopathologic appearance remains unsubstantiated. In 72% of specimens the treating surgeon's gross assessment differed from the histopathologic findings. Although the fate of the debrided muscle remains unclear if left in situ, these results raise important questions regarding current practices, including the possibility that experienced surgeons are debriding potentially viable muscle. A more objective means of assessing muscle viability should be investigated.

Notes:

7:05 am – 7:11 am

Fracture Displacement Following Initial Radiographs of Mid-Shaft Clavicle Fractures Changes Treatment Recommendation

Rebecca C. Whitesell, MD
Jason A. Lowe, MD
William Min, MD
Jeffrey Leary, MD
Rena Stewart, MD

Introduction: Operative indications for mid-shaft clavicle fractures (MCFs) are well defined (100% displaced, comminuted, elderly or female patients). Fracture displacement following initial radiographic evaluation however, is not described. The purpose of this study was to evaluate distance of fracture displacement between supine (trauma bay radiographs) and upright clavicle radiographs (UCRs) as well as determine if displacement on upright films changed treatment recommendations.

Methods: A retrospective radiographic (AP and Zanca) evaluation of all MCFs which presented to a single Level I trauma center from January 2008 through February 2012 was performed. Patients were divided into Group 1 (no UCRs) and Group 2 (UCRs). Fracture displacement was recorded on initial and all subsequent radiographs. A change in treatment recommendation based upon upright films was recorded.

Results: Three hundred and seventy mid-shaft clavicle fractures were identified, 299 without UCRs (group 1) and 71 (group 2). A total of 106 fractures (86 in group 1 and 20 in group 2) were nondisplaced on both the initial AP and Zanca (APZ) views. Group 1 (no UCRs) had 24(8%) and group 2 had 12(16.9%) fractures remain nondisplaced on both APZ views at the 2nd series of xrays. For the fractures that were initially nondisplaced and subsequently displaced at the second xray: the average displacement was 7.19mm +/- 7.66mm on AP and 7.83mm +/- 8.5mm on Zanca for group 1 and 4.31mm +/- 7.05mm on AP and 3.83 +/- 5.64mm on Zanca for group 2; the average percent displacement was 53% +/- 58% on AP and 60% +/- 67% on Zanca for group 1 and 28% +/- 44% on AP and 30% +/- 44% on Zanca for group 2. Group 1 had 180(60.2%) and group 2 had 44(62%) fractures initially treated nonoperatively. 11.4%(34) of group 1 and 19.7%(14) of group 2 initial non-operative fractures went on to operative treatment, most fre-

quently for displacement, at 49 versus 10.8 days, respectively.

Conclusion: UCRs improve one's ability to identify initially nondisplaced MCFs which will go onto displacement and potentially need operative management.

Notes:

Presidents' Resident Award Winner

7:11 am – 7:17 am

Outcomes After Total Ankle Replacement in Association with Ipsilateral Hindfoot Arthrodesis

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

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

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

Results: Mean patient follow-up was 3.2 years (range, 24-72 months). The SF-36 total and subscales, AOFAS hindfoot-ankle pain subscale, Foot and Ankle Disability Index, and SMFA Function and Bother scores were significantly improved at the most recent follow-up after TAR compared to pre-operative assessment, with no significant differences between the hindfoot arthrodesis and control groups. The AOFAS hindfoot-ankle total, function and alignment scores were significantly improved at the most recent follow-up

for both groups; the control group demonstrated significantly higher scores in all three scales. The control group demonstrated a significantly greater improvement in VAS pain score when compared with the hindfoot arthrodesis group. Walking speed, sit-to-stand time, and four-square step-test time were significantly improved for both groups at each post-operative time point, albeit with the hindfoot arthrodesis group completing these tests significantly slower than the control group. Outcomes and implant survivorship were not significantly different between the two groups.

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

Notes:

7:17 am – 7:23 am

Early to Mid-Term Outcomes of Fixed-Bearing Total Ankle Using a Modular Intramedullary Tibial Component

Samuel B. Adams Jr., MD, PhD
 *Robin M. Queen, PhD
 Constantine A. Demetracopoulos, MD
 Mark E. Easley, MD
 James K. DeOrio, MD
 James A. Nunley II, MD

Introduction: Modern prosthetic designs have contributed to an increase in the use of total ankle arthroplasty (TAA) for the treatment of ankle arthritis. One prosthesis employs a modular intramedullary tibial component. Our aim was to determine outcomes of patients who underwent TAA using this prosthesis.

Methods: All patients who underwent TAA with a fixed-bearing total ankle arthroplasty using a modular intramedullary tibial component from June 2007 to December 2010 were enrolled in this study. Pre-operatively and at all post-TAA visits, we assessed patients with the VAS for pain and the SF-36, AOFAS, and SMFA scores. To assess function, we measured walking speed and asked each patient to complete the Four Square Step Test (4SST), Timed Up and Go (TUG) test, and Sit-To-Stand (STS) test pre-operatively, and at 1 and 2 years post-operatively. Pre-operative deformity and correction of deformity after TAA was also assessed. Clinical, functional, and radiographic measurements were analyzed using repeated measures ANOVAs with post-hoc testing.

Results: We identified 214 consecutive patients with a mean age of 63.9 years (range, 23-88) and a mean follow-up of 3.7 years (range, 2.3-5.4 years). Patients demonstrated a significant improvement in VAS, SF-36, SMFA, and AOFAS scores at 1 year and at final follow-up. Functional testing, including walking speed, STS, and 4SST scores significantly improved from pre-operative to 1-yr, and 1-yr to 2-yr follow-up. The mean tibiotalar angle significantly improved postoperatively and this correction was maintained until final follow-up. There was a 13.1% incidence of wound complications. The incidence of re-operation was 10.7%, and the incidence of revision was 8.4%.

Discussion and Conclusion: Patients demonstrated significant improvement in radiographic, functional, and patient reported outcome scores at a mean of 3.7 years of follow-up. Compared to available literature on TAA, the incidence of wound complications, re-operation, and revision in our study is similar to other prostheses.

Notes:

7:23 am – 7:29 am

Allograft Reconstruction of Irreparable Peroneal Tendon Tears

William R. Mook, MD
James A. Nunley II, MD
Selene G. Parekh, MD, MBA

Background: Peroneal tendon injuries are a significant, but underappreciated source of lateral ankle pain. Partial thickness tears that are amenable to direct repair techniques are common. Irreparable tears are uncommon and require more complex surgical decision making. Intercalary segment allograft reconstruction has been previously described as treatment option; however, there are no reports of the outcomes of this technique in the literature. We describe our technique and present our results utilizing this method.

Methods: A retrospective chart review was conducted and charts were evaluated for details of patients' mechanism of injury, concomitant operative procedures, pertinent radiographic findings, pre- and post-operative physical exam, intercalary graft length, medical history, visual analog scores for pain (VAS), Short Form-12 (SF-12) physical health survey, Lower Extremity Functional Scores (LEFS), and complications.

Results: Eleven patients with peroneal tendon ruptures requiring reconstruction were identified. Mean follow-up was 13 months (range, 6-31). The average length of the intercalary segment reconstructed was $12\text{cm} \pm 3.9$ (range, 8-20). The average post-operative VAS decreased to 0.8 ± 1.4 ($p = 0.0004$). No patient had a higher post-operative pain score than pre-operative pain score. Average post-operative eversion strength improved to 4.68 ± 0.46 ($p = 0.003$). The average SF-12 survey improved to 45.7 ± 7.5 ($p = 0.03$). The average LEFS improved to 91.53 ± 8.8 ($p = 0.00001$). Four patients experienced sensory numbness in the sural nerve distribution, and two of these were transient. There were no postoperative wound healing complications, infections, tendon re-ruptures, or re-operations. No allograft associated complications were encountered. All patients returned to their preoperative activity levels.

Discussion/Conclusion: Allograft reconstruction of the peroneal tendons can improve strength, decrease pain, and yield satisfactory patient reported outcomes. This can be done without incurring the deleterious effects associated with tendon transfer procedures. Allograft reconstruction may be a safe and reasonable alternative in the treatment of irreparable peroneal tendon ruptures and warrants further investigation.

Notes:

Saturday, July 20, 2013

General Session 10: Arthroplasty

Moderator: Andrew A. Shinar, MD

8:30 am – 8:36 am

Fixation, Survival and Dislocation of Jumbo Acetabular Components in Revision Hip Arthroplasty

Paul F. Lachiewicz, MD
Elizabeth S. Soileau, BSN

Introduction: Acetabular revisions using jumbo components (Mayo definition: 62mm or larger in females and 66mm or larger in males) offer distinct advantages in revision THA with notable acetabular bone loss. There is little data on the long term survival and complications of these components.

Methods: Using a single surgeon database of 129 revision THA with jumbo components, we asked the following questions: (1) What is the incidence of infection, aseptic loosening, and reoperation? (2) What is the 10- and 15-year survival of jumbo components and are there any factors related to survival? (3) What is the incidence of and factors related to post-operative dislocation? Of a total cohort of 129 jumbo revisions, there were 109 hips (102 patients) followed for a mean of 8.1 years (range 2-20 years). The clinical results were evaluated with the Harris hip score and standard radiographic analysis for loosening and osteolysis. Kaplan-Meier survivorship at 10- and 15-years was calculated for the entire cohort.

Results: Four (3.1%) jumbo components were removed for infection and four hips (3.1%) had aseptic loosening. Reoperation for any reason occurred in 20 hips. With failure defined as cup revision for aseptic loosening or radiographic loosening, the 10- and 15-year survival was 97.3% and 82.8% respectively. With failure defined as cup removal for any reason, the 10- and 15-year survival was 93.8% and 79.8% respectively. There was no significant association between Paprosky grade, type of component, or patient characteristics and failure. Dislocation occurred in 12 hips overall (10%) and three had reoperation. Head size > 32-mm had a significantly lower risk of dislocation.

Discussion and Conclusion: Jumbo acetabular components with screw fixation have a low rate of infection and loosening after revision THA. Mechanical failure increases in the second decade. The most common complication, dislocation (10%) is

significantly associated with head sizes smaller than 32 mm. The author now recommends an enhanced surface, multiple screws and 32mm or 36mm femoral head for all jumbo acetabular revisions.

Notes:

8:36 am – 8:42 am

Impact of Socioeconomic Factors on Results of Total Knee Arthroplasty

Ryan M. Nunley, MD
Erin L. Ruh, MS
John C. Clohisy, MD
Adolph V. Lombardi, MD, FACS
Keith R. Berend, MD
William G. Hamilton, MD
Craig J. Della Valle, MD
Javad Parvizi, MD, FRCS
Robert L. Barrack, MD

Introduction: Predictors of outcomes of total knee arthroplasty (TKA) have focused primarily on surgical technique, implant details, and individual patient clinical factors. The relative importance of these factors compared to patient socioeconomic status is not known. Little data exists regarding the impact of socioeconomic factors on the results of current TKA.

Methods: A multicenter survey was conducted with patients age 18-60 who underwent TKA for non-inflammatory arthritis at one of five orthopedic centers. Data were collected by an independent third party with expertise in collecting health care data for state and federal agencies.

Results: Demographic and socioeconomic data were collected on 661 patients (average age 54; 61% female) 1-4 years following modern primary TKA. We looked at a specific series of questions regarding pain, function and satisfaction after TKA and examined the following socioeconomic factors: minority status, gender, household income, education, and employment status. Multivariate analysis was conducted to examine the relative importance of socioeconomic factors for each outcome of interest. Patients from households reporting < \$25,000 were worse than higher income households in nine

of ten satisfaction and clinical outcome questions. Females were worse on five questions and minority patients were worse on three questions. Patients who were not employed in the three months prior to surgery were worse in only one area. There were no differences in response to any question based on education.

Discussion and Conclusion: The results of this study indicate that socioeconomic factors may affect patient perception of TKA and are at least as important as implant type in determining outcomes following TKA.

Notes:

8:42 am – 8:48 am

Correlation of Economic Factors and Outcomes in Total Knee Arthroplasty

Carlos J. Lavernia, MD, FAAOS
Jesus M. Villa, MD
David A. Iacobelli, MD

Introduction: Costs and charges in TKA have received a lot of attention in the literature. How they relate to patient demographics, psychosocial measures, and functional measures pre and postoperatively is not clear. Our objective was to analyze the relationship between patient demographics, financial data, and psychosocial and functional measures for unilateral TKA patients.

Methods: 131 consecutive unilateral TKA patients (mean age 71.8 years; 72.5% women) were studied. Financial information extracted from the hospital's accounting software included charges, direct costs, and indirect costs. Each patient was administered the QWB, SF-36, and WOMAC. Functional measures included the Hospital for Special Surgery scale (HSS) and the Knee Society Function Score (KSFS). Data were collected pre-operatively and at 3, 6, 12, and 24 month follow-up. Pearson-product moment correlations were used to evaluate the relationship between variables. T-tests were used to assess the effects of gender and ethnicity. A p-value of less than 0.05 was considered significant.

Results: A significant inverse relationship was found between cost and functional data at all-time points. This finding was

strongest at three month follow-up. At three months, the HSS and KSFS were significantly correlated with: charges (HSS, $r = -0.41$; KSFS, $r = -0.46$), direct costs (HSS, $r = -0.47$; KSFS, $r = -0.46$), and indirect costs (HSS, $r = -0.36$; KSFS, $r = -0.44$). The QWB score at the 2-year follow-up was significantly inversely correlated with: charges ($r = -0.42$), direct costs ($r = -0.40$), and indirect costs ($r = -0.39$).

Discussion and Conclusion: Our results demonstrate that psychosocial and functional outcomes are associated with the financial aspects of TKA. Worse outcomes are associated with higher charges and costs.

Notes:

8:48 am – 8:54 am

Quantifying the Cost-Effectiveness of All-Polyethylene Tibial Components in Total Knee Arthroplasty

James A. Browne, MD
Wendy M. Novicoff, PhD
Tanya N. Wanchek, JD, PhD

Introduction: The importance of cost control in total knee arthroplasty is increasing secondary to the changing economic realities of healthcare and the increasing prevalence of joint replacement. Surgeons play a critical role in cost containment and may soon be incentivized to make cost-effective decisions under proposed gainsharing programs. The purpose of this study was to examine the cost-effectiveness of all-polyethylene tibial components and to determine what difference in revision rate would make modular metal-backed tibial implants a more cost-effective intervention.

Methods: Markov models were constructed using variable implant failure rates using previously published probabilities. Cost data was obtained from our institution and published U.S. implant list prices and modeled with a 3% discount rate. The decision tree was continued over a 20-year time frame.

Results: Using our institutional cost data and model assumptions with a 1% annual failure rate for metal-backed implants, an annual failure rate of 1.6% for all-polyethylene components would be required to achieve equivalency in cost. Over a

20 year period, a failure rate of over 27% for the all-polyethylene tibial component would be necessary to achieve equivalent cost compared to the proposed failure rate of 18% with metal-backed components.

Discussion and conclusion: The all-polyethylene tibial component is cost-saving if the excess cumulative revision rate is less than 9% higher at 20 years compared to the metal-backed implant. Surgeons, payers, and hospitals should consider this data when considering their selection of implants. Consideration should also be given to the decreased utility associated with revision surgery.

Notes:

Resident Travel Grant Award Winner

8:54 am – 9:00 am

Infection Rate in Total Knee Arthroplasty in “High Risk” Patients Using Antibiotic Bone Cement: Preliminary Results

Rabah Qadir, MD
Sanbir S. Sidhu, BA
George F. Chimento, MD
John L. Ochsner Jr., MD
Mark S. Meyer, MD

Introduction: Deep infection after knee arthroplasty is a devastating complication with estimated costs at over \$55,000/case. Antibiotic-Laden Bone Cement (ALBC) has been proposed as a preventive measure to decrease post-operative infections. Its efficacy has been compared with plain bone cement (PBC) in multiple studies. There has been no study examining its efficacy in “high risk” patients. The purpose of this study is to compare infection rates in: (1) all patients receiving only PBC, (2) all patients receiving only ALBC, and (3) only “high risk” patients receiving ALBC.

Methods: A standard cement protocol was instituted at our hospital for primary TKA. From January 2000-2005 all TKAs were performed with PBC. From February 2005-May 2010, all were performed with ALBC. From June 2010-March 2012, all patients received PBC unless they had previous diagnoses of RA, obesity, and/or diabetes mellitus. Our institutional joint

registry was queried and individual charts were retrospectively reviewed. Infection rates amongst cohorts were compared at 1, 6, and 12 months from surgery date utilizing two-sided proportion tests.

Results: A total of 3,292 consecutive primary TKAs were included. Infection rate at 12 months for the entire study was 0.45%. There were 1,026 patients who received PBC, 1486 ALBC, and 780 in the risk-stratified cohort. The 1-month infection rates for cohorts 1, 2, 3 were .039%, 0.27%, and 0.26% respectively. The 6-month infection rates for cohorts 1, 2, 3 were 0.49%, 0.54% and 0.38% respectively. The 12-month infection rate for cohorts 1, 2, 3 were 0.78%, 0.74%, and 0.38% respectively. The difference in infection rates between cohorts was not statistically significant at any time interval.

Conclusions: ALBC does not decrease infection rates for primary TKA. Even risk-stratified usage of ALBC may be unnecessary and add undue costs to both the patient and hospital, without appreciable benefit.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 49).*

Notes:

9:00 am – 9:06 am

Direct Anterior Approach vs Posterior Approach in Restoring Leg-Length and Offset in Primary Total Hip Arthroplasty

Michael D. Smith, MD
George Guild, MD
Dell C. McLaughlin
Greg Erens, MD
Thomas Bradbury

Introduction: The optimum surgical approach to facilitate early recovery, increase component accuracy, restore anatomy, and maximize functional outcome in total hip arthroplasty is currently debated.

Methods: 71 consecutive patients who underwent total hip arthroplasty for osteoarthritis of the hip using a direct anterior approach on an orthopaedic table with intraoperative fluoros-

copy were identified and compared to 71 patients who underwent primary total hip arthroplasty using the traditional posterior approach. Appropriate placement of the femoral and acetabular components with restoration of offset and length was confirmed with intraoperative fluoroscopy in the anterior approach cohort whereas indirect methods including intraoperative landmarks and templating were used to determine appropriate restoration of leg length and offset in the posterior cohort. The postoperative change in leg length and offset were measured using the preoperative and postoperative anteroposterior pelvic radiographs. The mean difference and standard deviations of the leg length and offset differences were compared between the two cohorts.

Results: In the direct anterior approach cohort, the mean change in leg length was -0.3mm and the mean change in offset was -1.7mm. In the posterior cohort, the mean change in leg length was 2.0mm and the mean change in offset was -1.4mm. Using the Wilcoxon-Mann-Whitney test to compare the cohorts, there was no statistical difference for leg length ($P = 0.2298$) and offset ($P = 0.4737$).

Conclusion: Primary total hip arthroplasty performed via the direct anterior approach with intraoperative fluoroscopy to confirm accurate placement of femoral and acetabular components produces similar accuracy in restoring leg length, offset and stability when compared to hip arthroplasty performed via the posterior method.

Notes:

9:06 am – 9:12 am

Tritanium Jumbo Cups in Revision Total Hip Arthroplasty with Major Acetabular Defects: A New Look

Morteza Meftah, MD

*Chitranjan S. Ranawat, MD

Amar S. Ranawat, MD

Matin Lendhey, MS

Introduction: Current challenges in revision THA with severe bone loss include accurate assessment of severity of bone loss and presence pelvic discontinuity, removal of prior implant without further damage to the remaining bone, and to

achieve a stable socket fixation against the bleeding bone. Tritanium jumbo cups (58 millimeter diameter or larger), theoretically have lowered the percentage of bleeding bone that is required for osseointegration, fixation and stability and can be used in severe acetabular defects. However, safety and efficacy of these cups is not yet established. The purpose of our study was to 1) assess the safety and efficacy of tritanium jumbo cups in revision total hip arthroplasty in patients with major acetabular defects, especially Paprosky type IIIa and IIIb, 2) analyze the stability and extent of osseointegration with these implants, and 3) present a new classification of acetabular defects.

Methods: From February 2007 and August 2010, 28 consecutive hips (26 patients) underwent acetabular revision arthroplasty using tritanium jumbo cups. 28 consecutive hips in 26 patients, with mean age of 69 years received jumbo cups larger than 58mm for treatment of Paprosky type IIIa and IIIb acetabular defects. 14% of the hips had pelvic discontinuity.

Results: There was no intra-operative fracture and initial stability was achieved in all hips, supplemented by screws. Tantalum augments were not used in any of the cases. At mean follow-up of 4 years, there were no failures due to loosening or cup migration. Radiographic assessment showed osseointegration in all cups, ranging from 30% to 75% of the cup surface area as assessed in both anteroposterior and false profile views in Charnley zones I through VI.

Discussion and Conclusion: Since pelvic discontinuity can change the management of revision THA, we propose the following simplified classification system: —Class 1: No pelvic discontinuity is present, with various degree of bone loss: non-cemented jumbo can be used to wedge between AHS, ischial tuberosity, and the tear-drop/pubis bone. In severe medial bone loss, bone graft is used in non-bleeding areas. There is no need for cemented fixation, bulk bone graft, or use of superior tantalum wedges. —Class 2: Pelvic discontinuity is present. The surgeon has choice of using jumbo cups, fixing the discontinuity using posterior plate first, or utilizing cup/cage combination. —Class 2-A: Chronic discontinuity: jumbo cup can be used to stretch the fibrous tissue and achieve a wedge fixation, especially in failed cemented sockets. In the failed cemented cups, the condensation of interface bone due to osteolysis provided an ideal wedge interference-fit fixation. —Class 2-B: Acute discontinuity due to fracture and osteolysis: A posterior plate and/or cup/cage combination can be used to reduce the fracture. This can be a non-cemented fixation with dome and ischial screws. Morselized bone graft should be used in the areas of non-bleeding bone. tritanium cup/screw construct

provided reproducible osseointegration results for significant acetabular bone loss, Paprosky IIIa and IIIb, in revision total hip arthroplasty.

Notes:

9:12 am – 9:18 am

Dynamic Balance Differences Between Isolated TKA Patients and Patients with Multiple Arthroplasties One Year Following TKA

Robin M. Queen, PhD
Samuel S. Wellman, MD
David E. Attarian, MD
Michael P. Bolognesi, MD
Robert J. Butler, DPT, PhD

Introduction: Total Knee Arthroplasty (TKA) is a significant lower extremity surgery that requires rehabilitation to return a patient to community ambulation. Currently available literature is lacking regarding the differences in function following primary TKA versus patients with multiple joint arthroplasties.

Methods: Data from fifty (36 single surgery (SINGLE), 14 multiple surgery(MULTI)) patients were included in this study. All of the patients were at least six months removed from the most recent TKA. The multiple surgery group had a history of contralateral TKA or total hip arthroplasty (THA) and/or ipsilateral THA. In order to be included in the study all patients were required to complete 10 seconds of independent single leg stance on each limb. Then subjects underwent a dynamic balance test using the Lower Quarter Y Balance Test protocol. Normalized maximum reach scores in each direction were determined as well as the composite score (average across reach directions). Reach asymmetry was also examined for each reach direction. Data were analyzed using a two-way ANOVA across each of the reach directions and the composite score. In addition, one way ANOVA were used to analyze reach asymmetry scores.

Results: No differences were apparent for the independent reach directions; however, in the SINGLE there was a greater composite score on the non-surgical side compared to the sur-

gical side while there was no bilateral difference in the MULTI. Interestingly, reach asymmetry was only different for the posteromedial direction (SINGLE:6.0 cm, MULTI: 3.2 cm).

Conclusion: Patients following multiple TKA surgeries should not exhibit lower dynamic balance scores than patients following a single TKA, however, greater asymmetries are observed in the SINGLE group when compared with the MULTI. Standardizing dynamic balance expectations following TKA may assist with optimizing outcomes following TKA.

Notes:

9:18 am – 9:24 am

Static Balance Differences One Year Following a Single Joint Arthroplasty Compared to Patients Following Multiple Joint Arthroplasties

Robert J. Butler, DPT, PhD
Michael P. Bolognesi, MD
Samuel S. Wellman, MD
C. Lowry Barnes, MD
Robin M. Queen, PhD
David E. Attarian, MD

Introduction: To date, little is known about how multiple joint replacement surgeries (TJR) affects static balance. It is hypothesized static balance will be lower in patients following multiple TJR (MULTI) compared to patients recovering from a single surgery (SINGLE).

Methods: Data from 312 (241 single surgery, 71 multiple surgery) patients were included in this study. All of the patients were at least six months removed from the most recent TJR (139 THA, 172 TKA). The MULTI group included any patients with a history of TJR at the knee or hip on either side and excluded all revision TJR patients. Data on single leg stance (SLS) of all patients was collected in a clinical setting during a typical physician visit. The patient was asked to maintain SLS for 10 seconds on each leg. If the patient was unable to accomplish this task then SLS time for each leg was recorded. Chi-square analysis was utilized to determine if

there was a similar ratio of patients who met the 10 second criteria between the groups. Additional analysis in the patients who could not complete the task was conducted in order to identify if differences existed in bilateral stance ability using a two-way ANOVA.

Results: Patients following MULTI (50%) exhibited a lower pass rate than following a SINGLE (66%) on the 10 second SLS test. For the patients who could not meet the 10 second criteria, no difference existed between the MULTI and SINGLE surgery groups and no differences in these groups were apparent between the surgical and non-surgical sides.

Conclusion: In general, patients in the MULTI group have poorer static balance. Standardizing a goal for static balance during rehabilitation may facilitate improving these relatively poor functional outcomes which are far below the normative value of 26 seconds in this age group.

Notes:

Saturday, July 20, 2013

General Session 12: Sports Medicine/Trauma

Moderator: Claude T. Moorman III, MD

10:55 am – 11:01 am

Functional Deficits Remain from 6 to 12 Months Following ACL Surgery

Robert J. Butler, DPT, PhD
William E. Garrett Jr., MD, PhD
Dean C. Taylor, MD
Robin M. Queen, PhD

Introduction: Approximately 175,000 ACL reconstructions (ACL-R) are performed yearly to restore function and normalize mechanics following ACL injury. There are no standard functional criteria for returning patients to sport participation. Therefore, it is important to identify appropriate tests that may be beneficial in assessing patient function following ACL-R.

Methods: Eight subjects were tested on a series of functional tests at 6 and 12 months following ACL-R. Data were

collected on the Functional Movement Screen (FMS) and the Lower Quarter Y Balance Test (YBT-LQ, surgical and non-surgical leg). The FMS is a test of 7 different fundamental movements. Performance on the 7 tests is summed to provide a composite score out of 21 possible points. YBT-LQ data were recorded on the both limbs and scores were normalized to limb length (%LL). Performance on these tests were analyzed using dependent samples t-test to examine changes in scores between 6 and 12 month after ACL-R ($\alpha=0.05$). In addition, results from this cohort were compared to established normative values using one-sample t-tests.

Results: No statistically significant changes existed for the composite FMS score and YBT-LQ composite score on the surgical or non-surgical limb over the course of 6 months. The functional testing values in this ACL-R cohort at 12 months were significantly lower than currently established values in the literature for uninjured control subjects (CON) (YBT-LQ – CON: 100.7 ± 7.5 , ACL-R: 93.3 ± 7.4 ; FMS – CON: 15.4 ± 2.3 , ACL-R: 13.1 ± 2.7).

Conclusions: ACL-R patients did not display any improvements in functional testing from 6 to 12 months following surgery. It is clear that patients at 12 months following ACL reconstruction have not achieved normal movement competency for single body weight tasks when compared to the general population. Improving these basic movement strategies may be helpful in improving overall movement ability and decreasing injury risk following ACL-R.

Notes:

11:01 am – 11:07 am

Elbow Extension ROM Loss Is Protective of Injury in Youth Baseball Pitchers

Michael J. Kissenberth, MD
Charles A Thipgen, PhD, PT, ATC
Lane B. Bailey, DPT, CSCS
Richard J. Hawkins, MD
Ellen Shanley, PhD, PT, OCS, CSCS

Purpose/Hypothesis: Shoulder ROM predicts arm injury in adolescent and professional pitchers. However, our recent

studies suggest these same measures do not predict arm injuries in 8-12 y/o (youth) pitchers. The purpose of this study was to identify the ability of elbow ROM to prospectively predict arm injury in youth pitchers.

Methods: 40 asymptomatic youth pitchers (age=9.9±1) who were participating without restriction. Two trials of bilateral shoulder external (ER) and internal (IR) rotation, horizontal adduction (HA), and elbow extension (EE) ROM was assessed in supine prior to initiation of spring season. ROM deficits were calculated as the non-dominant (ND) arm value-dominant (D) arm value. Shoulder and elbow injuries were prospectively tracked for each athlete. One-way ANOVA was utilized to examine the mean differences between the injured and uninjured pitchers. Receiver Operating Curves (ROC) were then calculated for those variables that displayed between group mean differences. ROC are used to identify athletes who based on a ROM cut score were at high-risk versus those at low risk for injury. Statistical significance was set a priori (minimum Area Under the Curve (AUC)=0.60 and $\alpha=0.05$).

Results: 14 time-loss injuries requiring at least one game absence were observed. There were no significant differences for any shoulder ROM values or side to side deficits between injured and uninjured pitchers. There was not a significant difference between dominant EE between injured ($6\pm6.7^\circ$) and uninjured ($7\pm9.5^\circ$) pitchers. However, an EE deficit was significantly different between the injured and uninjured ($3\pm4.3^\circ$ vs $7\pm5.3^\circ$) pitchers. The ROC indicated that EE deficit (5.1°) was able to distinguish between injured and uninjured pitchers (AUC=0.73).

Conclusion: There appears to be different risk profiles for pitchers across age groups. EE deficits as the apparent result of reactive tissue changes in youth pitchers may be protective of overuse arm injuries. A larger sample with a longer follow-up period may aide in the clarification of the best ROM measures as screening tools to predict arm injury across age groups.

Notes:

11:07 am – 11:13 am

Effect of Pitching Restrictions and Mound Distance on Youth Baseball Pitch Counts

Nicholas A. Kenney, MD
Scott D. Mair, MD
Timothy L. Uhl, PhD, ATC, PT
Joshua R. Johnson, MD
Robert Ullery, MS, ATC
Robert G. Hosey, MD

Introduction: Overuse injuries among skeletally immature throwing athletes are well documented within the literature and have been directly linked to higher pitch counts. In order to limit pitches, Cal Ripken Baseball imposes a 6 inning/week restriction while Little League Baseball has a maximum of 75 pitches in one outing. Both traditionally utilize a 46 ft pitching mound distance, but some leagues use an alternative 50 ft mound distance. The goal of this study was to evaluate the impact of different pitching limits and mound distances on season pitch counts among youth throwers.

Methods: Season pitch count data was collected from three different leagues, (A), (B), and (C). (A) has 85 pitches/ week restriction, while (B) and (C) have 6 innings/week rule. (A) and (C) have a 46 ft mound distance while (B) has a 50 ft distance. A league average for pitch counts and innings pitched was then calculated from the three highest volume pitchers from each team (n=84), and compared utilizing ANOVA with Bonferroni post hoc analysis.

Results: No significant difference in seasonal pitch counts or innings pitched was noted between leagues (A) and (C). League (B) had higher season pitch counts (597 ± 190) vs. (C) (432 ± 192), and greater innings pitched (32 ± 13) vs. (C) (23 ± 12).

Discussion: A significant deviation in pitch counts occurred at the increased pitching distance in league (B), while different pitch limitations (A vs C) alone did not significantly affect season totals. At the increased mound distance, fewer pitchers have the strength and accuracy to be successful throwers- thus a smaller number of pitchers throw a higher percentage of the teams' pitches. These throwers are also less accurate at the longer distance, leading to more hits and walks. Increased pitch counts with increased mound distances requires further investigation given the correlation with overuse injuries among youth pitchers.

Notes:

11:13 am – 11:19 am

Treatment of Isolated Posterior Malleolus Fractures

Shahin Sheibani-Rad, MD

*Paul M. Charpentier, MD

Norman Walter, MD

Introduction: Isolated posterior malleolus fractures of the ankle are very rare, especially those without any associated ligamentous injury. The mechanism of injury is unique, and treatment depends on the displacement of the fracture and associated injuries. Axial loading of the plantar flexed foot is the most likely cause of this fracture pattern. Because of the low incidence, isolated posterior malleolus fractures can present a diagnostic challenge. The purpose of this study was to assess outcomes of consecutively treated isolated posterior malleolus fractures.

Methods: We retrospectively reviewed the long-term outcomes of patients with isolated fractures of the posterior malleolus treated between 2005 and 2012. The assessments used were physical examination using a loaded dorsal and plantar range of movement measurement, radiological analysis of medial joint space widening, and the radiological presence of osteoarthritic change.

Results: There were a total of 31 patients (17 M, 14 F). The mean follow-up was 31.6 months (1-59 months). There were excellent or good results in 27 patients (87%) according to the Olerud score, in 28 patients (90%) according to loaded dorsal and plantar range of movement assessment, and for osteoarthritis 30 patients (97%) had an excellent or good score. There were no poor outcomes.

Discussion and Conclusion: This is the largest study evaluating outcomes of isolated posterior malleolus fractures. Conservative treatment of 'isolated' posterior malleolar fractures resulted in good clinical and radiological outcome in this series at long-term follow-up.

Notes:

Harley and Betty Baxter Resident Award Winner

11:19 am – 11:25 am

Open Femoral Shaft Fractures: A Difficult Problem in Capable Hands

Adam Sassoon, MD, MS

Jeffrey R. Petrie, MD

John Riehl, MD

Kenneth Koval, MD

Joshua R. Langford, MD

George J. Haidukewych, MD

Purpose: This study seeks to investigate the results of a large consecutive series of open femoral shaft fractures treated at a level-one trauma center by fellowship-trained surgeons using modern techniques.

Methods: Following IRB approval, adult patients sustaining an open femoral shaft fracture between 2008-2012 were identified from our institution's trauma database. Patients were followed for a minimum of 3 months or until death, radiographic union, or treatment failure. Patient demographics of age, gender, tobacco use, BMI, and medical co-morbidities were noted. Injury-related variables including the fracture mechanism, location, morphology, soft tissue status, associated injuries, and injury severity score (ISS) were also recorded. Finally, treatment-related factors including time to initial debridement, type of instrumentation, number of transfusions, and quality of reduction were assessed. The outcome measures of time until bony union, limb alignment, ambulatory status, the need for further surgical intervention, and complications such as non-union and infection were tabulated and correlated with the previously mentioned independent variables.

Results: Between 2008-2012, 69 open femoral shaft fractures were treated at our level-one trauma center. Fourteen patients had inadequate follow-up, leaving 55 fractures available for this retrospective review with an average follow-up of 10 months. Forty fractures occurred in males, while 15 occurred in females. The average patient age was 36. Thirty-nine patients sustained their fracture as part of a polytrauma and 16 fractures were isolated. The average ISS was 14.7. The average time from presentation at our institution until the initial debridement was 11.4 hours. All fractures were treated with intramedullary nails; 46 were retrograde and 9 were antegrade. Forty-seven patients

(85%) achieved a bony union following their index definitive fixation procedure. The average time to union was 140 days. Eight fractures (15%) failed initial treatment, requiring a re-operation. Five of these were due to non-union, 2 were due to acute post-operative infection and 1 was due to an infected non-union. There were an additional 8 patients that required secondary procedures including 3 symptomatic hardware removals, 2 quadricepsplasties, 2 knee manipulations, and 1 lengthening procedure. Ten patients required gait aids at their most recent follow-up.

Discussion and Conclusion: Open femoral shaft fractures represent a significant challenge to the treating orthopedic surgeon and a stark contrast to their closed counterparts. They are often incurred through high-energy mechanisms and associated with other serious injuries. Despite state of the art treatment at a level-one trauma center, a reoperation rate of 29% was observed with 15% of patients failing initial treatment.

Notes:

11:25 am – 11:31 am

Factors Affecting Spanning – Knee External Fixator Stiffness: A Biomechanical Study

Mihir J. Desai, MD
William M. Reisman, MD
Chelsea Fechter
Angela Lin, PhD
William C. Hutton, DSc

Introduction: The effect of bar diameter and the use of pin-to-bar articulations or clamps on external fixator stiffness have not been studied. External fixator manufacturers offer sets with a single bar diameter option and this diameter differs across manufacturers. Constructs assembled with pin-to-bar clamps are nearly two times more expensive than those assembled with pin-to-bar articulations. The purpose of this study was to test and compare construct stiffness using 11 mm diameter and 8 mm diameter cross-bars and compare construct stiffness using pin-to-bar clamps or articulations.

Methods: Three spanning-knee external fixator construct designs were tested with both 8 mm diameter and 11 mm

diameter bars and pin-to-bar clamps or articulations. Each construct was tested on a Mechanical Testing System (MTS) and the stiffness of each construct was calculated.

Results: All 11 mm diameter cross-bar constructs had an average stiffness that was significantly ($p < 0.05$) greater than the 8 mm diameter bar constructs. For the 11 mm diameter bar and 8 mm diameter bar constructs, two cross-bars and pin-to-bar articulations resulted in the highest mean stiffness (32.1 ± 3.7 N/mm and 11.5 ± 2.4 N/mm, respectively). In constructs using pin-to-bar articulations, constructs with a single 11 mm diameter cross-bar had a higher mean stiffness (15.3 ± 1.5 N/mm) than constructs with two 8 mm diameter cross-bars (7.8 ± 1.9 N/mm, $p < 0.05$).

Discussion and Conclusion: 1) cross-bar diameter is a significant component in external fixator stability; 2) constructs with pin to bar articulations and two cross-bars are stiffer than those using pin-to-bar clamps and two cross-bars with overall less construct cost; 3) constructs with a single 11 mm diameter cross-bar are stiffer than constructs made with two 8 mm bars.

Notes:

11:31 am – 11:37 am

Failure of Cephalomedullary Fixation for Low-Energy Basicervical Fractures of the Proximal Femur: A Case Series

Scott Watson, MD
Stephanie L. Tanner, MS
Thomas M. Schaller, MD
Kyle J. Jeray, MD

Introduction: The indications for cephalomedullary fixation have been broadened greatly, likely due to the proposed benefits of shorter operative time, decreased blood loss, a proposed superior biomechanical construct, and overall surgeon preference and comfort. These expanded indications have led to more cephalomedullary implants being used in all types of pertrochanteric fractures, including basicervical fractures patterns. The aim of the study is to report a series of cases of failed fracture fixation following cephalomedullary fixation of basicervical fractures of the proximal femur.

Methods: Institutional Review Board approval was obtained for the retrospective case series. Medical records and radiographs of patients with fixation failure of a cephalomedullary implant fixation of a basicervical petrochanteric fracture treated at our institution between 2010 and 2012 were reviewed. Tip-apex distance (TAD) was measured on intraoperative fluoroscopy films. Failure was defined as collapse of the fracture with movement of the position of the lag screw, or nonunion of the fracture with no signs of healing radiographically or clinically at 6 months postoperatively.

Results: A total of 5 patients with an average age 75 years were included. The average tip-apex distance was 17.9 (range: 12.8-21.9). Three patients had cutout of the lag screw and collapse of the fracture by 6 weeks. One patient had cutout of the screw with collapse at 6 months. The fifth patient had a nonunion of the fracture and was taken for revision ORIF at 9 months.

Discussion and Conclusion: This case series of failed cephalomedullary fixation of basicervical petrochanteric fractures initially treated with the implant in good position with an acceptable TAD suggest this implant may be insufficient for treatment of this particular fracture pattern. This has led us to stop utilizing this type of fixation in this fracture pattern at our institution.

Notes:

Saturday, July 20, 2013

General Session 13: Spine

Moderator: John J. McGraw, MD

11:47 am – 11:53 am

What Is the Best Construct for Fusion Across the Cervicothoracic Joint?

Justin S. Yang, MD

Vivek Verma, BS

Jacob Buchowski, MD

Introduction: The unique anatomy of the cervicothoracic junction lends itself to an equally unique approach to surgi-

cal stabilization. Several constructs over the years have been used to stabilize across the cervicothoracic junction; however no study to date has objectively compared their outcome. The present study sought to assess fusion at the cervicothoracic junction as a function of two types of constructs commonly used: small rods (3.2mm/3.5mm rods) or transitional constructs involving dominos or transition rods.

Methods: A retrospective review of a prospectively collected database revealed 135 patients with the above mentioned constructs, and having followed-up with imaging at 6 months, 12 months, and 24 months. There were 99 patients in the small rods group, and 36 patients in transitional construct group. Initial primary diagnoses were as follows: spondylosis (94), kyphosis/scoliosis (16), fracture (7), tumor involvement (6), spinal stenosis (4), and miscellaneous (8). Multivariate analysis was performed.

Results: There were a total of ten patients with pseudoarthrosis at two year follow-up. There was no difference in pseudoarthrosis rate between the small rods (7%) and transitional constructs (8.7%). The overall construct lengths were similar (5.8 levels in small rods, 6.7 levels in transitional construct). Blood loss was higher in transitional constructs (574ml) than small rods (236ml). Transitional constructs also had longer operating times (249min) than small rods (207min). Transitional constructs were more commonly used in kyphosis and scoliosis patients (11 vs. 5) than small rods. Overall complication rate was significantly higher in the transitional constructs group (19% versus 5%). There were 3 deep wound infections in the transitional constructs group and 1 in the small rods group.

Discussion and Conclusion: Overall pseudoarthrosis rate were similar between small rods and transitional constructs. However, there were higher complications rates, blood loss and operating time associated with transitional constructs. Our study supports the use of small screws and rod constructs across the cervicothoracic junction.

Notes:

11:53 am – 11:59 am

Cervical Posterior Foraminotomy's Effect on Segmental Range of Motion in the Setting of Total Disc Arthroplasty

Adam J. Bevevino, MD

*John P. Cody, MD

Ronald A. Lehman, MD

Daniel G. Kang, MD

Rachel E. Gaume, BS

David E. Gwinn, MD

Divya Ambati, MSc

Anton E. Dmitriev, PhD

Introduction: Posterior foraminotomy offers the ability to decompress cervical nerves roots while avoiding the need to extend a previous fusion or revise an arthroplasty to a fusion. However, the safety of a foraminotomy in the setting of total disc replacement (TDR) is unknown. With this in mind, the goal of this study was to investigate the effect on cervical segmental stability resulting from posterior foraminotomy following TDR.

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

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

Discussion and Conclusion: Our results indicate that cervical stability is not significantly decreased by the presence, number, or level of posterior foraminotomies in the setting of TDR. The addition of foraminotomies to specimens with a pre-existing TDR resulted in small and insignificant increases in segmental ROM. Therefore, posterior foraminotomy(s)

may be considered a safe and viable option in the setting of recurrent or adjacent level radiculopathy following cervical disc replacement.

Notes:

11:59 am – 12:05 pm

Outcomes Following Cervical Disc Arthroplasty

Robert W. Tracey, MD

*John P. Cody, MD

Daniel G. Kang MD

Ronald A. Lehman, MD

Michael K. Rosner, MD

Background: Symptomatic cervical radiculopathy is a common problem in society that causes significant disability. Cervical disc arthroplasty (CDA) is increasingly being used as an alternative to anterior cervical discectomy and fusion (ACDF). We set out to further evaluate the outcomes and complications of CDA.

Methods: We performed a retrospective review to evaluate the clinical outcomes of 176 consecutive patients undergoing CDA at a single military tertiary medical center between August 2008 and August 2012. All construct types (single-level CDA, CDA/ACDF hybrid, and multi-level CDA) were included for review.

Results: The study included 40 females (22.7%) and average age was 41.6 years. Three revision cases (1.7%) were included. Surgical indication was radiculopathy in 141 patients (84.4%), myelopathy in 13 patients (7.8%), and both in 10 patients (6.0%). Average follow-up was 8.5 months (± 7.6 months). 111 patients (63.1%) underwent single-level CDR. CDR/ACDF hybrid construct was used in 52 patients (29.5%) and 13 patients (7.4%) underwent a two-level CDR. The most frequently involved levels were C6-7 (42.0%) and C5-6 (39.6%). Average CDA post-operative range of motion was 7.46 degrees (± 3.6 degrees). 94.5% of patients experienced complete resolution of their pre-operative symptoms and 93.6% of patients returned to full activity. 36 patients (21.8%) experienced persistent posterior neck pain. Other complications included one superficial infection, five recur-

rent laryngeal nerve injuries and 18 patients reporting persistent dysphagia. No device or implant related complications were observed.

Discussion and Conclusion: Our study demonstrates relief of pre-operative symptoms (94.5%) and return to full activity (93.6%) with an average follow-up of 8.5 months. There was a low complication rate with regard to recurrent laryngeal nerve injury and post-operative dysphagia with no device or implant related complications. CDA continues to be safe and reliable option in treating patients with cervical radiculopathy or myelopathy.

Notes:

12:05 pm – 12:11 pm

Does Spanning the Ring Apophysis Affect Lateral Lumbar Interbody Fusion Rates? A Preliminary Report

Bradford S. Waddell, MD
Joseph M. Zavatsky, MD

Introduction: Interbody fusion using cages, supplemented with posterior instrumentation, is commonly utilized for a variety of spinal pathologies. Interbody fusion has been traditionally carried out using anterior (ALIF) or posterior (PLIF, TLIF) techniques. Recently, an interbody fusion technique using cages inserted through a direct lateral, trans-psoas, lumbar (LLIF) approach has been described. This approach can avoid many of the complications seen with other techniques. There are few studies utilizing CT scans to assessing fusion rates with the lateral technique. The purpose of this study was to use CT scans to assess interbody fusion rates utilizing the LLIF technique.

Methods: We performed a retrospective radiographic CT scan assessment of patients who underwent LLIF with posterior instrumentation between January 2008 and December 2012. All surgeries were performed by a single surgeon. Fifty-six patients with 97 levels underwent LLIF with pedicle screw instrumentation during that time. Of the 56 patients, only 28 patients with 51 levels were 1 year out from their index surgery. These patients received CT scans to evaluate fusion. Two board-certified musculoskeletal radiologists assessed fusion.

Results: Both radiologists agreed that bony fusion was achieved at all 51 levels (100% fusion rate) evidenced on coronal, sagittal, and axial reconstructive thin-cut CT images.

Discussion and Conclusion: Several studies have evaluated LLIF fusion rates and reported fusion rates between 88-96%. Our results demonstrate high fusion rates in LLIF, which exceeds most published data of all interbody techniques. Meticulous discectomy and endplate preparation, spanning the cage across the ring apophysis, and supplemental pedicle screw augmentation can affect fusion. Since stability plays a significant role in successful fusion, spanning the ring apophysis with the cage and pedicle screw augmentation are thought to be key factors. Data collection will continue as patients approach their one-year follow-up and will be reported in the future.

Notes:

12:11 pm – 12:17 pm

A Less Invasive Transforaminal Approach to Lumbar Interbody Fusion

Jeffrey L. Katzell, MD

Introduction: The trend in healthcare today is toward less invasive outpatient surgery. This benefits both the patient and healthcare delivery system in general. The goal of less invasive surgery has been to lessen soft tissue trauma, preserve normal muscle volume post operatively, and maintain normal bony and ligamentous stabilizers.

Methods: Less invasive surgery utilizing Kambin's triangle approach accomplishes this with the added benefit of not producing epidural fibroses and scarring. Spinal fusion surgery, although increasing in frequency and striving to be less invasive, remains costly with slow and often painful recovery. Less invasive advances have not yielded a corresponding decrease of complications. I wish to introduce the oblique lumbar interbody fusion. This represents the least invasive way to accomplish lumbar interbody fusion. This is accomplished through Kambin's triangle, a transforaminal approach.

Results: The technique does not require removal of bone, ligament, or any supportive structure. There is no sacrifice of

muscle, as it bluntly divides intramuscular planes. Discectomy and endplate preparation are done through a 9mm cannula.

Discussion and Conclusion: There are theoretical advantages of this technique over presently used fusion devices that will be discussed. Biometric analysis supports safety of the technique.

Notes:

12:17 pm – 12:23 pm

The Local Application of Vancomycin for the Prevention of Lumbar Spine Wound Infection

Radek Hart, Prof, MD, PhD, FRCS

Introduction: Postoperative spinal wound infections are relatively common. They are associated with significant morbidity, increased costs, and poor long-term outcomes. As the use of spinal instrumentation has become common, infection rates in elective instrumented cases as high as 3 % to 6 % have been reported. The aim of this prospective study was to evaluate the incidence of surgical site infection following elective instrumented lumbar spine operations supplied with locally poured vancomycin.

Methods: Between September 2008 and September 2012, 200 patients (112 men, 88 women) in the mean age of 59 years (range, 30 to 87 years) were included in the study. In all cases, transpedicular screw instrumentation was used. Other procedures were often added (fusion, decompression). In the end of the surgery, vancomycin powder was poured into the wound. Antibiotic prophylaxis was used in all patients consisting of 1g of intravenous cefazolin within 1 hour before the operation and additional six doses every 4 hours. Incidence of risk factors was: 1) obesity (BMI \geq 26): 178 patients (89 %), mean value 29 (range, 21–43), median 28.5; 2) old age (\geq 70 years): 84 patients (42 %); 3) diabetes mellitus: 36 patients (18 %); 4) smoking: 36 patients (18 %); 5) cardiovascular disease: 122 patients (61 %); 6) bronchopulmonary disease: 30 patients (15 %); 7) malignancy: 8 patients (4 %); 8) steroid use: 6 patients (3 %).

Results: Postoperative wound infection didn't occur in any case. Aseptic haematoma developed in 4 cases and was treated with revision and drainage.

Discussion and Conclusions: Despite the administration of prophylactic antibiotics, surgical site infections are not uncommon following lumbar spine operations. The additional local application of vancomycin is the reliable measure for preventing this complication also in cases at risk.

Notes:

SOA/OREF Resident Award Winner

12:23 pm – 12:29 pm

Pulmonary Function Following Adult Spinal Deformity Surgery: Minimum Two Year Follow-Up

Robert W. Tracey, MD
Daniel G. Kang, MD
Ronald A. Lehman, MD
John P. Cody, MD
Lawrence G. Lenke, MD

Introduction: Pulmonary function following adult spinal deformity remains uncertain. We hypothesized patients with pre-op PFT impairment ($<65\%$ pred FEV1) and those undergoing revision surgery may be at risk for exacerbated decline in pulmonary function.

Methods: PFTs were prospectively collected on 164 adult spinal deformity patients (150F, 14M, avg age 45.9) undergoing surgical treatment at a single institution, with minimum 2 yr follow-up (avg 2.81). There were 100 (61%) primary and 64 (39%) revision surgery patients, and the majority had posterior only surgery (77%). Radiographs for 154 patients were analyzed for main thoracic (MT) and sagittal T5-T12 (Sag) curve magnitude/correction.

Results: For all patients, there was a significant change in MT Cobb from 47.4 to 24.9 deg (avg -22.5, $p=0.00$), and Sag Cobb from 35.5 to 30.0 deg (avg -5.41, $p=0.00$). We also found a significant decline in absolute and %pred PFT, with %pred FEV1 and %pred FVC decreasing 5.26% ($p=0.00$) and

5.74% ($p=0.00$), respectively. A clinically significant decline ($\geq 10\%$ pred FEV1) was observed in 27% of patients. PFT impairment increased from 14 (8%) patients pre-op to 23 (14%) patients after surgery, but was not statistically significant ($p=0.31$). Interestingly, patients with pre-op PFT impairment had a significant improvement in absolute and %pred FEV1 after surgery compared to those without pre-op impairment (2.8% v -6.19%, $p=0.03$), with no significant differences in MT/Sag curve correction between the two groups. Revision surgery patients had no difference in post-op %pred PFTs, however there were significantly more patients with a clinically significant decline in PFTs [23 (35%) v 22 (22%), $p=0.03$].

Discussion and Conclusion: We performed the largest study to date evaluating pulmonary function tests in adult deformity patients, and found a significant decline in all measures of pulmonary function at 2 years following surgical correction. Surprisingly, patients with pre-op PFT impairment had improvement in absolute and %pred PFTs postoperatively. Revision surgery more frequently results in a clinically significant decline in PFTs.

Notes:

study focused on the frequency of comorbidities such as hypertension, cardiac, diabetes, pulmonary and GI disease. Blood loss, length of stay, decline of neurological function and wound infection were also reviewed in the current study.

Results: All patients 65 to 88 years of age had at least 2 comorbidities including hypertension, cardiac disease, pulmonary disease and GI disease. This study suggests that there is a correlation between cardiac and hypertensive with decreased analogue pain improvement in the postoperative period. The highest number of comorbidities were cardiac and hypertensive disease. There was no findings of postoperative wound infection, or cardiac events in this subset of patients.

Discussion and Conclusion: Results of this pilot study, suggests the importance of correlating multiple comorbidities with pain reduction when considering complex spinal surgery in the elderly population. Comorbidities such as cardiac or hypertension are less likely to have as much improvement in pain relief. In the continuum of care involving spinal decompression and fusion procedures, patients with cardiac and hypertension should be counseled that their outcomes for pain control may be less optimal. Infection and decline in neurologic function was not evident in this postoperative group of elderly patients.

Notes:

12:29 pm – 12:35 pm

Analysis of Postoperative Pain Reduction as a Function of Comorbidities in Elderly Patients

David Eidelson, BA
Stewart G. Eidelson, MD
Sarah Eidelson, BS

Introduction: Degenerative lumbar spinal stenosis due to narrowing of spinal canal is the most frequent cause of back and leg pain in the elderly population. The purpose of this study was to assess the improvement in postoperative pain using the analogue pain scale. In particular, this study seeks to correlate the relationship between improvement in analogue pain as a function of comorbidities such as cardiac disease, hypertension, diabetes, pulmonary and GI disease.

Methods: A chart review of patients 65 to 88 years of age included review of hospital and office based records. This



Southern Orthopaedic Association

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Poster Abstracts (Magnolia Room)

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

Poster 1

Improving Outcomes of Lateral Unicompartmental Knee Arthroplasty with Robotic-Assisted Surgery

Marco A. Augart, BS
Johannes F. Plate, MD
Thorsten M. Seyler, MD
Sara von Thae, BS
John Allen, BS
Gary G. Poehling, MD
Riyaz H. Jinnah, MD, FRCS

Introduction: The outcomes of lateral unicompartmental arthroplasty (UKA) have been inferior to medial UKA, with suboptimal patient satisfaction and increased revision rates. Robotic-assisted UKA was shown to improve precision and accuracy of component placement, which may improve outcomes of lateral UKA. The purpose of this study was to compare the outcome of robotic-assisted UKA to conventional UKA for degenerative disease of the lateral compartment.

Methods: In a search of institution's joint registry, a total of 130 lateral UKAs were identified that were performed between 2004 and 2012. The mean age was 63.1 years (range, 20 to 88) and mean BMI of 29.9 (range, 18 to 48). The medical records of all patients were reviewed and assessed for the type of surgical procedure used (robotic-assisted versus conventional), length of hospital stay, Oxford knee score, and occurrence of revision surgery.

Results: A total of 93 robotic-assisted and 37 conventional UKA were analyzed. At a mean follow-up 35 months (range, 1 to 107 months), the mean Oxford scores in the robotic-assisted and conventional group were similar (39.6 versus 35.9). Length of stay was significantly shorter after robotic-assisted UKA (1.65 days) compared to conventional UKA (2.3 days). There were significantly more revisions in the conventional UKA group [6 conversions to total knee arthroplasty (TKA), 2 tibial component exchanges] compared to robotic-assisted UKA (2 conversions to TKA).

Discussion and Conclusion: The findings of this study revealed that the use of robotic-assisted systems improves outcomes and lowers the revision rate of lateral UKA. Lateral UKA is technically challenging and the increased accuracy of component placement using a robotic-assisted system may improve the long-term survival of UKA in patients with limited lateral degenerative disease.

Poster 2

Outcomes of Combat-Related Tibial Plateau Fractures

Husain M. Bharmal, MD
Louis Lewandowski, MD
Korboi Evans, MD
Benjamin Chi, MD
Matthew G. Hanley, MD
Mark E. Fleming, MD

Introduction: Tibial plateau fractures have constituted a significant proportion of lower extremity injuries in the global war on terror. These complex injuries coupled with additional significant injuries have resulted in a number of complications and re-operations for a variety of reasons to include infection, hardware failure, malunion/nonunion, soft tissue contracture, joint degenerations, etc. The purpose of this retrospective review is to identify and describe complications following high energy combat related tibial plateau fractures at our institution. We aim to determine factors associated with these complications, specifically those requiring surgical intervention.

Methods: After obtaining approval from the Institutional Review Board, we performed a retrospective chart review of all patients who sustained tibia plateau fracture during Operation Enduring Freedom and Operation Iraqi Freedom from 01MAR2003 to 29DEC2011. Using our institution's medical records system, we identified all patients who underwent surgical treatment of a tibial plateau fracture and reviewed these patients' clinical course with respect to complications and revisits to the operating room. All additional injuries were also recorded to determine Injury Severity Score for

each patient. Mechanism of injury was also recorded. A surgical re-visit was defined as any return to the operating room after definitive fixation using either open reduction with internal fixation, external fixation, or a combination of the two techniques. Complications leading to operating room revisits were categorized as infection, wound complications, use of additional soft tissue coverage such as a free or rotational flap, hardware failure, malunion, nonunion, post-traumatic arthritis/joint degeneration, symptomatic hardware, and contractures or range-of-motion issues. Finally, we recorded the total number of additional surgeries each patient with a complication required.

Results: A total of 80 service members met inclusion criteria and were analyzed. Mean age 28.2 ± 8.1 years. 60 open, 20 closed. Of the 60 open fractures, 3 required free flap and 9 required rotational flap for definitive coverage. Majority (86%) of injuries were secondary to a blast mechanism. Overall: infection rate 21% (17/80), HW failure 5% (4/80), symptomatic HW 11% (9/80), stiffness requiring MUA 18.75% (15/80), amputation 7.5% (6/80), reoperation rate 37.5% (15/50). Patients with an open fracture had a greater risk of infection ($p=0.03$) and more wound complications following definitive treatment ($p=0.02$). Those with open fractures also underwent more surgical procedures as a result of a complication compared to those with closed fractures (2.5 ± 0.6 vs. 0.2 ± 0.9 ; $p=0.04$). There was no difference in HW failure and stiffness rates between open and closed fractures.

Conclusion: The rate of complications associated with tibial plateau in military subjects is greater than that seen in civilian populations. This is a result of the high-energy mechanisms that cause these injuries. Continued efforts to identify those at risk will lead to better clinical outcomes.

Poster 3

Angiotensin-(1-7) Prevents Radiation-Induced Muscle Fibrosis: An In Vivo Murine Model

Daniel N. Bracey, MD
Jeffrey S. Willey, PhD
E. Ann Tallant, PhD
Patricia E. Gallagher, PhD
Thomas L. Smith, PhD
Michael F. Callahan, PhD
Cynthia L. Emory, MD

Introduction: Over 1,000,000 patients are diagnosed with cancer annually, with 50% receiving radiotherapy (RT). Radiation-induced fibrosis (RIF) is a debilitating late effect of RT

causing muscle weakness, joint contracture, and functional limitations. Currently, no standardized therapy prevents RIF in muscle, and animal models for testing therapeutics are poorly established. We hypothesize that treatment with a novel antidiabetic endogenous peptide hormone, Angiotensin-(1-7), can prevent RIF in skeletal muscle after modeled sarcoma RT.

Methods: Seven-week-old Swiss Albino mice received either sham surgical procedure or subcutaneous osmotic minipump delivering angiotensin-(1-7) at $24 \mu\text{g/kg/hr}$ beginning three days before undergoing a two-week course of fractionated radiation (7.3 Gy/fraction; 2 fractions/week) using 300 kV x-rays targeting one hindlimb. This RT regimen provided the biological equivalent dose for sarcoma treatment (100.2 Gy) despite 29.2 Gy total dose. Controls received no treatment or irradiation. Animals were sacrificed at 1.5 and 4 months after RT. Fibrosis in the gastrocnemius was assessed with in vivo load-relaxation testing before sacrifice. Tension generated by displacing the muscle 5% and 10% resting length was recorded (IOX2.8, EMKA Technologies) with a force transducer. Muscles were then fixed for histological analysis of interstitial and perivascular fibrosis.

Results: Radiation ($n=12$) significantly increased ($\sim 100\%$) stiffness of the gastrocnemius relative to control ($n=10$) as determined from passive displacement muscle tension. Angiotensin-(1-7) treatment ($n=10$) mitigated this response significantly at 1.5 and 4 months compared to sham treatment. Modeled sarcoma RT induced skeletal muscle and perivascular fibrosis, coincident with functional stiffening. These fibrotic changes were significantly reduced in irradiated limbs pre-treated with angiotensin-(1-7).

Discussion and Conclusion: Angiotensin-(1-7) was an effective mitigator of RIF resulting from modeled sarcoma RT. Clinical translation of these findings will determine whether prophylactic angiotensin-(1-7) treatment can prevent RIF in patients who require adjuvant radiotherapy for treatment of extremity soft tissue sarcoma.

Poster 4

Hospital Length of Stay and Inpatient Costs with a Co-Managed Hip Fracture Service Line

Daniel N. Bracey, MD
Kamran S. Hamid, MD, MPH
Rebecca T. Pareja, BA
Erik C. Summers, MD
Cynthia L. Emory, MD
Riyaz H. Jinnah, MD, FRCS

Introduction: Hip fractures are a common injury of the elderly with an incidence of approximately 250,000 fractures per year in the US, and associated health care costs of \$10.3 to \$15.2 billion (Dy et al., 2011). With an aging population, the incidence of hip fractures is projected to double by the year 2040. To accommodate this growing health care burden, hospitals must modify clinical operation models to improve efficiency of hip fracture management. At our institution, the average hospital length of stay (LOS) for hip fracture patients was found to be 11 days, which was deemed unacceptably long. As a result, a combined orthopaedic-hospitalist comanagement (OHC) hip fracture service was implemented to reduce LOS and improve patient-centric value (health outcomes per dollar spent). The current investigation evaluates the effect of implementing a co-managed hip fracture service line.

Methods: The co-managed hip fracture service line was implemented March 8, 2012. An ambispective cohort study of patients with a primary admitting diagnosis of hip fracture is being conducted to compare hospital LOS, and time to surgery (TTS) before and after OHC initiation. Exclusion criteria include: age less than 65 years, and major polytrauma (ineligible for OHC admission). LOS and TTS are calculated in days for each cohort.

Results: Preliminary data suggest that hospital LOS and TTS have been reduced since introduction of the OHC hip fracture service line. Significance of results will be determined once the targeted sample size has been achieved (n=48 based on a priori administrative data). We anticipate reaching this mark in 4-8 weeks.

Discussion and Conclusion: Orthopaedic-hospitalist comanagement may represent an effective health care model to improve hip fracture treatment. Reducing LOS and TTS reduces inpatient costs, liberates resources to accommodate larger patient volumes and may improve outcomes as well as patient satisfaction scores.

Poster 5

The Impact of Depression Following Total Joint Arthroplasty: A Nationwide Database Study

James A. Browne, MD
Michele R. D'Apuzzo, MD
Wendy M. Novicoff, PhD

Introduction: Total joint arthroplasty (TJA) is major surgery, and therefore is a major life event in terms of physical and mental stress on the patient. The impact of psychological distress on the outcomes of TJA has been explored more in recent years. Studies have shown that patients pre-operative expectations are a significant predictor for improvement in physical health and functional outcome after TJA. Other studies have focused on the impact of decreased mental well-being on outcomes after TJA compared to those with a better mental state pre-operatively. The purpose of this study was to assess the incidence of the diagnosis of depression and determine the impact of this diagnosis on outcomes following TJA.

Methods: The Nationwide Inpatient Sample (NIS) database was used to identify patients undergoing total hip or total knee arthroplasty from 1998 through 2008. Multivariate regression analysis was performed to compare the incidence of depression, mortality associated with depression, and outcomes following TJA. Length of stay and hospital charges were also examined.

Results: The rate of diagnosis of depression has increased steadily from 2.8% in 1998 to 11.1% 2008. Patients with depression had significantly higher hospital charges (\$35,419 vs. \$38,133, $p<0.001$), more diagnoses per patient (7.66 vs. 5.33, $p<0.001$), more procedures per patient (1.79 vs. 1.70; $p<0.001$, and were younger (63.8 years vs. 66.9 years, $p<0.001$) than patients without depression. In multivariate analysis, people with depression were significantly more likely to be white, female, and have Medicaid as a primary payer. There was a greater risk of post-operative psychosis, post-operative anemia, and post-operative infections in the depressed patients compared to the patients without depression. There was no significant relationship between depression and in-hospital mortality or length of stay.

Discussion and Conclusion: Depression is a serious comorbidity that can impact outcomes after TJA. The rate of diagnosis has increased markedly over the last ten years, and adequate treatment for these disorders prior to surgery could

improve the chances of good outcomes post-surgically. In addition, assessing patients' mental health, social support, and expectations for surgery should be a regular part of preparing patients for surgery.

Poster 6

Transfusion Rates Are Increasing Following Total Hip Arthroplasty: Risk Factors and Outcomes

James A. Browne, MD
Farshad Adib, MD
Wendy M. Novicoff, PhD
Thomas E. Brown, MD

Introduction: Blood transfusion is a potentially lifesaving but expensive procedure that has been associated with complications. Despite attempts to minimize exposure to allogeneic blood, there is little data on nationwide trends in transfusion following total hip arthroplasty (THA) and no consensus on indications. The purpose of this study was to examine the rate, predictors, and inpatient outcomes associated with transfusion after primary THA.

Methods: This retrospective cohort study analyzed the data collected from US Nationwide Inpatient Sample (NIS) for each year during period 2005-2008 to assess the trends in transfusion in patients whom underwent elective primary THA. Logistic regression models were used to evaluate the predictive risk factors for blood transfusion. The University Hospital Consortium (UHC) database was also queried to examine the variability if rates of transfusion at different academic medical centers.

Results: A total of 129,901 patients were identified in the NIS database. The transfusion rates following THA consistently increased from 18.12% in 2005 to 21.21% in 2008 (p80%).

Discussion and Conclusion: The incidence of blood transfusion has recently increased following total hip arthroplasty and there is great variability in practice amongst different centers. We identified several patient risk factors along with the morbidity and mortality independently associated with transfusion following total hip arthroplasty. Further work is clearly needed to standardize the approach to blood conservation and minimize exposure to allogenic blood.

Poster 7

Fundamental Movement Profiles in Professional Baseball Pitchers and Non-Pitchers

Robert J. Butler, DPT, PhD
Phillip J. Plisky, PT, DSc, ATC, SCS
Tracy R. Ray, MD
Kyle B. Kiesel, PT, PhD, ATC

Introduction: Previously researchers have reported differences and asymmetries in isolated range of motion and strength testing measures in professional baseball players. Recent studies have examined how range of motion and strength combine to produce neuromuscular performance in fundamental movement tasks; however, few have focused on professional baseball players.

Methods: Eighty-eight professional baseball players were screened during pre-season physicals during spring training. Each athlete's fundamental movement ability was rated using the Functional Movement Screen (FMS). Players were grouped into pitchers (n = 56) and field players (n = 32) to examine differences between these groups. Statistical analysis was conducted with an independent sample t-test to compare differences in the composite FMS score between pitchers and field players. Chi-square analysis was used to examine differences in the frequencies or score and presence of asymmetries on the individual FMS tests. All statistical significance was identified at p<0.05.

Results: Average FMS composite performance did not differ between pitchers (14.5 ± 1.7) and field players (14.9 ± 1.9). Pitchers exhibited a greater percentage of athletes exhibiting full range competence (FMS score 3) compared to field players on the shoulder mobility tests. Interestingly, differences in the % of athletes exhibiting asymmetry were only observed for the rotary stability test which the field players (13%) exhibited a greater percentage of asymmetries compared to the pitchers (1%). Overall, the greatest percentage of athletes exhibited asymmetry during the shoulder mobility test (39%) while the lowest percentage of athletes exhibited asymmetry on the rotary stability test (6%).

Discussion: Differences in fundamental movement profiles do not appear to exist between baseball pitchers and field players on average. Additional research should address the difference between fundamental movement profiles and injury as well as performance.

Poster 8

An Economical Model for in the Field ACL Injury Screening in College Athletes

Robert J. Butler, DPT, PhD
 Michael Lehr, PT
 Kyle B. Kiesel, PT, PhD, ATC
 Robin M. Queen, PhD
 William E. Garrett Jr., MD, PhD
 Philip J. Plisky, PT, DSc, ATC, SCS

Background: There are few published reports of screening tools for Anterior Cruciate Ligament injury risk that can be conducted efficiently in a field setting. Two field tests, the Functional Movement Screen (FMS) and the Lower Quarter Y- Balance Test (YBT-LQ), have previously been used to identify athletes with an elevated injury risk; however, they have not yet been utilized to predict ACL injury.

Purpose: To examine whether pre-season performance on movement-based field tests would be different between collegiate athletes who remain uninjured and a group of college athletes who sustain a non-contact ACL injury.

Methods: 182 collegiate athletes were screened using the FMS and the YBT-LQ prior to their athletic season. The athletes were followed over the course of their season for the incidence of a non-contact ACL injury. Independent sample t-tests were used to compare the ACL injured to the uninjured cohort. Standard diagnostics statistics were calculated using cut points for the statistically significant variables.

Results: Over the course of the season, four non-contact ACL injuries occurred. Athletes who sustained a non-contact ACL injury scored lower on the Deep Squat and In Line Lunge of the FMS and exhibited lower composite scores on the YBT-LQ.

Conclusion: The results of the study suggest that performance on movement based field tests differ in athletes who sustained an ACL injury. These tests warrant further research for use as screening tools to identify athletes at elevated risk for a non-contact ACL injury.

Poster 9

Retrospective Review Comparing Post-Operative Protocols for CMC Interpositional Arthroplasty

Filippo C. Chillemi, MD
 Frederick N. Meyer, MD
 Daniel Smith

Introduction: Given the prevalence of CMC arthritis in the U.S. population, there is much warranted discussion in the current literature about CMC arthritis and its various surgical treatment methods. However, there has been no study to date which has analyzed post-operative protocols and their respective efficacies. The objective of this study was to show that casting with prolonged immobilization after CMC interpositional arthroplasty provided no benefit over removable splinting with early mobilization in the parameters of subjective pain, range of motion, and length of follow up.

Methods: Eighty patients' surgeries and their follow-up were retrospectively reviewed, 39 in the non-casting protocol and 41 in the casting protocol. Utilizing physician and occupational therapy notes, subjective pain scores and length of follow up data were gathered. Also, change in and final range of motion values for the MCP and IP joints, as well as change in and final radial abduction and opposition values, were gathered for each patient. The data were averaged for both groups and analyzed using a t-test. Surgical techniques were identical for all patients, and post-operative protocols differed only by 4 weeks of casting versus non-casting with early, controlled movements.

Results: After collecting the data, the mean values for each protocol were obtained and recorded. After comparison, no significant difference was found between the casting and non-casting groups when evaluating length of follow-up with the surgeon and OT, final ROM values, change in ROM in the IP and MP joints, as well as radial abduction. However, there was a statistically significant difference (0.02) when evaluating the change in opposition of the two groups, with the casting group having a greater change, 3.2cm compared to 1cm in the non-casting group. Subjective pain findings in the two different protocols evaluated were also compared. The casted group had 5 individuals with no pain, 9 with mild pain, and 3 with moderate pain. The non-casted group had 9 individuals with no pain, 7 with mild pain, and 2 with moderate. Neither protocol after com-

pletion showed patients having severe pain. Overall, both the casted and non-casted groups had greater than 80% of individuals experiencing none to mild pain, 83% and 89% respectively.

Discussion and Conclusion: The null hypothesis is confirmed; there is no statistical advantage to a casting protocol versus a non-casting protocol following CMC interpositional arthroplasty of the thumb. Also, though the casting group achieved a greater change in their opposition, the two groups reached very similar final opposition values. This large change is very likely due to increased stiffness after prolonged immobilization and thus a larger initial value with which to compare the final opposition value. Weaknesses of the investigation include its nature as a retrospective study as well as the unavailability of some patients' data due to the transition of paper charts into electronic medical records at this institution. The tenable next step is to perform a prospective study to commiserate with current data and allow for more detailed analysis.

Poster 10

A Systematic Review of Fresh Osteochondral Allograft Transplantation for Large Osteochondral Lesions of the Talus

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Introduction: Large osteochondral lesions of the talus (OLTs) often involve the talar shoulder and are difficult to treat. Their size, articular cartilage geometry, and loss of the medial or lateral articular buttress often preclude these lesions from treatment with traditional marrow stimulation and osteochondral autograft techniques. Recently, reports of fresh osteochondral allograft transplantation have emerged as a promising treatment option. The aim of this systematic review was to combine the results of the studies using fresh osteochondral allografts transplantation for OLTs to determine the overall survival rate of the graft and need for conversion to arthrodesis or arthroplasty.

Methods: A literature search was conducted to identify studies in which fresh osteochondral allograft transplantation was used to treat OLTs. The electronic databases of Cochrane Central Register of Controlled trials (CENTRAL), EMBASE, MEDLINE, NCBI Web Site, and PubMed were searched for articles published between January 1st 1967 to October 31st 2012. The methodological quality of the included studies was assessed using the Coleman methodology score.

Results: Eight studies representing 128 patients met the inclusion criteria and were used for further analysis. All of these studies were level IV case series. The mean age at surgery of this population was 37.1 (range 17-74) years. At a mean follow-up of 55 months (range 37-132) the overall graft survival rate was 89.4%. The conversion rate to arthrodesis or arthroplasty was 5.7% and 1.6%, respectively. The average Coleman Methodology score was 72.3 (range 64-79).

Discussion and Conclusion: Large talar shoulder OLTs remain a treatment dilemma for the foot and ankle surgeon. This systematic review demonstrates a near 90% success rate for fresh allograft transplantation, lending promise to this technique as a viable treatment option for this difficult problem.

Poster 11

Evaluation of Negative Pressure Wound Therapy vs. Dermabond Closure Over Orthopaedic Incisions in the Hip and Knee: A Retrospective Study

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Introduction: Select methods of closing orthopaedic surgical incisions have been shown to reduce risk of post operative infection, including the use of 2-Octylcyanoacrylate. 2-Octylcyanoacrylate provides a water tight barrier as well as a barrier to bacteria however; it may also contribute to seroma formation and wound complications. Negative Pressure Wound Therapy (NPWT) has been shown to decrease postoperative seroma formation and improve wound healing. The purpose of this study was to evaluate the difference between these two treatment methods for postoperative wound closure and subsequent wound complications.

Methods: A retrospective review of 371 patients that underwent hip and knee arthroplasty, by a single surgeon, was done over a two year period. For the first year all patients' surgical incisions were closed with 2-Octylcyanoacrylate. In the second year, all incisions were closed with nylon in the skin followed by an incisional wound vac (NPWT). Three main outcomes were: uncomplicated healing, wound dehiscence without infection, or wound dehiscence with infection. Medical risk factors were also considered.

Results: Fourteen (7.6%) of the 185 incisions closed with 2-Octylcyanoacrylate developed a wound infection while only 7

(3.8%) of the 186 incisions treated with NPWT developed a wound infection. There were no reported infections in any knee procedure in either group. Regardless of closure method, patients with previous infections of the operative joint were more likely to have a wound infection post operatively.

Tobacco use, immunosuppressant use, BMI, and diabetes did not have any statistical effect on wound complications.

Discussion and Conclusion: Surgical incision closure method did not have any statistical effect on infection risk of previously infected joints but infection rates were lower with NPWT. Hip procedures were more likely to have wound complications when compared to knee procedures. There was however, a lower overall infection rate in postoperative incisions treated with NPWT.

Poster 12

Uncemented vs. Cemented Stems in Two-Stage Revision for Infected Total Knee Arthroplasty

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Introduction: Controversy exists concerning the optimal method of stem fixation during reimplantation after two-stage revision total knee arthroplasty for infection. The purpose of this study was to compare the rate of re-revision, re-infection, and differences in Knee Society Radiographic Scores between cemented and uncemented stems.

Methods: A retrospective review of patients who underwent a two-stage reimplantation for infection was performed at two centers. The final dataset included 228 stems (102 cemented and 126 uncemented) in 124 patients. Patients with cemented and uncemented stems were similar with regards to age and gender. Loosening was defined using the Knee Society Radiograph scoring method. Failure mode was classified as septic or aseptic. Standard descriptive analysis included mean, variance and proportions calculated. A bivariate analysis was conducted using a Chi-Square test along with Student T-test.

Results: No difference was observed in re-revision rates between the cemented (26%) and uncemented stems (30%). Average time to failure between cemented (21 months) and uncemented (11 months) groups was significant. Recurrent

infection was most common reason for re-revision cemented (20%) and uncemented (25%).

Five (5%) cemented stems and two (2%) uncemented stems appeared radiographically loose. Twenty-eight (27%) cemented stems and nineteen (15%) uncemented stems were defined as closely observe. After combining the categories (closely observe and loose) representing concern for radiographic failure, a significant difference was observed between cemented (32%) and uncemented stems (17%).

Discussion and Conclusion: Our results suggest that cemented and uncemented stems both provide acceptable outcomes. Interestingly, we observed 32% of the cemented stems, while only 17% of the uncemented stems were radiographically classified as “loose” or “closely observe.” This significance is unknown, but may be concerning for long-term survival. We believe the use of uncemented stems for revision total knee arthroplasty after two-stage for infection is a reasonable option.

Poster 13

Contribution of Rotator Cuff Suture Fixation to Locked Plating of 2- and 3-Part Fractures of the Proximal Humerus: A Biomechanical Cadaveric Study

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Introduction: We evaluated the contribution of supplemental suture fixation of the rotator cuff tendons (RTCT) to locked plating of 2-part and 3-part fractures of the proximal humerus. We hypothesized that the addition of suture fixation of the RTCT would result in increased stability when compared with controls without suture fixation.

Material and Methods: Six cadaveric shoulder pairs were used in the study. In phase 1, specimens had fixation with locked plating of the proximal humerus after creation of a 2-part fracture of the greater tuberosity. Group A had suture supplementation placed through the subscapularis, supraspinatus, and infraspinatus tendons and tied to the suture plate. No sutures were added in Group B. A displacement meter was fixed to bone on each side of the fracture. A rotational testing device cycled the shoulders through the vertical axis of the humerus while the scapula was clamped in a fixed position simulating 30° and 90° of external and internal shoulder rotation, respectively. A final displacement reading was recorded at the end of 200 cycles during the

final cycle. In phase 2, an unstable 3-part fracture was created and testing was repeated.

Results: Supplemental suture fixation through the RTCT resulted in increased stability in 2-part fractures; however, this difference was not statistically significant. A statistically significant increase in stability was observed when sutures were incorporated into the construct of 3-part fractures.

Discussion and Conclusion: Our study is the first to examine and provide evidence of the improvement in fracture stability with suture supplementation. We believe the increase in fracture fixation stability with the use of RTCT suture supplementation will help to decrease the failure rate of proximal humeral fracture fixation.

Poster 14

Screening for Metal Allergy in Joint Arthroplasty

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Screening for Metal Allergy in Joint Arthroplasty Allergy to alloys used in the manufacture of joint arthroplasty components have been reported to cause hypersensitivity reactions which can present not only as dermatitis but may in some instances result in the late failure of the procedure necessitating revision. This current concepts review explores current thoughts and practices regarding screening for metal allergies pre and post-implantation. Patients who have a history of metal exposure, such as multiple piercings, jewelry wear, clothing with metal fasteners, and dental implants, may be at risk. Females are more likely to exhibit metal allergy than males. The procedure used to aid in the diagnosis of allergic contact dermatitis (such as that due to metal allergy) is patch testing. Patients who give a history of metal intolerance; in particular to the common alloys used in joint implants, may benefit from pre-implantation patch testing. Patch testing may be performed by a Dermatologist and, if positive, may influence the selection of an implant free of these alloys, or an implant that has been coated to minimize exposure and possible sensitization. There are several limitations with patch testing. It may only determine allergy at the time of testing and is not predictive of future allergy. Furthermore, cutaneous patch testing does not recreate the environment of the joint space and therefore is not completely representative of the clinical

scenario. With many variables to consider, the cause of joint loosening or diffuse dermatitis in a patient with joint arthroplasty may not necessarily result from metal allergy. Many questions remain regarding metal allergy in joint arthroplasty as few evidence based prospective series have been undertaken.

Poster 15

Obstructive Sleep Apnea as a Risk Factor After Shoulder Arthroplasty

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Introduction: Obstructive sleep apnea (OSA) has been identified as an important risk factor in perioperative orthopaedic surgery outcomes largely based upon studies performed in hip and knee arthroplasty. Screening systems are being instituted in increasing frequency to presumably attempt to prevent morbidity and mortality and decrease complication associated costs.

Methods: We utilized the Nationwide Inpatient Sample (NIS) to analyze 22988 patients undergoing TSA or hemiarthroplasty. Of these patients 1983 (5.9%) were diagnosed with OSA. Multivariate analysis with logistic regression modeling was used to compare patients with and without OSA for various outcomes. Our objective was to determine if patients with OSA have a higher likelihood of postoperative in-hospital complications, length of stay or increased costs after shoulder arthroplasty.

Results: Patients with obstructive sleep apnea had overall similar in-hospital mortality and complications including PE compared with those without OSA. OSA was not associated with increased postoperative charges (\$39,741 in patients with OSA vs. \$39,334 in those without OSA) and resulted in a shorter length of stay (mean, 2.61 vs. 2.91 days; $P < 0.0001$).

Discussion and Conclusions: This is the first study to demonstrate that the association of OSA with surgical morbidity and mortality may not be as relevant in shoulder arthroplasty as in hip and knee surgery. Our results suggest that a diagnosis of OSA does not increase perioperative morbidity and mortality including perioperative complications. This may be due to increased recognition and monitoring in those patients diagnosed with OSA. However, in

hospital costs do not appear to be higher for OSA patients. Additionally length of stay in patients with OSA was shorter. This information may be helpful for risk-benefit counseling in patients concerned about OSA status. Further analysis is needed in a prospective manner to further elucidate the nature of these conclusions to optimize patient outcomes.

Poster 16

Radiological and Clinical Evaluation of the Dynamic Interlaminar Implant

Radek Hart, Prof, MD, PhD, FRCS

Introduction: The aim of the study was to evaluate the flexibility of an interlaminar spacer, its effect on the flexion-extension range of motion and vertebral translation and on the height of the intervertebral foramina. The visual analogue scale (VAS) and the Oswestry Low Back Pain Disability Questionnaire (OQ) were used to evaluate clinical effect of the procedure.

Methods: Pre- and postoperative data were obtained for 40 patients with symptomatic lateral recesses lumbar stenosis treated with monosegmental implantation at least one year after the surgery. The mean age of 21 men and 19 women was 61 years (range, 76 to 35 years). Exclusion criteria contained severe or moderate degeneration of the treated and adjacent segments. In the lateral flexion-extension views, the angle was measured between branches of the implant and between end-plates of the instrumented and adjacent segment; the dorsal translation of the cranial vertebral body was measured in the instrumented and adjacent segment. The height of the neuroforamen was measured before and after the surgery.

Results: None of the measured values changed in flexion-extension statistically significantly. No statistically significant difference was found between instrumented and adjacent segments. The VAS changed at average from 8 preoperatively (range, 4 to 10) to 3 at the last follow-up control (range, 1 to 6) ($p = 0.009$). The OQ averaged postoperatively 32 points (preoperatively 54) ($p = 0.028$).

Discussion and Conclusions: Interspinous process devices have been designed for managing various conditions. But they differ significantly in biomechanics. This interspinous device increases the height of the neuroforamina (without statistically significant difference) with significant influence on the clinical result in cases with lateral stenosis. Its

branches compress in extension and dilate in flexion. This fact causes that the implant doesn't significantly alter the biomechanics of the treated segment.

Poster 17

Geriatric Hip Fracture Program

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Introduction: Geriatric hip fractures pose a significant public health concern. In the United States, the population 65 years and older is the fastest growing segment of society. It is projected that geriatric hip fractures worldwide will reach almost 4 million, with more than 700,000 in the United States. This anticipated growth can burden the already stressed health care system, therefore, efficient care of this projected patient volume is critical.

Methods: A twenty-four month consecutive period compared patient outcomes with and without a coordinated care effort in the treatment of acute geriatric hip fractures. Coordinated care efforts include an Orthopaedic Champion, Nurse Coordinator, Administrative support, and standardized care pathways implemented by an interdisciplinary team. The primary metrics evaluated included length of stay, 30 day readmission rate, and discharge disposition.

Results: The Geriatric Hip Fracture Program group demonstrated a shorter length of stay and a decreased readmission rate. Discharge disposition patterns changed with a reallocation of patients to acute inpatient rehabilitation centers rather than skilled nursing facilities.

Discussion and Conclusion: Coordinated Geriatric Fracture Care can positively impact quality outcomes for geriatric hip fractures. The rise in the geriatric population, coupled with health care cost containment drives innovative programs to achieve positive outcomes with cost efficiency. Implementing a standardized interdisciplinary team approach to geriatric hip fractures improved the ability to meet or exceed some commonly used health care quality measures.

Poster 18

Diagnosis of Phosphaturic Mesenchymal Tumor Is Frequently Delayed: A Series of Patients Diagnosed at Least Two Years After Symptom

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Introduction: Tumor induced osteomalacia (TIO) is a rare paraneoplastic syndrome by which a neoplasm causes renal phosphate wasting and resultant decreased bone mineralization. Nonspecific clinical symptoms of fatigue, bone pain, and musculoskeletal weakness make the diagnosis elusive and lead to delays in curative surgical treatment. This is the first study that characterizes the clinical course of patients with a delayed diagnosis of TIO due to phosphaturic mesenchymal tumor (PMT).

Methods: This study retrospectively chart reviewed adult cases diagnosed and treated for PMT. Patients were identified through an internal orthopaedic oncology database with the inclusion criteria of adults age >18, final pathological diagnosis of PMT, a duration of at least 2 years from onset of symptoms to diagnosis, and minimum 6 (average 69.2) month clinical follow-up.

Results: Five PMT patients were diagnosed and treated at an average age of 61 (35-74) years. All patients were seen by multiple specialties before the diagnosis was reached at an average of 7.2 (2-12) years after initial symptom onset. Two patients in whom the index procedure was wide surgical resection did not experience recurrence compared to three patients that experienced recurrent signs and symptoms after marginal excision. Pre-operative FGF-23 levels were elevated in two patients. These levels normalized immediately following surgery. Postoperative rise in FGF-23 was predictive of recurrent disease. Two patients developed hyperparathyroidism secondary to parathyroid adenomas following PMT resection.

Discussion and Conclusion: PMTs are uncommon tumors with variable and cryptic presentation contributing to delayed diagnosis. Definitive treatment is early, wide surgical resection. FGF-23 remains useful in diagnosis and may also prove to be beneficial in monitoring for recurrence. Parathyroid evaluation is warranted due to the high rate of associated par-

athyroid adenomas seen in this population. The diagnosis of TIO-associated PMT should be considered in any patient who presents with hypophosphaturic osteomalacia with no other physiological cause.

Poster 19

Combat-Related Hemipelvectomy: Twelve Cases, a Review of the Literature and Lessons Learned

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Benjamin K. Potter, MD

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

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

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

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

Poster 20

The Utilization of a Suture Bridge Construct for Tibiofibular Instability During Transtibial Amputation Without Distal Bridge Synostosis Creation

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Benjamin K. Potter, MD

Introduction: Symptomatic distal tibiofibular instability is a known complication of trauma-related transtibial amputations. Overt proximal tibiofibular dislocations, which are easily recognized on radiographs, may occur. More commonly, however, the proximal tibiofibular joint remains structurally intact in the presence of distal instability due to the loss of the distal syndesmotomic structures as well as damage to the interosseous membrane. Some authors have espoused treating this instability with the creation of a distal bridge synostosis in order to prevent potentially painful, discordant motion as well as to minimize the prominence of the residual distal fibula. Recent studies, however, have suggested an increase in complication and re-operation rates in transtibial amputations that received a bone-bridge compared to those that did not. While there are several described techniques for the bridge synostosis, most are dependent on having sufficient remaining fibula to construct the bridge without unnecessary shortening of the tibia, which is not always the case following traumatic and trauma-related amputations.

Methods: We propose a technique utilizing a tightrope device to restore distal tibiofibular stability when performing selected transtibial amputations.

Results: We have used this technique on 10 patients to date with a mean follow up of 12 months. No patient has developed symptoms or radiographic evidence of tibiofibular instability,

complaints of symptomatic implants, or posterolateral knee instability. All patients are community ambulators in standard sockets and prostheses.

Discussion and Conclusion: With this technique, we have been able to minimize the amount of distal fibular prominence and discordant tibiofibular motion in the patients mentioned above. Importantly, these goals were achieved without the increased complications associated with bone-bridge synostosis amputations. This method also provides a solution to address tibiofibular instability in the patient with minimal remaining fibular length, thus precluding a bone-bridge synostosis.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 49).*

Poster 21

Two-Bundle Grafts Do Not Equal 2-Bundle Function: Role of Positioning in Achieving Differential 2-Bundle Function

John C. McConnell, MD

Introduction: A more simplified approach to the problem of achieving anatomic 2-bundle ACL function might be to ignore elaborate fixation and instrumentation strategies and focus instead on positioning and support of the knee during the surgical procedure so that bundles are differentially tensioned and fixed at optimal points in the flexion/extension cycle. This paper illustrates technical considerations for positioning to achieve anatomic 2-bundle ACL function.

Methods: 1176 patients underwent 2-bundle ACL repair, repair/augmentation, and/or reconstruction as needed between 1/1/1999 and 6/29/12 using a variety of instrumentation and fixation systems. The common pathway in all cases was the use of a mechanical positioning system which allowed positioning for optimal placement of graft (when used) and differential anteromedial and posterolateral bundle tensioning and fixation at optimal points during the flexion/extension cycle to achieve differential 2-bundle function.

Results: Restoration of anatomic 2-bundle ACL function has been sensed to be desirable but technically more difficult to achieve and harder to prove as superior to one-bundle reconstruction. Various fixation techniques and surgical techniques and instrumentation have been advanced as offering advantages for placement and fixation of 2 bundles. A more simplified approach to the problem of achieving ana-

tomic 2-bundle ACL function might be to ignore elaborate fixation and instrumentation strategies and focus instead on positioning and support of knee during surgical procedure so that bundles are differentially tensioned and fixed at optimal points in flexion/extension cycle. This paper is not intended to contribute to debate about relative merits of 2-bundle v 1-bundle ACL repair/reconstruction but rather should 2-bundle function be desired, to illustrate technical considerations concerning positioning/support of knee to facilitate achieving an ACL which has two differentially functioning bundles.

Poster 22

Year Wear Analysis and Performance of Large Diameter Delta Ceramic Heads on Highly-Cross Linked Polyethylene

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Introduction: Large diameter ceramic heads combined with an alumina matrix have been developed to reduce dislocation rate, improve implant longevity and meet the increased activity demands in young patients. However, there is minimal long-term data on wear rates in the literature. Our objective is to compare 5-year wear rates using large diameter ceramic heads on highly cross-linked polyethylene with metal-on-highly cross-linked polyethylene.

Methods: Between April 2006 and March 2007, 48 patients (53 hips) with a mean age was 57 years underwent total hip arthroplasty with delta ceramic-on-highly cross-linked polyethylene. The femoral head sized were 32mm in 16 hips and 36mm in 37 hips. Clinical assessment included Western Ontario and McMaster Universities Arthritis Index (WOMAC), Hospital for Special Surgery (HSS) hip scores, and University of California Los Angeles (UCLA) activity score. 2-year and 5-year radiographs were analyzed for radiographic wear, femoral penetration, periprosthetic loosening or osteolysis by 2 independent observers using Roman 1.70 software.

Results: The mean WOMAC, HSS and UCLA scores were 8.6, 36, and 7 respectively. There was no osteolysis, loosening, dislocation, or ceramic head fracture. The mean wear at 5 years for 32mm and 36mm heads was 0.015 ± 0.04 mm/yr and

0.02 ± 0.05 mm/yr, respectively. There was no statistical difference between 32mm and 36mm groups.

Conclusion: Long terms results of large ceramic heads show excellent clinical and radiographic results in young and active patients with a mean wear rate well below the osteolysis threshold.

Poster 23

Neutral Mechanical Axis Malpositions Most Total Knees Compared to Normal Anatomy

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Introduction: New imaging technology was utilized to define the three-dimensional (3D) weight-bearing alignment of normal adult knees corrected for rotation to see how frequently knees were in neutral alignment.

Methods: Weight-bearing, simultaneous biplanar imaging of normal healthy adults was undertaken utilizing a novel low dose imaging technology that allows for correction of limb rotation and the ability to generate a 3D model. 100 volunteers (200 knees), average age 35 (range 18-72), 58% female, with no history of trauma, surgery, symptoms, or treatment of the lower extremity underwent imaging of both lower extremities. The hip-knee-ankle angle (HKA) was used to determine whether knees were in varus, neutral, or valgus alignment; target $0 \pm 3^\circ$. The mechanical lateral distal femoral angle (mLDFA) was used to determine whether the knee joint line was perpendicular to the mechanical axis of the femur (target $90^\circ \pm 3^\circ$) or whether joint line obliquity was present (93°).

Results: For HKA angle measurements in 200 knees, 70% were neutral, 10.5% were valgus ($\geq 3^\circ$) and 19.5% were varus ($\leq -3^\circ$). The average HKA angle was more varus in males (-1.5° , SD $\pm 2.9^\circ$) than in females (0.14° , SD $\pm 2.3^\circ$). Joint line obliquity $>3^\circ$ was present in 52.5% of all knees (45.2% M / 57.8% F). Neutral mechanical axis AND absence of joint line obliquity was present in only 31% of knees. The average mLDFA was 86.93° and the average HKA angle was -0.55° ; if the targets were shifted to $\pm 3^\circ$ of the average then 70% of knees fall within both targets (64.3% M / 74.1% F).

Discussion and Conclusion: Neutral mechanical axis malpositions most knees (69%) in terms of axis or joint line obliquity.

uity $>3^\circ$ from the normal population. Utilizing population means by gender as targets improves accuracy within 3° from 31% to 70%.

Poster 24

High Level of Residual Symptoms in Young Patients with TKA

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Introduction: Total Knee Arthroplasty (TKA) is among the fastest growing interventions in medicine with procedure incidence increasing the most in younger, more active patients. Global knee scores have a ceiling effect and do not capture the presence of difficulty or dissatisfaction with specific activities important to patients.

Methods: A national multicenter study was designed to quantify the degree of residual symptoms and specific functional deficits in young, active patients (age 18-60) undergoing modern TKA at one of five total joint centers. To eliminate observer bias, data was collected by an independent, third party survey center with expertise in administering medical outcomes questionnaires for federal agencies.

Results: Complete data on satisfaction and function was collected in 661 patients (average age 54 years old, 61% female) at one to four years following primary TKA. The degree of overall satisfaction was relatively high; 90% of patients reported being satisfied with the overall functioning of their knee, 89% reported satisfaction with their ability to perform normal ADLs, and 91% were satisfied with the degree of pain relief. Only 66%, however, felt their knee felt "normal", and the incidence of residual symptoms was surprisingly high with some degree of pain in 33%, stiffness in 41%, grinding or other noise in 33%, swelling or tightness in 33%, difficulty getting in and out of a car in 38%, difficulty getting in and out of a chair in 31%, and difficulty with stairs in 54%. Only 47% reported complete absence of a limp and only 50% had participated in their most preferred sport or recreational activity in the past 30 days.

Discussion and Conclusion: When interviewed by an independent third party, a surprising percentage of young, active patients report residual symptoms and limitations following modern TKA.

Poster 25

The Impact of Hip Arthroplasty Type on Proprioception

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Introduction: Improvement in proprioception has been proposed as a potential advantage of surface replacement arthroplasty (SRA) over total hip arthroplasty (THA), but objective proof is lacking. The purpose of this study was to apply recently available advanced technology to determine whether SRA patients have better proprioception compared to similar THA patients.

Methods: A commercially available device was utilized to quantify dynamic postural control (proprioception). This powered platform quantifies balance by measuring center of mass deviations in six planes: lateral, up/down, anterior/posterior, rotation, flexion/extension, and lateral flexion. Testing consisted of trials with both double and single limb support. Three groups of 25 patients (SRA, THA with femoral head >32 mm, and THA with femoral head ≤ 32 mm) and a matched control group of normal subjects were recruited to participate. Dominant leg was recorded for each subject. Patients were asymptomatic (average Harris Hip Score 98), well-functioning (average UCLA Score 8), and 1 to 5 years post-operative.

Results: Double limb testing showed equivalent results across all groups. In single limb testing, the operative side performed better in patients who had undergone SRA versus THA, but this apparent difference disappeared when the operative side was normalized to the non-operative side. When compared to age-matched controls, however, both operative and non-operative sides showed significantly worse proprioception for all arthroplasty cohorts.

Discussion and Conclusion: All hip arthroplasties return to a level of proprioception comparable to the non-operative side. SRA did not show improved proprioception when compared to THA and large head THA did not show improved perfor-

mance compared to standard THA. The finding of significantly inferior scores of the non-operative study hips compared to controls indicates that decreased proprioception is associated with arthritis of the hip in young adults.

Poster 26

Spanning External Fixation for Definitive Treatment

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Introduction: Spanning external fixation is well-accepted for the temporary treatment of complex fractures about the knee, particularly when there is a compromised soft-tissue envelope. Occasionally, patients may have severely compromised soft tissue or their medical condition may preclude additional surgical intervention. The purpose of this study was to retrospectively review the outcomes of patients treated with definitive spanning external fixation as a management alternative of complex, high-energy fractures about the knee.

Methods: Between 2002 and 2011, 763 patients with 798 fractures about the knee (OTA Type 33 and 41) were treated at our institution. Patients who were initially treated with spanning external fixation for either a distal femur, proximal tibia fracture or both were included in this study. The primary outcomes measures were range of motion of the knee, functional status after spanning external fixator removal and related complications.

Results: Eleven patients met inclusion criteria of distal femur and/or proximal tibia fractures which were treated definitively with knee spanning external fixation for an average of 12 weeks (5-20 weeks). Knee range of motion following external fixator removal ranged from 0 to 5 degrees of extension to 90 to 130 degrees of flexion. Six of the eleven patients developed pin site infections. No patient required an additional procedure for manipulation of knee under anesthesia after ex-fix removal. At time of final follow-up (22 months, range 7-67 months), all patients were ambulatory with full weight bearing and none of the patients required total knee arthroplasty.

Discussion: In patients who are either poor surgical candidates or whose soft tissues preclude surgical intervention for

distal femur and proximal tibia fractures, spanning knee external fixators can be an acceptable option. Obtaining acceptable knee range of motion can also be obtained following 2-3 months of knee immobilization.

Poster 27

Impact of Inferior Glenoid Tilt, Humeral Retroversion and Bone Grafting on Muscle Length and Deltoid Wrapping in Reverse Shoulder Arthroplasty

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Introduction: This computer model quantifies the ability of humeral retroversion, glenoid tilt, and glenoid bone graft to restore anatomic muscle length and deltoid wrapping in reverse shoulder arthroplasty.

Methods: A computer model simulated abduction and internal/external rotation in the scapular plane for the normal shoulder, a 38mm shoulder, and a shoulder 36mm reverse shoulders (implanted in 0, 20, and 40° retroversion, 0 and 15° of inferior tilt, and with and without a 10mm thick bone graft behind the glenoid baseplate). Each prosthesis was implanted along the inferior glenoid rim. Eight muscles were modeled as 3 lines from origin to insertion, muscle lengths were measured as the average of the 3 lines. The angle of abduction where the middle deltoid stops wrapping the greater tuberosity was also quantified.

Results: Each reverse shoulder shifted the center of rotation medially and inferiorly, elongated the deltoid, and shortened the internal and external rotators relative to the normal shoulder. Implanting the 36mm shoulder in less retroversion increased tension of the posterior muscles and decreased tension of the anterior muscles. Implanting the 36mm shoulder with 15° tilt decreased anteroposterior (AP) muscle tension. Implanting the 36mm shoulder with bone graft in a non-worn glenoid increased AP muscle tension. The 38mm shoulder best restored the lateral position of the humerus, had the most deltoid wrapping, and best restored the anatomic tensioning of the anterior and posterior shoulder muscles.

Discussion and Conclusions: Varying humeral retroversion, glenoid tilt, and/or using graft behind the baseplate of a non-

worn glenoid offers the potential to improve deltoid wrapping and muscle tensioning with the 36mm shoulder reverse shoulder. However, more anatomic muscle tensioning and improved deltoid wrapping can be achieved by using an alternative prosthesis design with a lower humeral neck angle, thicker glenosphere, and a more laterally offset humeral stem/liner.

Poster 28

Open, Intra-Articular, Distal Femur Fractures: A Life and Limb Threatening Injury

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Purpose: This study seeks to determine if the high-energy mechanisms and greater frequency of associated injuries in the setting of open, intra-articular, distal femur fractures lend themselves to poor outcomes, despite the use of modern techniques and implants in a level-one trauma center.

Methods: Following IRB approval, patients sustaining open, intra-articular distal femur fractures between 2008-2012 were identified in our trauma database. Patients with a minimum of 3 months clinical and radiographic follow-up, or those that died, achieved a radiographic union, or underwent a failure of treatment prior to this were included for analysis. Patient age, gender, tobacco use, BMI, and medical co-morbidities were noted. Injury related variables including fracture mechanism, location, morphology, soft tissue status, associated injuries, and injury severity score (ISS) were also recorded. Finally, treatment related factors including time to initial debridement, type of instrumentation, number of transfusions, and quality of reduction were assessed. Time until bony union, limb alignment, ambulatory status, the need for further surgical intervention, and complications such as non-union and infection were tabulated and correlated with previously mentioned independent variables.

Results: Between 2008-2012, 20 open intra-articular distal femur fractures were treated at our institution. Fourteen fractures occurred in males, while 6 occurred in females. The average patient age was 48. Sixteen patients presented with associated injuries, while 4 patients sustained this fracture as an isolated injury. The average ISS was 15.8. The average

time from presentation at our institution until the initial debridement was 9.3 hours. Twelve patients were treated with lateral based distal femoral locking plates, 5 patients were treated with retrograde femoral nails, one patient underwent medial based plating with additional lag screw fixation, and one patient underwent immediate above knee amputation. Nine patients underwent staged fixation, employing a temporary external fixator prior to definitive treatment. Two patients had inadequate clinical follow-up and one patient died on post-operative day 1, leaving 17 fractures available for further retrospective review with an average follow-up of 10 months. Union was achieved in 12 instances (71%) after an average of 190 days of healing. Three patients developed a nonunion (18%), one of which was infected. Two patients required an above knee amputation, one acutely and another following a post-operative infection. Two additional patients required an ipsilateral below knee amputation for associated open tibial fractures. The average knee range of motion in patients achieving union was 8-101 degrees. Gait aids, including prostheses, were required by 8 patients at final follow-up.

Discussion and Conclusion: Open intra-articular distal femur fractures are often incurred through high-energy mechanisms, associated with other serious injuries, and represent a serious threat to life and limb. In our series, 25% of patients that presented with this injury lost either their life or limb. Despite state of the art treatment at a level-one trauma center, results following the treatment of these injuries can be wrought with complications and permanent functional limitations can result.

Poster 29

Subcutaneous Depth in a Traumatized Lower Extremity

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Introduction: Acute compartment syndrome (ACS) is a rare but serious consequence of traumatic leg injury. This ongoing observational cohort study aims to validate the use of Near Infrared Spectroscopy (NIRS) for continuous monitoring of oxygen saturation in the muscles of the leg and diagnosis of ACS as an alternative to invasive pressure monitoring. NIRS is able to measure oxygenation to a depth of 2 to 3 cm below the skin, raising concerns over the ability of NIRS to accu-

rately determine oxygenation of injured leg compartments in the presence of swelling and in the obese.

Methods: Data was analyzed on 51 patients with severe leg injuries, including qualifying tibia fractures and gunshot wounds, who presented to a participating trauma center within 12 hours of injury. Distance from skin to fascia in the superficial posterior compartment of both legs was measured on each patient using a portable ultrasound device.

Results: Subject age ranged from 20 to 64 (mean: 39.2) years with 43 male and 8 female patients. The mean subcutaneous adipose tissue thickness was 7.75mm for the injured leg and 7.68mm for the uninjured contralateral leg. Mean comparison testing revealed no difference in adipose tissue thickness between the injured and uninjured legs. Out of the 51 enrolled subjects, only one subject had a subcutaneous depth of over 2cm on the injured leg.

Discussion and Conclusion: These data suggest that, within this traumatically injured population, symptoms associated with leg injury (such as swelling and edema) do not significantly affect the distance from skin to fascia. It is also notable that subcutaneous depth beyond the 2cm mark (validated in previous studies) is a rare occurrence in this population. These results further support the use of continuous NIRS monitoring for diagnosis of ACS.

**The FDA has not cleared this drug and/or medical device for the use described in the presentation. (Refer to page 49).*

Poster 30

Southern Orthopedic Association Abstract Publication Rates

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Introduction: Multiple studies have been published looking at overall publication rates of accepted manuscripts at various medical societies' annual meetings. Our hypothesis is that the rate of publication and the Southern Orthopedic Association's (SOA) annual meeting is similar to those at other medical societies. Therefore, the purpose of this study is to identify publication rates of accepted manuscripts at the SOA annual meetings.

Methods: An extensive literature search was performed using Google Scholar and PubMed. Inclusion criteria were all

accepted abstracts either posters or podium presentations that were presented at an SOA annual meeting from 2005 to 2011. Publication was confirmed by ensuring at least one author from the abstract was listed in the publication of the same subject matter. Abstracts and publications were also categorized into orthopedic subspecialty.

Results: A total of 568 abstracts were presented at SOA meetings between the years of 2005 and 2011. Of these abstracts, 234 (41.2%) were published in peer-reviewed literature. Yearly publication percentage rate varied from a high of 66% in 2005 to a low of 28% in 2010. Overall time between presentation at SOA and publication in a peer-reviewed journal varied with the average time to publication being 2.0 years in 2006, compared with 1.0 years in 2011, with an overall average of 1.5 years to publication. Poster presentations began in 2009 and had a publication rate of 45.7% that was compared to publication of podium presentations at 40.3%.

Discussion and Conclusion: The publication rate observed from abstracts accepted to the SOA annual meeting compare with other major orthopedic conference publication rates. Still, more than half of all abstracts remain unpublished. The SOA annual meetings does lead to publication in peer reviewed journals, but there are many abstracts that do not reach publication.

Poster 31

Pedicle Screw Hubbing in the Adult and Immature Thoracic Spine: A Biomechanical and Micro-Computed Tomography Evaluation

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Introduction: Pedicle screw "hubbing" involves seating the screw head into the dorsal lamina. This technique is postulated to provide 1) a load-sharing effect thereby improving pullout resistance, and 2) a reduction in the moment arm thereby decreasing cephalo-caudad toggling and implant loosening. The purpose of our study was to evaluate pull-out strength (POS) of fixed-head pedicle screws after hubbing versus standard insertion in the adult and immature thoracic spine.

Methods: Twenty-six (26) fresh-frozen human cadaveric and 22 fresh-frozen immature calf thoracic vertebrae were prepared.

Osteoporotic BMD (n=16), normal BMD (n=6), and immature (n=12) specimens were instrumented with pedicle screws in Group I (non-hubbed, control) and Group II (hubbed) in the opposite pedicle. Cyclic, fatigue loading in a cephalocaudal direction was applied for 2000 cycles at a rate of 1 Hertz (Hz). Pull-out testing was performed in-line with the midline of the vertebra at 0.25 mm/sec and peak POS measured in Newtons (N). Micro-computed tomography (uCT) was used to evaluate trabecular architecture and incidence of iatrogenic microfractures in both adult (n=4) and immature (n=10) specimens.

Results: Hubbed screws resulted in significantly lower POS in all specimens ($452 \pm 274\text{N}$ versus $656 \pm 285\text{N}$), adult specimens ($291 \pm 142\text{N}$ versus $512 \pm 243\text{N}$), and immature specimens ($747 \pm 197\text{N}$ versus $922 \pm 112\text{N}$). With the hubbing technique, 50% of all adult specimens, and 83% of non-osteoporotic adult specimens had visible fractures of the dorsal cortex. For immature specimens, the dorsal cortex demonstrated plastic deformation and conformed to the screw head in 88% of cases. No visible fractures occurred in the control group. uCT demonstrated microfractures of the dorsal cortex in 4/4 adult and 10/10 immature hubbed specimens, and no fractures in 0/4 adult and 1/10 immature control specimens.

Discussion and Conclusion: This is the largest cadaveric study ever performed to evaluate this topic. Hubbed pedicle screws have significantly lower pull-out strength in adult and immature thoracic vertebrae, and frequently cause iatrogenic fractures of the dorsal cortex (micro or visible). This study provides the surgeon with vital information to avoid this common misconception with screw insertion.

Poster 32

Comparison of Pulmonary Function in Adults Younger and Older Than Age 60 Undergoing Spinal Deformity Surgery

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Introduction: The objective of this study was to determine differences in pulmonary function in adult patients who are either younger (Y) or older (O) than age 60 following spinal deformity surgery. We hypothesize that older age may further exacerbate impairment of pulmonary function following spinal deformity surgery.

Methods: 128 consecutive adult deformity patients with idiopathic scoliosis undergoing surgical treatment were evaluated at a single institution with minimum 2 year follow-up. Prospectively collected PFTs, clinical records and radiographs were analyzed.

Results: There were 102 patients in Y group (avg age 39.3 ± 14.1 yrs) and 26 in O group (avg age 63.7 ± 2.7 yrs), with similar F/U (Y=2.9 v O=2.6 yrs, $p=0.27$). There were no differences in average preop main thoracic (MT) curve magnitude (Y=50.0deg, O=54.8deg, $p=0.27$), however O patients had significantly greater # of lumbar (5.9 v 4.2 , $p=0.00$), thoracic (9.1 v 7.3 , $p=0.00$), and total (15.0 v 11.5 , $p=0.00$) levels fused. We also found O patients had significantly lower absolute pre-op FEV1 (2.1 v 2.6L , $p=0.02$) and FVC (2.7 v 3.3L , $p=0.05$), but no differences in %pred PFTs. This relationship remained at 2 yrs, with lower absolute FEV1 (1.9 v 2.5L , $p=0.00$) and FVC (2.5 v 3.1L , $p=0.00$). A clinically significant decline in PFTs (greater than 10% pred FEV1) occurred in 8 (31%) O patients and 26 (25%) Y patients, which was not statistically different. ($p=0.63$). We also observed pre-op PFT impairment (less than 65%pred FEV1) in 1 (4%) O patient, which significantly increased to 6 (23%; $p=0.02$) O patients postoperatively, compared to Y group experiencing no change in the number of patients (n=12, 12%) with PFT impairment postoperatively.

Discussion and Conclusion: Despite age related reduction in PFTs, older patients (over age 60) had no significant difference in %pred PFTs compared to younger patients following spinal deformity surgery. We found older patients have no significant difference in %predicted PFTs compared to younger patients postoperatively, and no differences in the rate of clinically significant PFT decline ($\geq 10\%$ pred FEV1). However, older patients more frequently (23% v 12%) experience PFT impairment ($<65\%$ pred FEV1) after spinal deformity surgery.

Poster 33

Does Curve Magnitude/Deformity Correction Correlate with Pulmonary Function after Adult Deformity Surgery?

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Introduction: The effect of surgical correction on pulmonary function of adult spinal deformity patients is unknown. The

purpose of this study was to determine if a correlation exists between curve magnitude, deformity correction and postoperative pulmonary function (PFTs) following adult spinal deformity surgery.

Methods: We prospectively collected PFTs on 76 adult deformity patients (70F, 6M, avg age 41.2) undergoing primary surgical treatment for idiopathic scoliosis at a single institution and followed them for 2 years (avg 2.93). Radiographs for all pts were analyzed for main thoracic (MT) and sagittal T5-T12 (Sag) curve magnitude/correction.

Results: For all patients, there was a significant change in MT Cobb correction from 53.2 to 20.8 deg (avg -32.5 deg, $p=0.00$), Sag Cobb from 35.3 to 28.8 deg (avg -6.50 deg, $p=0.00$), and a significant decline in absolute and %pred PFTs after surgery, with %pred FEV1 and %pred FVC decreasing 5.86% ($p=0.00$) and 3.54% ($p=0.01$), respectively. We found pre-op MT curve magnitude significantly correlated (moderate, negative) with pre-op absolute and %predicted PFTs ($r=0.364$ to 0.506 ; $p=0.001$). The amount of MT deformity correction was also significantly correlated (weak, negative) with changes in %pred FEV1 and %pred FVC [change%pred FEV ($r=-0.238$, $p=0.04$); change%pred FVC ($r=-0.249$, $p=0.03$)], and there was no significant relationship between Sag deformity correction and PFTs.

Discussion and Conclusion: Pre-op MT curve magnitude in adult spinal deformity patients negatively correlated with pre-op pulmonary function (PFTs). There was also a negative correlation between MT deformity correction and %pred PFT change, which suggests that greater MT curve correction may result in significantly less decline in pulmonary function than smaller curve corrections.

Poster 34

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

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Introduction: During pedicle screw instrumentation, a low current reading (<6 -10mA) with intraoperative evoked electromyogram (EMG) stimulation of a pedicle screw warrants

complete removal in order to palpate the tract to reassess for pedicle wall violation. On many occasions no violation is found, and the same screw is re-inserted along the same trajectory without additional redirection. Previous studies have reported significantly decreased insertional torque during this reinsertion, however fixation strength has never been evaluated biomechanically.

Methods: Thirty-one ($n=31$) thoracic and nine ($n=9$) lumbar individual fresh-frozen human cadaveric vertebral levels were evaluated. Each level was instrumented bilaterally with 5.5mm (thoracic) and 6.5mm (lumbar) titanium polyaxial pedicle screws. A paired comparison was performed for each level, and randomized between control and the test group with screw re-insertion, which was performed by completely removing the pedicle screw, palpating the tract, and then re-inserting along the same trajectory. Screw insertional torque (IT) was measured with each revolution, and peak IT reported in inch-pounds (in-lb). Screws were tensile loaded to failure “in line” with the screw axis, and pullout strength (POS) measured in Newtons (N).

Results: *Thoracic Re-insertion:* There was no significant difference detected for pedicle screw POS between re-inserted (RI) and control screws (732 ± 307 N versus 742 ± 320 N, respectively; $p=0.78$). We also found no significant difference in IT between the initial test screw (INI) (7.28 ± 3.51 in-lb) and control (7.69 ± 4.45 in-lb) ($p=0.33$). However, IT for RI screws (5.14 ± 4.18 in-lb) was significantly decreased compared to INI and control screws (29% decrease, $p=0.00$; 33% decrease, $p=0.00$, respectively). *Lumbar Re-insertion:* There were similar findings for lumbar pedicle screws, with no significant difference for pedicle screw POS between RI and control screws (943 ± 344 N versus 803 ± 422 N; $p=0.09$), as well as a significant IT decrease between RI and control screws (6.38 ± 4.61 in-lb versus 9.56 ± 3.84 in-lb; $p=0.04$). *Correlation Analysis:* Test group screws in both the thoracic and lumbar spine had significant, strong correlations between initial screw IT and pullout strength ($r=0.79$, $p=0.00$; $r=0.93$, $p=0.00$). There was a moderate correlation between re-insertion IT and pullout strength in the thoracic spine ($r=0.56$, $p=0.00$), but no significant correlation for the lumbar spine ($r=0.218$; $p=0.57$).

Discussion and Conclusion: Despite a significant reduction in pedicle screw IT with re-insertion along a previous tract, there was no significant difference in pedicle screw pullout strength; which is the most clinically significant aspect of immediate stability. Therefore, when the surgeon must completely remove a pedicle screw for tract inspection

tion, re-insertion along the same trajectory may be performed without significantly compromising screw fixation strength.

Poster 35

Tapping Insertional Torque Predicts Better Pedicle Screw Fixation and Optimal Screw Size Selection

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Introduction: There is currently no reliable technique for intra-operative assessment of pedicle screw fixation strength and optimal screw size. Several studies have evaluated pedicle screw insertional torque (IT) and its direct correlation with pullout strength. However, there is limited clinical application with pedicle screw IT as it must be measured during screw placement and rarely causes the spine surgeon to change screw size. To date, no study has evaluated tapping IT, which precedes screw insertion, and its ability to predict pedicle screw pullout strength. The objective of this study is to investigate tapping insertional torque and its ability to predict pedicle screw pullout strength and optimal screw size.

Methods: Twenty fresh-frozen human cadaveric thoracic vertebral levels were prepared and DEXA scanned for bone mineral density (BMD). All specimens were osteoporotic with a mean BMD of 0.60 ± 0.07 g/cm². Five specimens were used to perform a pilot study, as there were no previously established values for optimal tapping IT. Each pedicle (n=10) during the pilot study was measured using a digital caliper, and optimal screw size was determined to be equal to or the first size smaller than the pedicle diameter. The optimal tap size was then selected as the tap diameter 1 mm smaller than the optimal screw size. During optimal tap size insertion, all peak tapping IT values were found to be between 2 in-lbs and 3 in-lbs. Therefore, the threshold tapping IT value for optimal pedicle screw and tap size was determined to be 2.5 in-lbs, and a comparison tapping IT value of 1.5 in-lbs was selected. Next, 15 test specimens (n=30) were measured with digital calipers, probed, tapped, and instrumented using a paired comparison between the two threshold tapping IT values (Group 1: 1.5 in-lbs; Group 2: 2.5 in-lbs). Each pedicle was incrementally tapped to increasing size until threshold value was reached based on the assigned group. Pedicle screw size was determined by

adding 1 mm to the tap size that crossed the threshold torque value. IT measurements were recorded with each revolution during tap and pedicle screw insertion. Pedicle screws were then pulled out "in-line" with the screw axis and tensile load to failure measured in Newtons (N).

Results: The pedicle screw pullout strength was also significantly increased (23%) in Group 2 (877.9 ± 235.2 N) compared to Group 1 (712.3 ± 223.1 N) ($p=0.017$). The peak tapping IT was significantly increased (50%) in Group 2 (3.23 ± 0.65 in-lbs) compared to Group 1 (2.15 ± 0.56 in-lbs) ($p=0.0005$). The peak screw IT was also significantly increased (19%) in Group 2 (8.99 ± 2.27 in-lbs) compared to Group 1 (7.52 ± 2.96 in-lbs) ($p=0.02$). There was also an increased rate of optimal pedicle screw size selection in Group 2 with 9 of 15 (60%) pedicle screws compared to Group 1 with 4 of 15 (26.7%) pedicle screws within 1 mm of the measured pedicle width. There was a moderate correlation for tapping IT with both screw IT ($r=0.54$) and pedicle screw POS ($r=0.55$).

Discussion and Conclusion: Tapping IT directly correlates with pedicle screw IT, pedicle screw pullout strength, and optimal pedicle screw size. We recommend incrementally increasing tap size until a tapping insertional torque threshold of 2.5 in-lbs is reached, which may maximize fixation strength and obtain optimal pedicle 'fit and fill' with the largest screw possible. Tapping insertional torque may provide a reliable method to intra-operatively judge pedicle screw fixation strength.

Poster 36

Orthopaedic Injuries Associated with Moped Trauma

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Introduction: It has been reported that in 2011, 24 people were killed and 635 were hurt as a result of moped-related trauma in South Carolina alone. Unfortunately, there is paucity in the English literature regarding moped-associated orthopaedic injuries. The goal of this study is to evaluate orthopaedic injuries encountered in moped-related trauma.

Methods: A retrospective review was performed of patients treated at our level-1 institution between 2006 and 2011 for

moped-associated trauma. Inclusion criteria was age 18 years or older and injury as a driver/passenger of a moped. Medical records were reviewed for patient demographics, incidence of orthopedic injury, characteristics of injuries, treatment of injuries, and complications rate. "Orthopaedic injury" was defined as any fracture or soft tissue injury treated by the orthopaedic service.

Results: A total of 314 patients were treated for moped-related trauma during the study period of which 205 (65%) had an orthopaedic injury. Ninety-one of the patients were males. Forty percent of patients were under the influence of alcohol and 78% were not wearing a helmet at the time of their accident. Of a total of 409 orthopaedic injuries, fifteen percent of these injuries were open fractures and/or soft tissue lacerations. Over half of the patients with lower extremity injuries had at least one open fracture. Overall 460 operative procedures were required to treat orthopaedic injuries with a significantly higher percentage of lower extremity injuries requiring operative intervention.

Conclusion: Moped-related trauma is associated with a high rate of orthopaedic injury. Further, there is a high rate of multiple injuries and open injuries.

Poster 37

Management Strategies and Outcomes for Moderate to Severe Heterotopic Ossification Following Shoulder Arthroscopy

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1) Heterotopic ossification (HO) is a commonly occurring phenomenon after spinal cord injury, head injury, neurological disorders, burns, trauma and arthroplasty. However, very little has been reported concerning the development and treatment of HO following shoulder arthroscopy. We report on a retrospective consecutive series of patients that developed significant heterotopic ossification following shoulder arthroscopic procedures. Patient demographics and past medical histories were also reviewed to explore commonalities and possible risk factors predisposing shoulder arthroscopy patients to an elevated risk of HO.

2) Seventeen patients identified as having developed moderate to severe heterotopic bone formation following shoulder arthroscopy and that required revision arthroscopic resection of ectopic bone were retrospectively reviewed. Patients

averaged 56 years of age (41 to 67 years), 88% were African American and 82% were diabetic. All patients underwent arthroscopic shoulder surgery between January 2003 and March 2011, and all procedures were carried out by one of two fellowship trained shoulder surgeons. Index procedure included a subacromial decompression and distal clavicle excision in all patients. Fifteen patients also underwent a concurrent rotator cuff repair. All 17 patients ultimately required an additional, secondary arthroscopic procedure performed between 3-28 months designed specifically to remove ectopic bone, formation, improve range of motion and alleviate symptoms. The secondary surgical debridement was performed on average 7.1 months following the index procedure. Management of this complication involved aggressive arthroscopic surgical debridement of ectopic bone in all patients along with the supplemental arthroscopic application of bone wax to bleeding bony surfaces in ten of the 17 patients along with the use of non-steroidal anti-inflammatory drugs for all patients post-operatively. Perioperative radiotherapy was also carried out in six patients. Demographic information was compared for all involved patients looking for possible similarities and or risk factors.

3) The mean patient age was 56 years old. The minimal duration of follow-up was one year. All involved patients were diagnosed with HO formation with radiographic imaging. All patients were treated with early aggressive arthroscopic HO removal. The average pre-operative passive forward elevation and passive external rotation before arthroscopic HO removal was 70.5 degrees and 18.76 degrees respectively. All patients received post-operative physical therapy. Final range of motion was determined at the final scheduled clinical office visit. The average post-operative passive forward elevation and passive external rotation post arthroscopic removal of ectopic bone had improved to 148.53 degrees and 67.65 degrees respectively. The duration of exposure to ectopic bone formation did not have a pronounced effect on eventual post-operative pain scores and final range of motion. At one year of clinical follow-up no ectopic bone formation had returned. There were no significant complication in any of our 17 patients.

4) Shoulder arthroscopy with subacromial decompression and distal clavicle excision may increase the risk of ectopic bone formation in certain patient populations. Although rare, when ectopic bone formation does occur it may require aggressive surgical debridement to improve range of motion and reduce symptoms. Supplemental bone wax application to bleeding bony surfaces intraoperatively, post-operative non-steroidal

anti-inflammatory drugs and post-operative radiation therapy were also utilized.

Poster 38

Early Arthroscopic Management Strategies for Patients Developing Moderate to Severe Heterotopic Ossification of the Elbow

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1) Heterotopic ossification (HO) about the elbow following elbow surgery or elbow trauma is poorly understood and little has been written about the successful arthroscopic treatment of this complication. Techniques for managing this complication are rarely described and primarily anecdotal in nature. This study evaluates 6 consecutive patients with early aggressive arthroscopic management of ectopic bone formation.

2) Six patients identified as having developed ectopic bone following elbow traumas and surgery were retrospectively reviewed. This group of patients underwent surgery between January 2007 and March 2010 and was operated on by a single fellowship trained surgeon. Radiographic and clinical follow-up between 2-5 years was carried out. All 6 of these patients underwent an arthroscopic elbow procedure designed to remove ectopic bone, increase motion and decrease pain symptoms. Management of this complication involved the arthroscopic resection of ectopic bone and post-operative radiation therapy within eighteen hours of the arthroscopic procedure. All patients were diagnosed with HO between 2-4 weeks postoperatively and were all operated on within 6 weeks from initial trauma and surgery. All involved patients were losing and or lost elbow flexion, extension, supination and pronation. All patients received post-operative physical therapy. Range of motion was continually determined at each clinical follow-up.

3) The mean patient age was 29 years old (range 16-42). Three of the patients were male and three were female. The minimal duration of follow up was 2 years. All patients were diagnosed with HO formation between 2-4 weeks with radiographic imaging and were treated within 6 weeks from their initial surgery and or trauma. All patients were treated with early aggressive arthroscopic ectopic bone debridement with the addition of a single dose of post-operative radiation therapy within 18 hours of their arthroscopic procedure. At the time of initial HO presentation the mean range of motion was -30 degrees of extension to 90 degrees of flexion with less than 15 degrees supination and pronation. Four of our

six patients with a minimal follow-up of at least 3 years have normal range of motion classified as flexion/extension of 0-150 degrees and pronation/supination 80-80 degrees. Two of our six patients with a minimal follow up of 4 years and 2 years have range of motion of -30 degrees of flexion to 100 degrees of extension with full supination and pronation, and -30 of flexion to 120 degrees extension with full supination and pronation respectively. At a minimum of 2-5 years of clinical follow-up no ectopic bone formation has returned. There were no significant complications in any of our six patients.

4) Ectopic bone formation of the elbow does occur and sometimes requires additional surgical intervention. Aggressive early arthroscopic debridement after discovery with the addition of postoperative radiation therapy has proved effective in addressing this potentially serious complication.

Poster 39

Would Resting a Lateral Interbody Cage Across the Ring Apophysis in the Lumbar Spine Mitigate Endplate Violation?

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Bradford S. Waddell, MD

Introduction: Interbody fusion stability can be increased by supplemental fixation with lateral plating, facet or pedicle screws. Poor bone quality or endplate violation can result in cage subsidence and affect stability. The peripheral ring apophysis is the strongest portion of the vertebral body endplate. In this study, we evaluated the value of resting the lumbar cage across the ring apophysis with and without endplate decortication.

Methods: Forty specimens were obtained from 8 fresh-frozen human lumbosacral spines. After DEXA scans and x-rays, each specimen was randomly assigned to one of the following groups: Group 1: Intact endplate, short cage not spanning the ring apophysis; Group 2: Intact endplate, long cage spanning the ring apophysis; Group 3: Endplate decortication, short cage; Group 4: Endplate decortication, long cage. Vertebrae were tested by applying a compressive load in an MTS load cell. Load displacement data was collected at 5Hz until failure. Failure was defined as cage subsidence >5mm or endplate fracture resulting in axial displacement of the actuator >5mm. Load displacement curves were plotted to calculate failure loads and displacement. Failure loads were normalized with respect to bone mineral density of the specimens.

Results: Longer cages, spanning the ring apophysis, with intact endplates had a significant increase in strength and less subsidence compared to the smaller cage group with intact endplates ($p=0.003$). Longer cages spanning the ring apophysis of intact endplates showed a significant increase in compressive strength and resistance to subsidence compared to similar length cages in decorticated endplates ($p=0.028$).

Discussion and Conclusion: Spanning a lateral interbody cage across the ring apophysis increases the load to failure by 40% with intact endplates and by approximately 30% with decorticated endplates. Larger cages spanning the ring apophysis could improve compressive strength and decrease subsidence. Utilizing this technique could increase stability and ultimately improve fusion rates.

Individual Orthopaedic Instruction/ Multimedia Education

Schedule:

Thursday, July 18, 2013 3:40 pm–5:00 pm

Friday, July 19, 2013 3:50 pm–5:00 pm

Saturday, July 20, 2012 3:30 pm–5:00 pm

The following AAOS DVDs are available for individual viewing at the above times.

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
31. **Reconstruction of Abductor Mechanism-Gluteus Maximus Flap Transfer** (15 minutes)
Leo Whiteside, MD and Marcel Roy, PhD
32. **Kinematic Alignment with Modified Conventional Instruments Instead of Patient-Specific Guides** (26 minutes)
Stephen Howell, MD
33. **Arthroscopic Management of Femoroacetabular Impingement** (12 minutes)
J. W. Thomas Byrd, MD
34. **Arthroscopic Suprascapular Nerve Decompression: Etiology, Diagnosis, and Surgical Technique** (21 minutes)
Sanjeev Bhatia, MD; Adam B. Yanke, MD; Neil S. Ghodadra, MD; Seth Sherman, MD; Anthony A. Romeo, MD; and Nikhil N. Verma, MD
35. **Combined Cartilage Restoration and Distal Realignment for Patellar and Trochlear Chondral Lesions** (12 minutes)
Peter Chalmers, MD; Adam B. Yanke, MD; Seth Sherman, MD; Vasili Karas, BS; and Brian Cole, MD, MBA
36. **Simple Arthroscopic Anterior Capsulo-Labral Reconstruction of the Shoulder** (17 minutes)
Stephen J. Snyder, MD and Jeffrey D. Jackson, MD
37. **Proximal Humerus Resection for Parosteal Osteosarcoma** (16 minutes)
Yvette Ho, MD; Camilo E. Villalobos, MD; and James C. Wittig, MD
38. **Biceps Tenodesis: Open Subpectoral and Arthroscopic Technique** (19 minutes)
Adam B. Yanke, MD; Peter N. Chalmers, MD; Anthony A. Romeo, MD; and Nikhil N. Verma, MD
39. **Total Shoulder Arthroplasty: Steps to Get It Right** (15 minutes)
Richard J. Hawkins, MD
40. **ACL Anatomic Single Bundle Reconstruction Technical Note and Results** (20 minutes)
Michael W. Moser, MD; Gonzalo Samitier Solis, MD; Terese L. Chmielewski, PT, PhD; and Trevor Lentz, PT

41. **Surgical Repair of Proximal Hamstring Avulsion in the Athlete** (15 minutes)
Tal S. David, MD and Gabriel L. Petrucci, MD
42. **Removal of a Broken Intramedullary Nail and Exchange Nailing for Tibial Nonunion**
(10 minutes)
Kenneth A. Egol, MD; Abiola Atanda, MD; Mathew Hamula, BA, BS; and Jason P. Hochfelder, MD
43. **Radical Resection of the Glenoid and Scapular Neck for Sarcoma and Reconstruction**
(11 minutes)
Brendon J. Comer, BA; Brett Hayden, BA; Camilo E. Villalobos, MD; and James C. Wittig, MD

Multimedia Financial Disclosure

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

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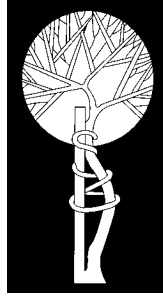
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Southern Orthopaedic Association

30th Annual Meeting

The Breakers
Palm Beach, Florida

July 18-20, 2013

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Multimedia Education

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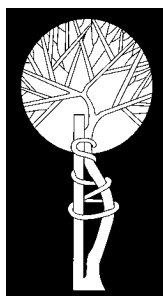
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| <input type="checkbox"/> DVD 9 (23 min) | <input type="checkbox"/> DVD 20 (18 min) | <input type="checkbox"/> DVD 31 (15 min) | <input type="checkbox"/> DVD 42 (10 min) |
| <input type="checkbox"/> DVD 10 (25 min) | <input type="checkbox"/> DVD 21 (22 min) | <input type="checkbox"/> DVD 32 (26 min) | <input type="checkbox"/> DVD 43 (11 min) |
| <input type="checkbox"/> DVD 11 (9 min) | <input type="checkbox"/> DVD 22 (20 min) | <input type="checkbox"/> DVD 33 (12 min) | |

Please indicate the DVD(s) you found to be most meaningful and any comments. Begin with the DVD number.

Please indicate any feedback that you may have concerning other DVDs. Begin with the DVD number.

Please indicate any comments or suggestions that you have regarding the Multimedia Presentations.



Southern Orthopaedic Association

30th Annual Meeting

July 18-20, 2013

The Breakers
Palm Beach, Florida

2013 CME Credit Record

Scientific Program

Instructions: To ensure correct CME credit is awarded, please complete this form, indicating the Sessions you attended. Return this form to the SOA Registration Desk or complete the Credit Record online at www.soaassn.org. 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. Unless you have provided a legible email address, please allow up to 30 days to receive your CME certificate.

Please Print:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Email Address: _____

Thank you for your cooperation.

2013 CME Credit Record Scientific Program

Please rate by checking the box corresponding to the appropriate number.

5 = Excellent 4 = Good 3 = Satisfactory 2 = Fair 1 = Poor

Thursday, July 18, 2013

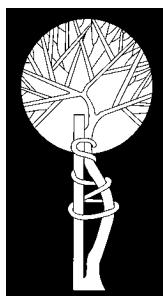
Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 1</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 2</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Symposium 1</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 3</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Symposium 2</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 4</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Instructional Course Lecture 1</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>

Friday, July 19, 2013

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 5</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 6</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Symposium 3</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 7</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Symposium 4</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 8</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Instructional Course Lecture 2</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>

Saturday, July 20, 2013

Sessions	Check if Attended	Presented objective balanced, & scientifically rigorous content	Achieved stated objectives	Satisfied my educational and/or professional needs
<i>General Session 9</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Symposium 5</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 10</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 11</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 12</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>General Session 13</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>
<i>Instructional Course Lecture 3</i>	<input type="checkbox"/>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>	<i>5 4 3 2 1</i>



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2013 CME Credit Record

Poster Presentations

Instructions: To ensure correct CME credit is awarded, please complete this form, indicating the posters viewed. Return this form to the SOA Registration Desk or complete the Credit Record online at www.soaassn.org. 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: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Email Address: _____

Thank you for your cooperation.

2013 CME Credit Record

Poster Presentations

Please place an X in the box by each posters viewed and write any comments you may have in the space provided. 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).

<input type="checkbox"/> 1	<input type="checkbox"/> 9	<input type="checkbox"/> 17	<input type="checkbox"/> 25	<input type="checkbox"/> 33
<input type="checkbox"/> 2	<input type="checkbox"/> 10	<input type="checkbox"/> 18	<input type="checkbox"/> 26	<input type="checkbox"/> 34
<input type="checkbox"/> 3	<input type="checkbox"/> 11	<input type="checkbox"/> 19	<input type="checkbox"/> 27	<input type="checkbox"/> 35
<input type="checkbox"/> 4	<input type="checkbox"/> 12	<input type="checkbox"/> 20	<input type="checkbox"/> 28	<input type="checkbox"/> 36
<input type="checkbox"/> 5	<input type="checkbox"/> 13	<input type="checkbox"/> 21	<input type="checkbox"/> 29	<input type="checkbox"/> 37
<input type="checkbox"/> 6	<input type="checkbox"/> 14	<input type="checkbox"/> 22	<input type="checkbox"/> 30	<input type="checkbox"/> 38
<input type="checkbox"/> 7	<input type="checkbox"/> 15	<input type="checkbox"/> 23	<input type="checkbox"/> 31	<input type="checkbox"/> 39
<input type="checkbox"/> 8	<input type="checkbox"/> 16	<input type="checkbox"/> 24	<input type="checkbox"/> 32	

Please indicate the poster(s) you found to be most meaningful and any comments. Begin with the poster number.

Please indicate any feedback that you may have concerning other posters. Begin with the poster number.

Please indicate any comments or suggestions that you have regarding the Poster Presentations.

2013 Overall Scientific Evaluation

Your feedback is critical to program planning and future course development. Please take a few minutes to complete and return this evaluation form to the registration desk prior to departure.

Why did you choose to attend this Meeting?	High Importance	Some Importance	Little Importance	No Importance
Course Topic(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Learning Method(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Program Faculty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of Program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timeliness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtaining CME Credit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poster Presentations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How did we do overall?	Excellent	Good	Fair	Poor
Course Educational Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical Application to Practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faculty Selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity to Interact with Faculty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Course 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** ☐ **Too Advanced** ☐ **Too Basic** ☐

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: _____

2014 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.
