Western Orthopaedic Association

Scientific Program

72nd Annual Meeting

July 23-26, 2008

Maui, Hawaii

Please be considerate and turn your cell phones to silent during the Scientific Program.

2008 WOA Resident Award Winners

Lloyd W. Taylor Award

Monitoring of Nerve Root Injury Using Transcranial Motor-Evoked Potentials (tcMEPs) in a Pig Model

James M. Mok, MD

San Francisco, CA – University of California

Vernon Thompson Award Winner

The Protective Effect of OP-1 on Articular Cartilage in the Development of Osteoarthritis

Neil Badlani, MD

La Jolla, CA – University of California

Harold and Nancy Willingham Award Winner

Incidence of Hip "Squeak" After Ceramic-on-Ceramic Total Hip Arthroplasty: 2 – 10 Years Follow-Up

Kenny Mai, MD

San Diego, CA – Scripps Clinic

WOA Resident Awards

Predictors and Prevalence of Vertebral Compression Fractures Following Kyphoplasty

Gregory D. Byrd, MD

Portland, OR – Southwest Washington Medical Center

Closed Treatment of Distal Bayoneted Forearm Fractures without Reduction in Pediatric Patients

Nick Crawford, MD

Honolulu, HI – University of Hawaii/Queen's Medical Center

Polyaxial Locking Plate Fixation in Distal Femur Fractures: A Biomechanical Comparison

Kenneth J. Wilkens, MD

Mission Viejo, CA – UC Davis Medical Center

Award Presentations will be on July 25, 10:50–11:37 am.

2008 Scientific Program Abstracts

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

Thursday, July 24, 2008

SYMPOSIUM I: POINT-COUNTERPOINT ON THE HIP AND KNEE

Moderator: William C. McMaster, MD

7:30 am – 8:45 am

Management of Hip Impingement:

Open – *Ernie Sink, MD, The Children's Hospital, Denver, CO*
Closed – *Thomas Sampson, MD, Total Joint Center, San Francisco, CA*

Gender Specific Knee: Ballyhoo or Not

Richard F. Santore, MD, Orthopaedic Medical Group of San Diego, San Diego, CA
Alberto A. Bolanos, MD, Orthopedic Institute of the Bay Area, San Mateo, CA

Notes:

Thursday, July 24, 2008

GENERAL SESSION I: TUMOR/BASIC SCIENCE

Moderator: R. Lor Randall, MD

9:05 am – 10:10 am

Thursday, July 24, 2008

9:05 am – 9:11 am

Favorable Outcome of Intramedullary Nail Fixation of Myeloma Pathological Fractures

Christopher P. Cannon, MD
Valerae O. Lewis, MD
Patrick P. Lin, MD
Alan W. Yasko, MD

Introduction: Multiple myeloma results in lytic bone lesions that often require intramedullary nailing to treat or prevent pathologic fractures. However, the literature provides little guidance on open versus closed nailing, adjuvant cementation, and potential failure rates. We thus investigated the means of fixation, failure rate, and complications associated with intramedullary nailing of myeloma lesions.

Methods: A review of our Orthopaedic Oncology database from 1990 to 2005 revealed 47 myeloma patients treated with 56 intramedullary nails, 37 for actual fractures and 19 for impending fractures. Sites of disease included the humerus (27), femur (27), and tibia (2). The medical records and radiographs were reviewed for each case.

Results: Thirty-one surgeries were closed nailings and 25 were open, with adjuvant bone cement used in 22 of those cases. The mean estimated blood loss for the entire group was 588 cc (range, 50-3500 cc) with significantly more blood loss in the open nailing group (mean 915 cc) than the closed group (mean 335 cc) ($p<.0001$). Mean follow-up was 18 months (range, 0-95 months). Mean overall survival from the time of surgery was 12 months (range, 5 days -58 months). There were no hardware failures or re-operations in either group.

Discussion and Conclusion: Management of myeloma lesions with intramedullary nails, whether treated open or closed, has a favorable outcome with low failure and re-operation rates. There is significantly greater blood loss with open nailings. Consideration should be given to closed nailing if reasonable bone stock exists as the likelihood of failure of the construct is very low.

Notes:

Thursday, July 24, 2008

9:12 am – 9:18 am

Skeletal Muscle Transection in Above Knee Amputation: A Comparison of Electrocautery Versus the Linear Cutting Stapler

Daniel C. Allison, MD, MBA
Lawrence Menendez, MD

Introduction: Because of skeletal muscle's density and vascularity, its transection through standard sharp dissection or electrocautery can be time consuming and bloody. The purpose of this study was to evaluate a new technique of skeletal muscle transection using a linear cutting stapling device (LCS) in comparison with electrocautery in the setting of a standardized procedure requiring significant skeletal muscle transection (above knee amputation [AKA]).

Methods: Charts from AKA surgeries performed between August 14th, 1998 and August 6th 2007 were retrospectively reviewed. Cases in which muscle transection was performed using electrocautery were compared to cases in which muscle was transected with the LCS. These cases were then analyzed in terms of blood loss, surgical time, and complications.

Results: 24 cases met the study criteria (14 cases with the electrocautery and 11 cases with the LCS). The cases using the LCS had lower mean blood loss (302cc vs 510cc) and decreased mean surgical time (1 hour 36 minutes vs 1 hour 58 minutes). Complications and revision surgeries were similar between the two groups.

Discussion and Conclusion: Skeletal muscle transection using a liner cutting stapler instead of electrocautery results in significantly less blood loss and shorter surgical time.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation.* *(Refer to page 32.)*

Notes:

Thursday, July 24, 2008

9:19 am – 9:25 am

An Experience in Structural Pelvic Allograft Reconstruction After Resection of Malignant Pelvic Bone Tumors

Jeffrey Thomas Luna, MD
*Jeffrey E. Krygier, MD
Valerae O. Lewis, MD
Christopher P. Cannon, MD
Robert L. Satcher, MD, PhD
Patrick P. Lin, MD

Introduction: Reconstruction after resection of a malignant pelvic tumor remains to be a surgical challenge. It has been associated with high complication rates and there are a few available data on the surgical outcomes of pelvic allograft procedures. The purpose of this study is to assess the clinical outcome of patients who underwent large segment pelvic allograft reconstruction as well as to identify any factors that might influence the success or failure of the surgical procedure.

Methods: A retrospective database and clinical chart review of twenty nine patients who underwent large segment allograft reconstruction was done. There were 11 females and 18 males with a mean age of 41 years. Mean follow-up was 38 months. Allograft survival was assessed by radiographic evaluation

and the patient functional outcome was assessed using the Musculoskeletal Tumor Society scoring system.

Results: Twelve patients underwent type II resection; 9 patients had type I-II resection; 4 patients had type II-III; and, 4 patients had type I-II-III resection. Twenty-four of the 29 patients developed complications. There were 11 early post-operative complications, 11 late complications and 2 intra-operative complications. Infection was the most common complication (44%). Seven (24%) had local recurrence and 11 (37%) remained without any evidence of disease on latest follow-up. Repeat surgical procedures were done for infection and hardware failure. Eight of the 29 patients (27%) had their allograft removed. Allograft survival ranged from 1 to 62 months (mean 38 months). The average Musculoskeletal Tumor Society score for patients below 50 years was 80% and 65% for patients above 50 years.

Discussion and Conclusion: The use of a large structural pelvic allograft in reconstruction of the pelvis following resection of malignant pelvic tumors was associated with a very high complication rate. Functional outcome was heavily influenced by prolonged operative time, blood loss, infection and age. With proper medical treatment and a multidisciplinary surgical approach as well as the necessary repeated surgical procedures, most patients who had retained their allograft had fair to good functional outcomes. At the latest review, 15 patients were alive, 11 of which were free of disease. Although there was an increase in morbidity noted, pelvic allograft reconstruction remains to be a treatment option in limb-sparing pelvic surgeries.

Notes:

Thursday, July 24, 2008

9:26 am – 9:32 am

Operative Management of Metastatic Melanoma to Bone

Jeffrey E. Krygier, MD
Christopher P. Cannon, MD
Valerae O. Lewis, MD
Robert L. Satcher, MD, PhD
Patrick P. Lin, MD

Introduction: Metastatic melanoma to bone presents a unique treatment challenge. Though bony disease is a well documented poor prognostic indicator in patients with melanoma, its actual management is not well described. As treatment strategies for other primary malignancies continue to be elucidated, this study evaluates patient outcomes following operative management of bony lesions secondary to metastatic melanoma.

Methods: An institutional orthopaedic operative database was interrogated to identify bony procedures performed for metastatic melanoma between 1990 and 2006 at a single institution. Clinical charts were retrospectively reviewed to identify patient demographics, location of lesion, history of radiation treatment, operative procedure, and clinical outcome, particularly need for further surgery and survival from time of surgery.

Results: 37 patients underwent 41 primary procedures for metastatic melanoma; 20 were for pathologic fracture. The mean age at time of surgery was 50.1yrs. The femur (19) and humerus (11) were the most common operative sites. Median radiographic follow-up was 1.4 months (range, 0 – 49.6). 22 sites were treated with radiation. 6 of 41 sites developed progression or recurrent local disease. Radiation showed no difference in rate of progression/recurrence or need for revision surgery. The odds ratio for progression or local recurrence when the tumor was not excised was 3.17 (95% confidence interval 0.39 to 25.58). 3 of 37 patients were alive at data compilation and median survival from date of first surgery was 9.0 months (range 1.3 – 134.8), with a 32.4% survival rate at 12 months post-operative, 16.7% at 24 months.

Discussion and Conclusion: The proceeding study describes approaches to operative management of metastatic melanoma to bone. Though the study power does not provide statistical significance, data support tumor removal to decrease the risk of local recurrence or progression.

Notes:

Thursday, July 24, 2008

9:33 am – 9:39 am

Variability Among 10 Production Lots of a Single Demineralized Bone Matrix (DBM) Product

Hyun Bae, MD
*Robert Tatsumi, MD
Ben Pradhan, MD
Li Zhao, MD, PhD
Dagny Zhu, MCD
L.E.A. Kanim, MA
Jeffrey Wang, MD
Rick Delamarter, MD

Introduction: There are over 17 demineralized bone matrix based products (DBMs) commercially available as bone graft extenders for fusion procedures. Few of these "off-shelf" DBMs have been evaluated for reliability and fusion efficacy. Recent studies have shown both intra-product variability (due to production lots) and inter-product variability (product formulations). The purpose of this study was to assess lot-to-lot variability of one DBM based product (intra-variability) using both in vitro and in vivo assays. In particular, can BMP-2, BMP-7 and/or alkaline phosphatase (AP) assays accurately predict the in vivo osteoinductive potential of individual DBM lots from a single vendor? The bone morphogenetic proteins BMP-2 and BMP-7 are known to be osteoinductive, but research on the correlation between BMPs in commercial DBMs and in vivo fusion success is limited. Additionally, in vitro assays for AP, a marker for osteoblast differentiation, have been used to predict in vivo osteoinductivity, but results have been variable. The inconsistency of fusion outcomes from previous DBM studies [5] warrants the development of a screening method for ensuring optimal osteoinductivity in clinical settings.

Materials and Methods: 10 individual production lots of one commercially available DBM based putty product were employed. In vitro methods: 1) BMP-2 and BMP-7 concentrations in each of 10 DBM lots were measured using ELISA. 2) Mouse myoblasts were incubated with each DBM lot, and the extent of subsequent osteoblast differentiation was detected using an AP assay. In vivo osteoinductive potential: 40 mature athymic nude female rats were used (170g, Harlan Sprague Dawley, IN). L4-L5 posterolateral intertransverse process fusion was performed with decortication of only the L4 and L5 transverse processes (lamina and facet joints were left intact without decortication). Wounds were irrigated. An aliquot from each of 10 DBM lots (0.3 cc per side) was implanted into 4 rats (n = 4 rats / each 10 lots, n=40 rats). Rats were sacrificed at 8 weeks. Radiographs and histology were done. Explanted segments were manually tested for intersegmental motion.

Results: In vivo study: 96% of the rats showed de novo bone formation on high resolution radiographs of explanted lumbar spines after sacrifice at 8 weeks. A Kappa value of 0.86 indicated excellent agreement between two radiographic coders. There was significant manual fusion variability across lots ($p<0.04$) where 23% of the rats were completely manually fused at 8 weeks. While 2 lots almost always promoted fusions, 5 lots consistently failed. In vitro study: From lowest to highest, there was a five-fold difference in amounts of BMP-2 and a three-fold difference for BMP-7 revealing lot-to-lot variability among the aliquots. There was a positive correlation between amount of BMP-2 and BMP-7 in lots of DBMs ($r = 0.77$, $p<0.0001$). Most notably, BMP-2 and BMP-7 concentrations positively predicted the rate of successful manual fusions across lots of DBM (BMP-2 $p < 0.01$; BMP-7 $p<0.009$). The same 2 lots that induced the highest fusion rate (75%) also contained the highest concentrations of both BMP-2 and BMP-7.

Discussion & Conclusion: This is the first of a series of studies to test in vitro predictors of in vivo lot-to-lot variability in one product of DBM. There is significant lot-to-lot variability in BMP levels, extent of AP induction, and in vivo fusion rates. Fusion demonstrated lot-to-lot differences with consistency within a lot for over half of the DBM lots implanted; several lots consistently demonstrated low levels of bone formation while others promoted consistently high levels of bone formation and fusion. Levels of BMP-2 and BMP-7 in DBM are positively correlated and predict spinal fusion success. BMP-2 and BMP-7 assays may be used to screen DBM lots for osteoinductive potential prior to clinical use. Future selection for high levels of BMP-2 and BMP-7may optimize DBMs' use for spinal fusion procedures.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation.* *(Refer to page 32.)*

Notes:

Thursday, July 24, 2008

9:40 am – 9:46 am

Use of the Axillary Roll During Lateral Decubitus Positioning

Eric Lim, MD
Montri D. Wongworawat, MD

Introduction: Axillary rolls are routinely used to prevent compression of the brachial plexus in the lateral decubitus postion. To our knowledge no objective studies have confirmed the value of an axillary roll in preventing neurovascular injury. We designed a study to evaluate brachial plexus compression by assessing compression of the subclavian/brachial artery. The purpose of this study is to examine changes in the brachial artery peak systolic velocity with an axillary roll in the lateral decubitus position.

Methods: Twenty healthy volunteers were enrolled in the study. Each was placed in the lateral decubitus position with the right side down. An experienced vascular technician measured the peak systolic velocity in the right brachial artery using a Doppler ultrasound. A 1 Liter saline bag was then placed under the chest wall in the axilla and the measurement was repeated. The volunteers also completed pre- and post-testing questionnaires. Statistical analysis was performed using a one paired t-test for the peak systolic velocity and t-test for the level of discomfort and paresthesias. Statistical significance was set as p 0.05.

Results: Ten men and ten women with an average age of 33.2 years were enrolled. The mean brachial artery peak systolic velocity without the axillary roll was 77.5 ± 20.0 cm/sec and 82.5 ± 21.2 cm/sec with the axillary roll. No volunteer complained of parasthesias in either position.

Discussion and Conclusion: Axillary rolls have been proposed to reduce vertical compression between the clavicle and the first rib in the lateral decubitus position. Our results support the routine use of an axillary roll in decompressing the neurovascular structures of the dependent arm in the lateral decubitus position.

Notes:

Thursday, July 24, 2008

9:47 am – 9:53 am

Biomechanical Strength Evaluation of an Injectable HA Bone Substitute into Acetabular Cavitary Defects in Revision Total Hip Arthroplasty

M. Wade Shrader, MD
John McCamley, MS
Marc Jacofsky, MA
Joseph Zitelli
David J. Jacofsky, MD

Introduction: Acetabular bone deficiency is a significant challenge during revision total hip arthroplasty. Many surgeons use compacted cancellous allograft to address cavitary lesions. The initial mechanical stability of such a construct is crucial to the success of the implant, but very little is known about the mechanical properties of this construct. This study compared the initial mechanical strength of compacted allograft bone placed in a cavitary retroacetabular defect to a similar reconstruction using an injectible HA bone substitute (self-setting calcium phosphate cement).

Materials and Methods: Five unembalmed cadaveric pelves were potted in a standard fashion. Acetabuli were reamed to receive a standard ingrowth acetabular component. A standard, cavitary defect was created with a burr. One cup was randomized to receive allograft and the other to receive HA bone substitute. Identical hemispherical acetabular components were impacted into each pelvis, and each construct was tested in an axial load machine. A cyclical fatigue load ranging from 200N to 2250N was applied for 160,000 cycles. Movement of the acetabular cup and the pelvis were recorded using an Optitrac motion tracking system.

Results: In each case, the hemi-pelvis containing the HA bone substitute performed better than the pelvis with the defect filled with allograft. The movement of the cup within the acetabulum prior to failure was smaller for the side containing the HA bone substitute than the side with allograft.

Discussion: In conclusion, the use of HA bone substitute provided a more stable base for the impacted acetabular cup then the compacted allograft resulting in a better environment for bone remodeling and osseointegration of the implant.

Notes:

Thursday, July 24, 2008

9:54 am – 10:00 am

Intercondylar Fixation of the Distal Femur: A Comparison of 3.5mm Versus 6.5mm Lag Screw Configurations

M. Wade Shrader, MD
Anjali Gupta, MD
Kristine Csavina, PhD
David Jacofsky, MD
Paul Tornetta III, MD

Introduction: The fixation of complex distal femur fractures has evolved to locked plating as opposed to DCS or blade plate fixation. These plates fill a greater area of the lateral portion of the lateral condyle, leaving less room for lag screws. Many surgeons have moved away from 6.5mm screws in favor of smaller screws that can be placed around the plate. The purpose of this study was to evaluate the stiffness and strength of 3.5mm vs. 6.5 mm screws for the fixation of a unicondylar fracture of the distal femur in osteopenic human bone (mimicking the intercondylar component of more complex injuries).

Methods: A standardized lateral condylar fracture was created in seven pairs of cadaveric femurs. Each pair was randomly instrumented with either three 3.5mm or two 6.5mm screws and loaded in a uniaxial load frame. An axial preload of 50N was applied to the femur to stabilize the construct. Afterwards, a load of 25N/s was applied until clinical failure of the bone, defined as a displacement greater than 3mm.

Results: The load to failure was 919 for the 3.5 mm and 1042 for the 6.5 mm screws (p=0.5, 95% CI). The stiffness of the constructs was 290 for the 3.5 screws and 376 for the 6.5 screws (p=0.29).

Discussion and Conclusions: This study supports the use of smaller lag screws that are more easily placed around the current distal femoral plates with a larger footprint than traditional DCS or blade plates.

Notes:

Thursday, July 24, 2008

SYMPOSIUM II

Introduction: Valerae O. Lewis, MD

10:30 am – 11:30 am

Own the Bone: Osteoporosis for the Orthopaedic Surgeon

Susan Bukata, MD
Assistant Professor University of Rochester Medical Center
Rochester, NY

Notes:

Thursday, July 24, 2008

11:31 am – 1:00 pm

Howard Steel Guest Lecturer

Introduction: Ramon L. Jimenez, MD

Letting Go of What's Holding You Back: Stresses, Challenges and Solutions for Orthopaedic Families

Wayne M. Sotile, PhD
Mary O. Sotile, MA

Notes:

Thursday, July 24, 2008

1:00 pm – 1:15 pm

How AAOS is Responding to Issues of Stress in the Lives of the Orthopaedic Surgeon

Frank B. Kelly, MD

Notes:

Thursday, July 24, 2008

1:15 pm – 1:20 pm

The First — WOA Distinguished Service Award

Presented by Ramon L. Jimenez, MD

Notes:

2008 Scientific Program Abstracts

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

Friday, July 25, 2008

CONCURRENT SESSION II: TOTAL JOINTS

Moderator: Alberto A. Bolanos, MD

7:00 am – 8:50 am

Friday, July 25, 2008

7:00 am – 7:06 am

Kinematic and Kinetic Results Following Use of a Valgus Knee Brace

M. Wade Shrader, MD
Manoshi Bhowmik-Stoker, BS
John McCamley, MS
Marc Jacofsky, MA
David Jacofsky, MD

Introduction: Valgus bracing is a non-invasive treatment option for patients with low grade arthritis (OA) of the knee that is limited to the medial compartment. Medial compartment wear increases varus moments during gait which leads to further degeneration of the joint surface. Tibiofemoral pain and varus alignment can be reduced by valgus bracing which can enhance knee function of these patients. This study investigates gait adaptations in OA patients who are prescribed a valgus brace.

Methods: Ten camera passive marker system and four force plates were used to collect 3-D kinetic and kinematic data while patients ambulated at a self selected pace. Sixteen patients with medial knee pain (66±11.3) and fifteen healthy age-matched controls (68±6.2) volunteered for the study. Each patient performed an initial data collection session without and immediately after with a custom fitted brace. Patients were then instructed to wear the brace as often as possible for two months and return to the laboratory for additional data collection sessions.

Results: Varus angles were significantly reduced to levels comparable to the control group immediately after donning the brace. After wearing the brace for 2 months, varus angles remain within the normal range with some improvement in cadence and weight bearing. Other sagittal and frontal plane kinematics and kinetics showed little change.

Discussion: Our results indicate significant reduction in varus deflection immediately following fitment of the valgus brace. These results suggest bracing treatment is appropriate for patients with early stage OA of the knee that is limited to the medial compartment.

Notes:

Friday, July 25, 2008

7:07 am – 7:13 am

Prospective Randomized Clinical Comparison of Computer Assisted Total Knee Arthroplasty (Stealthstation® TREON™ Zimmer EM Imageless Knee Application) and Conventional Total Knee Arthroplasty

John A. Maltry, MD
*Lawrence Housman, MD
Nebojsa V. Skrepnik, MD
Melvin D. Roberts, MD

Introduction: The main goal of this study was to assess the StealthStation® TREON™ Zimmer EM Imageless Knee Application System's performance versus Conventional Total

Knee Arthroplasty with NexGen® LPS and High Flex CR prosthesis. Restoring the physiologic alignment of the lower limb is a key factor in the success of total knee arthroplasty (TKA). Evolution of modern surgery has led to the introduction of computers into operating rooms. Femorotibial mechanical axis restoration is crucial for prosthesis functionality and duration. With conventional TKA surgery, the alignment is still unsatisfactory in about 24% of the cases. It is postulated that computer-assisted TKA is more efficient and more accurate.

Methods: Prospective, randomized, single site, two arm study (CAS vs. STD TKA, 30 patients per group) by single experienced community orthopaedic surgeon (225 TKA cases per year). This study evaluated the following: Hip-Knee-Ankle ("HKA") mean angle, sagittal distal femoral (SDF) and sagittal proximal tibial (SPT) angles and Anatomic-Mechanical Angle (AMA). Surgery time was recorded and clinical outcomes were compared by monitoring knee scores of the Knee Society and SF-12 tests.

Results: Preoperative HKA angles (optimal range 1800 ± 30) improved from 1740±5.90 to 178.10±3.50 for STD and even more for CAS (from 170.90±7.30 pre-op to 179.30±3.80). SDF angle (normal 90±5) was 86.90±1.90 for STD and 86.90±2.40 for CAS. SPT angle (normal 86±4) was 81.20±2.70 for STD and 81.10±2.50 for CAS. Pre-op AMA angle (normal 7±3) was 5.30±0.70 for STD and 5.30±0.90 for CAS and post-op was 5.50±0.70 for STD and 5.50±0.70 for CAS. Surgery time, Knee Society and SF-12 data will be available soon.

Discussion and Conclusion: Preliminary data analysis from this prospective, randomized controlled clinical trials did not show clinically important advantages of using CAS system vs. STD TKA. The results showed that CAS did not benefit experienced surgeon to improve his accuracy, but may benefit less experienced surgeons.

Notes:

Friday, July 25, 2008

7:14 am – 7:20 am

High Rate of Acetabular Component Failure Associated with the Use of an Extended Offset Liner

Michael J. Archibeck, MD
Daniel W. Junick, MD
Tamara Cummins, RT(R) (ARRT)
Richard E. White Jr., MD

Introduction: The use of extended offset femoral components and acetabular liners aids in restoration of preoperative offset during hip replacement. The purpose of this review was to report on a relatively high acetabular component failure rate with the use of offset polyethylene liners.

Materials and Methods: Between 8/21/1997 and 6/1/2005 we have performed 1,919 primary THAs and 254 revision THAs. A 7mm offset acetabular liner was used in 120 (6%) of the primary THAs and 100 (39%) of the revision THAs. These have been followed prospectively.

Results: In the group of primary THA with extended offset liners (120) there were 9 revisions (4 for instability, 3 for acetabular aseptic loosening, and 2 for infection). In the group of revision THAs with extended offset liners (100) there were 10 revisions (7 for acetabular aseptic loosening, 2 for instability, and one for sepsis). Radiographic review a demonstrated a high incidence of progressive radiolucencies in the extended offset groups (6.7% in primary THR and 13% in revision THR compared to 3% and 5.2% in the nonoffset groups respectively ($p<0.05$).

Conclusion: While extended offset acetabular liners may aid in restoration of hip offset, torsional force applied to the implant-bone interface may have a detrimental effect on fixation. We found a relatively high failure rate and incidence of progressive radiolucencies in our primary and revision acetabular components used with an offset liner.

Notes:

Friday, July 25, 2008

7:21 am – 7:27 am

Polyethylene Exchange in a Second Generation Cementless Acetabular Component

Michael J. Archibeck, MD
Daniel W. Junick, MD
Tamara Cummins, RT(R) (ARRT)
Richard E. White Jr., MD

Introduction: Some have suggested that isolated polyethylene exchange in a well-fixed Harris-Galante II acetabular component (Zimmer, USA) necessitates cementing the liner, as the locking mechanism is suboptimal. The purpose of this study was to review the minimum two-year results of polyethylene exchange using the native locking mechanism in the HGP-II acetabular design.

Materials and Methods: We reviewed 29 consecutive hip revisions performed for a variety of reasons during which the acetabular metallic shell was retained and the polyethylene was exchanged. In all cases the native locking mechanism was used. All patients were followed clinically and radiographically at regular intervals. The mean age at revision was 60 years (36 to 86). Mean follow up was 5.1 years (2 to 13 years).

Results: No patients were lost to follow up. Of the 29 patients, one had a disengagement of the revision polyethylene at 2.5 years. At the time of this patient's original revision, one of the tines was fractured but a direct exchange was performed. Two patients required additional revisions for dislocation (one additional poly exchange and one revision to constrained liner.). There were no other complications attributable to the direct polyethylene exchange and no further reoperations.

Conclusion: This series suggests that polyethylene exchange with the Harris-Galante II prosthesis can be performed safely using the native locking mechanism in the absence of any fractured tines.

Notes:

Friday, July 25, 2008

7:28 am – 7:34 am

Are Patients with Osteonecrosis Suitable Candidates for Hip Resurfacing? An Analysis of 84 Hips

Harlan C. Amstutz, MD
Michel J. Le Duff, MA

Introduction: Patients with osteonecrosis (ON) of the femoral head are generally young which makes them potential candidates for hip resurfacing but they often have large femoral defects which may lead to short-term failures. The purpose of the present study was to assess the clinical results of metal-on-metal hip resurfacing for the treatment of arthritis secondary to ON of the femoral head.

Materials and Methods: From a consecutive series of over 1000 Conserve® Plus metal-on metal hybrid resurfacings, 84 hips were resurfaced in 70 patients with end stage arthritis of the hip secondary to ON of the femoral head, irrespective of the size of the defects after removal of all the dead bone. 19 hips were rated Ficat stage III and 65 stage IV. Average age was 40.1 years (range, 14 to 61) with 81% male. The risk factors for ON included Steroids (36.9%), Trauma (22.6%), Alcohol (7.1%), Sickle cell disease (1.2%), and Idiopathic ON (32.1%). 31% had undergone at least one previous surgery and 83% presented femoral head defects greater than 1cm in size.

Results: Average follow-up was 6.5 years (range, 1.0 to 10.8). UCLA hip scores improved significantly (pain: 3.5 to 9.4; walking: 5.7 to 9.4; function: 5.2 to 9.3; activity: 4.3 to 7.0). Average post-operative Harris Hip score was 91.8. There were 2 conversions to THR consecutive to loosening of the femoral component at 23 and 61 months, which were hips # 6 & 25 in the overall series. The 5-year survivorship was 97.1%. 3 hips have radiolucencies about the femoral stem. All are asymptomatic. There were no complications in this series.

Discussion and Conclusions: Metal-on-metal resurfacing arthroplasty of the hip is indicated for patients with osteonecrosis. There was no femoral loosening recorded in patients implanted after July 1997. Optimal bone preparation is critical, while cementing the stem when the femoral head defects are large and avoiding high impact activities ensures durability of the femoral fixation.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation. (Refer to page 32.)*

Notes:

Friday, July 25, 2008

7:35 am – 7:41 am

Total Hip Arthroplasty and Surgical Wound Closure: A Retrospective Analysis of Sutures Versus Staples

Michael R. Dayton, MD
Justin T. Newman, BS
Steven J. Morgan, MD
Gustavo V. Resende, MD
Allison E. Williams, ND, PhD

Introduction: Review of the literature reveals a paucity of information regarding the closure of wounds after elective orthopaedic procedures. The purpose of this study was to compare staple skin closure to suture skin closure in patients undergoing primary total hip arthroplasty with the intention of comparing surgical time and post-operative complications related to closure technique.

Methods: A retrospective analysis was conducted of 142 consecutive primary total hip arthroplasties which had surgical wound skin closure by either staples or subcuticular Monocryl skin closure. Operative notes and medical records were reviewed. Outcome variables included total surgical time, wound dehiscence, surgical site infection per Center for Disease Control criteria and repeat procedures for debridement and re-closure.

Results: There were equal numbers of cases of sutures and staples (n=71). Two (2.8%) patients in the staple group developed an infection (one superficial and one organ/space) and 1 (1.4%) patient in the suture group developed a superficial infection. The mean total surgical time for the suture group was 119.6 minutes (sd = 39.0) and 115.3 minutes (sd = 24.2) for the staple group. No significant association was found between closure type and complications or surgical time.

Discussion and Conclusion: Studies have produced conflicting results regarding efficacy, economics, and complications when comparing sutures to staples for a variety of applications. The data suggests it would be prudent to base the use of sutures or staples for skin closure on the anatomic location and indication for the operation. To our knowledge, this is the largest analysis of its kind in the literature. As no significant differences were demonstrated, surgeon preference and comfort with either method of wound closure should be combined with considerations of cost, convenience of removal and patient comfort to determine which method is best suited for individual patients.

Notes:

Friday, July 25, 2008

7:55 am – 8:01 am

Fixed Versus Rotating Platform Total Knee Replacement

Scott T. Ball, MD
Ormonde Mahoney, MD
Hugo B. Sanchez, MD, PhD
Thomas P. Schmalzried, MD

Introduction: Controversy continues over the relative benefits and risks of mobile bearing total knee arthroplasty (TKA). Additionally, there has been growing interest in increasing flexion range of motion. The purpose of this study was to compare outcomes in patients treated with a rotating platform total knee prosthesis to outcomes in patients treated with a fixed bearing version of the same prosthesis.

Methods: Under the auspices of an FDA IDE randomized, single-blind clinical trial, 100 knees were implanted by two surgeons at different institutions. With a minimum follow-up of 2 years, 95 knees (69 patients) were evaluated (2 revised; 3 lost). Forty-four knees had received a fixed bearing (FB), posterior-stabilized TKA and 51 knees had received the rotating platform (RP) version of the same knee. All components were fixed with cement and all patellae were resurfaced.

Results: There were no significant differences in the pre-operative demographics of the patients. At two-years, there were no significant differences in Knee Society (KS) clinical scores and SF-12 scores. KS functional scores were higher in the RP group (92.2) than the FB group (85.7) (p=0.07). This was due to higher scores in stair climbing for patients with RP knees (p=0.02). There was no difference in the average range of motion (FB knees, 1-125º; RP knees, 1-126º) or increase in flexion (FB knees, 14º; RP knees, 13º). Two FB knees were revised (tibial loosening; persistent pain). No RP knees were revised and there were no bearing dislocations or subluxations.

Discussion and Conclusion: With 97% follow-up in this FDA trial, the RP version is at least as efficacious as the FB version and both provided equally good (high) knee flexion. Patients treated with the RP version reported better stair climbing ability but enthusiasm for this finding should be tempered by the relatively small sample size.

Notes:

Friday, July 25, 2008

8:02 am – 8:08 am

Home Health Physical Therapy with TKA: Help or Hinderance?

Jon R. Cook, DPT
Jack W. Wylie, MD

Introduction: The purpose of this paper is to compare home health (HHPT) and outpatient physical therapy (OutPT) for rehabilitation after TKA.

Methods: 104 consecutive patients with TKA were prospectively studied over a 28 month period (7/05-11/07). Our Joint Replacement Program (JRP) includes pre-op education, proactive discharge planning, comprehensive peri-operative pain management, and aggressive physical therapy (PT) beginning the day of surgery. The first 12 study months focused on discharge to HHPT and the next 16 months focused on OutPT. Patients with HHPT later received OutPT to complete rehabilitation. Patients completed a Knee Injury and Osteoarthritis Outcome Scores (KOOS) and 6 Minute Walk Test (6 MWT) at pre-op, discharge from OutPT, and 12 months post-op. Length of stay (LOS), discharge destination, number of PT visits, ROM, and complications were tracked.

Results: At hospital discharge 49% (n=51) were OutPT, 48% (n=50) HHPT, and 3% (n=3) SNF. LOS was 2.5 days for OutPT and 2.8 days for HHPT. At hospital discharge ROM for OutPT was 2-92° while HHPT was 2-90°. HHPT presented in OutPT 28 days post-op with ROM 8-98° and at discharge 62.1 days post-op had 1-113°. OutPT (n=36) began 6 days post-op with ROM 4-91°, and at discharge 47 days post-op had 1-121°. Number of PT visits for OutPT was 16 and HHPT had 24 visits total. There was no incidence of DVT, PE, or deep infection. KOOS and 6MWT scores showed similar increases from pre to post-op.

Discussion and Conclusion: OutPT had improved ROM, increased speed of rehabilitation, and fewer PT visits. KOOS, 6 MWT, and complications were similar between groups. OutPT has a lower cost than HHPT and can lower hospital loss of DRG payment. We use an innovative approach to care after TKA which accelerates recovery, reduces complications, and saves healthcare dollars. Direct discharge to OutPT further achieves these goals.

Notes:

Friday, July 25, 2008

8:09 am – 8:15 am

Minimizing Catheter–Associated Urinary Tract Infections in Patients Undergoing Total Joint Arthoplasty

Rishi Bhatnagar, MD
Christopher Sheu, BS
Justing Gettings, BS
Ehsan Tabaraee, BS
Andrew S. Holmes, MD

Introduction: Medicare recently reshaped reimbursement for preventable harms. An example that will affect Orthopedic surgeons is catheter-associated urinary tract infection (UTI). Under the rule, hospitals will not receive additional payment for this complication. Previous studies, not specific to joint arthoplasty, found nearly 50% of patients undergoing major surgery had postoperative catheter duration > 48 hours. In-hospital infection rates were twice as high for these patients and catheter duration > 48 hours was the strongest modifiable risk factor to prevent UTI. To our knowledge, no report in the literature describes average catheter duration of patients undergoing total joint replacement and the relationship between duration and UTI development in this population.

Methods: We retrospectively evaluated 240 patients undergoing primary total knee arthoplasty (TKA) or total hip arthoplasty (THA). We looked at catheter duration, procedure, patient age, and development of UTI. Urine was considered positive if urine wbc count was greater than 1 x 104 /mL.

Results: Ninety patients had THA, 150 patients had TKA. The average age was 66. Two-Hundred Thirty-Seven (99%) patients had catheters discontinued within 48 hours. Of these, 76 (32 %) were discontinued within 24 hours, and 161 (67%) within 48 hours. Three (1 %) patients had removal within 72 hours. Twelve (5%) patients had a positive urinalysis, with 6 (2.5%) being symptomatic and receiving treatment. No statistically significant difference in UTI incidence was seen between the 24, 48, and 72 hour groups.

Discussion and Conclusion: Previous studies report nearly 50% of patients undergoing major surgery had catheter duration > 48 hours. Our results suggest that this is not the case in the orthopedic joint population. A strong commitment toward reducing modifiable risk factors associated with UTI, such as catheter discontinuation within 48 hours, needs to continue with the recent paradigm shift by Medicare.

Notes:

Friday, July 25, 2008

8:16 am – 8:22 am

Dislocation After THA: The Impact of Head Size

Andrew I. Spitzer, MD
*Brian D. Solberg, MD
Beth Habelow, MS, PT
Ilana Waltuch, BS
Peg Goodmanson
Kathleen Suthers

Introduction: Dislocation following THA is a multifactorial challenge involving patient, surgical, and implant variables. Head size is an important determinant of dislocation, affecting head to neck ratio, range of motion free of impingement, and the distraction distance necessary for dislocation to occur. We report a significant decrease in dislocation rate using a 36 mm head.

Methods: Between December 1998 and August 2007, 486 THAs were performed by a single surgeon through a posterior approach. All but one acetabular cup was cementless, with either polyethylene or metal liners. 3 different cemented stems and 2 different cementless stems were used. The heads were either metal or ceramic. 28mm heads were implanted in 299 hips, 32mm heads in 49 hips, and 36mm heads in 138 hips. Minimum follow up was 3 months.

Results: 24 hips (4.94%) dislocated. The dislocation rate with 28mm heads was 6.35% (19/299), with 32mm heads was 4.08% (2/49), and with 36mm heads was 2.17% (3/138). The differences in the rates of dislocation between 36mm and 28mm heads, and between 36mm and the combined rates of 28mm and 32mm heads were statistically significant. ($p<0.1$) Age, gender, and implants were similar between the groups.

Discussion and Conclusions: Larger head size reduces the risk of dislocation after THA. Based on this data, there is an inverse linear correlation between dislocation rate and head sizes between 28mm and 36mm, reaching statistical significance with a 36mm head.

Notes:

Friday, July 25, 2008

8:23 am – 8:29 am

Sutures Versus Staples: A Retrospective Comparison of Wound Closure Methods in Primary Total Knee Arthroplasty

Michael R. Dayton, MD
Justin T. Newman, BS
Steven J. Morgan, MD
Gustavo V. Resende, MD
Giby A. Philips, MD
Allison E. Williams, ND, PhD

Introduction: A literature review reveals conflicting information regarding wound closure after elective orthopaedic procedures. No consensus exists guiding orthopaedic surgeons to employ either sutures or staples in skin closure for primary total knee arthroplasty. The purpose of this study was to review the outcomes at our facility and evaluate which method was more efficacious.

Methods: We conducted a review of 181 consecutive total knee arthroplasties which had surgical wound skin re-approximation by either staples or absorbable subcuticular sutures. Operative records, medical charts and clinic notes from follow-up visits were reviewed. Outcome variables included time of surgery, wound dehiscence, surgical site infection per Center for Disease Control criteria and repeat procedures for debridement and re-closure.

Results: Staples were employed in 82 cases (45.3% of total) and sutures in 99 cases (54.7%). No complications occurred in the staples group. The sutures group had 9 complications (9.1% of suture cases). These complications were comprised of 4 infections (2 superficial, one deep, one organ/space), 3 patients who required re-suturing for dehiscence, one allergic reaction to suture material and one patient who had a gout flare resulting in dehiscence. Mean surgical time with sutures was 122.3 minutes (sd = 33.4) and 114 minutes with staples (sd = 24.4). The association between closure method and complications was significant. No significant association was found between closure method and surgical time.

Discussion and Conclusion: This study suggests that skin closure of patients undergoing total knee arthroplasty with staples are less likely to develop wound complications than patients undergoing closure with subcuticular suture. Further, use of staples for skin closure resulted in lower operative time. Ultimately, surgeon preference and comfort with either method of wound closure should be combined with considerations of cost, convenience of removal and patient comfort to determine which method is best suited for individual patients.

Notes:

Friday, July 25, 2008

8:30 am – 8:36 am

How Accurate Can Hip Navigation Really Be?

Graham N. Gitlin, MD
Charles N. Moon, MD
Michael Kreutz, BA
Yashdeep Kumar, BTech, MS, MBA

Introduction: A navigation system used during total hip arthroplasty as a tool, is purported to aid in assessing implant

positioning with a high degree of precision; but just how accurate can the system be when taking human factors into account? Users are required to identify and register anatomic landmarks needed by the system as references. Three dimensional errors introduced into the system by the user during acquisition of these landmarks can lead to errors in anteversion and inclination of the acetabular component.

Method: Utilizing a currently available navigation system, a cohort of ten orthopaedic surgeons were asked to perform the routine steps required to identify and register the necessary anatomic landmarks, the pubic symphysis and both anterior superior iliac spines, on ten cadaveric specimens in both supine and lateral positions. The specimens were subsequently skeletonized and the principal investigators re-identified and re-registered the necessary landmarks to serve as controls. The possible error that could occur in implant positioning i.e. anteversion and inclination of the acetabular component was determined, based on the differences in landmark identification by the participants.

Results: With supine positioning during landmark acquisition, the average error in acetabular component anteversion and inclination was 6.8 degrees and 2.5 degrees. For lateral positioning during landmark acquisition, the average error in acetabular component anteversion and inclination was 9.0 degrees and 4.7 degrees. Supine and lateral positioning resulted in a significant difference in the errors.

Discussion and Conclusion: Even though navigation can be a useful tool during total hip arthroplasty, the claims of increas- ing the accuracy of implant placement to within a few may be inaccurate secondary to human factors. While potentially acceptable clinically, limitations of navigation systems used during total hip arthroplasty, generated by human factors, need to be recognized and acknowledged.

Notes:

Friday, July 25, 2008

CONCURRENT SESSION III: SPORTS MEDICINE/TRAUMA

Location: ***Amphitheatre***

Moderator: **Michael Klassen, MD**
Steven Morgan, MD

7:00 am – 8:50 am

Friday, July 25, 2008

7:00 am – 7:06 am

Arthroscopic Matrix/ Membranous Autologous Chondrocyte Implantation for the Treatment of Large Chondral Defects of the Knee

Stephen P. Abelow, MD
Pedro Guillen, MD
Marta Guillen, MD
Isabel Guillen, MD

Introduction: Matrix/Membrane Autologous Chondrocyte Implantation (MACI) is a new biotechnology allowing the impregnation of autologous cultured chondrocytes onto a purified collagen membrane. The MACI implant is fixed with fibrin glue (no suturing is necessary). The procedure can be performed arthroscopically or by mini-arthrotomy.

Methods: 42 consecutive patients (ages 16-52) with large full thickness cartilage lesions of the knee 2.5-3.0cm2 to 20cm2 were treated with a second generation MACI technique fixed to the chondral defect with fibrin glue. Follow up was 24 months to 4 1/2 years. Standardizied Spanish knee rating scales, Visual Analog Scale, MRI, and several second look athroscopies obtained.

Results: Clincally, there was better than 81% good-to-excellent results with regards to pain relief, swelling, return to previous level of activity, and satisfaction with the procedure. Biopsy showed “hyaline-like” cartilage. MRI showed loss of subchondral edema. There was no case of delamination nor periosteal proliferation. There was no infection or phlebitis.

Discussion and Conclusion: The MACI technique is a surgical technique that produces a "hyaline-like" cartilage in large full thickness chondral lesions of the knee. It reduces pain and improves activity level. MACI can be implanted arthroscopically or by mini-arthrotomy and offers access to

certain areas where suturing of a periosteal flap is difficult or even impossible.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation. (Refer to page 32.)*

Notes:

Friday, July 25, 2008

7:07 am – 7:13 am

The "Dynamic Labral Shear Test" for Diagnosis of SLAP Tears Infection

Emilie V. Cheung, MD
Shawn W. O'Driscoll, MD, PhD

Background: The purpose of our study is to describe the "dynamic labral shear test," and report its usefulness as an accurate physical examination technique for diagnosis of SLAP tears of the shoulder.

Methods: 105 shoulders in 100 patients underwent surgical intervention for suspected labral pathology of the shoulder, and were assessed preoperatively with the dynamic labral shear test. Starting with the arm at the side and the elbow flexed 90 degrees, the examiner fully externally rotates the shoulder, then elevates the arm overhead while maintaining full external rotation and 'horizontal abduction' The motion is then reversed as the arm is then brought back down to the side while maintaining full horizontal abduction and external rotation. A positive test is defined as sudden pain, which may be associated with a click, that is maximal at a point between 90 and 120 degrees of elevation and which reproduces the patient's pain.

Results: The sensitivity of the dynamic labral shear test for diagnosing a SLAP lesion (Types I-IV) was 86%, MRI with gadolinium was 79%, and MRI without gadolinium was 63%. The specificity of the dynamic labral shear test for diagnosing a SLAP lesion was 100%, and MRI without gadolinium was 100%. The mean arc of shoulder motion in the sagittal plane, within which pain was reproduced was 100 to 115 degrees.

Conclusions: The dynamic labral shear test is an accurate physical examination technique that is highly sensitive for shoulder pain arising from tears of the superior and posterior superior labrum.

Notes:

Friday, July 25, 2008

7:14 am – 7:20 am

Long-Term Durability of Functional Improvement After Treatment with Autologous Chondrocyte Implantation (ACI): A Multicenter, Observational Study in US Subjects

J. Bruce Moseley, MD
Allen Anderson, MD
Jon E. Browne, MD
Bert Mandelbaum, MD
Lyle Micheli, MD
Freddie Fu, MD
Christoph Erggelet, MD, PhD

Introduction: Autologous Chondrocyte Implantation (ACI) for full-thickness lesions of the distal femur has demonstrated good short- to mid-term clinical improvement. However, long-term durability (> 5 years) of ACI has not been evaluated in US patients to date. The purpose of this study was to determine if patients who improve from baseline to early follow-up will sustain improvement at later follow-up.

Methods: In a multicenter, observational, within-patient control cohort study, study patients met predefined eligibility criteria before data analyses (full-thickness distal femur

lesion(s); modified overall Cincinnati knee scores at baseline and 1-5 year follow-up; ACI before Dec. 31, 1996). Per a priori analysis plan, ACI durability was determined by comparing early (1-5 year) outcomes to long-term (6-10 year) outcomes.

Results: 72 patients met eligibility criteria. Patients and defect baseline characteristics were: mean age=37 years; 61% male; mean lesion size=4.3 cm2; low mean baseline overall condition score=3.4 points (poor). Within the 5-years prior to the cartilage biopsy harvest, 68% (49/72) of patients had at least one cartilage repair procedure. At 1-5 year follow-up (mean follow-up=4.6 years), 75% (54/72) improved. At 6-10 years follow-up (mean follow-up=9.2 years), 87% (47/54) of patients who improved at the earlier follow-up period sustained a significant mean improvement in overall condition score of 3.8 points from baseline. In addition, at a mean follow-up of 9.2 years, 69% (50/72) of patients significantly improved in overall condition score from baseline. In total, ACI failed in 12 patients; 75% (9/12) of treatment failures occurred at a mean follow-up of 2.5 years.

Discussion and Conclusion: Treatment with ACI for large, symptomatic, full-thickness lesions of the distal femur in patients with a history of failed prior surgeries can result in early improvement that is sustained at longer follow-up (up to 10 years) in the majority of patients.

Notes:

Friday, July 25, 2008

7:21 am – 7:27 am

Oral Contraceptive Use Increases Risk of DVT Following Knee Arthroscopy

Thomas Y. Wu, MD
Ali R. Motamedi, MD

Introduction: Deep venous thrombosis (DVT) is a known complication following routine knee arthroscopy. Oral contraceptive use is a risk factor for DVT. The purpose of this study is to determine if oral contraceptive use increases the risk of having a deep venous thrombosis after knee arthroscopy.

Methods: All knee arthroscopies by one surgeon over one year were reviewed for use of oral contraceptives at time of surgery and DVT after surgery. Statistical analysis was performed to determine risk ratio and statistical significance using Fisher's exact test.

Results: Of 149 cases, 6 involved used of oral contraceptives and 4 had post-operative DVT. Two of the 6 cases involving oral contraceptives had a DVT. Risk ratio for post-operative DVT with use of oral contraceptives is 23.8. If only the 67 women were included for analysis, risk ratio is 20.3. Both risk ratios are statistically significant.

Discussion and Conclusion: Use of oral contraceptives may increase risk of DVT following knee arthroscopy. Consideration should be given to withholding oral contraceptives or providing DVT prophylaxis in those patients taking oral contraceptives who are to undergo knee arthroscopy.

Notes:

Friday, July 25, 2008

7:28 am – 7:34 am

Outcomes After Arthroscopic Repair of Articular Side Partial Rotator Cuff Tears

Walter B. McClelland Jr., MD
Xavier A. Duralde, MD

Introduction: The treatment of partial-thickness articular side RCT remains controversial. Debridement alone, as well as acromioplasty combined with debridement, have both been

associated with higher failure rates. Traditional open repairs risk damage to the deltoid origin, require takedown of intact cuff tissue, and may result in undiagnosed pathology. We report the results of a prospective nonrandomized consecutive series of 25 patients treated with arthroscopic acromioplasty and antomic arthroscopic repair of articular side RCT (Ellman Grade III) without takedown of the intact bursal side RC tissue.

Methods: Between October, 2001 and February, 2003, all patients with a partial articular side RCT representing >50% thickness who failed conservative management underwent arthroscopic acromioplasty and arthroscopic repair of the rotator cuff utilizing a suture anchor technique. Patients were evaluated pre and post-operatively with American Shoulder and Elbow Surgeons (ASES) scores.

Results: Twenty-five patients with an average age of 49 were evaluated. At the time of submission, complete 2 year follow-up data had been collected on 14/25 patients. One patient has expired after only 17 month follow-up. ASES scores improved from 47.4 (21.7-73.3) to 94.35 (73.3-100). There were 12 excellent, 1 good, and 1 fair outcome. Patients complaining of night pain improved from 12/14 to 2/14. VAS pain scored improved 5.4 points (0-10). One patient required reoperation at 24 months post-op for continued symptoms.

Discussion and Conclusions: Partial thickness RCT are an accepted cause of shoulder pain and disability. Disagreement exists regarding the appropriate management of articular side lesions. Arthroscopic acromioplasty with arthroscopic RC repair offers reliable pain relief and functional improvement with low complication and failure rates, and should be considered in patients who fail conservative management.

Notes:

Friday, July 25, 2008

7:35 am – 7:41 am

Relationship Between Posterior Tibial Slope and ACL Injury in Patients with Open Physes

Shail Vyas, MD
Norman Otsuka, MD

Introduction: The purpose of this study is to determine whether the posterior tibial slope of the proximal tibia is associated with anterior cruciate ligament (ACL) injury in patients with open physes. This is the first such study to evaluate this in patients with open physes.

Methods: Plain radiographs of fifteen patients with open physes and with ACL injuries, proven by arthroscopy, were evaluated retrospectively. The posterior slope was measured on the lateral plain radiograph of each of these patients. This data was compared to the same measurement on twenty-two patients with open physes and knee pain for reasons other than ACL injury. A statistical t-test was used to analyze the data.

Results: The mean posterior tibial slope for the group of patients with ACL injuries was 12.07. The mean posterior tibial slope for the control group was 9.09. This difference was found to be statistically significant with a p value less than 0.05.

Discussion and Conclusion: There is a statistically significant relationship between an increased tibial slope and ACL rupture in patients with open physes. This may be secondary to altered knee biomechanics when the tibial slope is increased. Patients with increased posterior tibial slope naturally have an increased anteriorly translated tibia with respect to the femur, which in turn may lead to increased strain on the ACL and subsequent higher predisposition to ACL rupture. Therefore, an increased posterior tibial slope may be a risk factor for ACL injury in patients with open physes. Knowledge of this increased risk factor may serve as a basis for further research into biomechanics of pediatric ACL injuries as well as have potential predictive value for children at risk for ACL injury.

Notes:

Friday, July 25, 2008

7:42 am – 7:48 am

Biomechanical Comparison of Open Transosseous Versus Arthroscopic Suture Anchor Repair Techniques for the Subscapularis Tendon

Roberto Lugo, MD
Daniel J. Wheeler, BA
Tigran Garabekyan, MD
Jennifer Buckley, PhD
Jeffrey Lotz, PhD
Marielena Lotz
C. Benjamin Ma, MD

Introduction: Arthroscopic subscapularis repair has become popular with improved surgical technique and injury recognition. We performed a biomechanical analysis of open trans-osseous and arthroscopic suture anchor subscapularis repair.

Methods: Six matched pairs of human cadaveric shoulders were studied. Each paired shoulders was randomized to have suture anchor versus trans-osseous repair. For arthroscopic repair, two anchors double loaded with No.2 FiberWire were used as four horizontal mattress sutures. For the trans-osseous repair, three Mason-Allen stitches were placed in the tendon and tied across bone tunnels in the lesser tuberosity. Real-time measurements of contact area and pressure between the subscapularis and insertion were obtained using a tactile pressure measurement system. Local displacement was monitored with retroreflective markers. The set-up was subjected to cyclical loading followed by load to failure testing. Contact area and pressure, conditional elongation, stiffness and tensile strength were recorded.

Results: In cyclical loading, the conditioning elongation of trans-osseous repairs (0.64 ± 0.40 mm) was found to be significantly lower than arthroscopic repairs (2.38 ± 1.58 mm). The mean insertional footprint was 2.95 cm2. No significant differences were detected in mean pressurized contact area between the trans-osseous (2.72 ± 1.25 cm2, 94.2 ± 37.4 % footprint) and suture anchor repairs (2.01 ± 0.89 cm2, 65.9 ± 27.9 % footprint). There were no significant differences in the peak-to-peak contact area changes between both repairs under cyclical loading. In the load-to-failure tensile test, there were no significant differences between trans-osseous (453.2 ± 66.1 N) and suture anchor repairs (392.6 ± 78.0 N).

Conclusions: Arthroscopic suture anchor repairs have higher conditional elongation when compared with trans-osseous repairs. There were no significant differences in contact area and pressure between the two techniques, however, arthroscopic suture anchor technique tends to have lower contact area. Improvement in arthroscopic repairs may lead to better biomechanical behavior of the repair construct.

Notes:

Friday, July 25, 2008

7:49 am – 7:55 am

Improvement in Symptoms and Function After Autologous Chondrocyte Implantation (ACI, Carticel®) in Patients Who Failed Prior Treatment. Results of the Study of Treatment of Articular Repair (STAR) Trial

COL Thomas M. DeBerardino, MD
Brian J. Cole, MD, MBA
Robert C. Brewster, MD
Jack Farr II, MD
Peter J. Fowler, MD
Carl W. Nissen, MD
Ken R. Zaslav, MD

Purpose: The purpose of this study was to assess the efficacy of ACI in patients who within the 3 years prior to study enrollment had failed a prior, non-ACI, index surgical treatment for articular cartilage defect(s) of the distal femur.

Methods: This was a 4 year, prospective, multicenter study of ACI performed in patients who, by predefined criteria, failed a prior, non-ACI, index treatment that included microfracture, osteochondral autograft, or debridement. The primary endpoint was assessment of durability of ACI (Carticel®) compared to the durability of the prior, non-ACI, index treatment for each patient. Secondary endpoints included improvements in function and reduction in symptoms as captured by the KOOS, Modified Overall Cincinnati Knee Scale, VAS current

knee condition, and SF-36. Serious adverse events, including surgeries after ACI (SSP-subsequent surgical procedures), irrespective of relationship to ACI, were recorded. A sample size of 100 provided 90% power at =0.05.

Results: 154 patients received ACI following determination that they had failed the prior, non-ACI, index treatment. 82% (126/154) of patients completed the protocol. At baseline, mean age was 34.5 years; mean lesion size was 4.6 cm^2. Index lesion was located in the MFC, LFC and trochlea in 66%, 18%, and 16% of patients, respectively. Multiple lesions were observed in 50 patients. The mean Modified Overall Cincinnati Knee score at baseline was 3.26, indicating moderate to significant limitations with activities of daily living. By the end of the study, 76% (117/154) of patients were ACI treatment successes (did not meet the a priori definition of treatment failure). Significant mean improvements from baseline to 48 month follow-up were observed for the following reported outcome scores ($p<0.001$). Preoperative to postoperative (48 month) mean values, respectively, are KOOS Pain: 48.7 to 72.2; KOOS Symptoms: 51.8 to 70.8; KOOS Sports/Recreation: 25.9 to 55.8; KOOS Knee Quality: 20.9 to 52.2; KOOS ADL: 58.6 to 81.0; Modified Overall Cincinnati Knee Scale: 3.26 to 6.31; VAS: 28.8 to 69.9; and SF-36 Physical Component Summary Scale: 33.0 to 44.4. 49% (76/154) of patients had an SSP, irrespective of relationship to ACI. The most common findings at SSPs were arthrofibrosis or joint adhesions and graft overgrowth. Having an SSP was not predictive of ACI failure.

Conclusion: Patients who have moderate to large symptomatic chondral knee lesions, significant functional impairment and pain, and failed prior cartilage repair procedures can expect durable and significant functional improvement and symptom reductions following ACI.

Notes:

Friday, July 25, 2008

7:56 am – 8:02 am

Hip Arthroscopic Surgery for Femoroacetabular Impingement: Clinical Experience from Both Sides of the Scalpel

Dean K. Matsuda, MD

Arguably a hot topic in orthopedics surrounds the diagnosis and management of athletes afflicted with femoroacetabular impingement (FAI). Until recently, athletic young patients had very limited options (e.g. give up sports, wait for an early THA). Because of skeletal abnormalities that can occur on both sides of the hip joint, an abutment conflict occurs during flexion and abduction that can lead to labral/chondral damage with resultant pain, mechanical symptoms, and disability. FAI is currently thought to be a major cause of "idiopathic" osteoarthrosis in young and active individuals. The typical pathway to diagnosis involves a history of groin pain with a positive anterior impingement test and X-rays that reveal skeletal deformities such as a retroverted acetabulum and/or a loss of normal femoral offset. Most patients have a combined cam-pincer impingement pattern with femoral head-neck and acetabular pathology. The formal open hip dislocation procedure with trochanteric osteotomy may now be performed with an arthroscopic equivalent which performs the rim trimming, labral refixation, and femoral osteoplasty as an outpatient procedure with all of the advantages of minimally invasive surgery. I will show how I perform comprehensive arthroscopic management of FAI using two arthroscopic portals. I will present early outcome data, discuss complications and end with actual video clips of my own blateral FAI surgeries.

Notes:

Friday, July 25, 2008

8:05 am – 8:11 am

Humeral Nonunions: Use of the Pedicled Lateral Border of Scapula

Cynthia M. Kelly, MD
Ross M. Wilkins, MD

Difficult nonunions of the humerus are frequently treated with free vascularized bone – usually the fibula – but donor site morbidity from the lower leg can be significant. The lateral border of the scapula is a 7-12 cm tubular length of vascular bone that can be easily transferred to the humerus.

Since May 2001, 20 patients with average age of 62 (35-80) underwent microvascular scapular transfer and had 24-month minimum followup. Time from injury to procedure averaged 28 months (1-88) during which patients underwent three previous surgeries on average. One patient was treated for significant bone loss following a gunshot wound to the distal humerus. The surgical team consisted of an orthopedist and plastic surgeon working simultaneously with the patient in the lateral position. The scapular segment was juxtaposed to the humerus through an axillary tunnel, rigidly plated and grafted with calcium sulfate and bioassayed demineralized bone matrix (Allomatrix™, Wright Medical Technology, Arlington TN).

Average followup was 44 months (24-78). Grafts demonstrated radiographic consolidation at 17 weeks on average (4-112). There were no complications at the donor site. One elderly patient fractured through his healed graft two years after surgery and underwent endoprosthetic revision. Delayed union in one and recurrent infection in two patients required more time and further intervention before healing. Graft survival averaged 53 months (30-89) and MSTS scores were good to excellent (average 84%).

Pedicled transfer of the lateral border of scapula with the circumflex scapular artery is an excellent choice for treating recalcitrant humeral nonunions.

Advantages include:

- Surgery time <3 hours with a two-surgeon team
- Lateral decubitis positioning
- Readily available source of vascularized cortical/cancellous bone
- Minimal donor site morbidity
- Rapid bone healing

Notes:

Friday, July 25, 2008

8:12 am – 8:18 am

Comparison of ORIF with Locked Plating System and Hemi-Arthroplasty for 3 and 4 Part Proximal Humerus Fractures

Brian D. Solberg, MD
Charles N. Moon, MD
Dennis P. Franco, MD

Purpose: The purpose of the study was to compare age and sex matched cohorts of patients with 3 and 4 part proximal humerus fractures undergoing either open reduction or internal fixation (ORIF) with a locked plate or hemi-arthroplasty.

Materials and Methods: Forty Seven (47) patients with 3 or 4 part proximal humerus fractures treated with a locked plating construct between were compared to a cohort 47 of age and sex matched patients undergoing hemi-arthroplasty for fracture. Inclusion criteria included 24 months minimum clinical and radiographic follow-up. For the ORIF group, intraoperative AP radiographs of the humeral head reduction were judged as good, satisfactory, or poor. Clinical outcomes were reported using the modified Constant-Murley scoring system.

Results: Forty-seven (47) patients consisting of 34 women and 13 men who underwent ORIF had an overall mean Constant score of 70 (43-90). The average age was 63 (45-88) with an average follow-up of 36 months (24-52). Six patients developed AVN with partial humeral collapse with an average Constant score of 63 (57-71). There was a significant difference in Constant scores between the 34 patients with good reductions (77) and the 13 patients with satisfactory or poor reductions (57) ($p=0.03$). The hemi-arthroplasty group had a mean Constant score of 61 (53-77) at an average follow-up of 37 months (24-58). The average age was 64(49-86) with 34 women and 13 men. There was a significant difference in

Constant scores between the ORIF (70) and hemi-arthroplasty (61) groups (p=0.045.

Conclusion: Three and four part proximal humerus fractures treated with ORIF with a locked plating system have a better functional than hemi-arthroplasty. Quality of initial reduction had a significant positive influence on outcome. The worst outcomes were seen in patients with failed ORIF and conversion to secondary hemi-arthroplasty.

Notes:

Friday, July 25, 2008

8:19 am – 8:25 am

Rare Flexion-Type Proximal Tibial Physeal Fracture in the Jumping Adolescent

Shail Vyas, MD
Caleb Behrend, MSIV
Lewis Zionts, MD

Introduction: Fractures of the tibial tubercle apophysis and of the proximal tibial epiphysis have been well described. The purpose of this study is to describe the only known series of rare flexion-type proximal tibial physeal fractures that falls as an intermediate to these two fracture patterns.

Methods: The cases of five patients presenting with this flexion-type proximal tibial physeal fracture were retrospectively reviewed. An exhaustive literature search was performed to identify other similar described cases and two were found and included in our analysis. A review describing the epidemiology, suspected pathogenesis, diagnosis, treatment, and prognosis of this rare type of proximal tibial physeal fracture was performed.

Results: All seven patients were adolescent males 14 or 15 years old. Each presented with knee pain after sustaining a jumping-related knee injury. Radiographs of the knee were diagnostic of this unique fracture pattern. Each case was treated with sedated closed reduction. The knee was casted in full extension for approximately six weeks. Each patient exhibited normal knee range of motion, strength, and function within three months.

Discussion and Conclusion: This study describes the only series of this rare flexion-type proximal tibial physeal fracture. This fracture can be viewed as a variant of a tibial tubercle fracture or of a proximal tibial epiphyseal fracture. This fracture pattern is result of a consistent mechanism of injury coupled with a precise period in the skeletal development of these adolescents. The growth plate of the proximal tibia closes in an asymmetric pattern with the posterior physis fusing prior to the anterior physis. Thus, a jumping injury with traction of the contracted quadriceps on the tibial tubercle coupled with the landing force causing shear at the physis may result in this unique fracture pattern. Patients are successfully treated with sedated closed reduction and immobilization in full extension.

Notes:

Friday, July 25, 2008

8:26 am – 8:32 am

Fractures of the Acetabulum in Patients Over 60 Years of Age: Epidemiology, Fracture Patterns, and Radiographic Morphology

Ravi Patel, MD
Tania Ferguson, MD
Joel M. Matta, MD

Introduction: An increase in acetabular fractures afflicting the elderly patient sector has been predicted with the geriatric population growth. Our goals were to determine if the incidence of acetabular fractures in the elderly has increased, to

evaluate the predominant fracture patterns in this age group, and to evaluate the radiographic morphology of these fractures for characteristics that may pose technical challenges.

Methods: A prospective database of 1309 acetabular fractures collected from 1980-2007 was reviewed for trends in patient age, injury mechanism, and fracture classification. Injury radiographs of patients over 60 years old were analyzed to identify unique characteristics.

Results: 235 patients were age 60 years or older at presentation. The mean age of patients statistically increased over the study period. In the first half of the study period (1980-1993), the mean patient age was 38 and 10% were older than 60 years old. In the second half (2000-2007), the mean age was 45 and 24% were over 60 years old. The anterior fracture patterns were more common in the older cohort (37% vs 15%). Anterior column, anterior-hemitransverse, and anterior wall fractures represented 19%, 15%, and 3.4% of the elderly patients' fractures, compared to 7.2%, 7.6%, and 0.3% of the younger population's. Transverse and transverse+posterior wall fractures were significantly less common in the older cohort (9%) than in those patients in the younger age group (22.8%) Anterior fractures in patients >60 commonly involved a separate fragment of the quadrilateral plate (63%), dome involvement (48%), and central subluxation of the femoral head (25%). The posterior wall was often comminuted (56%), demonstrated impaction (45%), and represented the predominant component of the associated posterior fracture patterns.

Conclusion: The age of patients presenting with acetabular fractures has increased over the last 27 years. Older patients tend to have patterns involving the anterior column, and comminution and impaction are common morphologic features.

Notes:

Friday, July 25, 2008

8:33 am – 8:39 am

Management of the Pulseless Supracondylar Humerus Fracture in Children

Paul D. Choi, MD
Rojeh Melikian, BS
David L. Skaggs, MD

Introduction: 10-20% of displaced supracondylar humerus fractures in children are associated with vascular impairment. The purpose of this study is to report the incidence and outcome of vascular injuries associated with displaced pediatric supracondylar humerus fractures and to review the management.

Methods: We retrospectively reviewed 569 pediatric supracondylar humerus fractures treated operatively at our institution. We identified 22 patients who presented with Gartland type III fractures and had absent distal pulses. We reviewed the management and outcome of their injuries. Discussion: Of patients presenting with a pulseless but well-perfused extremity, 87% (13/15) had clinically acceptable vascular status following fracture reduction and did not require vascular intervention. Of patients presenting with a pulseless and poorly-perfused extremity, 71% (5/7) required vascular surgery and 29% (2/7) developed a compartment syndrome.

Results: 15 patients presented with a pulseless, well-perfused hand (Group A); 7 with a pulseless, cool, poorly-perfused hand (Group B) – 3.8% (22/569) rate of vascular impairment. 14 patients in Group A underwent closed reduction attempt (1 patient underwent open reduction as the injury was open). Adequate perfusion was maintained in 12 patients: 6 with return of palpable pulses, 6 with absent pulses but satisfactory perfusion noted clinically. These patients were treated definitively with closed reduction, percutaneous pinning (CRPP). The remaining 2 patients in Group A required open reduction, brachial artery exploration because of inadequate perfusion. All 7 patients in Group B also underwent closed reduction attempt. Perfusion improved clinically in 2 patients who were treated definitively with CRPP. Perfusion did not improve in 3 patients who underwent open reduction, brachial artery exploration. Perfusion improved initially in 2 patients. They were observed with serial neurovascular checks and later developed compartment syndrome necessitating fasciotomy and brachial artery exploration.

Conclusion: Clinical signs of inadequate perfusion on presentation may be a powerful predictor of whether vascular surgery is needed.

Notes:

Friday, July 25, 2008

8:40 am – 8:46 am

Timing of Femoral Shaft Fracture Fixation: A Survey of Orthopaedic Traumatologists

William Page, MD
Tania Ferguson, MD
Ravi Patel, MD
Mark Lee, MD

Introduction: Extensive controversy exists within the orthopaedic literature regarding the ideal time to operate femoral shaft fractures in the multiply injured patient. Little attention has been dedicated to the timing of operation of isolated femur fractures. We used a survey to evaluate current expert opinion regarding the optimal time to surgical intervention for patients with femoral shaft fractures.

Methods: We administered a survey to academic orthopaedic trauma surgeons, active instructors in AONA and active members of the OTA. Of 109 surveys mailed, we received 85 responses (78%). The survey examined the optimal time to surgery for a closed, isolated femoral shaft fracture and a closed femoral shaft fracture in a patient with multiple injuries.

Results: The majority of respondents indicated intervention for isolated fractures was non-urgent, with only 16% indicating the need for surgery within twelve hours. Additionally, more than one-third (36%) of respondents indicated a delay of greater than twenty-four hours was acceptable. In contrast, nearly half (48%) of those surveyed indicated femoral shaft fractures in the setting of polytrauma should be treated within twelve hours.

Discussion and Conclusion: Over the past decade there has been a significant change in management protocols for several common orthopaedic trauma issues, including femoral neck fractures, open fractures, and femoral shaft fractures. Traditionally, femoral shaft fractures have been treated urgently. Our results demonstrate a shift in expert opinion toward less urgent fixation of isolated femoral shaft fractures. In contrast, the importance of stabilization in multiply injured patients remains a priority.

Notes:

Friday, July 25, 2008

SYMPOSIUM III

9:10 – 9:55 am

Expert Witness: The Law, the AAOS and You

David Teuscher, MD
Beaumont Bone & Joint Institute
Beaumont, TX

Notes:

Friday, July 25, 2008

9:56 am – 10:30 am

Presidential Guest Speaker

Volunteerism and Diversity, An Orthopaedist's Responsibility

Douglas W. Jackson, MD
Memorial Orthopaedic Surgical Group, Inc.
Long Beach, CA

Notes:

Friday, July 25, 2008

GENERAL SESSION IV: RESIDENT AWARDS

Moderators: Valerae O. Lewis, MD
Ramon L. Jimenez, MD

10:50 am – 11:44 am

Friday, July 25, 2008

10:50 am – 10:56 am

Lloyd Taylor Award Winner

Monitoring of Nerve Root Injury Using Transcranial Motor-Evoked Potentials (tcMEPs) in a Pig Model

James M. Mok, MD
Russ Lyon, MS
Jeremy A. Lieberman, MD
Jordan M. Cloyd, BA
Shane Burch, MD

Introduction: The ability of intraoperative neuromonitoring modalities to give information about a single nerve root remains poorly understood. Reports suggest that tcMEPs may be a reliable and accurate method to detect nerve root injury. An animal model to study the sensitivity and specificity of this technique has yet to be validated. The purpose of this study was to validate measurement of tcMEPs from multiple myotomes in a pig model and determine the capacity to detect injury to a single nerve root.

Methods: Transcranial stimulation was delivered through customized electrodes placed in burr holes over the motor cortex in 7 pigs. Spontaneous and evoked muscle potential activity was recorded in five myotomes (rectus femoris, vastus lateralis, vastus medialis, tibialis anterior, gastrocnemeus) bilaterally. Following unilateral exposure of the L3-S1 nerve roots, sequential ligations were performed. The tcMEP responses from all myotomes were measured after ligation of each nerve root.

Results: Robust MEP responses (range, 37-1165 mV) were achieved in all monitored myotomes. Significant decreases in tcMEP amplitudes occurred in specific myotomes following ligation of the corresponding nerve root. Consistent and substantial decreases were observed after L3 and L5 ligations in rectus femoris (48%) and tibialis anterior (67%), respectively.

Discussion and Conclusion: Our results validate monitoring of tcMEPs in multiple myotomes to detect nerve root injury in pigs. This model may be used for further study of the use of tcMEPs to detect predictors and risk factors of nerve root injury during spinal surgery.

Notes:

Friday, July 25, 2008

10:57 am – 11:03 am

Vernon Thompson Award Winner

The Protective Effect of OP-1 on Articular Cartilage in the Development of Osteoarthritis

Neil Badlani, MD
Atsuo Inoue, MD
Rob Healey, BS
Richard Coutts, MD
David Amiel, PhD

Introduction: The purpose of this study was to determine whether Osteogenic Protein 1 (OP-1) would protect articular cartilage from degeneration during the development of osteoarthritis (OA) in the rabbit anterior cruciate ligament transection (ACLT) model. Previous studies have shown that OP-1 is vital to cartilage matrix integrity and repair, stimulates synthesis of cartilage matrix components, proteoglycans and collagen, and has a protective effect against catabolic mediators like matrix metalloproteinases and interleukin-1.

Methods: The rabbit ACLT model was used in which the anterior cruciate ligament (ACL) was transected leading to osteoarthritis. OP-1 was delivered to the joint surgically for approximately 6 weeks by implantation of an Alzet osmotic pump into the medial thigh with a catheter threaded from the pump into the knee joint. 40 rabbits (20 control, 20 experimental) had the ACLT surgery and implantation of the pump performed simultaneously. They were sacrificed 9 weeks after for analysis. The osteoarthritis was graded using the Outerbridge classification with India Ink staining. Histological staining and histomorphometry with Hematoxylin & Eosin and Safranin O were performed to analyze OA progression and Semi-quantitative Polymerase Chain Reaction (PCR) was performed for anabolic and catabolic genes.

Results: The experimental group had an average Outerbridge score of 1.8 versus 2.5 for the controls. Histomorphometry showed 10.9% surface deterioration or an average depression of 0.05mm versus 22.3% and 0.1mm for the controls. Semi-quantitative PCR showed a significantly greater expression of aggrecan and collagen type II in the OP-1 treated cartilage when compared to controls and less expression of aggrecanase, a catabolic mediator.

Conclusions: OP-1 may have a potential benefit in protecting articular cartilage during the development of OA.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation. (Refer to page 32.)*

Notes:

Friday, July 25, 2008

11:04 am – 11:10 am

Harold and Nancy Willingham Award Winner

Incidence of Hip "Squeak" After Ceramic-on-Ceramic Total Hip Arthroplasty: 2 – 10 Years Follow-Up

Kenny Mai, MD
Christopher Verioti, DO
Kace Ezzet, MD
Steven Copp, MD
Richard Walker, MD
Clifford W. Colwell Jr., MD

Background: Ceramic-on-ceramic bearing surfaces can be an excellent choice for young, active patients requiring total hip arthroplasty due to the superior wear characteristics of ceramic bearing. "Squeaking" phenomenon associated with ceramic bearing surface has recently raised concerns, in part due to patient's dissatisfaction with the noise and in part due to lack of understanding of its clinical significance. The incidence of hip "squeak" has been variably reported at national meetings. Our study aims to report the incidence of hip "squeak" after ceramic-on-ceramic total hip arthroplasty (THA) in our population.

Methods: Between July 1997 to July 2005, 336 ceramic THA in 306 patients were performed at our institution. Every effort was made to contact all patients at routine follow-ups or by telephone, and questionnaire regarding hip noise was obtained. Each patient was asked to describe noise, if audible, and whether it was symptomatic or required intervention. Activities that produced any noise as well as onset of noise were also inquired.

Results: At the average of 3.92 years of follow up, two hundred and ninety patients (320 THA) were contacted by telephone and questionnaire was completed. Hip noise occurred in 17.19% of all THA; 10.0% (32 THA) of these hips produced "squeak" with different activities. Most "squeaking" hips (29/32) were asymptomatic. One patient was unhappy with "squeaking" hip. Another patient had total hip revision for painful click and instability. "Squeaking" is associated with taller male patients and femoral components with smaller neck geometry.

Conclusion: Our study shows a much higher incidence of "squeak" than previously reported in the literature. "Squeaking" is also related to prosthetic design.

Notes:

Friday, July 25, 2008

11:17 am – 11:23 am

WOA Resident Award Winner

Closed Treatment of Distal Bayoneted Forearm Fractures without Reduction in Pediatric Patients

Nick Crawford, MD
Lorrin Lee, MD
Byron Izuka, MD

Introduction: Fractures of the distal radius represent the most common fracture seen by pediatric orthopaedic surgeons today. Treatment outcomes are uniformly good and can be attributed to the durable distal radial physis. Traditionally, fractures with marked displacement and angulation were reduced by closed or open techniques and either casted or fixed with hardware. Reduction maneuvers almost always require analgesia and sedation, which increase hospital time, cost, patient risk, and the surgeon's time. In our study, we tested a treatment protocol for completely displaced distal radius fractures in which the fracture was left shortened in the bayoneted position and casted without attempt at reduction.

Methods: IRB approval was obtained. Prospectively, consecutive patients aged 4-12 years of age with completely displaced distal radius fractures were included. All fractures were primarily metaphyseal and did not involve the diaphysis or the distal radial physis. All patient care was performed by one pediatric orthopaedic surgeon. Initial treatment included minimal analgesia, no sedation, and a fiberglass cast. Patients were followed until clinical healing of the fracture. A cost analysis was performed for the traditional and experimental treatment methods.

Results: 30 children, average age 7.8. Average time spent in a cast was 47 days. Complications included one distal ulna growth disturbance and two cases of redisplacement following initial casting. Average residual sagittal and coronal angulation was 1.7 and 0.5 degrees, respectively. Average final ulnar variance was -0.8mm. All 30 patients achieved clinical union. All patients/guardians were satisfied with the treatment plan and would have it done again the same way. Hospital cost and time analysis was performed.

Discussion: Closed treatment of completely displaced and shortened distal radius fractures without attempts at reduction result in excellent clinical and radiographic outcomes. Hospital utilization and treatment costs are reduced significantly when reduction maneuvers and anesthesia are not used.

Notes:

Friday, July 25, 2008

11:24 am – 11:30 am

WOA Resident Award Winner

Predictors and Prevalence of Vertebral Compression Fractures Following Kyphoplasty

Gregory D. Byrd, MD
Robert L. Tatsumi, MD
Jayme Hiratzka, MD
Judson E. Threlkeld, MD
Jung U. Yoo, MD
Robert A. Hart, MD

Introduction: Vertebral compression fractures (VCFs) affect 44 million Americans annually causing significant associated morbidity. Kyphoplasty provides functional improvement but may lead to subsequent VCFs at local levels. The prevalence and risk factors associated with subsequent VCFs requiring additional vertebral cement augmentation after kyphoplasty has not been previously evaluated.

Methods: A retrospective review of 256 consecutive patients treated with kyphoplasty for VCFs (2003-2007) at a single medical center were evaluated and followed for 6 months after the procedure. Patients were excluded if: involved in high energy trauma, presence of severe spinal degeneration, tumor presence at level of VCF, disk prolapse with nerve compression, vertebra plana, >10 degrees of coronal imbalance or prior spinal fusion. All patients underwent kyphoplasty at one or multiple levels using a bilateral transpedicular approach with the Kyphon™ balloon tamp system. Residual kyphosis was measured with Cobb angles.

Results: Mean age 79.5 years. 43 patients (17%) sustained subsequent VCF requiring additional kyphoplasty after the initial procedure (median 33.5 days). The most common level for subsequent VCF was the adjacent level. In the thoracic spine 65% of the VCFs were adjacent to the prior fractures versus 45% in the lumbar spine. Steroid use was the most significant risk factor for subsequent VCFs. Age, gender, smoking and bisphosphonate use had no impact on the rate of subsequent fractures. Residual kyphosis was not predictive of subsequent VCFs.

Discussion and Conclusion: In patients treated with kyphoplasty for VCF's, 17% underwent additional kyphoplasty for subsequent symptomatic VCF's. Oral steroids use a significant risk factor for subsequent fracture after initial kyphoplasty. The most common level of subsequent VCF after initial kyphoplasty was the adjacent level in the thoracic spine but in the lumbar region it was equally likely to occur up to three levels away. Bisphophonates did not impact the incidence of subsequent VCFs.

Notes:

Friday, July 25, 2008

11:31 am – 11:37 am

WOA Resident Award Winner

Polyaxial Locking Plate Fixation in Distal Femur Fractures: A Biomechanical Comparison

Kenneth J. Wilkens, MD
Mark A. Lee, MD

Introduction: Uniaxial, first-generation locking plates have become increasingly popular for fixation of supracondylar femur fractures. Polyaxial plates are currently available which allow for variable angle screw insertion, however the biomechanical integrity of these new locking interfaces is yet unproven. This study compares the mechanical stability of a conventional locking plate with that of a new polyaxial design.

Methods: A comminuted supracondylar femur fracture (AO/OTA33-A3) gap model was created in 4th generation synthetic composite bones. Fixation was obtained with two different plate constructs: 1) A conventional locking plate (uniaxial screw heads threading directly into plate) and 2) A polyaxial locking plate (screw heads are captured and "locked" into a fixed angle using locking caps). Eight specimens of each type were then tested in axial, torsional, and cyclic axial modes on a material testing machine.

Results: The mean axial stiffness for the polyaxial locking plate was 24.4% greater than the conventional locking plate (168.2 N/mm vs. 127.1 N/mm). The mean torsional stiffness was also greater for the polyaxial plate (2.78 Nm/degree vs. 2.57 Nm/degree). Cyclic axial loading caused significantly less mean irreversible deformation in the polyaxial plate (5.6 mm) than in the conventional plate (8.8 mm). The mean ultimate load to failure was significantly higher for the polyaxial plate (1560 N) than for the conventional plate (1337 N).

Conclusion: This new polyaxial plate locking mechanism provides a biomechanically favorable fixation option for supracondylar femur fractures. The frictional locking mechanism allows variable screw placement with maintenance of required stability.

Notes:

2008 Scientific Program Abstracts

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

Saturday, July 26, 2008

SYMPOSIUM IV

Moderator: Valerae O. Lewis, MD

7:30 am – 8:30 am

How to Keep Out of Trouble: Oncology and the Community Orthopaedic Surgeon

R. Lor Randall, MD
The University of Utah
Salt Lake City, UT
Cynthia M. Kelly, MD
The Denver Clinic for Extremities at Risk
Denver, CO

Notes:

Saturday, July 26, 2008

GENERAL SESSION V: SPINE/ PEDIATRICS/UPPER EXTREMITY

Moderators: Sigurd Berven, MD
Ellen M. Raney, MD
Amy Ladd, MD

9:00 am – 10:52 am

Saturday, July 26, 2008

9:00 am – 9:06 am

Survivorship of Primary Fusion for Adult Spinal Deformity

James M. Mok, MD
Jordan M. Cloyd, BA
David S. Bradford, MD
Serena S. Hu, MD
Sigurd H. Berven, MD

Introduction: Compared to the adolescent population, surgery for adult deformity is often more complex and technically difficult, contributing to a high reported rate of complications that can result in the need for reoperation. We sought to determine the survivorship of primary fusion for adult spinal deformity and identify patient-specific factors which are significant predictors of complications requiring reoperation. Reported complication rates vary widely.

Methods: From 1999 to 2004, all patients who underwent primary instrumented fusion for non-paralytic adult spinal deformity at a single center were included. Inclusion criteria included minimum age at surgery of 20 years and minimum fusion length of 4 motion segments. Surgical, demographic, and co-morbidity data were obtained retrospectively by chart review. Kaplan-Meier method was used to calculate cumulative probability for reoperation. Comparisons were performed between the reoperation group and patients who did not.

Results: 89 patients met inclusion criteria. The cumulative reoperation rate was 25.8%. Survival was 86.4% at 1 year, 77.2% at 2 years, and 75.2% at 3 years. ASA class and smoking status were significantly higher in the reoperation group. Reasons for reoperation included infection, pseudarthrosis, adjacent segment problems, implant failure, and removal of painful implants.

Discussion and Conclusion: This represents the largest cohort reported to date of patients undergoing primary fusion using third-generation instrumentation techniques. In the presence of relevant risk factors, many patients undergoing primary fusion for adult spinal deformity required reoperation. Complex medical and surgical factors contribute to the treatment challenges posed by this patient population.

Notes:

Saturday, July 26, 2008

9:07 am – 9:13 am

Extravasation of rhBMP-2 with Use of Postoperative Drains After Posterolateral Spinal Fusion

James M. Mok, MD
Salim K. Durrani, MS
Samantha L. Piper, BA
Serena S. Hu, MD
Vedat Deviren, MD
Sigurd H. Berven, MD
Shane Burch, MD

Introduction: Retention of rhBMP-2 at the fusion site is essential for clinical efficacy and avoidance of unintentional bony growth in other areas of the spine. In vitro studies have shown a large degree of rhBMP-2 release from the sponge within the first 48 hours. It is unknown what effect drainage may have on changing the local concentration of BMP at the posterolateral site. The purpose of the study was to quantify the amount of rhBMP-2 that extravasates into drains after posterolateral fusion using its current commercially available form, rhBMP-2 within an absorbable collagen sponge

Methods: The entire contents of drains were collected prospectively for 48 hours postoperatively from 9 patients who underwent instrumented posterolateral fusion with rhBMP-2. The total amount collected was calculated from the concentration of BMP-2 as measured by ELISA.

Results: A median 68 mcg of BMP-2 (range, 13-498) was recovered from drains, representing a median 0.58% (range, 0.21-4.2%) of the amount implanted; adjusted for yield rate, a median 1.08% was recovered. No significant relationships were found between percentage of BMP-2 extravasation and amount implanted, number of levels, blood loss, and drainage output. A mean 54% of the total amount recovered was in the drain within the first 6 hours.

Discussion and Conclusion: The greater bleeding and muscular compression associated with posterolateral fusion did not result in a substantial amount of rhBMP-2 extravasation into postoperative drains. Based on the small rates of recovery, suction drains may be placed following even complex surgeries involving large blood loss without the loss of significant amounts of the implanted rhBMP-2 into the drain.

Notes:

Saturday, July 26, 2008

9:14 am – 9:20 am

Initial Results from the USA FDA Trial Using Mobi-C Cervical Disc Replacement for the Treatment of One and Two Level Cervical Disc Disease

Hyun Bae, MD
*Robert Tatsumi, MD
Ben Pradhan, MD
Kim Kee, MD
L. E. A. Kanim, MA
Rick Delamarter, MD
Jesse Babbitz, MD

Introduction: The artificial disc, Mobi-C, has a potentially higher range of motion in flexion and extension and the ability to treat single and multi-level cervical disc disease compared to other approved ADRs which are able to treat one level. The treatment of single and multi-level cervical disc disease with this ADR is compared to fusion in a US FDA clinical trial. Objective: To analyze clinical results, motion, as well as cervical alignment after single and multi-level cervical disc replacement (CDR), and to compare them with anterior cervical discectomy and fusion (ACDF).

Methods: This is a report from two US clinical trial sites for the Mobi-C cervical disc prosthesis (LDR Spine). The study is prospective, randomized, and controlled with the control subjects receiving anterior cervical discectomy and fusion. Pain, disability, and range of motion outcomes were measured preoperatively and at 6 weeks, 3, 6, and 12 months postoperatively.

Results: Sixty Seven were patients enrolled in the study, with 44 randomized to cervical disc replacement (32 two level and 12 one level CDR) and 23 to anterior discectomy and fusion (17 two level and 6 one level ACDF). After a follow-up period of 12 months from surgery, there were significant improvements in Visual Analog Scale scores for both neck pain and arm pain, and Oswestry Disability Index scores, for both disc replacement and fusion patients (all $p < 0.05$). These outcome measures were not significantly different between treatments (all $p > 0.05$). A trend was observed for as well as Oswestry index in the disc replacement group compared to fusion. Motion was preserved at all disc replacement levels, including multilevel procedures. Disc replacements were able to maintain both sagittal and coronal cervical alignment, both sagittal and coronal. There were no major complications, technique or device related, in any of the cases.

Conclusions: Cervical total disc replacement preserves range of motion without compromising the clinical results. No significant difference in outcome measures at one year was observed between the patients who received disc replacements or fusions. A trend was observed suggesting slightly earlier recovery in the disc replacement patients. Disc replacement (single or multiple levels) imparts more motion to treated segments, and is able to maintain normal cervical alignment. Longer-term follow-up will reveal if preserved motion will translate to decreased adjacent segment degeneration.

* *The FDA has not cleared the drug and/or medical device for the use described in this presentation. (Refer to page 32.)*

Notes:

Saturday, July 26, 2008

9:21 am – 9:27 am

Treatment of Multi-Level Spinal Coccidioidomycosis Osteomyelitis

Stephen L. Curtin, MD
Rolando Roberto, MD
Steven E. Hanks, MD
Yuri Lewicky, MD

Introduction: The purpose of this study is to assess our results and review the presentation and treatment of patients with multi-level spinal coccidioidomycosis.

Method: We reviewed the medical record of nine consecutive patients with multilevel destructive lesions of the vertebrae. A prospective treatment protocol was utilized. Risk factors and treatment efficacy were assessed.

Results: Six male and three female patients with a mean age of 31 made up the study group. (7/9) were African American. Combinations of cervical, thoracic, lumbar and sacral pelvic lesions were treated. Back pain and malaise were primary presenting symptoms and definitive diagnosis was delayed. Patients averaged two surgeries to stabilize their condition. These included open drainage, corpectomy, anterior and/or posterior reconstruction. (7/9) patients had local amphotericin B beads placed at the time of reconstruction. All patients were treated with systemic fluconazole and (3/9) were given perioperative systemic amphotericin B. (6/9) patients had remission of disease progress and excellent pain relief at average two year follow up. Two patients are still under active management at the time of this writing. One patient died of pulmonary disease remote from her spinal surgery.

Discussion and Conclusion: Disseminated coccidioidomycosis is an aggressive and life threatening disease. Our study population was relatively young and (7/9) patients were otherwise healthy without immunosuppression. Aggressive surgical and anti-fungal treatments can halt the disease and early results are encouraging that a majority of patients can get back to pain free daily activities.

Notes:

Saturday, July 26, 2008

9:28 am – 9:34 am

Disseminated Intravascular Coagulation in Pediatric Spine Surgery

Ellen M. Raney, MD
David Freccero, MD
Suzanne Yandow, MD
Ramona Fillman, MHA, PT
Desiree Medeiros, MD

Purpose: The authors noted significantly higher blood loss and use of blood products in our population of patients undergoing scoliosis surgery than previously experienced. The literature contains no prospective studies documenting the incidence of disseminated intravascular coagulation (DIC) in pediatric spine patients. To scientifically evaluate the problem we initiated a study to prospectively evaluate the incidence of

DIC in our population of pediatric patients undergoing spine surgery.

Methods: A prospective consecutive series of pediatric patients undergoing spinal arthrodesis through a posterior approach or combined anterior-posterior approach were studied. Platelet count, prothrombin time (PT), partial thromboplastin time (PTT), fibrinogen level, fibrin degradation products, and D-dimer levels were obtained preoperatively, at 3 hours intraoperatively, prior to any blood product intervention done beyond 4 hours intraoperatively, and 24 hours postoperatively. Laboratory evidence for DIC was defined as: platelet count < 150,000/mm, PT value 3 points above baseline, PTT > 40 seconds, and fibrinogen < 150 mg/dL; and/or either of these: fibrin degradation products > 5 mcg/ml or D-dimer > 0.5 mcg/ml.

Results: Fifteen patients that underwent posterior spinal arthrodesis were studied. All 15 patients had elevations in fibrin degradation products and/or D-dimer either intraoperatively or postoperatively suggestive of DIC.

Discussion and Conclusion: Our preliminary results indicate coagulation abnormalities in a striking number of our patient population. The incidence of DIC may be more common in the pediatric population undergoing spine surgery than previously reported in the literature. A multicenter study with more extensive laboratory evaluation is indicated to elucidate this issue.

Notes:

Saturday, July 26, 2008

9:43 am – 9:49 am

A New Classification System Predictive of Complications in Surgically Treated Pediatric Humeral Lateral Condyle Fractures

Jennifer M. Weiss, MD
David L. Skaggs, MD
Robert Kay, MD
Sara Lewicke, BA
Elliott Mendelsohn, BA
Scott Yang, BS

Background: The most commonly cited classification system for lateral condyle fractures (Milch) has not been shown to be predictive of outcome or recommend treatment. Purpose: To determine whether a classification system based on fracture displacement and articular congruity correlates with a higher rate of complications in lateral condyle fractures.

Methods: A retrospective review of all children with lateral condyle fractures treated operatively at one institution from 1996 to 2003 was performed. All fractures were classified by the following system: Type 1 fractures – displaced less than 2 mm (treated nonoperatively, excluded). Type 2 fractures – displacement of 2 to 3mm with congruity of the articular surface as proven by intra-articular arthrogram (65 pts). Type 3 fractures greater than 3 mm of intraarticular displacement or lack of articular congruity (93 pts). The 158 patients with Type 2 and 3 fractures underwent surgery and are the focus of this study. Complication rates were compared between groups 2 and 3, as well as with regard to patient age, length of time between injury and surgery, and duration of casting.

Results: The overall complication rate was 22.2% (35/158). The most common complications included radiographic and/or clinical bump (10%), and infection treated with po antibiotics (4%). There were no delayed or nonunions. The complication rates for type 2 and 3 fractures were statistically significantly different (p<_x0030_.03_x0029_: _x0031_4_x0025_ _x0028_9 _x002f_65_x0029_ for type _x0032_ and _x0032_8_x0025_ _x0028_26 _x002f_93_x0029_ for type _x0033_ fractures. There was no correlation between complication rate and patient age_x002c_ or number of days between fracture and surgery.

Conclusion: This is the largest series of operatively treated lateral condyle fractures reported in the literature. This classification system based on fracture displacement and articular

congruity predicts the risk of complications_x002c_ which were twice as likely to occur in type _x0033_ fractures as type _x0032_ fractures.>

Notes:

Saturday, July 26, 2008

9:50 am – 9:56 am

Sacroiliac Joint Width and Sacral Ossification in Pediatric Patients: Growth Patterns with Skeletal Maturation

Tania Ferguson, MD
Amir Nejad, BA
Amir Jamali, MD
Sandra W. Gorges, MD

Introduction: The growth patterns and ossification centers of the posterior pelvic ring have never been described. The goal of this study was to characterize the width of the SI joint throughout skeletal growth. We also aimed to identify the ossification centers of the sacrum and determine the ages at which they close.

Methods: Axial CT images of 140 pediatric patients (2-15 years old) were analyzed with a commercially available software package. The narrowest distance between the ilium and ala was measured at the level of the first sacral body (SI joint width). Three distinct ossification sites within the sacrum were identified (trans-alar, pedicular, S1-S2 alar). For each patient the ossification sites were described as open, transitional, or closed.

Results: 19 of 140 patients were determined to have dysmorphic lumbosacral vertebrae and were excluded from further analysis. The mean sacroiliac joint width for the remaining 121 patients was 3.279 mm. The mean widths in patients 2-6, 7-11, and 12-15 years of age were found to be 4.110, 3.457, and 2.041 mm respectively. The three specified ossification sites closed in a consistent order and at different ages. The trans-alar growth plate was the first to close, followed by the pediclar, and finally the S1-S2 alar. At all three ossification sites, females transitioned towards closure sooner than males.

Conclusion: Distinguishing injured from non-injured pelves requires detailed information about the normal radiographic appearance of the posterior pelvic ring. We found that the width of the sacroiliac joint decreases predictably as the pelvis matures. Several ossification sites within the sacrum are open at birth, but close in a specific order beginning in infancy and continuing into adolescence. The female pelvis progresses towards maturity earlier than the male pelvis.

Notes:

Saturday, July 26, 2008

9:57 am – 10:03 am

Complications with Flexible Nailing of Femur Fractures More Than Double with Child Obesity and Weight >50 kg

Jennifer M. Weiss, MD
Christine Ghatan, BS
David L. Skaggs, MD
Paul D. Choi, MD
Robert M. Kay, MD

Introduction: Previous studies reported that children above 95th percentile in weight for their age had an increased risk for complications following titanium elastic nailing for femur fractures in children. The purpose of this study is to examine whether obesity, defined as BMI > 95th percentile, and/or simple weight correlates with an increased rate of complications.

Methods: The incidence of complications was compared between obese and non-obese patients and also between patients who weighed ³ 50 kg and those < 50 kg.

Results: The overall complication rate was 23% (16/71). The complication rate was 17% (10/58) for "non-obese" patients and 46% (6/13) for "obese" patients. This difference was statistically significant (p=0.03). The complication rate was 46% (6/13) in children who weighed ³50 kilograms and 17% (10/58) in children who weighed < 50 kilograms. This difference was also statistically significant (p=0.03).

Conclusions: This study demonstrates that obesity (BMI > 95th percentile), and weight over 50 kg predispose patients to increased risk of surgical complications undergoing flexible elastic nailing for femur fractures. Both obese children and children weighing ³ 50 kg were 2 times more likely to have a complication when undergoing this procedure.

Notes:

Saturday, July 26, 2008

10:04 am – 10:10 am

The Effect of Insurance Type on Delay in Fracture Care

Peter Elsissy, MD
Michael Sim, BA
Montri D. Wongworawat, MD

Background: Wrist and hand fractures are common orthopedic injuries that often heal in a short period of time. Therefore, delay in evaluation could lead to corrective rather than primary treatment needs. Our objective is to determine if insurance status affects the management of wrist and hand fractures. We hypothesize that those patients who had pre-authorization requirements (AR) to see an orthopaedist had (1) longer delays in orthopaedic evaluation and (2) higher rates of corrective osteotomy when compared with patients who had direct access (DA) using a retrospective cohort model.

Methods: After obtaining institutional review board approval, we reviewed medical records of patients seen in an orthopaedic clinic from July 2005 to June 2007. Of the 1820 patients seen, 410 had wrist or hand fractures and were selected for study. Selected patients were then categorized into three groups based on insurance type: pre-authorization required (AR), direct access (DA), and no insurance. Patients without insurance were excluded to avoid confounding factors, leaving 360 in the study population. Delay in evaluation was assessed using t-test analysis of log transformed injury-to-visit time data. Relative risk of corrective osteotomy was assessed using a multivariate model, and other parameters included age, sex, and tobacco use.

Results: In the study population, 267 patients had AR and 93 patients had DA. There was a significant delay in orthopaedic evaluation of AR patients (median: 17 days) compared with that of DA patients (10 days). The age-adjusted relative risk of corrective osteotomy in the AR group was 2.07, which did not reach significance.

Discussion and Conclusion: Requiring pre-authorization to see an orthopaedist introduces a delay. A trend toward needing corrective treatment due to delay was found. We recommend eliminating pre-authorization requirements for fracture care.

Notes:

Saturday, July 26, 2008

10:17 am – 10:23 am

Percutaneous Fixation of the Scaphoid through a Dorsal Approach: An Anatomical Study

Damon C. Adamany, MD
Elizabeth Mikola, MD
Bonnie Fraser

Introduction: Percutaneous surgical treatment of nondisplaced scaphoid fractures is becoming more common. Although the surgical anatomy at risk has been well described for the volar approach to the scaphoid, there have been no articles elucidating the dangers with a percutaneous dorsal approach. Additionally, direct site of the screw is not possible with a percutaneous approach, and there is a risk of not seating the screw below the subchondral bone. The purpose of this study was to delineate the anatomy at risk using a dorsal percutaneous approach to the scaphoid and to determine the accuracy of using fluoroscopy to seat the screw flush with the subchondral surface.

Methods: Cannulated, headless screws were placed into the scaphoids of twelve fresh-frozen cadavers in standard percutaneous fashion through a dorsal approach. Fluoroscopy was used to seat the screw just below the subchondral surface. The wrists were then dissected and the distance from the guide wire to various anatomical structures was measured. The distance that the screw was protruding above or buried below the subchondral bone was also measured.

Results: The distances from the guide wire to the posterior interosseous nerve (PIN), extensor digitorum communis (EDC) to the index and to extensor indicis proprius (EIP) were 2.2mm, 2.2mm and 3.1mm, respectively. These structures were most at risk. The screw was prominent (above the subchondral bone) in 2 of the 12 (17%) specimens and flush with or buried in the remaining ten specimens.

Conclusions: The results of this study show that there are anatomical structures at risk of injury with dorsal percutaneous placement of a headless screw into the scaphoid. Despite using live and static fluoroscopy views, we incorrectly placed the screw above the subchondral bone in two of the specimens. We support the use of a limited incision when internally fixing a scaphoid from the dorsal approach.

Notes:

Saturday, July 26, 2008

10:24 am – 10:30 am

Risk Factors for Prolonged Time to Union After Internal Fixation for Scaphoid Nonunions

Eric J. Venn-Watson, MD
Nathan Hammel
Leo Kroonen
Edton Ganal
Brian Fitzgerald
Eric Hofmeister
Michael Thompson

Introduction: Scaphoid fracture nonunions are commonly encountered in young active populations. Much has been written about the treatment of these fractures, however their management remains challenging. Operative treatment of scaphoid nonunions has been shown to result in eventual bony consolidation in 65% to 95% of cases. While previous studies have focused on the eventual outcome of persistent nonunion or union, we sought to determine risk factors for prolonged time to union.

Methods: A retrospective chart and radiographic data review were conducted. Thirty eight patients were identified who underwent screw fixation with bone grafting between 2003 and 2005 for scaphoid nonunions and had a minimum of 2 year follow up. Patients were divided into three groups depending on time to radiographic union. Group I: < 3mo; group II: 3-6months and group III: >6months. Univariate and regression analysis were performed to identify risk factors associated with prolonged time to union. Potential risk factors included age, proximal pole fractures, fracture displacement, smoking, presence of avascular necrosis, time from injury to surgical fixation, surgical approach, use of a bone stimulator, implant, previous injury or surgery and type of bone graft.

Results: Eventual radiographic union occurred in 33 of 38 (87%) patients. There were 10 patients in group I, 10 patients in group II and 18 patients in group III. Average time to union for 33 patients was 170 days. Univariate analysis revealed that patients undergoing a dorsal approach were at higher risk for prolonged union.

Conclusion: Prolonged time to union was only associated with surgical approach. This may be due to a dorsal approach being preferentially used for patients with proximal pole fractures and for vascularized bone graft. Patients requiring a dorsal approach should be educated that a prolonged

postoperative period may be required before healing can be anticipated.

Notes:

Saturday, July 26, 2008

10:01 am – 10:07 am

The Incidence of Triangular Fibrocartilage Complex Injuries without Concomitant Wrist Instability Requiring Surgical Intervention

Jeffrey Yao, MD
*Anubhav Jagadish, BA

Introduction: Immobilization is an accepted form of treatment for ulnar-sided wrist pain due to triangular fibrocartilage complex (TFCC) tears without concomitant instability. However, patients treated with immobilization often require surgical intervention if still symptomatic. Arthroscopic TFCC debridement or repair is successful in treating these refractory injuries. The goals of this study were to identify if casting was superior to splinting in treating these injuries, and to define the incidence of injuries refractory to immobilization but adequately treated with arthroscopy.

Methods: Approval from our institutional review board was obtained. A retrospective chart review of patients treated from September 2005 – September 2007 was completed. 84 patients with TFCC injuries diagnosed via a history of a traumatic fall with classic physical findings of a positive TFCC grind maneuver and a palpable click were immobilized for a total of 4 weeks using a short arm cast (50%) or wrist splint (50%). Patients were stratified into two groups: those requiring immobilization alone (asymptomatic after 4 weeks and able to resume normal activities) and those requiring surgery following failed immobilization.

Results: Complete resolution of symptoms was achieved with immobilization alone in 48 patients. The remaining 36 patients required a surgical intervention. 56% of those patients were splinted, whereas 44% were casted. Of these patients, 20 required TFCC debridement, 15 underwent repair (Palmer 1B) and 1 patient required both debridement and repair (concomitant Palmer 1D and 1B).

Discussion: 43% of patients required surgery for stable TFCC tears despite a period of immobilization, indicating the resolute nature of these injuries. Immobilization remains our first line of treatment for suspected TFCC tears without instability, and we found that casting is superior to splinting. Furthermore, our study suggests the percentage of patients that will require surgical intervention is not trivial, and should be reinforced with the patient during consultation.

Notes:

Saturday, July 26, 2008

10:38 am – 10:44 am

Surgical Treatment of Established Ischemic Volkman's Contracture with Flexor Origin Slide

Nina Lightdale, MD
Milan Stevanovic, MD

Introduction: The authors review indications, describe modifications of the Page technique, and report functional outcomes and long term follow up for the surgical treatment of Tsuge type I mild and type II moderate or classic established ischemic Volkmann's contracture.

Methods: Twenty seven consecutive cases were reviewed retrospectively. Surgical treatment was performed in all patients only after each reached maximal benefit with occupational therapy. Average time from injury to surgery was 8 months.

Each case was evaluated for pre and post operative range of motion, function, as well as patient satisfaction. Clinical follow up was from one to fourteen years.

Results: Patients with pre-operative active finger flexion and no motor impairment of intrinsic muscles of the hand had good or excellent functional outcome with significantly improved finger extension and flexion post-operatively. All patients were satisfied with their outcome and would have the surgery again in retrospect and recommend it to another patient.

Discussion and Conclusion: The goals of surgical intervention for established Volkmann's ischemic contracture, including enhanced function, range of motion, and appearance of the forearm, can all be met with a flexor origin slide. Surgical candidates should be selected only after maximum occupational therapy participation with intact active finger flexion and intrinsic function.

Notes:

Saturday, July 26, 2008

GENERAL SESSION VI: AAOS/OREF/ PRESIDENTIAL ADDRESS

11:01 am – 12:15 pm

Saturday, July 26, 2008

11:01 am – 11:20 am

Your AAOS

E. Anthony Rankin, MD, President

Notes:

Saturday, July 26, 2008

11:21 am – 11:30 am

OREF Presentation

Mr. Gene Wurth, CEO, OREF

Notes:

Saturday, July 26, 2008

11:31 am – 12:15 pm

Presidential Address

Orthopaedics in 2048

Ramon L. Jimenez, MD

Notes: