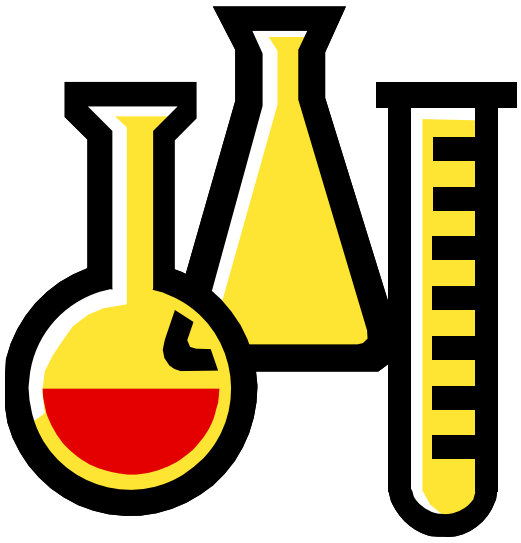
THE OHIO STATE UNIVERSITY

37th Annual Mallory-Coleman Resident Research Day



Thursday, June 4, 2009

Blackwell Hotel and Conference Center

PROGRAM

7:00 am	Welcome and Introduction
7:15 am	Christopher Donaldson, M.D. *"Defining Chronicity in ACL Deficient Knees Undergoing Reconstruction"*
7:30 am	Kristen Thomas, M.D. "*A Biomechanical Comparison of Coracoclavicular Ligament Reconstructive Techniq*ues"
7:45 am	Bradley Ellison, M.D. *"Polyethylene Wear is Influenced by Manufacturing Technique in Modular Total Knee Arthroplasty"*
8:00 am	Said Atway, D.P.M. *"Early Weightbearing of Calcaneal Fractures Fixated with Locked Plates"*
8:15 am	Charan Gowda, M.D. *"Open Exploration and Nature of Injury to the Brachial Artery following Displaced Supracondylar Humerus Fractures with Absent Pulses"*
8:30 am	Eric Thiel, M.D. *"Incidence, Type, and Cause of Injury in the High School Athlete Comparing Synthetic Turf and Natural Grass"*
8:45 am	Laura Hirvinen, D.V.M. *"Influence of Bone Cements on Bone-Screw Interface in vivo"*
9:00 am	Break
9:15 am	Michael Skeels, D.O. "*Prevention of DVT in Unicompartmental Knee arthroplasty: What is appropriate?"*
9:30 am	Joshua Harris, M.D. *"Is 2 cm2 (squared) the correct size threshold to dictate articular cartilage repair?"*
9:45 am	Adam Thomas, D.P.M. *"Mechanical Compression Force of Bioabsorbable and Metal Small Fragment Screws"*
10:00 am	Craig Shank, M.D. *"Valgus Slipped Capital Femoral Epiphysis: A Case Series"*

10:15 am	Hisham Awan, M.D. *"Evaluating the Efficacy of Physical Examination Teaching in Medical Schools"*
10:30 am	Tyler Smith, M.D. *"Reasons for Lack of Return to Pre-injury Level of Function After ACL Reconstruction"*
10:45 am	Break
11:00 am	James Heckman, M.D., Visiting Professor and Moderator *"Publication of Articles in Scientific Journals: How to Succeed in 2009" "*
12:00 pm	Lunch
12:30 pm	Jason Hurbanek, M.D. "*Two Year Clinical Comparison of Bioabsorbable and Non-Bioabsorbable Femoral Cross-Pin Fixation in Soft Tissue ACL Reconstruction Correlated with CT In Vivo Degradation Characteristics"*
12:45 pm	Timothy Miller, M.D. "*Stress Fractures: A New Classification System"*
1:00 pm	Daniel Cuttica, D.O. *"Pediatric Femoral Shaft Fractures: A Comparison of Outcomes Between Flexible Intramedullary Nailing Versus Rigid Intramedullary Nailing"*
1:15 pm	Maria Menendez, B.V.S.c. *"Radiofrequency Energy On Hemostatsis and Healing of Cortical Bone and Soft Tissue"*
1:30 pm	Andrew Ajluni, D.O. *"Metal on Metal bearings in Total Hip Arthroplasty: Minimum 2 year follow up"*
1:45 pm	Julie Chevillet, D.O. "*Juvenile Osteochondritis Dissecans (JOCD): Predictors of Lesion Stability"*
2:00 pm	Elijah Hothem, M.D. *"Plasma Pharmacokinetics of Intra-articular Medications in Exercised Horse"*
2:15 pm	Brian Seng, D.O. "*Enhanced Early Outcomes with Anterior Supine Intramuscular Approach in Primary Total Hip Arthroplasty"*
2:30 pm	*End of Day*

Mallory-Coleman Day

Mallory-Coleman resident research day was established by Drs. Thomas Mallory and Carl Coleman in 1972 in memory of Katherine Virginia Mallory and Sally Jo Coleman.

This research day was established in order to encourage the development of ideas related to research in orthopaedic surgery and related basic sciences.

Each year, a distinguished visiting professor from an outside institution is invited to moderate and analyze the resident presentations and provide constructive criticism and commentary.

Past Visiting Professors:

2008	Cato Laurencin, M.D.
2007	William Garrett, M.D.
2006	Peter Stern, M.D.
2005	James Goulet, M.D.
2004	Steven Arnoczky, D.V.M.
2003	Joseph Buckwalter, M.D.
2002	Victor Goldberg, M.D.
2001	James Urbaniak, M.D.
2000	Douglas Jackson, M.D.
1999	Douglas Dennis, MD
1998	Thomas Einhorn, MD
1997	Larry S. Matthews, MD
1996	Gary Friedlander, MD
1995	James Herndon, MD
1994	Clement B. Sledge, MD
1993	Eric L. Radin, MD

2009 Mallory-Coleman Visiting Professor and Moderator:

James Heckman, M.D.

Dr. Heckman is the Editor-in-Chief of *The Journal of Bone and Joint Surgery*, as of January 2000. He has brought fresh new ideas to *The Journal*, creating new sections to appeal to a broader readership, enhancing the web site, and a new image.

Dr. Heckman now sees patients as Visiting Clinical Professor of Orthopaedic Surgery at Harvard Medical School, and Visiting Orthopaedic Surgeon at Massachusetts General Hospital.

In 1998, he was President of the American Academy of Orthopaedic Surgeons. He joined the AAOS in 1978, and has served on many committees since that time. At varying times, he chaired six of those committees, including the Council on Education, the Committee on Instructional Courses, and the Committee on Publications.

From 1988-1999, Dr. Heckman served as Chairman of the Department of Orthopaedic Surgery at the University of Texas Health Science Center San Antonio.

Dr. Heckman's interests include treatment of foot & ankle conditions, fracture management, and fracture complications.

Dr. Heckman obtained his medical degree from Jefferson Medical College. He did his orthopaedic residency at the University of Virginia Hospital in Charlottesville, Virginia. Following two years at Womack Army Hospital in Fort Bragg, North Carolina, Dr. Heckman joined the staff at the University of Texas Health Science Center at San Antonio in 1976.

Chris Donaldson, M.D. is a Fellow in Sports Medicine at The Ohio State University

DEFINING CHRONITY IN ACLS DEFICIENT KNEES UNDERGOING RECONSTRUCTION

Authors: Christopher Donaldson, MD., Angela Pedroza, MPH, David Flanigan, MD, Christopher Kaeding, MD

Presenter: Christopher Donaldson, MD

Arbitrary definitions of chronic ACL-deficient knees undergoing reconstruction have introduced inconsistency into the literature. This investigation defines the differences in acute and chronic ACL-deficient knees undergoing reconstruction through statistical differences in meniscal tear rates and chondral integrity at time from ACL injury until reconstruction.

676 patients completed ACL reconstruction by either of two high-volume ACL surgeons (CK, DF). Patients (207/676) with multiple ligament-injured knees [medial collateral ligament (MCL) ≥ grade 3, posterior cruciate ligament (PCL) ≥ grade 2, or lateral collateral ligament (LCL) ≥ grade 3]; previous meniscus, cartilage or ligament-reconstruction knee surgeries were excluded from review. Chart review identified 469 patients (age≥12 years old) meeting inclusion criteria undergoing primary, isolated-ligament ACL reconstruction surgery from 2005-2008. 311 patients with complete demographic, functional and surgical data in the Multicenter Orthopaedic Outcomes Network (MOON) or surgeons' databases were included for study. Meniscus tear incidence, giving way episodes and chondral integrity were identified for groups at increasing weekly intervals at times from ACL injury until reconstruction.

Statistically significant differences in medial meniscus tears (week 11) and Outerbridge grade ≥2 medial compartment chondral lesions (week 4) identified by Fisher's exact test established the chronic ACL group from the baseline (acute) group. Statistically significant differences in Outerbridge grade≥2 chondral lesions in the lateral (week 7) and patellofemoral compartments (week 11) were also observed. No statistically significant differences in mean lateral meniscus tear rates or giving way episodes at any weekly time interval from injury until ACL reconstruction were identified.

In conclusion, statistically significant differences in medial meniscus integrity and medial, lateral and patellofemoral compartment chondral lesions (grade≥2) at times from ACL injury until reconstruction are objective methods to define the acute versus chronic ACL-deficient knee. This method is an improvement on previous arbitrary and subjective methods used to determine acute and chronic ACL-deficient knees in the literature.

Kristen Thomas, M.D. is a resident in Orthopaedics at The Ohio State University

A Biomechanical Comparison of Coracoclavicular Ligament Reconstructive Techniques

Authors: Kristen Thomas MD, Alan Litsky, ScD, Grant Jones MD, Julie Bishop MD
Presenter: Kristen Thomas, MD

Background: Acromioclavicular (AC) joint dislocations are common orthopedic injuries. Numerous operative techniques have been described, but, the gold standard has yet to be defined. The goal of fixation is to create a stiff and strong reconstruction of the coracoclavicular (CC) ligaments in order to provide optimal stability. Currently, the modified Weaver-Dunn, a non-anatomic reconstruction, represents the most traditional surgical procedure. However, due to the high rate of recurrent instability with this technique, a shift towards a more anatomic repair has occurred.

Purpose: Evaluate the biomechanical performance of multiple reconstructions of the CC ligaments.

Methods: 16 fresh-frozen human cadaveric shoulders were assigned to four reconstruction groups: modified Weaver-Dunn, non-anatomic allograft, anatomic allograft and an anatomic suture. A type III AC joint dislocation was simulated in all specimens. The four techniques were completed and a cyclic pre-load and a load-to-failure protocol were performed.

Results: In comparison to all techniques, the anatomic allograft had the highest load to failure against superior forces (982 +/- 147.2 N). It had a significantly higher load to failure than the modified Weaver-Dunn (510.3 +/- 108.9 N) ($p < 0.05$), the anatomic suture (509.5 +/- 139.3 N) ($p<0.05$) and the non-anatomic allograft repairs (591.2 +/- 65.6 N) ($p<0.05$). No significant difference in load to failure was found between the remaining techniques.

Conclusion: The anatomic allograft repair has superior initial biomechanical properties compared with the modified Weaver-Dunn, non-anatomic allograft, and the anatomic suture technique. An anatomic reconstruction of the CC ligaments with an allograft may provide a stronger biologic solution for AC joint dislocations. This reconstruction may minimize recurrent subluxation and pain and permit earlier rehabilitation than the current techniques.

Brad Ellison, M.D. is a resident in Orthopaedics at The Ohio State University

Polyethylene Wear Is Influenced By Manufacturing Technique in Modular Total Knee Arthroplasty

Authors: Bradley Ellison, MD, Keith Berend, MD, Adolph Lombardi, MD
Presenter: Bradley Ellison, MD

Polyethylene wear at the backside surface of the modular insert is implicated in osteolysis and failure of total knee arthroplasty. Other reports have demonstrated that manufacturing and sterilization methods impact wear-related properties at the articular surface. We questioned whether manufacturing technique also influences the severity of backside wear. We examined 39 nine explanted tibial bearings in a blinded fashion using visual, stereomicroscopic, and scanning electron microscopic techniques. We examined 26 direct-compression molded (DCM) components and 13 non-DCM components and applied a new backside wear severity score. The score characterized the magnitude of the various modes of wear with severity ranging from 0 (no wear) to 27 (severe wear). Time in vivo, tibial baseplate material, and manufacturing technique were used as variables for comparison. Backside wear was related to polyethylene manufacturing process with DCM implants having a wear score of 2.3 and non-DCM a score of 5.7. Time in vivo influenced backside wear although DCM predicted decreased backside wear independent of time in vivo. Thus, manufacturing technique influences backside wear in TKA polyethylene inserts.

Said Atway, D.P.M. is a resident in Podiatry at The Ohio State University

Early Weightbearing of Calcaneal Fractures Fixated With Locking Plates

Authors: Said Atway, DPM, Christopher Hyer, DPM, Gregory Berlet, MD, Thomas Lee, MD
Presenter: Said Atway, DPM

Purpose: The use of locked plate technology in the calcaneus has been shown in previous studies to provide greater stability than that of non-locking plates. The purpose of this study is to examine the effects of early weightbearing of calcaneal fractures repaired with locked plating.

Methods: A retrospective review was performed of 22 calcaneal fractures repaired with locked plate fixation over a 2 year period. A chart and radiographic review evaluated the time the patient was kept nonweightbearing, the Bohler's angle at first post-operative visit and final post-operative visit. Change in Bohler's angle was used to evaluate for bone subsidence. The senior author performed standard reduction and fixation techniques to realign all components of the intra-articular calcaneal fracture using a titanium locking calcaneal fracture plate. Patients returned for follow-up 4-5 weeks post-operatively and underwent radiographic examination. A weightbearing short leg cast was applied and the patient began protected weightbearing.

Results: The average Bohler's angle at first post-operative visit was 26.55 degrees in comparison to the average at final visit of 24.91 degrees. The average time the patient was kept nonweightbearing after the procedure was 5 weeks. There were no cases of significant bone subsidence or collapse noted.

Discussion: Calcaneal fractures can have significant morbidity associated with the injury and its care. This study examined early weightbearing of calcaneal fractures fixated with locked plating. There was no significant loss of calcaneal height, joint reduction or fixation stability noted. These results are thought to be due to the inherent stability of the locked plate construct.

Charan Gowda, M.D. is a resident in Orthopaedics at The Ohio State University

Open Exploriation and Nature of Injury To The Brachial Artery following Dispaced Supracondylar Humerus Fracture With Absent Pulses

Authors: Charan Gowda, MD, Kevin Klingele, MD
Presenter: Charan Gowda, MD

Displaced supracondylar fractures in children may present with associated vascular compromise in approximately 11% of cases. More often than not, closed reduction with percutaneous pinning of type III supracondylar fractures restores palpable pulses with a viable hand. Occasionally, there is no return of palpable or dopplerable pulses in the upper extremity following reduction and stabilization. In cases where the hand appears perfused despite the lack of pulses, the so-called "pink pulseless" situation, there continues to be controversy in the appropriate management. There is support for non-surgical observation among some who believe that the collateral circulation will accommodate despite the lack of pulses. However, others argue that collateral flow is inadequate and therefore surgical exploration is mandatory. Even in these instances, there is no clear consensus on the how often the brachial artery is injured and whether an open exploration is warranted.

This retrospective study from Nationwide Children's Hospital identifies 7 type III supracondylar injuries undergoing brachial artery exploration for absent pulses despite a viable appearing hand over the past 10 years. In 6 of the 7 brachial artery explorations, microsurgical intervention was required for restoration of a patent brachial artery. The artery was uninjured and left alone in 1 case. Two patients required surgical sympathectomy while 1 case required excision and primary repair of an intimal tear. Finally, 3 cases required resection of damaged portion of the artery and reverse saphenous vein grafting. All explored extremities had palpable pulses following exploration and repair. Six out of the 7 also had excellent outcomes, however one patient who had delayed exploration, > 72 hours, had developed compartment syndrome in the forearm and hand and required fasciotomies in addition to the reconstruction of the artery.

The findings from this review indicate that the majority of cases of continued vascular compromise in a supracondylar injury, despite viable appearing hands after reduction, may have significant injury to the brachial artery. All patients with immediate explorations developed no major long-term complications, whereas the one case with delayed exploration developed severe compartment syndrome. Given the potentially devastating complications that may arise as well as the frequent occurrence of arterial injury, open exploration of the brachial artery should be strongly considered in the pink pulseless supracondylar fracture.

Eric Thiel, M.D. is a resident in Orthopaedics at Mt. Carmel

INCIDENCE, TYPE, AND CAUSE OF INJURY IN THE HIGH SCHOOL ATHLETE COMPARING SYNTHETIC TURF AND NATURAL GRASS

Authors: Eric Thiel, MD, Bill Kumler, MD, John Sheets, ATC, Gary Phillips, MA
Presenter: Eric Thiel, MD

Background: Synthetic turf is becoming increasingly popular at the high school level. Relatively few studies have evaluated the risk of injury in the high school athlete on newer generation synthetic turf. The purpose of the present study was to compare the injury rate in the high school athlete sustained on synthetic turf and natural grass.

Study Design: Prospective cohort study.

Methods: A total of 22 teams were evaluated for game-related injuries sustained while playing on both synthetic turf and natural grass during a 4-year period. The incidence, type and cause of injury was recorded. To determine the effect of environmental factors both field condition and temperature were recorded.

Results: There was a total of 81 direct injuries out of 1595 players combining all sports played on grass and synthetic turf (5.0% incidence). There were a total of 57 indirect injuries out of 1595 players combining all sports played on grass and synthetic turf (3.6% incidence). There was a total of 35 direct injuries on grass out of 759 players (4.6% incidence). There was a total of 46 direct injuries on synthetic turf out of 836 (5.5% incidence). There was a total of 21 indirect injuries on grass out of 759 players (2.8% incidence). There was a total of 36 indirect injuries on synthetic turf out of 836 players (4.3% incidence). Contusion was the most common type of injury for both field types, 3.0% incidence synthetic turf, 2.6% incidence grass. No difference of statistical significance noted between playing surfaces across injury categories (Fisher's exact = .211). A random-effects logistic regression model was used to determine relationship between field type, field condition, and field temperature. The incidence of direct injury on wet grass (6.1%), dry synthetic turf (6.1%), and wet synthetic turf (7.3%) are not statistically different from dry grass (5.6%) which is the referent group (p-values are 0.856, 0.902, and 0.658, respectively). The incidence of indirect injury on wet grass (3.0%), dry synthetic turf (5.9%), and wet synthetic turf (3.6%) are not statistically different from dry grass (3.7%) which is the referent group (p-values are 0.705, 0.125, and 0.973, respectively). Temperature was not found to be an effect modifier of the relationship between field condition and whether or not an athlete had an injury (interaction p-values all greater than 0.05).

Conclusion: In this 4-year prospective cohort we found the incidence, type and cause of injury in the high school athlete to be similar on synthetic turf and grass. We found no statistically significant interaction between surface type and field condition or temperature.

Laura Hirvinen, is a Resident in Equine Surgery at The Ohio State University

INFLUENCE OF BONE CEMENTS ON BONE-SCREW INTERFACE IN VIVO

Authors: Laura Hirvinen, DVM, Alan Litsky, ScD, V. Sami, DVM, Steven Weisbrode, DVM, Alicia Bertone, DVM

Presenter: Laura Hirvinen, DVM

INTRODUCTION: Implant failure is a well acknowledged complication both in human and veterinary orthopedic surgery. Various implant surface configurations, coating methods and biomaterials have been developed to improve integration between bone and implant. Wear debris formation and subsequent implant loosening are downsides of the non-resorbable bone cements such as PMMA, whereas both Ca- and Mg-cement can increase the biomechanical strength of the bone-implant interface[1,2] and yet be resorbed during bone remodeling. A potential advantage of Mg-cement is the adhesive properties, demonstrated to increase extraction torque of screws in vitro[2]. If these biomechanical properties could be sustained in vivo, implant failure may be reduced.

The objective of this study was to compare biomechanical strength, interface quality and effects of bone healing on bone-implant interface treated with calcium phosphate cement, magnesium phosphate cement, polymethylmethacrylate or left untreated in horses in vivo.

METHODS: Four 4.5mm 316L stainless steel cortical screws were inserted into the mid-diaphyseal dorsal cortex of 12 equine metacarpal and 12 equine metatarsal bones with or without bone cement. The holes were power drilled in a distal to proximal direction in a linear fashion at 2 cm intervals using a 3.5mm drill bit. After drilling, the holes were manually threaded using a 4.5mm tapping drill bit. Screws without any cement were applied first, followed by PMMA, Ca- and Mg-cement, respectively, in a controlled block design. The screws were applied immediately after cement application to a defined torque using a torquewrench. Samples were harvested for further analysis 5 days and 6 months postoperatively.

Biomechanical testing was performed by use of a Bionix 858 Servohydraulic Biaxial Materials Testing System. A constant rate of rotation was applied to the screw head and a continuous recording of the angle of displacement and torque were recorded. Peak torque to failure was recorded and interface stiffness, toughness and residual friction were calculated. Radiographs were taken to confirm implant integrity and to evaluate periosteal reaction. Histomorphometry was used to evaluate bone forming activity and characteristics of the bone-implant interface. Computed tomography was used to quantify differences in bone mineral density between the treatment groups in the remodeling bone.

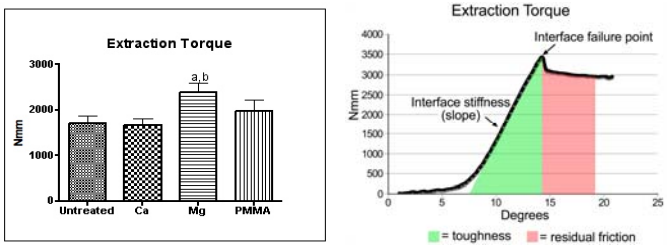
Objective data from the biomechanical testing, mCT and bone activity analysis were analyzed with 1-way ANOVA and Tukey´s multiple comparison test. Scored data (histomorphometry) were analyzed by use of Kruskal-Wallis and Dunn´s multiple comparison post tests. Mann-Whitney test was used for the paired scored data.

The protocol for this study was approved by The Ohio State University Institutional Animal Care and Use Committee (IACUC).

RESULTS:

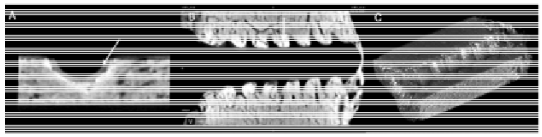
Biomechanical testing: Mg-cement increased the extraction torque (peak torque to failure) compared to untreated ($p=0.019$) or Ca-cement ($p=0.012$) but not significantly when compared to PMMA ($p>0.05$). Mg-cement increased the interface toughness (energy absorbed to failure) compared to untreated ($p=0.007$), Ca-cement ($p=0.012$) or PMMA ($p=0.027$). There were no significant differences between the treatment groups for interface stiffness or residual friction. The interface failed consistently at the screw-cement interface for the Ca-cement, Mg-cement and PMMA.

INFLUENCE OF BONE CEMENTS ON BONE-SCREW INTERFACE IN VIVO, CONTD.



A representative load-deformation curve (left) demonstrating biomechanical properties evaluated. Graph on the right shows differencesin interface failure point (peak torque). a.b significantly different ($p<0.05$)

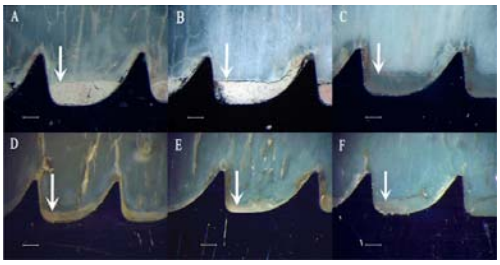
Computed tomography: Ca-cement increased the mineral density within the screw thread compared to untreated and PMMA ($p<0.001$) and Mg-cement increased the mineral density within the screw thread compared to PMMA ($p<0.001$). Mg-cement increased the mineral density of bone adjacent to the screw compared to untreated or PMMA ($p<0.01$).



Photomicrographs of longitudinal sections of screws with cement in equine MC3/MT3 bones. Figures A-C at Day 5, D-F at Week 26 . A) Ca-cement B) Mg-cement C) PMMA D) Ca-cement E) Mg-cement F) PMMA. Arrows point to surface of the cement. Note equal filling with cement at Day 5 and partial resorption of Ca- and Mg-cement at Week 26. Bar

Radiographs: Implant backout was observed radiographically in one of the screws treated with Ca-cement and one without treatment (incidence 2.29%). Periosteal reaction around the screw head was seen in 75% of screws treated with Mg-cement or PMMA, 85.7% treated with Ca and 57.1% without cement ($p=0.24$).

Histomorphometry: At day 5 all threads were filled with cement indicating consistent distribution of material. There was significantly less ($p<0.0001$) Ca-cement and Mg-cement within the screw threads at week 26 compared to day 5 indicating resorption. Differences in bone forming activity among groups could not be detected.



Photomicrographs of longitudinal sections of screws with cement in equine MC3/MT3 bones. Figures A-C at Day 5, D-F at Week 26 . A) Ca-cement B) Mg-cement C) PMMA D) Ca-cement E) Mg-cement F) PMMA. Arrows point to surface of the cement. Note equal filling with cement at Day 5 and partial resorption of Ca- and Mg-cement at Week 26. Bar 400mm.

DISCUSSION:

This study suggests that Mg-cement can safely and effectively improve the biomechanical strength of the bone-implant interface during the initial stages of bone healing. The results also indicate, that the Ca-cement and Mg-cement are replaced by bone at the screw interface, Mg-cement more so than Ca-cement in a time frame relevant to bone healing. The potential osteogenic properties of Mg-cement as evidenced by the mCT warrant further investigation. In conclusion, Mg-cement possessed several of the characteristics of an ideal biological fixator and when clinically available, Mg-cement may be beneficial in reducing the likelihood of implant failure.

Michel Skeels, D.O. is a Fellow in Adult Joint Reconstruction with Joint Implant Surgeons

PREVENTION OF DVT IN UNICOMPARTMENTAL KNEE ARTHROPLASTY: WHAT IS APPROPRIATE?

Authors: Michael D. Skeels, DO; Keith R. Berend, MD; Adolph V. Lombardi, MD
Presenter: Michael Skeels, DO

Deep venous thrombosis and pulmonary embolism are significant concerns following lower extremity arthroplasty. Unicompartmental arthroplasty has been touted as a minimally invasive treatment for unicompartmental arthritis, that allows for rapid patient recovery. Patients are at risk for development of deep vein thrombosis and subsequent pulmonary embolism after lower extremity arthroplasty. The type of chemical prophylaxis used is weighed against the risk of potential bleeding complications and potential infectious complications associated with hematoma or prolonged drainage. A multimodal prophylactic strategy was used on 900 consecutive patients undergoing unicompartmental knee arthroplasty. Risk stratification by the medical consulting team determined appropriate anticoagulation level. Eighty four percent of knees were managed with an aspirin based protocol. To date one patient suffered subsequent symptomatic deep vein thrombosis. This low incidence of DVT may support the use of less aggressive chemical prophylaxis for patients undergoing unicompartmental knee arthroplasty.

Josh Harris, M.D. is a resident in Orthopaedics at The Ohio State University

Is 2 cm2 (squared) The correct Size Threshold To Dictate Articular Cartilage repair?

Authors: Joshua Harris, MD, Pete Brockmeier, B.S., Rob Siston, PhD., Dave Flanigan, MD
Presenter: Joshua Harris, MD

Most contemporary algorithms use 2 cm^2 as the size to guide management of traumatic, focal chondral defects in the knee. Little evidence exists to support this size as threshold. The objective of this study was to identify how femoral condyle chondral defect size influences subchondral bone contact (SCB) within the defect.

Full-thickness, chondral defects were created in 8 healthy bovine femoral condyles. Defects with areas between 0.2 cm^2 and 5.07 cm^2 were created with cylindrical coring punches. Knees were loaded to 1000N and knee joint pressure measurements were identified with a Tekscan sensor and I-Scan software. A MATLAB program was designed to compute defect area and the area within the defect demonstrating SCB contact. After detecting unequal variances in the SCB contact areas for different defect sizes, a Kruskal Wallis test was used to evaluate the effect of defect size on resultant SCB contact area, without distinguishing between medial and lateral femoral condylar defects. Post-hoc comparisons were made using Dunnett's T3 test. Wilcoxon tests were performed to determine the difference in SCB contact area between medial and lateral defects.

No SCB contact within the defect was observed below a defect diameter of 12.7 mm (area 1.27 cm^2). A statistically significant difference ($p<.006$) between defect SCB contact and zero was not seen until defect area enlarged to 1.99 cm^2, although the largest increase in defect SCB contact area was between 2.87 cm^2 and 3.87 cm^2 (see figure 1). Across all defect sizes, higher SCB contact occurred on the lateral condyle versus the medial ($p<.001$), with an overall contact area increase of 65% laterally.

Clinical studies have shown microfracture appropriate for defects up to 4 cm^2. The current study supports the use of a 2 cm^2 threshold size for treating chondral defects, as SCB contact occurred in defects larger than 2 cm^2. Contact pressures greatly increased in defects of 2.87 cm^2. This finding may support why defects over 2.87 cm^2 may have higher chances of failure with microfracture, as SCB contact pressures increase, causing further bone reaction and further subchondral sclerosis and thickening. This is the proposed mechanism for a 3X greater incidence of failure of ACI after previously failed microfracture. Lateral defects experience greater SCB contact than medial and may progress more rapidly, suggesting that 2 cm^2 may not be the appropriate size threshold on the lateral side.

Adam Thomas, D.P.M. is a resident in Podiatry at The Ohio State University

MECHANICAL COMPRESSION FORCE OF BIOABSORBABLE AND METAL SMALL FRAGMENT SCREWS

Authors: Adam Thomas, DPM, Alan Block, DPM, Alan Litsky, MD, ScD
Presenter: Adam Thomas, DPM

Introduction: The purpose of this study is to compare the compression strength generated by a bioabsorbable screw with that of metallic small fragment screws of similar size. The sizes of the screws are those commonly selected in forefoot and Hallux Valgus surgery. Our hypothesis is that equal compression should be achieved based on a similar study evaluating a bioresorbable screw with titanium screws used in scaphoid fractures.

Materials and Methods: Metal screws, one titanium cannulated, partially threaded (ref # SCN271632 DARCO Wright Medical Technology Inc.) and one stainless steel non-cannulated, fully threaded (ref # 7182-3016 Smith & Nephew Inc.) and one bioabsorbable non-cannulated, fully threaded fixation screw (ref # FRF-1260 Inion Ltd.) were compared. Both metal screws were 2.7 x 16mm; the bioresorbable screw was 2.8 x 16mm. The screws were tested in grade 20 polyurethane foam blocks [Last-A-Foam, General Plastics Mfg Co., Tacoma, WA] with a 2 mm solid polyurethane surface layer to represent the bone of a first metatarsal. A Tekscan pressure transducer [Tekscan, Inc., Boston, MA] was placed between the two blocks of foam cut to 8mm thickness. Twelve screws were obtained from each manufacturer. Two screws per trial were inserted at equidistant pre-measured points on opposite corners of the blocks and the compression force recorded. This allowed 6 separate trials for each screw type. All screws were manually inserted by a single investigator and hand tightened. Completion of insertion was selected as flush with the surface layer and determined subjectively by the investigator. Maximum compressive force was recorded.

Results: The mean maximum compressive force generated by the cannulated titanium screw was greatest (41.8 ± 25.6 N), followed by the non-cannulated stainless steel (21.9 ± 9.3 N), and the absorbable screw (14.7 ± 8.3 N). The mean force generated by each of the metal screws was significantly higher than the mean force generated by the bioabsorbable screw (p-value 0.03).

Discussion: The mean force values seen for all screw types in our study were close to the range for the means found in the comparative study which was 13.8 N - 35.2 N. The results in our study differ from previous studies which demonstrated similar compression strength in absorbable vs. non-absorbable screws [Bailey, et al., *J. Hand Surg.,* 31B (2):208-212, 2006]. We did not evaluate the numerous differences in the screws such as thread pitch, material, cannulated vs. non-cannulated or head design. Our study used a different force measurement system and a less dense foam than Bailey's study. Furthermore, our study design allowed 2 screws per trial instead of one. Lastly, debris or irregularities in the surface between the blocks could have played a role in some of the compressive force measurements. The data in our study indicated that the maximum compressive force was produced by the titanium small fragment screws, with the lowest values generated by the bioresorbable screw.

Craig Shank, M.D. is a resident in Orthopaedics at Mt. Carmel Hospital

VALGUS SLIPPED CAPITAL FEMORAL EPIPHYSIS

Authors: Craig F Shank, MD, Kevin Klingele, MD, Eric Thiel, MD
Presenter: Craig Shank, MD

Background: Slipped capital femoral epiphysis (SCFE) is classically characterized by posterior and inferior displacement of the femoral epiphysis on the metaphysis. Rarely, the epiphysis can displace in a posterolateral direction, which is termed a valgus slipped capital femoral epiphysis. The purpose of this study was to retrospectively review our institution's experience with valgus SCFE.

Methods: Radiographs of all patients undergoing operative treatment of SCFE between 1996 and 2008 were reviewed. Displaced SCFE cases were classified as valgus if they demonstrated increased prominence of the lateral femoral epiphysis relative to the lateral femoral neck (Klein's line) and an increased AP physis-shaft angle. Demographic and clinical data, as well as radiographic measurements of proximal femoral geometry, were collected for 11 patients identified with valgus SCFE. For comparison, demographic and radiographic information was collected for 123 patients with varus SCFE.

Results: 11 patients (16 hips) with valgus SCFE were discovered among 257 SCFE patients treated operatively, yielding an incidence of 4.2% at our institution. The demographics of valgus patients were quite similar to those of varus SCFE. No statistically significant difference from varus patients was found with regard to sex, race, height, weight, slip stability, or slip side. Valgus SCFE patients were significantly younger (mean 1.5 years) than varus patients and had a significantly higher proportion of atypical slips (36% vs. 3%). 3 patients in the valgus group had endocrine dysfunction, and 1 was diagnosed with Stickler's syndrome. Southwick angle measurements demonstrated that valgus SCFEs were less severe than varus by a mean of 7.7 degrees. Hips of valgus patients also had a significantly higher mean femoral neck shaft angle (153 degrees) than those of varus patients (141 degrees). Difficulty placing hardware for in situ fixation was noted in 4 of 11 valgus cases. One valgus case, fixed through an open lateral approach, was complicated by articular surface penetration and chondrolysis. No other major complications were encountered, and clinical outcomes were satisfactory in the remainder of patients.

Discussion: Although valgus displacement occurs in a small minority of SCFE cases, it may not be as rare as once thought. Valgus SCFE can appear normal on the AP view, underscoring the importance of obtaining a lateral view in children with hip pain. The etiology of valgus SCFE, like that of its varus counterpart, involves both biomechanical and biochemical factors. Obesity and preexisting coxa valga may predispose the adolescent epiphysis to posterolateral displacement. Also, we found possible associations of valgus SCFE with pituitary and growth hormone abnormalities as well as Stickler's syndrome. Lateral displacement of the femoral epiphysis makes in situ fixation of valgus SCFE more difficult due to the necessity of a more medial starting point. With careful preoperative planning and awareness of the location of the neurovascular bundle, percutaneous in situ fixation appears to be safe and effective. Satisfactory outcomes can be expected if major complications are avoided.

Hisham Awan, M.D. is a resident in Orthopaedics at The Ohio State University

EVALUATING THE EFFICACY OF PHYSICAL EXAMINATION TEACHING IN MEDICAL SCHOOLS

Authors: Julie Bishop, MD, Hisham Awan, MD, David Rowley, MSIV
Presenter: Hisham Awan, MD

Background: Recent literature has indicated a deficiency in musculoskeletal education among medical students in the United States. Various competency examinations have resulted in high numbers of failing grades among residents in primary care specialties, despite the fact that musculoskeletal problems account for a high number of primary care visits. An important aspect of musculoskeletal education is the physical examination, and with improved technology and imaging modalities, less and less emphasis is placed on the physical exam. At our institution, we are attempting to improve the physical examination skills of our medical students as well as our residents. We attempted to create and validate a physical exam test in an effort to create a more standardized education curriculum that could be available for all medical schools.

Methods: A multiple choice physical examination test was created using the most common musculoskeletal disorders seen by non-orthopaedists. We also included disorders that are important for practitioners to not misdiagnose. We initially administered our test to the orthopaedic residents at our institution in an attempt to validate our test. We also sent our test to orthopaedic program directors and asked them to rate the importance of each question on a scale from 0 to 10. We also surveyed the program directors and residents as to their attitudes on the amount of time residents spend in clinic and how often their physical examination skills are directly observed. We subsequently administered our examination to second and third year medical students at our institution, and compared these results to a cognitive exam that was also administered.

Results: The average score of orthopaedic residents at our institution was 91%. Fourty eight of 110 chairmen responded to our survey, and most questions were rated at least 7/10 in importance, thus validating our exam. 2nd year medical students who had just finished a standardized musculoskeletal course scored 78% on the cognitive test and 73% on the physical examination test. Third year medical students one year removed from their course scored 71% on the cognitive test and 58% on the physical exam test.

Conclusions: Our physical examination test was validated by the orthopaedic residents at our institution and the orthopaedic chairmen who responded indicated our topics as being important aspects of musculoskeletal education. Our results indicate that the establishment of a standardized curriculum improves musculoskeletal education among medical students, but there still needs to be more emphasis placed on physical examination skills. We feel our examination, in conjunction with previously published studies, can help establish a more standardized curriculum of musculoskeletal education, particularly with regard to the physical examination.

Tyler Smith, M.D. is a resident in Orthopaedics at The Ohio State University

REASONS FOR LACK OF RETURN TO PRE-INJURY LEVEL OF FUNCTION AFTER ACL RECONSTRUCTION

Authors: David Flanigan, MD, Tyler G Smith, MD, Chistopher Kaeding, MD, Garett Pangrazzi, BS, Steven Durning, BS
Presenter: Tyler Smith, MD

Purpose: It is well documented that no more than 60% of patients undergoing anterior cruciate ligament reconstruction surgery will regain their preinjury levels of function. These outcomes are based on several patient-based measurements, including Lysholm Knee scores, International Knee Documentation Committee scores, and SF-36. short term outcomes are ususally attributed to the success of returning the athlete back to previous level of activity. Unfortunately, many do not return to their previous level despite a "successful" surgery. To our knowledge, there have been no attempts to investigate why a reconstructed patient does not regain the previous level of activity. postoperatively from the patients' perspective. We hypothesized that non-anatomic considerations are adversely affecting patients' ability to return to their pre-injury level of function.

Materials and Methods: 171 patients with 171 ACL reconstructions at a single institution were retrospectively identified. All surgeries were performed by two fellowship trained sports medicine specialists (DCF and CCK). All patients we between one and two years postoperative. All patients that were contacted successfully were included in the study. Patients were contacted by telephone for a brief interview. Patients were asked what their prior activities were, what their current activities were, and whether they had returned to their prior level of pre-injury function. If the patient responded yes, the interview concluded. If they answered no, they were asked why. Patient responses were catalogued into 15 categories. A single patient could be included in mulpitple response categories if apllicable. Responses were matched with demographic information without regard for specific reconstruction technique or attending surgeon.

Results: Of 171 eligible patients, 88 completed the survey. There were 44 men and 44 women. Of these 88 patients, 44 (50%) said that they had returned to their prior level of pre-injury function. 44 (50%) said that had not returned to their prior level of function. Of the patients that had returned to their prior level of function, 23/44 (52%) were women with a mean age of 23.9 years (range 15y-55y, SD+/- 9.6y). 21/44 (48%) were men with a mean age of 26.6 years (range 17y-55y, SD+/- 11.1y). Of the 44 patients that did not return to their prior level of function, 21/44 (48%) were women with a mean age of 29.3 years (range 15y-51y, SD+/- 11.2y), and 23/44 (52%) were men with a mean age of 31.7 years (range 16-46, SD+/- 9.4y). Knee related problems were reported by 30/44 (68%) patients. "Knee hurts with activities" (n=20) was the most common response, followed by "lack of motion" (n=12), "knee swells" (n=12), "knee or leg muscles feel weak" (n=11), and "knee feels unstable" (n=10). Life event related considerations were identified by 16 patients. "Other health reasons" (n=7) was most common, followed by "demands of education" (n=5), "job requirements" (n=4), "family related" (n=2), and "due to elevation of level of play" (n=1). 22 patients responded that their inability to return to prior level of function was influenced by choices they made, with "fear of re-injury" (n=18) the most common, followed by "no time in schedule" (n=3), "not interested in playing at prior level" (n=2), and "was told not to return to prior level" (n=2). Both of these patients citied ipsilateral revision surgery as the reason for such advice.

Discussion: Our study indicates that anterior cruciate ligament reconstruction surgery short term outcomes are highly variable. There are multiple variables affecting any given patient's ability or desire to return to their prior level of function. Current commonly used outcome measures do not account for these variables, thus making it impossible to reliably and predictably account for the technical success of the procedure. An anatomically sound reconstruction does not guarantee a return to previous level of activity. Residual pain and fear of reinjury seem to be the most common reasons. It would be wise to further study other variables that can be intervened upon once identified.

Jason Hurbanek, M.D. is a Fellow in Sports Medicine at The Ohio State University

Two Year Clinical Comparison of Bioabsorbable and Non-Bioabsorbable Femoral Cross-Pin Fixation is Soft Tissue ACL Reconstruction Correlated With CT In Vivo Degradation Characteristics

Authors: Jason Hurbanek MD, Eric Parsons MD, Angela Pedroza MPH, Christopher Kaeding MD

Presenter: Jason Hurbanek, MD

Introduction: Multiple methods of femoral graft fixation are available in soft-tissue ACL reconstruction (ACL-R). Cross-pin fixation has two available options: bioabsorbable and non-bioabsorbable (metal). The in-vivo characteristics of bioabsorbable pins are unclear.

Methods: The MOON database of a prospective cohort of ACL-R was used to compare the clinical results between patients receiving bioabsorbable and metal cross-pins with hamstring ACL-R between 2002-2003. Two-year follow-up data was obtained. Four patients that received bioabsorbable pins underwent serial CT scans at 6 weeks, 4 months, 1 year, and 2 years postoperatively. A musculoskeletal radiologist evaluated the CT scans for density of pins and surrounding bone, as well as pin morphology at each interval.

Results: Two-year data was available for 170/209 (81%) hamstring ACL-R with bioabsorbable (n=75) or metal (n=95). There were no significant differences in IKDC, all KOOS subscales, sexes, and number of reoperations (p=0.081). Both groups had similar chondral changes at the time of surgery (p=0.91). Subjects were significantly younger in the bioabsorbable group (p<0.001). The average cross-pin density reduction was 7.7%, 49.1%, and 75% at 4 months, 1 year, and 2 years respectively. Bone density values adjacent to the pin decreased by an average of 8.6% between 6 weeks and 4 months, reaching 14.2% reduction at 1 year. Bone density improved over the second year, matching the 4 month value. Pin morphology changed little at 6 weeks, showed surface changes at 4 months (no fractures), 2 fractures at 1 year, and all had fractured by 2 years. No pin had completely resorbed at 2 years.

Conclusion: There are no significant differences in 2-year outcomes of ACL-R between grafts fixed with bioabsorbable and non-bioabsorbable cross-pins. The bioabsorbable pin remains largely unchanged at 4 months postoperatively, suggesting that this device maintains the necessary structural integrity. In addition, at 2 years, the cross-pins degraded by 75% without host inflammatory response or adjacent osteolysis.

Tim Miller, M.D. is a resident in Orthopaedics at The Ohio State University

STRESS FRACTURES: A NEW CLASSIFICATION SYSTEM

Authors: Christopher Kaeding, MD, Timothy Miller, MD
Presenter: Timothy Miller, MD

Background: Stress fractures are troublesome overuse injuries that occur over a broad spectrum of severity. To date, no standard generalizable classification system for stress fracture severity exists that includes both clinical and imaging parameters.

Purpose: To develop a functional and generalizable classification system for stress fracture severity. The goal of this research was to evaluate the inter- and intra-observer reliability of a newly developed clinical and radiographic classification system.

Hypothesis: When categorizing stress fractures using a newly developed classification system, a high level of inter- and intra-observer reliability will be observed among sports medicine clinicians.

Methods: Fifteen sports medicine clinicians were shown radiographic imaging and were provided short clinical vignettes for twenty patients with stress fractures. The clinicians graded each case using a newly developed classification system for stress fracture severity. They then graded the same cases in scrambled order seven to fourteen days later. Inter- and intra-observer reliability was measured using weighted and non-weighted K-values. After the second round of grading, the clinicians were asked to write out the classification system from memory. Finally, they assessed the system's clinical usefulness by completing a standardized questionnaire. Responses were analyzed, and reliability was again determined.

Results: Weighted and non-weighted K-values showed a substantial level of intra-observer agreement (84.4 %) after two rounds of grading and almost perfect agreement with the assessments of the primary researchers (86.4%). (K-values = 0.7972 and 0.8243, respectively) Interobserver analysis showed an almost perfect level of reliability among evaluators for Grades I, II and V (K-values = 0.9603, 0.8032 and 0.8412, respectively.) Grade III showed a substantial level of reliability (K- value= 0.7011), and Grade IV showed a high moderate level (K-value = 0.5925).

Conclusions: The inter- and intra-observer reliability of this classification system for stress fracture severity reached substantial to almost perfect levels of among sports medicine clinicians. It was easily remembered by practitioners and rated by evaluators as highly clinically applicable. In the future, it is expected that this classification system will be of value for assessment, communication, and prognosis when treating stress fractures.

Daniel Cuttica, D.O. is a resident in Orthopaedics at Doctor's Hospital

PEDIATRIC FEMORAL SHAFT FRACTURES: A COMPARISON OF OUTCOMES BETWEEN FLEXIBLE INTRAMEDULLARY NAILING VERSUS RIGID INTRAMEDULLARY NAILING

Authors: Daniel J. Cuttica, DO, Kevin E. Klingele, MD
Presenter: Daniel Cuttica, DO

Purpose: The purpose of this study is to compare the clinical and radiographic outcomes of pediatric diaphyseal femur fractures treated by retrograde, flexible intramedullary nailing to those treated by antegrade, rigid intramedullary nailing using a trochanteric starting point on skeletally immature patients 8 years or older.

Methods: A comparative, retrospective chart and radiographic review of skeletally immature patients age 8 and older who were treated between January 1, 2001 to August 1, 2006 by either flexible or rigid intramedullary nails was performed. A minimum of 12 weeks follow-up was required. Outcomes evaluated included time to union (including incidence of delayed and nonunion), incidence of malunion (defined as more than 5 degrees of angulation in the sagittal or coronal planes), time to full weightbearing, residual limp, limb length discrepancy, presence of heterotopic ossification, avascular necrosis, and painful hardware or nail tip irritation.

Results: There were a total of 77 fractures in 75 patients included in the study. There were 44 fractures treated with retrograde, flexible femoral nails and 34 fractures treated with rigid, antegrade femoral nails. There was no difference between the two groups in time to union, residual limp, or limb length discrepancy. The rigid femoral nail group had a significantly shorter time to full weightbearing and a significantly greater incidence of heterotopic ossification. The flexible femoral nail group had a significantly greater incidence of malunion ($p= 0.022$)and hardware irritation($p= 0.008$). No cases of avascular necrosis were seen.

Conclusion: A greater incidence of malunion and hardware irritation can be expected when treating pediatric femur fractures with flexible intramedullary nails. Use of a rigid trochanteric femoral nail allows for an earlier return to full weightbearing, but an increased incidence of heterotopic ossification. Both procedures, however, provide similar and reliable union rates.

Significance: A retrospective comparative series of two commonly used fixation devices for pediatric femoral diaphyseal fractures. There are few studies that directly compare the outcomes between these two devices.

Maria Menendez, B.V.S.c is Post-doctoral Fellow in The College of Veterinary Medicine at The Ohio State University

RADIOFREQUENCY ENERGY ON HEMOSTASIS AND HEALING OF CORTICAL BONE AND SOFT TISSUE

Authors: Menendez, BVSc; Akikazu Ishihara, BVSc; Stephen Weisbrode, VMD, PhD; Alicia Bertone, DVM, PhD

Presenter: Maria Menendez, BVSc

Our goal was to determine a radiofrequency energy (RFE) safety margin on cortical bone and skin by varying RFE watts and fluence (f=watt.sec/cm2). Five mature sheep had six 2.5 cm^2 tibial periosteal defects and six skin incisions assigned to: 1) untreated control, 2) 50W for 9.5 seconds (190f; n=5), 3) 110W for 4.3 seconds (190f; n=5), 4) 170W for 2.8 seconds (190f; n=5; 1X), 5) 170W for 5.6 seconds (380f; n=5; 2X), or 6) 170W for 8.4 seconds (570f; n=5; 3X). Outcome assessment included bleeding intensity; surface hemostasis; incision drainage, swelling and healing; and histomorphometric analysis for inflammation and necrosis at two weeks. Hemostasis of tibial cortical bone and skin was effective (> 85%) at all dosages and, in addition to skin contraction, increased as fluence increased ($P<0.05$). On cortical bone, RFE did not induce detectable necrosis and demonstrated a safety margin of 3X. In skin, RFE at dosages of 190f had primary healing and mild necrosis. Skin dosages above 190f induced an atypical firm and desiccated surface in some incisions and increasing necrosis at higher dosages. In summary, our study demonstrated a safe application of RFE on bone and a 3X safety margin. In skin, surgeons using fluence greater than 190f should anticipate potential incisional complications including an atypical firm and desiccated surface and necrosis.

Andrew Ajluni, D.O. is a Fellow in Adult Reconstruction at Joint Implant Surgeons

METAL-ON-METAL BEARINGS IN TOTAL HIP ARTHROPLASTY: MINIMUM 2-YEAR FOLLOW-UP

Authors: Keith Berend, MD, Adolph Lombardi, Jr, MD, Andrew Ajluni, DO, Brian Seng, DO, Michael Skeels, DO
Presenter: Andrew Ajluni, DO

Metal-on-metal THA has had a long clinical history. Metal-on-metal offers a reduction in wear and osteolysis when compared to the standard of metal-on-polyethylene. Metal-on-metal articulations allow the use of femoral head sizes that resemble native anatomy, which increases stability. The purpose of this study is to report the early failure and need for revising newer generations of metal-on-metal THA.

Retrospective review of all THA performed from 1996 to 2006 identified 1542 THA done utilizing three different metal-on-metal manufacturing designs. Design 1 represents a titanium shell with a cobalt-chrome tapered insert of 28 or 32 mm inner diameter. Design 2 represents a cobalt-chrome monoblock shell with Porous Plasma Sprayedâ (PPS) titanium, increasing outer diameter and a standard head diameter of 38mm. Design 3 is a resurfacing style cup of cobalt-chrome with PPSâ titanium and an outer diameter 6mm larger than the femoral head.

The revision rate of 1063 hips with minimum 2-year follow up is 4.2% (45 hips). Assuming those lost to follow up have not failed, the revision rate is 2.9%. The rate of acetabular revision for aseptic loosening or metallosis with minimum 2-year follow up is 2.8% (30 hips). Nine hips were revised for infection, two for stem loosening, one for stem breakage, one concomitant with hardware removal and two for dislocation. The aseptic acetabular revision rate is 2.3% for Design 1 at average follow-up of 70 months, 4.5% for Design 2 at 49 months, and 2.2% for Design 3 at 34 months, yielding revision annual rates of 0.4%, 1.1% and 0.8% respectively ($p<0.05$).

This study showed an overall survivorship of 95.8% for all designs at an average of 50 months. Design 2 demonstrated the highest failure rate. Design features specific to this device may have contributed to this failure rate, including a flared cup design and an overall stiffer modulus of elasticity.

Julie Chevillet, D.O. is a Fellow in Pediatric Orthopaedics at Nationwide Children's Hospital

JUVENILE OSTEOCHONDRITIS DISSECANS (JOCD): PREDICTORS OF LESION STABILITY

Authors: Julie Chevillet, DO, Kevin Klingele, MD, Blake Gillete, BS
Presenter: Julie Chevillet, DO

An IRB approved, retrospective review of all surgically treated juvenile OCD lesions by a single surgeon from January 2003 to May 2009.

Lesion stability was graded preoperatively by modern MRI imaging techniques and clinical assessment. Each lesion was characterized by location, patient age, gender, duration of symptoms, and the presence of multiple or multifocal lesions in the involved or additional joints. Intraoperative assessment of lesion stability and grading was documented and statistical, comparative analysis performed in effort to identify risk factors for higher grade JOCD lesions.

Eli Hothem is a resident in Orthopaedics at The Ohio State University

PLASMA PHARMACOKINETICS OF INTRA-ARTICULAR MEDICATIONS IN EXERCISED HORSES

Authors: Alicia Bertone, DVM, Maria Mendendez, BVSc, Elijah Hothem, MD
Presenter: Elijah Hothem, MD

Our goal was to determine the pharmacokinetics of methylprednisolone (MP) and develop a pharmacokinetic-pharmacodynamic model of the related changes in plasma concentrations of endogenous hydrocortisone (HYD) following intra-articular administration of methylprednisolone acetate (MPA) in exercising horses. Five Thoroughbred horses received intraarticular injections into the tarsometatarsal joint and the ipsilateral metatarsophalangeal joint with 60 and 40mg of MPA, respectively. The horses were exercised three times per week in a routine training schedule. Plasma and urine concentrations of MP and HYD were determined via liquid chromatography-mass spectrometry. Peak plasma concentration of methylprednisone was 5070 pg/mL at 12 hours and then decreased to normal levels at 7 days post injection. Similarly, the urine methylprednisone peak level of 72 ng/mL methylprednisone was reached at 12 hours post injection and decreased to baseline levels at day 8 post injection. At 6 hours after injection of MPA both urine and plasma levels of HYD were significantly decreased from the baseline and remained suppressed for 48 to 72 hours. This showed a more rapid normalization compared to previous studies with resting horses, which revealed HYD suppression up to 120 hours. Results of this study indicate an increased rate of metabolism in routinely exercised horses in comparison to previously published models without a regular training schedule. This study may have important implications when contrasted to current guidelines for steroid injection withdraw times.

Brian Seng, D.O. is a Fellow in Adult Reconstruction at Joint Implant Surgeons

ENHANCED EARLY OUTCOMES WITH ANTERIOR SUPINEI INTRAMUSCULAR APPROACH IN PRIMARY TOTAL HIP ARTHROPLASTY

Authors: Brian Seng, DO, Keith Berend, MD, Adolph Lombardi, Jr., MD, Joanne B. Adams
Presenter: Brian Seng, DO

While the benefits of total hip arthroplasty have been documented for several decades, surgeons continue to refine technique in an effort enhance recovery after primary total hip arthroplasty and meet the demands of younger, more active patients. The anterior supine intramuscular approach (ASI) was developed to be muscle-sparing, with the goal of enhancing functional recovery. The purpose of this study was to investigate the early outcomes of primary THA with a single, tapered microplasty femoral component, comparing cases performed via ASI versus direct lateral approaches. From January 2006 through August 2008, 605 patients (655 hips) underwent primary THA with TaperLoc Microplasty stems (Biomet, Inc.) at our institution. Surgical approach was ASI in 258 hips (39%), less invasive direct lateral (LIDL) in 372 (57%), and traditional direct lateral in 25 (4%). Forty-four percent of patients were men. Average age was 63-years-old and average body mass index was 30.4 kg/m^2. Underlying disease was osteoarthritic in 81%. While no effort was made to select patients based on size, ASI patients had lower body mass index (28.9 vs 30.4 kg/m^2; p=0.004) than LIDL patients. All other preoperative and demographic variables were similar between groups. There was no difference in length of stay or transfusion rates between groups. However, more ASI patients were discharged to home (87% vs 80%; p=0.04) than LIDL patients. At 6 weeks postoperative, average Harris hip score was significantly higher for the ASI group (80 vs 75; p=0.0000), as was the average lower extremity activity scale (8.6 vs. 8.0; p=0.04). Our results indicate that the anterior supine intramuscular approach provides a significantly faster return to function and daily activities.

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