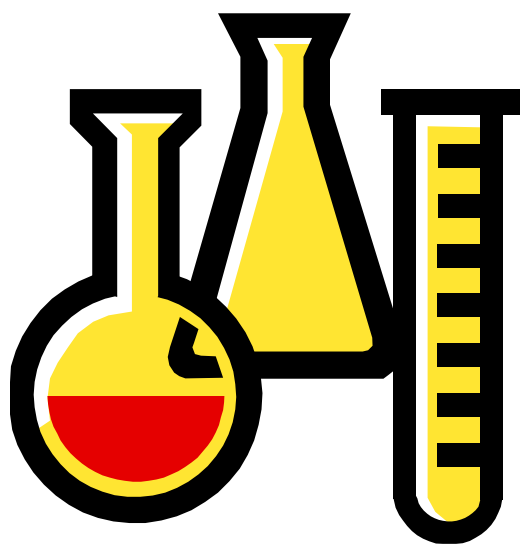


THE OHIO STATE UNIVERSITY

Department of Orthopaedics

29th Annual
Mallory-Coleman
Resident Research Day



Friday, April 6, 2001

BWC Rehab Center
2050 Kenny Rd

PROGRAM

- 7:00 am Refreshments
- 7:30 am Welcome and Introduction
- 7:45 am **SHANA MISKOVSKY, M.D.**
"Proximal Tibiofibular Joint Ganglion Cysts: Excision, Recurrence, and Joint Arthrodesis"
- 8:00 am **RAJEEV PURI, M.D.**
"Dual Incision for Retrocalcaneal Exostectomy"
- 8:15 am **JOSEPH WILCOX, M.D.**
"The Outcome of Anterior Cruciate Ligament Reconstruction Using Quadruple Hamstring Autograft with Femoral Crosspin Fixation"
- 8:30 am **ANDREW LAYNE, M.D.**
"Comparative Accuracy of Visual, Goniometric, and Radiographic Joint Angulation Measurements of the Knee and Elbow"
- 8:45 am **JOE MILETI, M.D.**
"Ipsilateral sliding hip screw and retrograde intramedullary femoral nail: A biomechanical comparison of constructs"
- 9:00-9:15 *Break*
- 9:15 am **KRISTIN BACKSTROM**
"Plasmid-Mediated PTH 1-34 Gene Activated Matrix is Osteoinductive in Cortical Bone"
- 9:30 am **ANNE RYAN, M.D.**
"The Effects of Radiofrequency Treatment on Chondrocytes and Articular Cartilage Matrix of Fibrillated Cartilage"
- 9:45 am **LEE WILLIAMS, M.D.**
Ultrasonographic evaluation of the Neonatal Foot:
Preliminary Study Comparing Club Foot and Neonatal Controls with
Implications to Guiding Treatment Strategies
-

PROGRAM, CONTD

- 10:00 am **TIM KAVANAUGH, M.D.**
"Prospective Randomized Comparison of Bioabsorbable and Titanium ACL Interference Screws"
- 10:15-10:30 *Break*
- 10:30 am **JAMES URBANIAK, M.D., VISITING PROFESSOR AND MODERATOR**
"The Treatment of Avascular Necrosis of the Femoral Head by Free Vascularized Graft—1500 Hips"
- 11:30-12:30 *Lunch*
- 12:30 pm **KERI REESE**
"Use of Cannulated Screws in Fixation of Jones Fractures – a Clinical and Biomechanical Study"
- 12:45 pm **JONATHAN HENRY, M.D.**
"Biomechanical evaluation of distal biceps tendon repair"
- 1:00 pm **CHRISTOPHER KAEDING, M.D.**
"Use of SIS Extracellular Matrix in the Treatment of Tendon Injuries"
- 1:15 pm **ABDI RAISSI, M.D.**
"Evaluating the Source and Content of Information about Total Ankle Replacement on the World Wide Web"
- 1:30 pm **JAMES KERPSACK, M.D.**
"Cost Comparison of Open and Arthroscopic Subacromial Decompression"
- 1:45 pm **JOHN SHARKEY, M.D.**
"Efficacy of Oral Rofecoxib versus Oral Ketoralac in Control of Early Postoperative Outpatient Orthopaedic Surgical Pain "
- 2:00 pm End of Day
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MALLORY-COLEMAN DAY

Mallory-Coleman resident research day was established in 1973 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 basic science. In accordance with the Curriculum for the OSU Orthopaedic residency program, each chief resident is required to present his or her research project during this forum.

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

Past Visiting Professors Include:

2000 Douglas Jackson, MD
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

2001 MALLORY-COLEMAN VISITING PROFESSOR AND MODERATOR:

JAMES URBANIAK, M.D.



Dr. Urbaniak is currently the Chief of the Division of Orthopaedic Surgery at Duke University. He has held the chief position since 1985. He is also the Vice Chairman of the Department of Surgery at Duke University. He has held this position since 1994. In addition, he is the Virginia Flowers Baker Professor of Orthopaedic Surgery at Duke.

Dr. Urbaniak received a bachelor of science degree from the University of Kentucky in 1958. He went on to receive his Doctor of Medicine degree from Duke University School of Medicine in 1962.

He served as an lieutenant in the U.S. Navy Medical Corps from 1963-1965. In this position, he was an attending physician to the U.S. Senate and House of Representatives.

He is board certified in orthopaedic surgery with a certificate of added qualifications in surgery of the hand.

Over the course of his career, Dr. Urbaniak has served as President of the American Society for Surgery of the Hand, President of the American Board of Orthopaedic Surgery, President of the American Orthopaedic Associate, and President of the American Society of Reconstructive Microsurgery. He has also been a guest lecturer at many universities and hospitals, both nationally and internationally.

He is currently a member of 22 national and international societies and a corresponding member to the Japanese Orthopaedic Society, the Australian Orthopaedic Association, the New Zealand Orthopaedic Association, and the Pan Hellenic Orthopaedic Association.

Dr. Urbaniak has contributed more than 45 book chapters to the medical literature, has published nearly 200 articles in medical journals, and has been more than 400 presentations in the United States and beyond.



*Shana Miskovsky, M.D.
is a PGY4 resident in
Orthopaedics at The Ohio
State University*

PROXIMAL TIBIOFIBULAR JOINT GANGLION CYSTS: EXCISION, RECURRENCE, AND JOINT ARTHRODESIS

Authors: Shana Miskovsky, M.D., Christopher Kaeding, M.D.,
Lawrence Weis, M.D.
Presenter: Shana Miskovsky, M.D.

Objective:

In this paper, we will review the presentation, treatment and outcomes of 13 patients with proximal tibiofibular joint cysts. We will also discuss an alternative treatment option: proximal tibiofibular joint (PTFJ) fusion. Ganglion cysts of the proximal tibiofibular joint are rare entities associated with significant patient disability. The mainstay of treatment is cyst excision however, several authors in the literature have noted recurrence as a significant problem. Our series of patients represents one of the largest to date reported in the literature. No studies to date have evaluated the utility of proximal tibiofibular joint fusion in relieving symptoms and preventing recurrence. Our study includes four patients with successful PTFJ fusions using 6.5mm AO partially threaded cancellous screws.

Methods:

This is a retrospective review of thirteen patients who presented to our institution between 1987 and 1999. Two patients had prior surgery at an outside institution. Medical records and office charts were reviewed for each patient in the study. After this review all patients were contacted and interviewed to complete a phone survey describing their level of activity, any symptom or mass recurrence, current pain level, any additional knee surgery and overall satisfaction. Average follow-up from surgery to date of phone survey was 6.3 years (ranged from 1.3-12.9). Average follow-up from surgery to last office visit and to date of detailed functional survey was 1.7 and 6.3 years respectively.

Results:

At presentation, most patients (75%) described a mass or "fullness" of their lateral knee. Seven patients (54%) complained of peroneal nerve dysesthesias. On MRI, cysts appeared dark on T1 and bright on T2-weighted images. Twelve patients elected to undergo surgery. Eight patients underwent cyst excision and four underwent cyst excision combined with arthrodesis of the proximal tibiofibular joint. There is no recurrence rate for this type of cyst quoted in the literature due to the rarity of the disorder, small patient samples and limited follow-up. However, over our post-operative follow-up period, we observed a recurrence rate of 25% following simple cyst excision. Our study includes four patients (two with a history of recurrence) with successful PTFJ fusions using 6.5mm cancellous screws. All of these patients are without subsequent cyst recurrence and currently have no activity restrictions. Morbidity of the procedure itself appears to be minor. One patient developed tenderness over the screw tip necessitating removal and another developed mild lateral ankle pain which did not significantly interfere with her activity.

Conclusions:

Proximal tibiofibular cysts are rare entities that can cause significant disability in active patients. These cysts appear to have a high rate of recurrence after simple surgical excision. In the setting of multiple recurrences, joint arthrodesis seems to have a valuable role. Due to its low morbidity, when used as a primary procedure, arthrodesis may be more effective than traditional cyst excision. Additional studies are needed to further examine the role of PTFJ fusion in the treatment of these peculiar ganglion cysts.



*Rajeev Puri, M.D. is a
PGY5 resident in
Orthopaedics at The
Ohio State University*

DUAL INCISION FOR RETROCALCANEAL EXOSTECTOMY

Authors: Rajeev D. Puri, MD, Gregory C. Berlet, MD, Thomas H. Lee, MD
Presenter: Rajeev Puri, M.D.

Hypotheses/Purpose:

The spectrum of posterior heel pain includes the following: swelling, inflammation and fibrosis in the retrocalcaneal and posterior superficial Achilles' bursae, heel cord thickening and tightening, and painful thickening and swelling of the skin in the area overlying the Achilles' tendon insertion. Retrocalcaneal bursitis and Achilles' tendonosis is associated with a prominent posterior, superior tuberosity of the calcaneus which impinges on the retrocalcaneal bursa and the Achilles' tendon. The pathomechanism shares many similarities with outlet impingement syndrome in the shoulder. With failure of conservative therapy, we believe surgical measures include removal of the exostosis with excision and imbrication of the chronically degenerated Achilles tendon. The reasons for patient dissatisfaction are varied, but inadequate decompression is thought to be a major reason leading to poor results.

Conclusions/Significance:

We believe that the exposure afforded by the 2 incision technique facilitates complete decompression of the retrocalcaneal exostosis in the correction of chronic Achilles tendonosis secondary to impingement.

Summary of Methods/Results:

After failure of conservative therapy, we advocate a 2 incision technique in order to address the retrocalcaneal exostosis. All patients were scored pre and post-operatively with the AOFAS Hindfoot score as well as the SF 12 for outcome measurements. In our preliminary study of 20 patients undergoing a dual incisional approach to the Achilles tendon, we found 18 good/excellent results with return to work and sports.



*Joseph Wilcox, M.D. is
a Sports Medicine
Fellow at The Ohio
State University*

THE OUTCOME OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING QUADRUPLE HAMSTRING AUTOGRAFT WITH FEMORAL CROSSPIN FIXATION

Authors: Joseph Wilcox, M.D.

Presenter: Joseph Wilcox, M.D.

Purpose:

To investigate the short-term outcome of patients who underwent endoscopic ACL reconstruction with quadruple hamstring autograft utilizing femoral crosspin fixation

Methods:

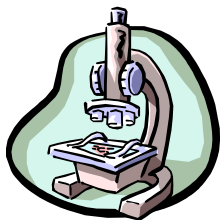
Twenty-one patients (average age =37) who underwent ACL reconstruction with quadruple hamstring autograft using crosspin fixation for the femur and soft thread Bioscrew fixation for the tibia were evaluated at a minimum of 1 year postoperatively. All patients underwent a full knee exam, and side-to-side difference using the KT-1000 arthometer was measured by an independent examiner. Standing plain radiographs of the operative knee were also taken to determine any chondral changes. Subjective data was collected using the IKDC and the Cincinnati Knee Scale evaluation forms.

Results:

The average KT-1000 was 1.63 +/- 0.68 mm. Overall IKDC scores showed 3 patients in group A (normal knee), 15 patients in group B (nearly normal), 1 patient in group C (abnormal), and 2 patients in group D (severely abnormal). The average subjective symptom rating was 8.7 +/- 1.2. When compared to a group of matched patients who had previously undergone ACL reconstruction with central 1/3 patellar tendon autograft, there was no significant difference in average KT-1000 value, IKDC score, or Cincinnati Knee Scale score.

Conclusion:

Endoscopic ACL reconstruction utilizing quadruple hamstring autograft fixed with a femoral crosspin is a reliable technique showing short-term outcomes comparable to other established methods of ACL reconstruction.



*Andrew Layne, M.D.
is a PGY5 Resident in
Orthopaedics at Mt.
Carmel*

COMPARATIVE ACCURACY OF VISUAL, GONIOMETRIC, AND RADIOGRAPHIC JOINT ANGULATION MEASUREMENTS OF THE KNEE AND ELBOW

Authors: Andrew E. Layne MD, Brian L. Davison MD,
Robert F. Ostrum MD
Presenter: Andrew Layne, M.D.

Introduction:

Orthopaedic surgeons measure joint motion to determine effectiveness of treatment, expected functional limitations, and impairment. This study evaluates the accuracy of visual estimation and goniometric measurement of the knee and elbow when compared to a radiographic "gold standard".

Methods:

The left knee was stabilized in an arbitrary position while 5 examiners independently performed visual and goniometric measurements of the joint angle. A lateral radiograph was then performed. This sequence was repeated for 3 positions of the knee and the left elbow in 5 subjects. The radiographic joint angle was determined from the lateral radiograph. The examiners were 2 attendings, 2 fellows, and 1 senior resident.

Results:

The average difference between the visual and radiographic angle was 6.5° in the knee (S.D. ± 5.8) and 10.7° in the elbow (S.D. ± 7.1). The average difference between the goniometric and radiographic measurements was 5.6° in the knee (S.D. ± 4.2) and 8.1° in the elbow (S.D. ± 4.4). The Kruskal-Wallis Analysis of Variance found attending surgeons visually underestimated knee angles compared with resident or fellows ($P < 0.036$). No difference was found in the accuracy of goniometric measurements between the knee and elbow. Pearson's Correlation Coefficients comparing the radiographic values to visual and goniometric measurements found a correlation of .981 or greater for all examiners in the knee and elbow.

Conclusion:

The visual and goniometric measurements strongly correlated with the radiographic angle in the knee and elbow. The accuracy of goniometric measurements was equal for the knee and elbow and for orthopedic attendings, fellows, and senior resident.



*Joseph Mileti is PGY5
resident in Orthopaedics
at The Ohio State
University*

IPSILATERAL SLIDING HIP SCREW AND RETROGRADE INTRAMEDULLARY FEMORAL NAIL: A BIOMECHANICAL COMPARISON OF CONSTRUCTS.

Authors: Joseph Mileti, MD, Brian Davison, MD, Alan Litsky, MD, ScD,
Adam Schaaf, MS

Presenter: John Sharkey, M.D.

Background: Ipsilateral femoral neck and shaft fractures are frequently fixed with a sliding hip screw and a retrograde intramedullary femoral nail. Whenever two implants are used in close proximity, an area of stress concentration can be created between the implants. The purpose of this study is to analyze the stress concentration created in a femur instrumented with four variations of a sliding hip screw, side plate, and a retrograde intramedullary nail. Our goal is to determine the optimal fixation construct to decrease the risk of fracture at this site of stress concentration.

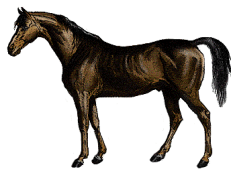
Methods: Composite femora (Pacific Labs, Seattle, Washington) were instrumented with a combination of an Omega sliding hip screw (Howmedica, Rutherford, NJ) and an Alta retrograde intramedullary femoral nail (Howmedica, Rutherford, NJ). Each femoral nail was statically locked with two proximal and two distal locking screws. Four different constructs were used with 4 trials in each construct tested. Group A was instrumented with a 2 hole 130 degree sliding hip screw side plate and a 38 cm retrograde nail that extended to the end of the plate. The remainder of the groups consisted of a 4 hole 130 degree side plate and 38 cm retrograde nail. This resulted in an overlap of the nail with the distal two screw holes of the plate. These holes were not filled in Group B. In group C, the overlapping distal two screw holes were filled with unicortical screws. In the last construct, group D, bicortical screws were placed in the overlapping distal two screw holes.

Each construct was tested on a Bionix 858 servohydraulic materials testing machine (MTS Systems, Eden Prairie, MN) in axial loading at a rate of 50 N/mm with continuous recording of load and displacement until failure of the construct. The ultimate strength and the structural modulus were determined from the load-displacement curves.

Results: In Group A, the ultimate strength to failure in axial loading averaged 3130 N (range 2930-3310). Group B averaged 3403 N (range 3270-3500). In groups C and D, the ultimate strength averaged 5207 N and 5402 N, respectively. There was no statistically significant difference between groups A and B ($p=0.23$) nor between groups C and D ($p=0.65$). However, between group B and group C, there was a statistically significant difference ($p=0.01$). With regards to structural modulus, groups A through D averaged 929 N/mm², 970 N/mm², 930 N/mm² and 882 N/mm², respectively. There was no statistically significant difference between the groups ($p=0.65$).

Conclusions: A combination of a sliding hip screw and a retrograde intramedullary femoral nail is an option in certain clinical scenerios for treatment of femur shaft fractures associated with femoral neck or intertrochanteric fractures. In this biomechanical study, we found that the ultimate strength in axial loading was significantly higher in constructs consisting of unicortical or bicortical screws filling the overlapping holes in the sliding hip screw side plate. Interestingly, we did not find any difference between those constructs with unicortical versus bicortical screws in the overlapping region of the side plate.

Clinical Relevance: With use of an ipsilateral sliding hip screw and retrograde intramedullary femoral nail, a potential stress concentration is formed between the two implants. There is no published study identifying the most biomechanically sound construct to minimize this stress concentration. Decisions with regards to this fixation are made empirically by the surgeon. This study provides biomechanical evidence that overlap of the side plate and nail with unicortical screws in the overlapping region provides for a construct with the highest ultimate strength in axial load and minimizes the risk of a subsequent fracture at this area of stress concentration. In addition, placing bicortical screws around the nail provides no additional strength to the construct and is unnecessary.



*Krisin Backstrom is a
Graduate Research
Assistant & Head
Research Technician in
the Orthopaedic Research
Laboratory of the
Department of Veterinary
Clinical Sciences*

PLASMID-MEDIATED PTH 1-34 GENE ACTIVATED MATRIX IS OSTEOINDUCTIVE IN CORTICAL BONE

Authors: Backstrom KC, Bertone AL, Wisner ER, Weisbrode SE
Presenter: Kristin Backstrom

Hypothesis: Plasmid-mediated PTH₁₋₃₄ gene activated matrix (GAM) would promote bone formation and healing of both cortical and subchondral bone; and would be compatible with articular tissue.

Introduction: GAM is comprised of a mixture of patented bovine type I collagen and plasmid- gene encoding parathyroid hormone (hPTH₁₋₃₄) in the form of a compressible, biocompatible and safe collagen sponge (pMat-1). The composition of the sponge promotes cellular ingrowth, adherence, and proliferation of wound repair cells; namely fibroblasts. The local fibroblasts take up the PTH₁₋₃₄ genes during the healing process and produce PTH locally for several weeks; six weeks in a canine critical defect model. This novel construct could be used to augment healing on difficult fractures, fracture non-unions, and in patients with delayed healing due to systemic conditions such as osteoporosis.

The goal of this study was to assess the osteoinduction and biocompatibility of pMat-1 gene therapy in an equine bone defect model designed to mimic location of clinical stress fractures and performance fatigue fractures. Osteoinduction was quantified with Cann-Genant reconstruction and quantification of bone density and volume by computer tomography [CT], histomorphometry; and joint compatibility with lameness scores, synovial fluid analysis, pain-free range of joint motion, and synovial histology.

Materials and Methods: Sixteen metacarpal bones from 8 horses had 6.5mm diameter defects drilled in the diaphysis (cortical bone) and from the articular surface into the condyle (trabecular bone exposed to joint surface). One limb was randomly assigned to treatment with pMat-1 sponge containing 100 mg DNA (encoding for hPTH₁₋₃₄) and the contralateral limb received surgery but no treatment. The following parameters were evaluated at weeks 0,1,2,3,4,8,10 and 12: serial clinical examinations, lameness, joint circumference, MCIII analyses. At 12 weeks, metacarpal bones were isolated, photographed, and CT screened for soft tissue mineralization. Each defect was subsequently CT scanned in 2 planes at 1 mm slices. Using a Cann-Genant K₂HPO₄ phantom to standardize for x-ray attenuation differences, CT unit- K₂HPO₄ equivalent density was determined on a slice by slice basis using a sigmaplot analysis. Contour tracings of regions of interest were performed for each slice. To quantify bone volume and density, three, central 1 mm cross sectional slices were used as the best representation of the total amount of bone and density in each defect. Total bone index (percent bone filling the cortical defect plus total new periosteal bone volume), total bone density index (density of bone filling the defect plus density of periosteal bone), periosteal new bone volume, and percent of bone filling the subchondral bone defect were calculated. Bone slabs (200u) were cut undecalcified from the center of the defect, stained, and quantified for tissue type filling the defect. Synovium was harvested from each MCP joint, and specimens were stained with hematoxylin and eosin (H&E) stain. Synovium sections were blinded and scored independently for vessel thrombosis (10x), synovial hyperplasia (10x), inflammation (20x) and cell necrosis (20x). Crude radiographs were scored by a blinded investigator conglomerating flexed lateral and cranio-caudal views and estimating the % bone filling the defects. Scored data were compared between limbs using a Mann-Whitney U analysis and among times using a Kruskal-Wallis analysis. Objective data with repeated measures were analyzed with ANOVA, and paired single measurements with a t-test.

PLASMID-MEDIATED PTH 1-34 GENE ACTIVATED MATRIX IS OSTEOINDUCTIVE IN CORTICAL BONE CONTINUED....

Results and Discussion:

Osteochondral Model: This defect model served as a humane method to assess articular and diaphyseal bone healing as horses were comfortable throughout the study. The defect pressure in the joint produced reduction in pain free range of joint motion that gradually improved through week 12, but never return to normal ($p < 0.011$).

Clinical data: Limbs receiving pMat-1 were not lame anytime during the study except one horse at week 3 with a mild 1 out of 5 lameness score. Range of pain free joint motion and circumferences revealed no significant difference between treated and control limbs. Importantly, mean synovial fluid values were normal for the entirety of the study, demonstrating the noninflammatory nature of the model and the pMat-1. The synovium was grossly normal. Most synovial histology scores were similar between treated and control limbs, except for a greater inflammation score from synovium at the palmar pouch site from pMat-1 exposed joints ($P = 0.025$). This inflammation was rated mild (mean score 1.85) as compared to minimal (mean score 0.75) for control joints and was considered clinically insignificant. In summary, pMat-1 was clinically compatible.

Osteoinduction: Diaphyseal Bone: pMat-1 was potentially osteoinductive in 5 of the 8 horses studied. Quantitative CT results supported a difference in the total bone index in treatment limbs compared to control limbs ($p < .075$), most of which was new periosteal bone ($P < 0.075$), and this was confirmed by histomorphometry. In 5 of 8 horses, this periosteal response was dramatic and represented a 44.2% increase in periosteal bone over control limbs. Three of the eight horses had no periosteal response and these 3 horses had poor bone healing in general. This finding of non-responding animals in bone healing is recognized and presumed to be gene promoter activity related. Bone deposited in treated defects was similar in density to normally healing bone ($p = 0.29$), as has been seen in other species.

Osteoinduction: Condyle Trabecular Bone: Subchondral bone volume filling the defect was significantly less in pMat-1 treated defects compared to control ($p = 0.016$). Histomorphometry of undecalcified sections revealed a loose fibrous tissue; not an endochondral ossification process occurring in the unmineralized areas. This may represent hindrance of bone healing by the PTH, but more likely represents interference from synovial fluid in combination with the collagen sponge. Increased intraosseous pressure from increased intra-articular pressure can cause subchondral bone lysis and defect persistence clinically with other models.

Conclusion: pMAT-1 gene therapy is potentially osteoinductive in diaphyseal bone in most individuals, particularly expressed in the periosteum. pMat-1 is clinically compatible with joint tissue.

References:

1. Goldstein *et al.* (1998) Clin. Orthop. **355S**:154.
2. Bonadio *et al.* (1999) Nat Med. **5**:753.

Acknowledgements: Supported by Selective Genetics Inc., San Diego, CA



*Anne Ryan, M.D. is a
PGY5 resident in
orthopaedics at The
Ohio State University*

THE EFFECTS OF RADIOFREQUENCY TREATMENT ON CHONDROCYTES AND ARTICULAR CARTILAGE MATRIX OF FIBRILLATED CARTILAGE

Authors: Anne Ryan MD, Alicia Bertone DVM, PhD, Chris Kaeding, MD
Kris Backstrom BS, Steve Weisbrode DVM, PhD
Presenter: Anne Ryan, M.D.

Introduction (Objective)- The purpose of this study was to determine whether commercially available radiofrequency probes used in arthroscopic surgery have detrimental effects on articular cartilage chondrocytes. Chondrocyte well being was determined by examining proteoglycan metabolism, cell viability and tissue morphologic changes associated with three different energy settings and a control.

Methods- Paired patellae from 11 horses between the ages 2 weeks and 20 years were harvested and the surface of each was divided into 3 sites. Fibrillation of patellae was created with a bone rasp to mimic clinical fibrillation. One patella served as a fibrillated articular cartilage control (Gp 1). The contralateral patellae were treated at each of the 3 sites with one of 3 different energy settings (20 [Gp 2], 40 [Gp 3], or 60 [Gp 4] watts) for 4 minutes at each site in a paintbrush pattern under arthroscopic guidance. Surface articular cartilage temperature was measured with the patellae submerged in arthroscopic fluids at each energy setting. Cartilage explants (in duplicate) were immediately harvested and incubated for 24 hours at 37 degrees Celsius and 95% humidity. Proteoglycan synthesis (Na³⁵SO₄ incorporation for 24 hours), proteoglycan degradation (Na³⁵SO₄ release for 72 hours) and cell viability (0.2% Trypan blue exclusion stain) were measured. Explant histologic sections were scored for cellular characteristics, metachromatic matrix staining intensity, and tissue architecture. Sections were quantitatively analyzed for cell death (% empty lacunae). Quantitative data were analyzed with a two-way ANOVA for group and energy setting. Semiquantitative data was analyzed by Wilcoxin rank test. Significance was set at P<0.05.

Results- Mean peak surface articular cartilage temperatures were 96.3°F, 105.8°F, and 113.9°F for Gp2, Gp3, and Gp 4, respectively. Radiofrequency applications at all three settings significantly decreased proteoglycan synthesis of the chondrocytes as compared to controls. Increasing radiofrequency energy setting decreased proteoglycan synthesis further among treatment groups. Proteoglycan degradation increased with increased energy setting such that radiofrequency settings of 40 and 60 Watts had significantly greater degradation than the 20 Watt treatment group or the controls. Increasing energy also decreased cell viability in higher energy groups. Control cartilage cultured for 7 days had 89% viability. Radiofrequency treatment at 40 and 60 Watts significantly decreased viability to 81% (p=0.059) and 73% (p=0.001) respectively.

Conclusion- Radiofrequency treatment of cartilage has immediate suppressive effects on chondrocyte metabolism at all power settings. Cell viability and proteoglycan synthesis decreased and proteoglycan degradation increased with increased power settings. Based on this ex vivo model of fibrillated cartilage, cautious use of radiofrequency energy treatment of cartilage is recommended until studies evaluate more long term in vivo effects of radiofrequency energy treatment of cartilage.



*Lee Williams, M.D.
is a PGY5 resident
in Orthopaedics at
Mt. Carmel*

ULTRASONOGRAPHIC EVALUATION OF THE NEONATAL FOOT: PRELIMINARY STUDY COMPARING CLUB FOOT AND NEONATAL CONTROLS WITH IMPLICATIONS TO GUIDING TREATMENT STRATEGIES

Authors: Leamon Williams, John Kean, Williams Shiels
Presenter: Leamon Williams, M.D.

Abstract: Over the past six years the use of ultrasound has been expanding for the evaluation of the pediatric clubfoot. The purpose of the present study is to evaluate sonographic parameters and to evaluate if there is a correlation to independent operative findings. A precise description of the technique is included. The two parameters examined and compared to controls involve the tarsal navicular: a quantitation of the dysplasia and the relationship to the medial malleolus. Fifty-five patients with clubfoot are examined, compared to controls, and the final form of treatment reported. The use of dynamic measurement of the navicular-malleolus relationship has not been previously reported and may have an implication on the necessity of a medial release. This study can serve as a guide for ultrasonographic evaluation of the clubfoot but will require further long term studies to confirm.



*Tim Kavanaugh is a
PGY5 resident in
Orthopaedics at The
Ohio State University*

PROSPECTIVE RANDOMIZED COMPARISON OF BIOABSORBABLE AND TITANIUM ACL INTERFERENCE SCREWS

Authors: Tim Kavanaugh MD, Christopher Kaeding MD, Jack Farr MD, Robyn Portzline
Presenter: Tim Kavanaugh, M.D.

Surgical reconstruction of the anterior cruciate ligament commonly involves the central third of the patellar tendon with patellar and tibial bony blocks. The gold standard for fixation of this graft is the interference screw. Metallic interference screws have the potential disadvantages of injuring the graft and interfering with magnetic resonance imaging of the knee. The purpose of this study is compare the Phantom resorbable polymer interface screw with the Advantage titanium metal interference screw when used for femoral and tibial bone blocks in central third patellar tendon bone-tendon-bone autografts in anterior cruciate ligament reconstruction. Clinical evaluation using prescribed parameters will be presented with greater than 1-year followup in the study group. Two-year radiographic evaluation will also be presented in the results.



Keri Reese is a 2nd year medical student at the Ohio State University College of Medicine and Public Health

USE OF CANNULATED SCREWS IN FIXATION OF JONES FRACTURES – A CLINICAL AND BIOMECHANICAL STUDY

Authors: Christopher Kaeding, M.D., Alan Litsky, M.D., ScD.,
Keri Reese
Presenter: Keri Reese

Objective: To review the long term clinical results of cannulated screw fixation of Jones fractures as well as to perform biomechanical testing of various screws: cannulated vs. solid; stainless steel vs. titanium; and small (4mm) vs. large (6.5mm-7.3mm)

Methods: In the clinical study 21 patients who had undergone cannulated screw fixation of a Jones fracture were evaluated for: time to full weight-bearing, average time to painless gait, time to full activity, intra-operative/post-operative complication, and AOFAS midfoot scale. The average follow-up time was greater than 2 years. As part of the biomechanical study the following screws were fatigue tested under cyclic loading of 250 newtons to a maximum of 201,000 cycles: 4mm cannulated steel, 4mm solid steel, 7mm cannulated steel, 6.5mm solid steel, 4mm cannulated titanium, and 7.3mm cannulated titanium.

Results: The clinical study yielded the following results. Average time to full weight-bearing: 1.75 weeks. Average time to painless gait: 4 weeks, Average time to full activity: 7 weeks. All patients showed radiographic union and returned to prior level of activity. Average AOFAS midfoot scale: 94. No intra/post operative complications or broken screws were reported at average follow-up of over two years. The biomechanical study yielded the following results. Cycles to failure: 4mm cannulated steel - 22,012; 4mm solid steel - 44,820; 7mm cannulated steel – 195,959; 6.5mm solid steel - 201,000; 4mm cannulated titanium - 4,308; 7.3mm cannulated titanium - 201,000.

Conclusions: Clinically all patients demonstrated excellent short and long term results. Biomechanical testing of screws showed that for fatigue resistance: solid > cannulated; stainless > titanium; and large > small. The advantage of greater fatigue strength vs. higher modulus of elasticity warrants further study.



*Jonathan Henry, M.D.
is a Sports Medicine
Fellow at The Ohio
State University*

BIOMECHANICAL EVALUATION OF DISTAL BICEPS TENDON REPAIR

Authors: J. Henry, MD, G. Jones, MD, C. Kaeding, MD, R. Portzline
Presenter: Jonathan Henry, M.D.

Abstract:

Surgical reattachment of a distal biceps tendon tear is indicated in most individuals in order to restore elbow flexion and forearm supination strength. The method has expanded beyond the classic two-incision approach to include various modified two-incision techniques as well as several different one-incision techniques. A modified technique developed at OSU incorporates an anterior approach with suture reattachment of the avulsed tendon with a limited muscle-splitting posterior approach securing the suture over a bone bridge. The purpose of this study is to compare elbow flexion and forearm supination strength of repairs performed by an anterior reattachment (OSU method) to those performed by a classic two-incision technique. The clinical portion compared retrospective clinical assessment and long-term isokinetic dynamometer testing results of patients treated by the two methods. The laboratory portion compared MTS results for elbow flexion and forearm supination strength in fresh-frozen cadaver specimens with intact, anterior reattached, and posterior reattached biceps tendons. The results are discussed from biomechanical and clinical perspectives.



*Christopher Kaeding MD
is an Associate Professor of
Orthopaedics and the
Program Director of the
Sports Medicine
Fellowship Program at the
Ohio State University*

USE OF SIS EXTRACELLULAR MATRIX IN THE TREATMENT OF TENDON INJURIES

Authors: Christopher Kaeding, M.D., Rodney Tomczak, DPM, EdD.
Presenter: Christopher Kaeding, M.D.

Introduction: The purpose of this report is to: 1) review SIS, a new implant to augment soft tissue repairs, 2) describe a classification system of tendon injuries and 3) review our early experience using SIS in the repair of difficult tendon injuries. SIS is an acellular extracellular matrix derived from the submucosal membrane of porcine small intestine. It has a naturally occurring mixture of growth factors, cytokines and an antimicrobial peptide in a three dimensional collagen matrix. This material appears to have bioinductive properties which would be beneficial to tendon healing.

Materials and Methods: Our classification system divides macroscopic tendon injuries into 4 classes. Our clinical study involves two of the subclasses of injury: Class 3 - chronic neglected tendon disruptions with tissue loss and poor tissue quality and class 4 - intratendonous degenerative lesions (tendinosis). Our class 3 injuries included quadriceps, achilles and biceps brachii tendons. Our class 4 injuries included patella, achilles, common extensor (at the elbow) and posterior tibialis tendons. All tendon injuries underwent repair with SIS augmentation. The class 4 patella tendon repairs had a control group against which to compare results. Clinical results and complications were recorded.

Results: SIS appears to have a positive influence on tendon healing of repairs with tissue loss (class 3) as well as in repairs of focal areas of impaired tendon healing potential (class 4). No significant complications or adverse affects were noted.

Summary:

Certain tendon injuries present significant clinical challenges. This is often due to one or a combination of the following: poor tendon tissue quality, tendon tissue loss, and poor healing potential. A classification of tendon injuries can take these negative influences on tendon healing into account. A classification system is needed if one is to investigate adjunctive interventions to improve clinical outcomes of difficult tendon injuries. The bioinductive properties of SIS appear to provide a positive influence on tendon healing. This has been shown in animal models. Our early experience using SIS to augment tendon repairs of challenging tendon injuries in humans shows promise. Additional study of this implant is needed to further define its efficacy, indications and application.



Abdi Raissi, M.D. is a Foot and Ankle Fellow with Drs. Lee and Berlet at Orthopaedic Foot and Ankle

EVALUATING THE SOURCE AND CONTENT OF INFORMATION ABOUT TOTAL ANKLE REPLACEMENT ON THE WORLD WIDE WEB

Authors: Abdi Raissi, M.D., Gregory Berlet, M.D., Thomas Lee, M.D.
Presenter: Abdi Raissi, M.D. .

Hypotheses/Purpose:

Authors of health related web pages are not subject to editorial scrutiny nor required to adhere to any standard of medical accuracy. The content of information provided on the Internet to patients about total ankle replacements is often extraneous and at times inaccurate. Furthermore, the majority of the content available is not provided by orthopaedic foot and ankle surgeons.

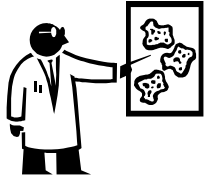
Conclusions/Significance:

The information available on the World Wide Web is of limited quality and informational value. The patients and physicians need to be aware of these limitations. Orthopedic foot and ankle surgeons need to play a more active role in providing accurate and contemporary information about total ankle replacements on the Internet.

Summary of Methods/Results:

The search phrase "total ankle replacement" was entered into the search engines of the top 5 most commonly visited portals on the Internet. Search results netted a list of universal resource locator (URLs), otherwise known as web addresses. The top 50 matches from each search engine were combined to provide a master list of 250 web sites. These web sites were then analyzed for authorship, content, and an informal value score from a scale of 0 to 10.

The largest authorship belonged to commercial sites that did not sell products (fifty three percent). An additional 17% belonged to academic organizations. The numbers of web sites sponsored by orthopedic physician groups was very similar to those provided by podiatric physician groups, 14 percent and 10 percent respectively. Only 10 percent of the sites sold commercial products related to TAR. Fewer than half of the sites provided conventional information (consistent with current medical literature), and a majority were found to be uninformative. The mean informational value of the web sites was 3.2 at of a possible 10 points. The quality and relevance of the search results varied greatly between various search engines.



*James Kerpsack, M.D.
is a PGY3 Resident in
Orthopaedics at Mt.
Carmel*

COST COMPARISON OF OPEN AND ARTHROSCOPIC SUBACROMIAL DECOMPRESSION

Authors: James Kerpsack, M.D.
Presenter: James Kerpsack, M.D.

Arthroscopic Subacromial Decompression has become an increasingly popular method for treatment of impingement syndrome. Reduced cost and decreased operative time have been cited as benefits of the arthroscopic technique. A retrospective review was done to directly compare the hospitalization cost and operative time of open, arthroscopic and combined open and arthroscopic subacromial decompression and distal clavicle resection. The open technique has a significantly lower operative cost and a shorter total time in the operative suite. This study contradicts the conclusions of previous studies which favor arthroscopic subacromial decompression based on lower cost and decreased operative time.



*John Sharkey, M.D. is a
Clinical Assistant Professor
of Orthopaedics at The
Ohio State University*

EFFICACY OF ORAL ROFECOXIB VERSUS ORAL KETORALAC IN CONTROL OF EARLY POSTOPERATIVE OUTPATIENT ORTHOPAEDIC SURGICAL PAIN

Authors: John Sharkey, M.D., Christopher Kaeding, M.D., Joseph Verducci, M.D.

Presenter: John Sharkey, M.D.

Objective:

The objective of this prospective randomized study was to compare the efficacy of rofecoxib versus ketorolac in ambulatory anterior cruciate ligament reconstruction patients.

Methods:

Forty patients were randomly assigned to one of two study groups, rofecoxib or ketorolac. Prior to surgery patients were instructed in the use of a visual analog pain scale (VAS) and a baseline measurement of pain was taken. All patients received standardized anesthesia. Patients in the rofecoxib group took 50 mg po in pre-op holding and 50 mg po every morning after that for five days. Patients in the ketorolac group received 30 mg intravenously intraoperatively and 10 mg po qid for the five days after surgery. Patients in both groups received oxycondone, 1-2 po q three hours as needed for pain. Patients were contacted mid-day for 5 post-operative days and asked to provide their level of pain as quantified by the visual analog scale, the number of supplemental narcotic analgesics used and to discuss the presence and severity of any nausea, diarrhea or bleeding at the surgical site.

Results:

With respect to pain control, a two-sided t-test showed no significant difference between the two treatment groups in either the mean VAS score ($p = .64$) or the change in VAS score ($p = .51$) over time. With respect to the use of oxycondone, similar tests revealed no difference between the two treatment groups in either mean usage ($p = .61$) or the change in usage ($p = .32$). With respect to side effects, a two-sided Fisher exact test found no significant difference in the incidence of nausea ($p = .49$) or diarrhea ($p = .71$). A sizeable difference in the incidence of bleeding (33% for ketorolac versus 9% for rofecoxib) was, however, not statistically significant (two-sided Fisher exact test, $p = .06$) with these sample sizes.

Discussion:

The objective of this investigation was to determine whether rofecoxib, a cyclooxygenase-2 specific inhibitor, was as effective as ketorolac, a cyclooxygenase 1 and 2 inhibitor, in managing orthopaedic postoperative pain. Rofecoxib has been shown to have a much lower frequency of deleterious side effects compared to cyclooxygenase 1 and 2 inhibitors. The dosing schedule of rofecoxib is once daily. The dosing schedule of ketorolac is four times daily. The superior safety profile and ease of dosing makes rofecoxib an attractive alternative to other nonsteroidal anti-inflammatory medications.

Mark your calendars now!

MALLORY-COLEMAN DAY 2002

Friday, April 12, 2002

Visiting Professor and Moderator

Victor Goldberg, M.D.

Chairman, Department of Orthopaedics
Case Western Reserve University

Department of
Orthopaedics

N1050 Doan Hall
410 W. 10th Ave.
Columbus, OH 43210

Phone: 614-293-6194
Fax: 614-293-3596
Email: panzo-1@medctr.

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