

2015 AOSSM Specialty Day Abstracts

1.

Publishing Title: Sleep Quality in Patients with Rotator Cuff Disease

Author: Michael S. Khazzam, MD, Ed Mulligan, DPT, Zachary Shirley, Meredith Brunette, DPT.

Block: UT Southwestern Medical Center, Dallas, TX, USA.

Objectives: Sleep disturbance may be an important prognostic variable driving patients to seek treatment for rotator cuff disease related shoulder pain. Currently, little is known on the influence of rotator cuff pathology on sleep. The purpose of this study was to determine which patient factors correlate with sleep disturbance in patients with atraumatic rotator cuff disease.

Methods: A prospective, nonrandomized single surgeon cross-sectional cohort study was performed evaluating the effects of rotator cuff disease on sleep quality. Time-zero prior to treatment intervention outcomes data was collected including the Single Assessment Numeric Evaluation Rating (SANE), American Shoulder and Elbow Score (ASES), Pittsburgh Sleep Quality Index (PSQI), patient demographics and medical comorbidities. Statistical analysis included Pearson correlation and multiple regression analysis to determine which patient reported factors were associated with sleep quality disturbance.

Abstract Body:

Results: 147 shoulders in 131 subjects 66 right 49 left 16 bilateral (66 male, 65 female) with a mean age 56.4 were enrolled. There were 92 subjects with rotator cuff tendinitis, and 34 subjects full thickness rotator cuff tears confirmed on MRI. The mean SANE was 48, VAS 4.85, ASES 52, PSQI 8.26±5.0, and 92% of subjects reported nocturnal shoulder pain. Pearson correlation coefficient determined that female sex (males -0.23, p=0.001), higher pain VAS score (+0.26, p=0.003), depression (+0.39, p<0.0001), presence of low back pain (+0.36, p<0.0001) smoking (+0.22, p=0.01), diabetes (+0.19, p=0.03), presence of osteoarthritis (+0.19, p=0.03), and NSAID use (+0.17, p=0.05) were associated with poor sleep quality. Factors associated with worse sleep quality. Age, SANE, ASES, presence of full thickness RCT, presence of biceps pain, or cervical spine symptoms were not predictive and did not correlate with worse sleep quality.

Conclusion: Based on our findings pain, female gender, depression, presence of low back pain, smoking, diabetes mellitus, and prior NSAID use are all factors associated with worse sleep quality in patients with rotator cuff disease. These results demonstrate that the sleep quality does not seem to correlate with severity of rotator cuff pathology.

2.

Publishing Title: Outcome Following Isolated Osteochondral Allograft Transplantation of the Femoral Trochlea

Author: James I. Cameron, MD¹, Pamela Pulido, BSN², Allison DeYoung, MPA³, Simon Gortz, MD⁴, William Bugbee, MD¹.

Block: ¹Scripps Clinic, La Jolla, CA, USA, ²Scripps Health, La Jolla, CA, USA, ³SCORE at Scripps Clinic, La Jolla, CA, USA, ⁴University of California, San Diego, San Diego, CA, USA.

Objectives: Osteochondral allograft (OCA) transplantation is a recognized treatment modality for cartilage damage in the knee. Few reports on outcomes of OCA in the patellofemoral joint and no reports on lesions isolated to the femoral trochlea are available. The goal of this study was to evaluate graft survivorship and clinical outcomes in patients who had an OCA of the femoral trochlea.

Abstract Body: **Methods:** Twenty-nine knees in twenty-eight patients (mean age, 30.2 years; range 12-47 years) were treated with fresh OCA transplant limited to the femoral trochlea. There were eight females and twenty males. Minimum follow-up was 2 years. The primary outcome was graft survivorship. Pain and function were assessed by the Modified Merle d'Aubigné-Postel (18-point) scale, Knee Injury and Osteoarthritis Outcome Score (KOOS), Knee Society function (KS-F), International Knee Documentation Committee (IKDC) and UCLA activity scores. The OCA patient satisfaction score (five

point scale from extremely satisfied to extremely unsatisfied) was reported.

Results: Mean follow-up was 7.0 years (range 2.1-19.9 years) with 65.5% of patients with more than five years of follow-up. Graft survivorship was 91.7% at a mean of 7.0 years. One patient was converted to a total knee arthroplasty at 7.6 years after allograft surgery. Mean Modified Merle d'Aubigné-Postel (18-point) scale improved from 13.0 to 16.1, mean KS-F score from 65.6 to 85.2 and mean IKDC from 38.5 to 71.9. Mean UCLA score postoperatively was 7.9 and mean KOOS QOL (quality of life) scores improved from 34.0 preoperatively to 75.1 postoperatively. Eighty-nine percent of patients were extremely satisfied or satisfied with the outcome of surgery.

Conclusion: Fresh OCA transplantation appears to have good results in this cohort of patients with advanced articular cartilage damage to the femoral trochlea. The procedure resulted in improved pain and function and could delay the need for patellofemoral or total knee arthroplasty for many years.

3.

Publishing Title: The Effect Of Concomitant Glenohumeral Joint Capsule Release During Rotator Cuff Repair - A Comparative Study Of 195 Patients.

Author Block: **Jordan McGrath**¹, Patrick Hong Lam, PhD¹, Martin Tan², George A.C. Murrell, MD, PhD³.
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Objectives:

Background: There is debate as to whether to operate or defer surgery on patients with concomitant rotator cuff tear and shoulder stiffness. The purpose of this study was, therefore, to compare the outcomes in those patients who had both their rotator cuff tear and shoulder stiffness treated with patients who had a rotator cuff repair but no stiffness.

Methods:

Methods: 1232 primary arthroscopic rotator cuff repairs were performed during the study period, including 44 patients who received a concomitant glenohumeral joint capsule release for ipsilateral shoulder stiffness, forming the stiffness group. A chronologically matched group of four rotator cuff repair-only patients before and after each stiffness patient were chosen from the consecutive list of rotator cuff repairs. Twenty-five patients from the stiffness group and 170 patients from the non-stiffness group met the inclusion criteria, leaving a total cohort of 195 patients. Patients completed modified L'Insalata Questionnaires for patient-ranked pain and function scores pre-operatively, intra-operatively, and at one week, six weeks, 12 weeks, six months and two-years post-operatively, while examiners recorded range of motion, strength, and presence of impingement signs.

Abstract Body:

Results:

Results: Patients from both groups had significantly improved clinical outcomes at the two-year follow-up as compared to pre-operative values. Stiffness patients had 0/25 (0%) re-tears at two years, significantly less ($p = 0.009$) than the non-stiffness patients (34/170 [20%]). Range of motion was similar between groups at two-years for forward flexion, abduction and external rotation, while the non-stiffness group had a superior range of internal rotation ($p < 0.02$).

Conclusion:

Discussion: The good outcomes of rotator cuff repair with glenohumeral joint capsule release suggest that there is no advantage in delaying surgical repair of a rotator cuff tear to allow for stiffness to resolve. In contradistinction, the data presented in this paper suggests that shoulder stiffness with glenohumeral joint capsule release, confers an advantage in terms of repair integrity.

4.

Publishing Title: The Effects of Latarjet Reconstruction on Glenohumeral Instability in the Presence of Combined Bony Defects: A Cadaveric Model

Author Block: **Ronak M. Patel, MD**¹, Piyush Walia, MS², Lionel Gottschalk, MD³, Morgan H. Jones, MD², Stephen D. Fening, PhD⁴, Anthony Miniaci, MD⁵.

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Objectives: Recurrent glenohumeral instability is often a result of underlying bony defects in the glenoid and/or humeral head. Anterior glenoid augmentation with a bone block (i.e. Latarjet) has been recommended for glenoid bone loss in the face of recurrent instability. However, no study has investigated the effect of Latarjet augmentation in the setting of both glenoid and humeral head defects (Hill-Sachs Defects (HSD)). The purpose of this study was to evaluate the stability achieved through a Latarjet procedure in the presence of combined bony defects. Our hypothesis was that Latarjet augmentation would increase shoulder stability for glenoid defects with small HSD, but have limited success in cases with large concomitant HSD.

Abstract Body: **Methods:** Eighteen fresh-frozen cadaveric specimens were tested at combinations of glenohumeral abduction (ABD) angles of 20°, 40°, and 60° and external rotation (ER) angles of 0°, 40°, and 80°. Each experiment applied a 50N medial load on the humerus to replicate the static load of soft tissues, and then simulated anterior dislocation by translating the glenoid in an anterior direction. Translational distance and medial-lateral displacement of the humeral head, along with horizontal reaction forces, were recorded for every trial. Specimens were tested in an intact condition (no defect), different combinations of defects, and with Latarjet augmentation. The Latarjet was performed for 20% and 30% glenoid defects by transferring the specimen's coracoid process anterior to the glenoid flush with the articulating surface.

Results: Results are summarized in Fig. 1. The vertical axis represents the normalized distance to dislocation with respect to the values of the intact joint. The horizontal axis represents the varying sizes and combinations of bony defects. Latarjet augmentation improved stability for every combination of bony defects. At 20° ABD, 0°ER, and 20% glenoid defect size, the percentage of intact translation did not change with increasing HSD size, and the Latarjet augmentation increased percent intact translation to greater than 100 percent for all cases (Fig. 1A). However, at 60° ABD, 80° ER, and 20% glenoid defect size, increasing HSD size caused decreased stability, and Latarjet augmentation did not increase the percent intact translation to normal levels for HSD sizes greater than 30% (Fig. 1B).

Conclusion: This is first study to investigate and quantify the effect of Latarjet reconstruction on anterior shoulder instability in the presence of combined humeral head and glenoid defects. Clinically, these results demonstrate that some degree of stability can be regained for combined bony Bankart and Hill-Sachs defects with a Latarjet procedure. However, for humeral defects larger than 30%, the HSD led to persistent instability in the abducted externally rotated position, even after the Latarjet procedure. Thus, directly addressing the humeral defect to restore the articular surface should be considered in these cases.

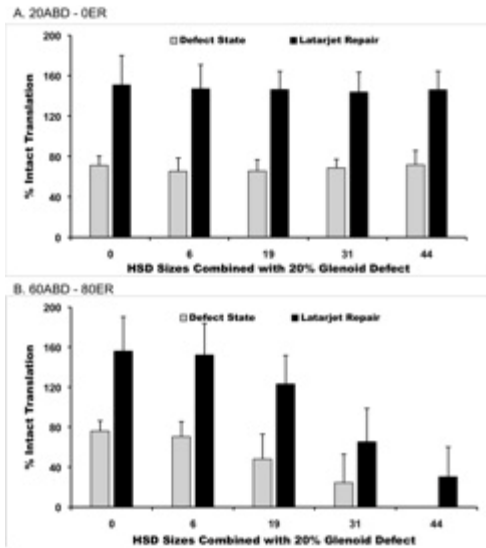


Figure 1: Percent intact translation for the listed defect state with and without Latarjet augmentation for a 20% glenoid defect combined with HSD sizes of 0, 6, 19, 31, and 44% at arm positions of (A) 20° ABD and 0° ER and (B) 60° ABD and 80° ER.

5.

Publishing Title: Correlates With Injury In Youth And Adolescent Pitchers

Author Block: Peter Nissen Chalmers, MD¹, Terrance Sgroi, DPT², Andrew Joseph Riff, MD¹, Matthew Lesniak, MPT³, Eli Sayegh, BS⁴, Nikhil N. Verma, MD⁵, Brian J. Cole, MD, MBA⁶, Anthony A. Romeo, MD⁷.
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Objectives: Shoulder and elbow injuries are common among youth and adolescent baseball players. While previous cross-sectional studies have identified breaking pitches as a risk factor for injury, breaking pitches have not been associated with higher shoulder and elbow torques in motion analysis. We hypothesized that pitch velocity and kinematic factors would be more important predictors of injury than breaking pitches.

Methods: Demographic and kinematic data were collected on normal youth and adolescent pitchers in pre-season training using dual orthogonal high-speed video analysis. Pitching history was also collected. Players were asked whether they had ever experienced a pitching-related shoulder or elbow injury.

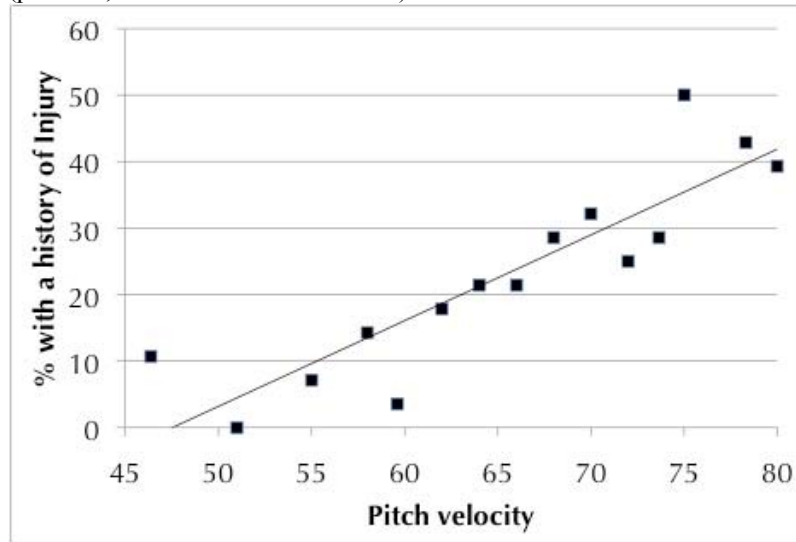
Abstract Body: Multivariate logistic regression analysis was performed on those variables that correlated with injury to identify the most important predictors.

Results: Four hundred and twenty pitchers were included, of whom 31% had a history of a pitching related injury. After multivariate logistic regression analysis only subject height ($p=0.009$, $R^2=0.023$), pitching for more than one team ($p=0.019$, $R^2=0.018$), and pitch velocity ($p=0.006$, $R^2=0.194$), served as independent correlates of injury status. A model constructed with these three variables could correctly predict 77% of injuries. Within our cohort, the presence of either an 8.6 inch increase in height or a 17 mile per hour increase in velocity was associated with a doubling of likelihood of history of injury. Playing for more than one team increased the likelihood of a history of injury 61%.

Conclusion: Pitch velocity, pitcher height, and pitching for more than one team correlate with a history

of shoulder and elbow injury. Current recommendations regarding breaking pitches may not prevent injury. Pitchers should be cautioned from pitching for more than one team. Taller pitchers and high velocity pitchers may be at risk for injury. To fully prevent injury, age-based velocity limits could be considered.

Figure 1. Percent of pitchers with a history of injury significantly correlates with pitch velocity ($p=0.006$, $B=0.059\pm 0.021$ $R^2=0.194$).



6.

Publishing Title: Effects of Acetabular Rim Trimming on Hip Joint Contact Pressure: How Much is Too Much?

Author Block: Sanjeev Bhatia, MD¹, Simon Lee, MPH¹, Elizabeth Shewman, MS¹, Charles A. Bush-Joseph, MD², Michael Jonathan Salata, MD³, Shane Jay Nho, MD, MS⁴.

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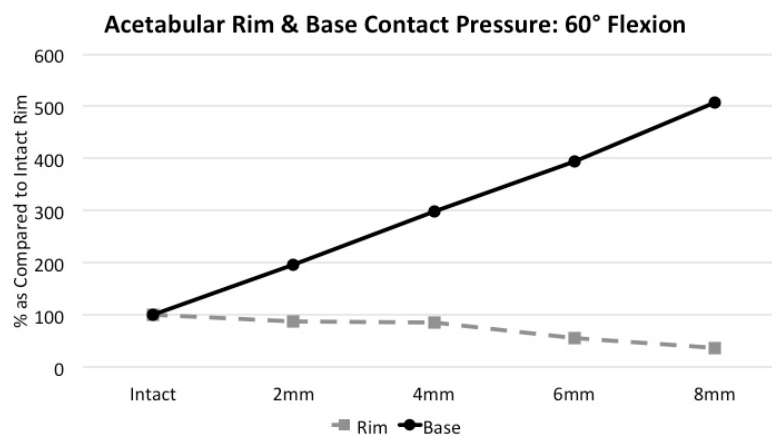
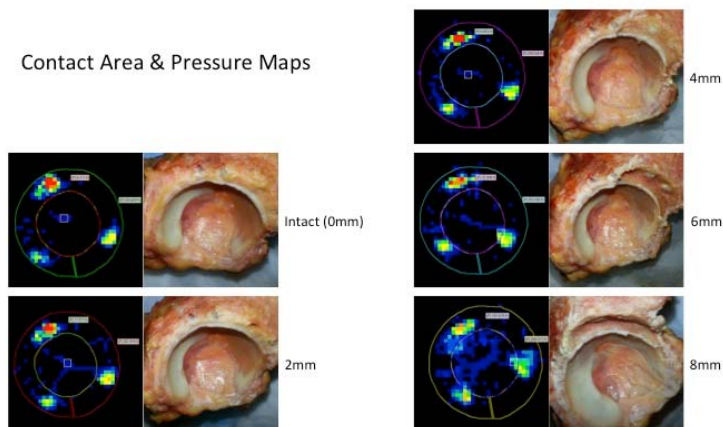
Objectives: In patients with femoroacetabular impingement (FAI), acetabular rim trimming removes the offending cause of pain in patients with pincer-type and mixed-pincer-cam type pathology and helps protect repaired damaged labrum from further injury. Although the clinical benefit of arthroscopic acetabular rim trimming in FAI patients is well established, the threshold at which excessive rim resection results in abnormal hip contact pressures from iatrogenic acetabular dysplasia has never been studied. The purpose of the present study was to investigate the changes in contact areas, contact pressures and peak forces within the hip joint with sequential acetabular rim-trimming.

Abstract Body: **Methods:** A comparative biomechanical analysis of 4 fresh-frozen human cadaver hemi-pelvises was performed. Prior to testing, all specimens underwent a CT scan and were deemed non-dysplastic based on center edge angle measurements. For each specimen, the acetabulum and proximal femur were potted in dental cement and mounted on a materials testing system (MTS Insight 5, Eden Prairie, MN). After resecting the labrum, a contact pressure and area mapping system (Tekscan, Boston MA) was placed within the acetabulum and a 700 N load was subsequently applied resulting in a real-time pressure map. Each specimen was sequentially tested in the intact state as well as anterosuperior acetabular rim-trimming (from the 12 o'clock to 3 o'clock position) of 2mm, 4mm, 6mm and 8mm depth. Each testing condition was examined at two different positions within the natural hip range of motion: 20° extension and 60° flexion. Analysis of total force, contact area, contact pressure and peak force was performed on

two regions of interest: the acetabular rim and the acetabular base (deep part of acetabulum). The rim-trimmed states were then normalized with respect to the intact state in order to help account for specimen variability. Statistical analysis was conducted via a Paired and Unpaired Student's T-test on normalized data.

Results: At 60° flexion, rim-trim depth was significantly correlated to acetabular rim contact area ($R=-0.698$, $P=0.001$), contact pressure ($R=-0.892$, $P<0.001$) and peak force ($R=-0.857$, $P<0.001$). At 20° extension, rim-trim depth was significantly correlated to acetabular rim contact area ($R=-0.684$, $P=0.001$), contact pressure ($R=-0.673$, $P=0.001$) and peak force ($R=-0.574$, $P=0.008$). With regards to the acetabular base, at 60° flexion and 6mm resection there was a statistically significant increase in both base contact pressure ($393.90\% \pm 163.33$, $P=0.020$) and base peak force ($178.94\% \pm 75.7$, $P=0.026$). There was also a significant increase in base contact area after 8mm resection at 60° flexion ($408.15\% \pm 224.17$, $P=0.015$). At 60° flexion, rim-trim depth was significantly correlated to acetabular base contact area ($R=0.604$, $P=0.005$), contact pressure ($R=0.718$, $P<0.001$) and peak force ($R=0.593$, $P=0.006$)

Conclusion: Resecting more than 4-6 mm of bone in an acetabular rim trimming hip arthroscopy procedure may dramatically increase hip joint contact pressures and predispose patients to early osteoarthritis via creation of an iatrogenic acetabular dysplasia. In dysplastic or borderline dysplastic hips, the amount of safe resection may be even less.



7.

Publishing Title: 15 Year Survival Of Endoscopic Anterior Cruciate Ligament Reconstruction In Patients Aged 18 Years And Under

Author Block: Leo A. Pinczewski, FRACS¹, Matthew Morgan, MBBS², Lucy J. Salmon, PhD¹, Alison Waller, BAppSci(Physio)¹, Simon Thompson, MBBS BSc(Hon) MSc FRCS(Tr & Orth)¹, **Justin P. Roe, MBBS, FRACS¹**.

¹North Sydney Orthopaedic and Sports Medicine Centre, Sydney, Australia, ²University of Notre Dame, Sydney, Australia.

Objectives: The incidence and risk factors for further anterior cruciate ligament (ACL) injury after ACL reconstruction have been examined in adults but not in juveniles. The aim of this study was to determine the long term survival of the ACL graft and the contralateral ACL (CACL) after primary reconstruction in those 18 years and under, and to identify the factors that increase the odds of subsequent ACL injury over the long term.

Methods: All patients having undergone primary ACL reconstruction at the age of 18 or less between January 1993 and December 1998 by a single surgeon in a single unit were considered. ACL reconstruction was performed using a single-incision endoscopic technique with either autologous bone-patellar tendon-bone graft (BPTB) or hamstring tendon graft (HT). Femoral tunnel drilling was performed via the anteromedial portal. Patients were contacted to complete a subjective interview by telephone or online questionnaire at a minimum of 15 years after the index surgery.

Abstract Body:

Results: A total of 288 juveniles met the inclusion criteria of which 237 (82%) were reviewed at a mean of 16.6 years after ACL reconstruction. The mean age at the time of surgery was 16 years (13-18). Subsequent ACL injury occurred in 29% of juveniles. 16% of suffered an ACL graft rupture, 19% suffered a CACL rupture and 5% ruptured both the graft and CACL. Expected survival of the ACL graft after reconstruction was 93%, 89%, 87% and 85% at 2, 5, 10 and 15 years, respectively. Expected survival of the CACL was 97%, 90%, 84% and 82%, respectively. Survival of the ACL graft was less favourable in those with a positive family history (73% versus 91%, $p = .001$). Survival of the CACL was less favourable in males than in females (77% versus 87%, $p = .05$). Graft source, age at surgery and graft diameter did not significantly increase the odds of graft or CACL rupture. The mean International Knee Documentation Committee (IKDC) subjective score at 15 years was 88. Return to preinjury sport level was reported in 69% of patients and 65% were still participating in strenuous or very strenuous activities at a mean 16 years post-reconstruction.

Conclusion: After ACL reconstruction in those aged 18 years or less, further ACL injury occurred to 1 in 3 over 15 years. The expected 15 year survival of the ACL graft was 85% and expected 15 year survival of the CACL was 82%. Family history of ACL rupture significantly increased the odds of ACL graft rupture. CACL injury was more common in males than females. High subjective scores and continued participation in sports were maintained over the long term after ACL reconstruction in the juvenile population.

8.

Publishing Title: A Prospective Randomized Comparison using MRI of Two Distinct Allogenic Tissue Constructs for Anterior Cruciate Ligament Reconstruction

Author Block: **Michael Rose, MD**, Mehwish Farooqi, BS, Samantha Quilici, PA-C, Dennis C. Crawford, MD, PhD. Oregon Health and Science University, Portland, OR, USA.

Objectives: To compare the radiographic and clinical outcomes of anterior cruciate ligament (ACL) reconstruction using quadrupled hamstring tendon (HT) allograft vs. doubled tibialis anterior (TA) allograft.

Abstract Body:

Methods: Methods: A prospective randomized controlled trial (PRCT) at a single center was conducted with enrollment from 7/2010 to 4/2012. One hundred subjects undergoing primary ACL reconstruction were randomized to either HT or TA allograft (47 vs. 53, respectively). Subjects completed KOOS, IKDC, Tegner, VR-12, and Lysholm outcomes measure pre-operatively, and then post-operatively at the

6 month and 24 month time period. Arthrometric testing using KT-1000 (MEDmetric® Corporation) was applied at 6 months post-operatively. At this time patients also underwent MRI to evaluate allograft integrity and ligamentization. The signal to noise quotient (SNQ) was calculated via the Impax markup tool (Afga HealthCare®) using sagittal non-contrast T2 weighted MRI (Figure 1) as follows: $SNQ = \frac{\text{Signal graft} - \text{Signal Quadriceps}}{\text{Signal Background}}$

Results: MRIs were obtained in the HT (n=22, 53%, 205.6 ± 35.7 days) and TA (n=23, 47%, 187.3 ± 26.0 days) groups. The average SNQ for the HT and TA allografts were 2.94 ± 3.03 and 4.14 ± 3.64, respectively (p = 0.12). There was no correlation between MRI SNQ and subject age, BMI, sex, graft diameter or smoking status. With arthrometric testing there was a trend for the HT allografts to have increased laxity as compared to contralateral side but the magnitude of difference was not clinically relevant (average 0.88 vs. 0.40mm, respectively). At an average of 2.4 ± 0.4 years there was no difference detected between groups in any of the outcomes scores with each showing improvement from baseline (Table 1). Allograft re-tear rates were similar between groups (9.5% HT vs. 4.5% TA, p=1.0).

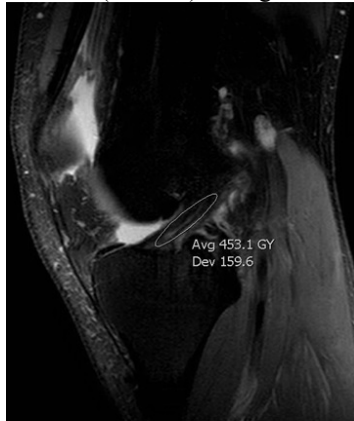


Figure 1. Representative MRI of reconstructed ACL. A standard ellipse demarcating the intra-articular portion of the graft was defined for analysis. The sagittal non-contrast T2 weighted MRI cut containing the largest portion of the reconstructed ACL was used for analysis. The signal to noise quotient (SNQ) was calculated for each graft.

Patient Reported Outcomes	Pre-Operative		24 Months Post-Op		Change from Baseline	
	HT	TA	HT	TA	HT	TA
IKDC ¹	45.9 ± 18.6	43.0 ± 14.5	76.7 ± 20.5	81.1 ± 12.6	27.4 ± 23.4*	38.2 ± 21.4*
VR-12 Physical ²	38.0 ± 9.6	35.7 ± 11.6	50.3 ± 8.5	53.1 ± 4.1	10.8 ± 10.6*	20.8 ± 17.0*†
KOOS ³	53.0 ± 19.1	49.4 ± 16.8	76.0 ± 21.3	81.2 ± 9.9	22.2 ± 20.0*	30.9 ± 19.2*
Lysholm ⁴	63.0 ± 20.2	56.1 ± 18.3	79.5 ± 20.2	86.0 ± 13.0	15.8 ± 25.4*	28.0 ± 22.2*
Tegner ⁵	2.6 ± 1.7	2.6 ± 1.3	5.7 ± 1.9	5.0 ± 1.7	3.2 ± 2.2*	3.5 ± 1.8*

Table 1. Patient Reported Outcomes. All values represent mean score ± standard deviation. *Statistically significant change from baseline, p<0.05. † Statically significant difference in change compared to HT group. 1. International Knee Documentation Committee Subjective Knee Score, score of 100 represents no limitation in activities of daily living. 2. Veteran Rand 12 Item Health Survey, Physical Health component, lower score represent decreased quality of life 3. Knee Injury and Osteoarthritis Outcomes Score, score of 0 represents extreme knee problems and 100 represents no problems 4. Lysholm Knee Score, score of 93-100 represent good to excellent ability to manage in everyday life; less than 65 represents poor ability 5. Tegner Activity Score with Level 10 being a professional athlete and level 0 being disabled from work.

Conclusion: Limited data exists directly comparing different ACL allograft soft tissue constructs. Specifically, to the author’s knowledge this is the first prospective RCT comparing quadrupled

hamstring tendon and doubled tibialis anterior allografts. Our data indicate no difference in graft failure rate, rate of ligamentization, and similar significant improvement from baseline with respect to subjective outcomes scores between each treatment group after more than two years.

9.

Publishing Title: Arthroscopic Repair of Anterior Labroligamentous Periosteal Sleeve Avulsion Lesions Does Not Have an Increased Failure Rate Compared to Arthroscopic Bankart Repair

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Objectives: Anterior labroligamentous periosteal sleeve avulsion lesions (ALPSA) have been identified as a potential risk factor for failure of an arthroscopic labral repair. The objective of this study was to compare the failure rates and clinical outcomes of arthroscopic ALPSA repair to arthroscopic Bankart repair. Additionally, the role of glenoid bone loss on failure rates was analyzed within each group.

Methods: This was a retrospective review of 72 consecutive patients with anterior shoulder instability (73 shoulders) who underwent an anterior arthroscopic labral repair at a single military institution by one of three Sports medicine fellowship trained orthopaedic surgeons. At the time of surgery, a diagnostic arthroscopy identified 13 (17.8%) ALPSA lesions and 60 (82.2%) isolated Bankart lesions. All lesions were repaired and placed on standard post-operative protocol. Data was collected on demographics, the Western Ontario Shoulder Instability (WOSI) score, SANE score, and recurrence rates. Failure was defined as recurrent dislocation. Additionally, glenoid bone loss in all patients was calculated using a standardized technique on preoperative images. Outcomes were analyzed by type of initial lesion. The effect of bone loss on failure rate was analyzed between and within groups.

Abstract Body:

Results: The average age at surgery was 26.3 years (range, 20-42) with an average follow-up of 53.3 months (range, 28-63). There were 13 distinct ALPSA lesions and 60 Bankart lesions identified on diagnostic arthroscopy. There were no significant differences between groups with respect to any demographic data. There was 1 failure (7.7%) in the ALPSA group and 8 failures (13.3%) in the Bankart group (p=0.10). There was no significant difference between groups for WOSI or SANE scores. There was no significant difference in glenoid bone loss between groups. The ALPSA group had 13.1% glenoid bone loss compared to 13.5% in the Bankart group (p=0.88).

Conclusion: Contrary to previously published data, we did not find patients with ALPSA lesions to be at an increased risk for failure of an arthroscopic repair compared to an isolated Bankart repair, nor was there a difference in functional outcomes between groups. Finally, the presence of an ALPSA lesion was not predictive on increased glenoid bone loss in this population.

Publishing The effects of ACL deficiency on meniscal deformation and kinematics

Title:

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Objectives: The meniscus plays a vital role in knee load transmission by increasing the tibiofemoral joint contact area and distributing the joint forces within the medial and lateral compartments. Clinically, anterior cruciate ligament (ACL) injuries are commonly concomitant with tears of the lateral meniscus. In isolated ACL tears, it is likely that meniscal behavior is affected as a result of altered tibiofemoral kinematics. However, little is known regarding the effects of acute ACL injury on meniscal translation and deformation. A method combining implanted radiopaque marker beads, dynamic stereo x-ray (DSX) and advanced imaging was designed to investigate meniscal kinematics and deformation in both ACL-intact and -deficient states.

Methods: Six fresh frozen human cadaveric knees were screened with fluoroscopy to ensure the specimens were free of osteoarthritis. MRIs were acquired to generate 3D tibial models and meniscal roots were identified and mapped onto the model. Six 1.0 mm diameter steel beads were injected into the medial and lateral meniscus (Fig. 1) using minimally invasive surgical techniques and a RSA bead injector. Three additional beads each were implanted into the femur and tibia for bone tracking. CT scans were then obtained and used to create 3D femur and tibia models. The specimens were then potted with the quadriceps tendon isolated, for use in a custom-designed knee press. DSX images were collected at 30 frames/s while the specimens underwent dynamic flexion under half body weight from 10 to 40 degrees. The ACL was then transected arthroscopically and testing was repeated. Meniscal translation and deformation were analyzed by combining 3D models with DSX data. A least-squares-fitted ellipse (Fitzgibbon, 1999) was generated based on six meniscal beads and two centroids of the meniscal roots for the medial and lateral meniscus respectively (Fig. 1). The meniscus kinematics was quantified by the translation of the center of the ellipse, and the circumferential deformation was represented by the changes in the elliptical arc length. The arc lengths of four regions were calculated: total (posterior root to anterior root), posterior horn (posterior root to the adjacent bead), anterior horn (anterior root to the adjacent bead), and middle region (first to last beads). The translation and deformation of the meniscus were compared between ACL-intact and ACL-transected states.

Abstract Body:

Results: The differences in meniscal translation and deformation between the two states are shown in Table 1. The differences didn't vary markedly during the common knee flexion angles (10 to 40 degrees). The center of the ellipse translated approximately 1 mm posteriorly in the ACL-transected state for both menisci. The total arc length increased by an average of 2.2 mm in the lateral meniscus compared to 0.5 mm in the medial. Interestingly, the posterior horns underwent greater change in arc length compared to the anterior horns (lateral meniscus: 1.2 mm vs. 0.4 mm; medial meniscus: 1.1 mm vs. 0.1 mm).

Conclusion: Following ACL-transection, both menisci translate approximately 1mm posterior under dynamic physiologic loading conditions. Additionally, the posterior horns of both menisci experience greater deformation than the anterior horns. This cadaveric study demonstrates altered biomechanics of the menisci during knee flexion in the setting of acute ACL deficiency. We also plan to investigate the effect of this altered meniscal function/motion on cartilage deformation.

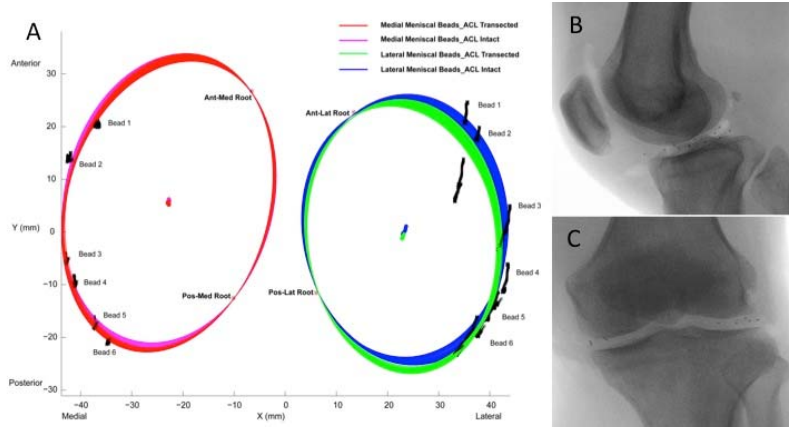


Figure 1. A) Schematic of least-squares-fitted ellipse for one representative specimen. B) Lateral fluoroscopic view of a knee with implanted meniscal beads. C) Anteroposterior fluoroscopic view of a knee implanted with meniscal beads.

Meniscal Translation and Deformation				
ACL_Intact - (minus) ACL_Transected	Over a Flexion range of 10 to 40 degrees Mean	Standard Deviation	Minimum	Maximum
Center of Ellipse_Lateral Meniscus (mm): X (Lateral +, Medial -)	1.06	0.86	0.58	1.20
Y (Anterior +, Posterior -)	1.15	0.50	0.87	1.38
Center of Ellipse_Medial Meniscus (mm): X (Lateral +, Medial -)	0.34	0.78	-0.56	2.06
Y (Anterior +, Posterior -)	1.02	0.56	0.02	2.54
Arc Length_Lateral Meniscus (mm) Total	2.23	2.64	-7.75	6.88
Anterior Horn; Posterior Horn	-0.39; 1.26	1.91; 1.99	-5.19; - 4.80	2.89; 4.95
Arc Length_Medial Meniscus (mm) Total	0.55	1.40	-2.38	3.81
Anterior Horn; Posterior Horn	-0.14; -1.06	2.74; 2.48	-6.41; - 7.77	4.52; 2.13

11.

Publishing All-Arthroscopic Supraperacrotal versus Open Subpectoral Tenodesis of the Long Head of the Biceps

Title: Brachii

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Objectives: Pathology of the long head of the biceps tendon is a recognized source of shoulder pain in adults that can be treated with tenotomy or tenodesis when non-operative measures are not effective. It is not clear whether arthroscopic or open biceps tenodesis has a clinical advantage. To date, we are not aware of any studies that directly compare clinical outcomes between an arthroscopic and an open technique for tenodesis of the long head of the biceps brachii. The purpose of this study was to determine whether a difference in outcomes and complications exists between matched cohorts after biceps tenodesis utilizing an open subpectoral versus an all-arthroscopic supraperacrotal technique.

Methods: A prospective database was reviewed for patients undergoing an all-arthroscopic supraperacrotal or open subpectoral biceps tenodesis. Adult patients with a minimum 18-month follow-up were included. Patients undergoing a concomitant rotator cuff or labral repair were excluded. The groups were matched to age within 3 years, sex, and time to follow-up within 3 months. Pain improvement, development of a popeye deformity, muscle cramping, post-operative ASES scores, satisfaction scores, and complications were evaluated.

Results: Forty-six patients (23 all-arthroscopic, 23 open) patients with an average age of 57.2 years (range, 45-70) were evaluated at a mean 28.7 months (range, 18-42) follow-up. No patients in either group developed a popeye deformity or complained of arm cramping. There was no significant difference in mean ASES scores between the open and all-arthroscopic groups (92.7 vs. 88.9, P = 0.42, Table 1). Similarly, there was no significant difference between patient satisfaction scores (8.9 vs. 9.1, P = 0.73). Eighteen patients (78.3%) in the arthroscopic cohort and sixteen patients (69.6%) in the open cohort fully returned to athletic activity (P = 0.50). There were no complications in the all-arthroscopic group. There were two complications in the open group (superficial incisional erythema, and brachial plexopathy) that resolved by final follow-up.

Abstract Body:

Conclusion: Biceps tenodesis is a reliable treatment option for pathology of the long head of the biceps that may avoid arm cramping and a cosmetic “popeye” deformity that can occur following tenotomy. Open subpectoral and all-arthroscopic supraperacrotal are two commonly used techniques to reattach the biceps tendon distal to the bicipital groove. In this study, patients undergoing an all-arthroscopic tenodesis experienced similar pain relief, shoulder function, and return to athletic activity as patients undergoing an open tenodesis. An open subpectoral technique may increase the risk of complications secondary to a larger incision and increased surgical dissection. Larger studies with longer follow-up would help delineate the long-term effects and potential differences between an all-arthroscopic supraperacrotal and open subpectoral biceps tenodesis.

Table 1: Patient Demographics and Outcomes after Arthroscopic or Open Biceps Tenodesis

Demographics	All-Arthroscopic Tenodesis				Open Subpectoral Tenodesis				t-test
	Average	SD	Range (min-max)		Average	SD	Range (min-max)		P-value
Age (years)	57.3	6.8	45	69	56.9	6.7	46	70	0.88
Follow-up (months)	30.4	7.3	21.1	44.9	29.9	6.3	21.7	42.6	0.81
Outcome Scores	Mean	SE	95% CI		Mean	SE	95% CI		P-value
ASES (0-100)	88.9	3.4	81.7	96.1	92.3	3.2	85.7	99.5	0.42
Satisfaction (1-10)	9.1	0.3	8.5	9.6	8.9	0.3	8.4	9.5	0.73

SD = Standard Deviation, SE = Standard Error, CI = Confidence Interval, ASES = American Shoulder and Elbow Score

12.

Publishing Title: Clinical Outcomes Following Revision Shoulder Arthroscopic Capsulolabral Stabilization

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Objectives: The purpose of this study was to assess clinical outcomes in patients following revision shoulder arthroscopic capsulolabral stabilization. The hypothesis was that revision arthroscopic stabilization would offer predictable clinical outcomes in appropriately selected patients.

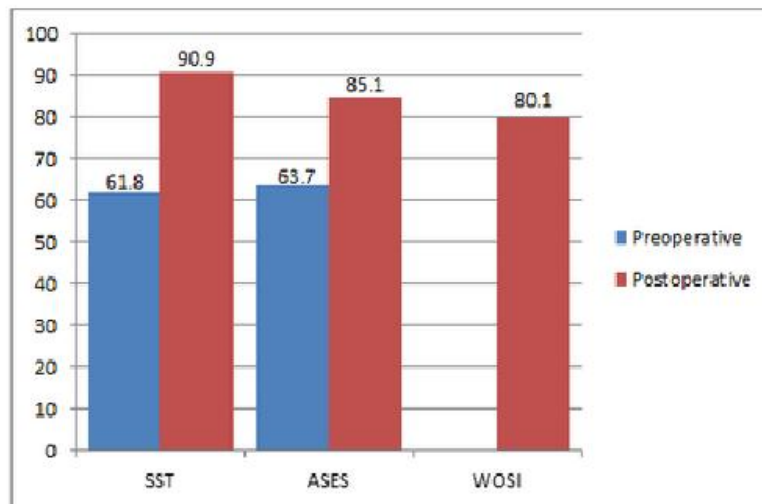
Methods: Sixty-two patients (63 shoulders) with failure of primary instability repairs were treated with revision arthroscopic shoulder stabilization at a mean follow-up of 46.9 ± 16.8 months (range, 15-78). Forty-six male patients and 16 females with a mean age of 23.2 ± 6.9 years (range, 14.7 - 47.2) met the inclusion criteria for the study. Revision arthroscopic stabilization was indicated in patients with recurrent instability with limited glenoid bone loss. Clinical outcomes were evaluated using validated patient reported outcome questionnaires including the American Shoulder and Elbow Surgeons score, Simple Shoulder Test, visual analog pain scale and Western Ontario Shoulder Instability Index. In addition, patients were queried for recurrent instability events (subluxation or dislocation) or revision surgery.

Results: At final follow-up, the mean post-operative Western Ontario Shoulder Instability normalized score was 80.1 (range, 15.0 - 100). There were clinically significant improvements in American Shoulder and Elbow Surgeons scores from 63.7 pre-operatively to 85.1 post-operatively (P < 0.001), Simple Shoulder Test scores from 61.8 pre-operatively to 90.9 post-operatively (P < 0.001), and VAS pain scores from 2.89 pre-operatively to 0.81 post-operatively (P < 0.001). Recurrent instability occurred in 12 shoulders (19.0 %), with number of prior surgeries and hyperlaxity found to be significant risk factor for failure (P < 0.001 and P = 0.04, respectively).

Conclusion: Arthroscopic revision stabilization of the shoulder can result in satisfactory outcomes in patients who have failed previous capsulolabral repair. Increased number of prior surgeries and hyperlaxity are predictive of poor outcome. Longer-term studies are required to determine whether similar results are maintained over time, and to provide guidance on focused clinical indications.

Abstract Body:

Patient Reported Outcomes following Revision Stabilization



13.

Publishing Meniscal and Articular Cartilage Predictors of Clinical Outcome following Revision ACL

Title: Reconstruction

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Objectives: Revision ACL reconstruction has been documented to have worse outcomes compared with primary ACL reconstructions. The reasons why remain unknown. The purpose of this study was to determine if both the prevalence and/or degree of meniscal and chondral damage noted at the time of ACL revision reconstruction predicts activity level, sports function, and OA symptoms at two year follow-up.

Methods: Revision ACL reconstruction patients were identified and prospectively enrolled between 2006 and 2011. Data collected included baseline demographics, surgical technique and pathology, and a series of validated patient reported outcome instruments (IKDC, KOOS, WOMAC, and Marx activity rating score). Patients were followed up for 2 years, and asked to complete the identical set of outcome instruments.

Regression analysis was used to control for age, gender, BMI, smoking status, activity level, baseline outcome scores, revision number, time since last ACLR, previous and current meniscal and articular cartilage pathology, in order to assess the meniscal and AC pathology risk factors for clinical outcomes 2 years after revision ACL reconstruction.

Results: 1205 patients met the inclusion criteria and were successfully enrolled. 697 (58%) were males, with a median cohort age of 26 years. The median time since their last ACL reconstruction was 3.4 years. Surgeons noted previous pathology in the medial meniscus (39%), lateral meniscus (20%), and articular surfaces (12%) at the time of revision surgery. Surgeons reported current pathology in the medial meniscus (45%), lateral meniscus (37%), MFC (43%), LFC (29%), MTP (11%), LTP (17%), patella (30%), and trochlea (20%).

**Abstract
Body:**

At 2 years, follow-up was obtained on 82% (989/1205). Previous meniscal pathology (both medial and lateral), as well as current AC pathology (in the MFC, LFC, MTP, LTP, and trochlea) were found to be significant drivers of poorer outcomes at 2 years (Table 1). The most consistent cartilage-related factors driving outcome in revision patients were previous lateral meniscus pathology and current trochlea AC pathology. Having a previous excision on the lateral meniscus resulted in significantly poorer outcomes on the IKDC (odds ratio=1.69; 95% CI=1.16-2.44; p=0.005), all KOOS subscales (OR range=1.54-2.08; 95% CI=1.04-3.03; p<0.029), and all WOMAC subscales (OR=1.56; 95% CI=1.06-2.27; p=0.02).

Having a current Grade 3-4 AC chondrosis of the trochlea resulted in significantly poorer outcomes in the IKDC (OR=1.89; 95% CI=1.25-2.94; p=0.003), 4 of 5 KOOS subscales (OR range = 1.64-2.70; 95% CI=1.09-4.17; p<0.02), and 2 of 3 WOMAC subscales (OR range = 1.61-2.70; 95% CI=1.04-4.17; p<0.03).

Lower baseline outcome scores, lower baseline activity level, and shorter time since the patient's last ACL reconstruction all significantly increased the odds of reporting poorer clinical outcomes at 2 years. Meniscal and AC pathology was not found to be a significant risk factor for 2 year activity levels.

Interestingly, previous AC pathology and current meniscal pathology were not found to be significant risk factors for 2 year outcomes in this revision cohort.

Conclusion: Having a previous meniscal excision, as well as grade 3-4 chondral damage noted at the time of ACL revision reconstruction results in decreased sports outcome scores and worse WOMAC scores at two years following revision surgery. However, incidence of meniscal and AC pathology was

not found to be a predictor of a patient's activity level at 2 years.

Table 1. Significant Predictors at 2 Years (p values)

Structure	Marx Activity	KOOS					IKDC	WOMAC		
		Symptoms	Pain	ADL	Sports/Rec	QoL		Stiffness	Pain	ADL
Meniscus (previous pathology)										
Medial			0.002				0.035			
Lateral		0.008	0.042			<0.001	0.038	0.03	0.032	
Meniscus (current pathology)										
Medial										
Lateral										
Articular Cartilage (previous)										
Yes /No										
Articular Cartilage (current)										
Medial Femoral Condyle (MFC)			0.018						0.012	
Lateral Femoral Condyle (LFC)				0.048						0.048
Medial Tibial Plateau (MTP)					0.004					
Lateral Tibial Plateau (LTP)										
Patella										
Trochlea			0.034	<0.001	0.011		0.01			<0.001

14.

Publishing Title: Characterizing Patterns In Patellar Maltracking On Dynamic Kinematic CT Imaging

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Objectives: Patellar maltracking has been traditionally difficult to assess due to its dynamic component. Unlike the assessment of malalignment, which relies on static radiographic measurements, maltracking is a dynamic phenomenon described subjectively with the J sign. The advent of dynamic, kinematic computed tomographic imaging (DKCT) has allowed for the dynamic assessment of the patellofemoral joint. We used DKCT to visualize and quantify patterns of patellar maltracking and correlated these findings with the presence or absence of symptoms of patellar instability.

Methods: 76 knees in 38 subjects were analyzed using DKCT. Measurements of bisect offset at 10° intervals of knee flexion were performed for each knee during active flexion/extension cycles. Patterns in bisect offset were assessed and graded in terms of 1, 2 or 3 quadrants of lateral patellar motion, based on 75-100, 100-125, and >125% bisect offset. The presence or absence of symptomatic patellar instability were recorded for each knee, and ratios of patients with symptoms were calculated for J sign tracking patterns of grades 1, 2 and 3. Differences in ratios between Grades 1, 2 and 3 were calculated using chi squared analysis.

Abstract Body:

Results: 76 knees were available for analysis, of which 51 had symptomatic patellar instability. 9 knees demonstrated normal patterns of tracking. 58 knees demonstrated increased lateral translation in extension. 7 knees showed persistent lateralization of the patella throughout range of motion, and 2 knees showed increased translation in flexion. In the 58 knees that showed maximal lateral translation in extension (J sign), the J sign was graded as 1(N=24), 2 (N=20) and 3 (N=14). The sensitivities of J sign grades in predicting patellar instability were 45.8% (J1), 80% (J2), and 92.9% (J3) (p<0.01), with statistically significant differences between Grades 1 and 2/3 (0=0.018).

Conclusion: On DKCT imaging, we noted additional patterns of patellar maltracking besides the standard J sign. Of those with maltracking in extension (J sign), Grade 2 and 3 J signs with > 2 quadrants of patellar lateralization in extension were predictive of symptomatic patellar instability. Further understanding of patellar maltracking patterns can provide the clinician with information regarding the pathoanatomy and pathophysiology of patellar instability, and allow us to better plan for surgical stabilization.

15.

Publishing Title: Medial Meniscus Root Repair: Are We Healing and How Do We Tell?

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Author Block: ¹Rothman Institute of Orthopaedics, Egg Harbor Township, NJ, USA, ²Rothman Institute of Orthopaedics, Egg Harbor Twp, NJ, USA, ³Atlantic Medical Imaging, Galloway, NJ, USA.

Objectives: Meniscus root tears are associated with loss of hoop stress, increased peak pressure, and reduction in contact area of the affected compartment of the knee. Reversal of this outcome is predicated on the successful restoration of the meniscus through biologic healing to the tibial attachment. The purpose of this investigation was to evaluate the biologic healing of meniscus root tears through high resolution MRI and correlate this appearance to clinical outcome

Methods: Nine patients were identified as having undergone a medial meniscus root repair using an identical pull-out surgical technique by a single surgeon. Outcomes were determined using Lysholm and WOMAC scores and quality of meniscus healing was assessed using a 3 Tesla MRI. MRI studies were reviewed by two fellowship trained musculoskeletal radiologists according to pre-defined criteria.

Abstract Body: **Results:** There were 4 females and 5 males in the study group. The average follow-up time was 30 months (range 21-41). MRI demonstrated a new tear medial to the prior repair in 4/9 patients. 4 patients demonstrated recurrence of tear or lack of biologic healing of the root attachment. In patients with recurrent tears of the root, meniscal extrusion averaged 1.5mm. In patients with evidence of healing, extrusion averaged 1.0mm. The average WOMAC and Lysholm scores were 11.2 and 81.6 respectively. There was no correlation between healing and clinical outcome scores in this series.

Conclusion: 4 of 9 patients demonstrated recurrent tearing of the meniscus root. There was an increase in peripheral meniscus tears away from the repair in 4/9 patients, indicating excessive stress induced by the repair. Successful repair and healing was associated with decreased meniscus extrusion; however, this did not correlate with functional outcome scores, indicating that biologic healing is not a pre-requisite for good clinical outcome. A similar finding has been shown in studies evaluating rotator cuff repair.

16.

Publishing Title: Anterior Cruciate Ligament Reconstruction with Bone-Patellar Tendon-Bone Autograft Versus Allograft in Young Patients

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Objectives: Traditionally, bone-patella tendon-bone (BTB) autograft has been the gold standard graft choice for younger, athletic patients requiring ACL reconstruction. However, donor site morbidity, post-operative patella fracture, and increased operative time have led many surgeons to choose BTB allograft for their reconstructions. Opponents of allografts feel that slower healing time, higher rate of graft failure, and potential for disease transmission makes them undesirable graft choices in athletic patients. The purpose of this study is to evaluate the clinical outcomes, both subjective and objective, of young patients that who have undergone either BTB autograft or allograft reconstructions with a minimum of 2-year follow-up.

Abstract Body: **Methods:** One hundred and twenty patients (60 autograft, 60 allograft), age 25 and below at time of surgery, were contacted after being retrospectively identified as patients having an ACL reconstruction with either a BTB allograft or autograft by one senior surgeon. Patients were administered the Lysholm

Knee Scoring Scale and IKDC Subjective Knee Evaluation questionnaires. Fifty (25 BTB autograft and 25 BTB allograft) of the 120 returned for physical examination as well as completion of a single leg hop test and laxity evaluation using a KT-1000 arthrometer evaluation. Of the 120 patients contacted, there were a total of 7 failures (5.8%) requiring revision, 6 in the allograft group (86%) and 1 in the autograft group (14%).

Results: The average Lysholm scores were 89.0 and 89.56 and the average IKDC scores were 90.8 and 92.1 in the autograft and allograft groups respectively. The differences in the Lysholm scores and the IKDC scores were not significant. The single leg hop and KT-1000 scores were also not significantly different. One autograft patient had a minor motion deficit. Three allograft patients had a grade 1 Lachman and pivot glide. One autograft patient and two allograft patients had mild patellafemoral crepitus. There was no significant difference in anterior knee pain between the two groups

Conclusion: There is no significant difference in patient-rated outcome between ACL reconstructions using BTB autografts versus allografts. However, the overall study group did reveal an increased failure rate requiring revision in the allograft group.

17.

Publishing Successful Conservative Therapy in Rockwood Type

Title: V Acromioclavicular Dislocations

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Objectives: Acromioclavicular (AC) joint injuries are common and constitute approximately 9% of all shoulder injuries. Traditionally Rockwood Types IV, V, and VI AC dislocations are indicated for surgery, type III dislocations are controversial, and type I and II are treated non-operatively. Our objective is to determine the success of non-operative treatment in Type V AC dislocations in active duty service members who must continue to do push-ups, pull-ups, bear weight, and wear ruck-sacks among other demanding activities requiring upper body strength in order to maintain current employment and lifestyle.

**Abstract
Body:**

Methods: A retrospective review was conducted using an automated search of electronic patient medical records from March 2007 through March 2012 for patients diagnosed with an AC dislocation in the Tripler Army Medical Center Department of Orthopedics. Patients were excluded who were not active military at the time of injury or who were tertiary referrals. Radiographs were reviewed and comparison was made to the contralateral shoulder. A Type V injury was defined as greater than 100% increase in the coracoclavicular distance compared to the contralateral side or greater than 2cm of displacement unilaterally. Acute repair was defined as repair within 90 days without a trial of conservative therapy. Failure of conservative therapy was defined as being unable to return to full duty. A good outcome was defined as a return to full duty without limitations

Results: 103 patients were identified with 60 patients having a bilateral shoulder films. Normal CC distances of the uninjured shoulder ranged from 4.3 mm to 18.66 mm with a mean of 9.09 mm and a standard deviation of 2.30 mm. 34 patients were Type V dislocations. 5 patients were tertiary referrals and were excluded. Acute surgical AC reconstruction was selected in 8 patients, initial conservative therapy in 21. In the conservative group: 11 patients (61%) returned to duty without surgery (average 97.8 days); 5 patients had delayed surgery and returned to full duty (average 135.2 days after surgery, 1 revision); 1 was medically separated for this injury; 1 was considered a failure and elected to change his career; and 3 patients were lost to follow up. In the acute surgical group: 6 patients returned to full duty in an average of 169.3 days after surgery (mean time to surgery 28.29 days) with 3 of those requiring revision surgery; 1 patient was lost to follow up, 1 patient failed to return to full duty. In the conservatively treated group,

there was no association between failure rates and increase in CC distance or mm of displacement ($p=0.32$ and 0.69 respectively).

Conclusion: While numerous studies have evaluated the operative versus non-operative treatment of type III injuries in both a prospective and retrospective manner, no study to date has reported on the conservative treatment of type V AC dislocations. In this study we report on conservative treatment being successful in a majority of patients and that the average time to return to duty was not improved in an acute versus delayed surgical intervention. While more study is needed, this suggests that type V AC dislocations may be given a trial of conservative therapy. Secondarily we report on an increased range of the normal CC interspace (previously reported 1.1-1.3cm).

18.

Publishing Title: Does Relief from Intra-articular Anesthetic Injection Predict Outcome after Hip Arthroscopy?

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Objectives: Intra-articular (IA) anesthetic injection is commonly performed as a diagnostic test in the setting of femoroacetabular impingement (FAI). Currently, there is a paucity of data correlating post-injection pain relief and outcomes after hip arthroscopy for FAI. The purpose of this study is to determine whether the amount of pain relief after IA injection predicts clinical and functional outcomes following hip arthroscopy. We hypothesize that increased pain relief ($>50\%$) will correlate with better outcomes after surgery.

Methods: The records of patients undergoing hip arthroscopy for FAI at our institution between April 2007 and April 2012 were reviewed. We identified patients who underwent IA injection and subsequent hip arthroscopy. Inclusion criteria were: ultrasound or fluoroscopic guided intra-articular anesthetic injection performed at our institution, prospectively documented pre- and post-injection Numerical Rating Scale (NRS) pain scores, no prior ipsilateral hip surgery, and minimum 1 year follow-up. Pre-operative radiographs were reviewed and degree of osteoarthritis was determined using the Tonnis classification system. Outcomes were assessed with Modified Harris Hip Score (MHHS) and Hip Outcome Score (HOS). Univariate and multivariate models were performed to assess whether percent pain relief correlated with outcome scores.

Abstract Body: **Results:** 99 hips in 96 patients met our inclusion criteria and included 71 females (74%) and 25 males (26%) with a mean age of 37.5 ± 14.0 years. 26 patients had Tonnis grade 0, 55 had grade 1, and 18 had grade 2 (0 grade 3). Mean pain relief after IA injection was 73.6 ± 36.1 (range 0-100) percent. 26 patients (26%) had $\leq 50\%$ pain relief while 73 (74%) had $>50\%$ pain relief. Outcome scores were obtained at a mean 14.9 months. Mean MHHS, HOS-ADL, and HOS-Sport scores were 79.2 ± 17.3 , 82.6 ± 17.3 , and 67.4 ± 28.2 , respectively. There was no statistical correlation between percent pain relief and MHHS, HOS-ADL, or HOS-Sport scores. There was no significant difference in outcome scores between those with $\leq 50\%$ and $>50\%$ pain relief. While patients that received $>50\%$ pain relief by IA injection were more likely to achieve positive results (MHHS >70) with a likelihood ratio of 1.23 (95% CI 0.92-1.53), this was not significant. Multivariate regression analysis demonstrated no significant predictors of outcome, including age, gender, Tonnis grade, percent relief with IA injection, number of months postoperatively, or type of surgery.

Conclusion: In patients undergoing hip arthroscopy for FAI, our data indicates that the amount of pain relief from IA injection is a poor predictor of short term outcome, even when adjusting for chondral degeneration. While anesthetic injections can be an important diagnostic tool in select patients,

correlation of the clinical history, physical examination, and imaging findings are fundamental. In addition, outcome following hip arthroscopy remains multifactorial.