Summary: Distance mapping WBCT algorithms could detect syndesmotic instability in a cadaveric model with a high accuracy. Malreduction and subsequent positioning change after flexibilization were identified by the system. 3D WBCT algorithms might be an ample instrument in diagnosing tibiofibular instabilities.

Data: Introduction: Syndesmotic injury and subsequent malreduction can be devastating to the long-term health of the ankle joint. The objective of this cadaveric study was to develop a WBCT 3D distance mapping algorithm that would allow for detection of syndesmotic instability, different types of syndesmotic malreduction, as well as possible correction of malpositioning with flexible fixation. We hypothesized that this algorithm could detect syndesmotic instability, enable assessment of induced syndesmotic malreduction and gauge correction of malpositioning provided by flexible syndesmotic fixation. Methods: Four WBCT scans were obtained for each of 22 matched pairs (44 legs) of through-knee cadaveric specimens in a radiolucent frame under native normal, syndesmotic destabilization, rigid malreduction, and flexibilization conditions. A conventional limited lateral approach was used to destabilize the joint ahead of 4 controlled malreduction conditions: 5mm anterior displacement, 5mm posterior displacement, 15° of internal rotation, and over-compressed (140N). Fixation was performed with a single implant 20mm proximal to the ankle joint. Implant utilized allowed initial rigid screw-type fixation, followed by implant flexibilization similar to a suture-type fixation. Syndesmotic incusura and gutter distances were assessed using a 3D distance map algorithm. Results: Significant increases in mean syndesmotic distance was observed over the first centimeter of the syndesmosis from control to injured conditions. The largest changes were observed posteriorly with an average increase of 19% and averaged 1mm. Anterior increases were less pronounced at 11.8% in the first centimeter from the joint and averaged 0.5mm. Qualitatively, these changes were visually apparent in comparison distance maps. The increased distances observed more proximally at 3cm, 5cm, and 10cm from the joint were less pronounced. ROC analysis of injured specimens and contralateral intact limbs for the first 1cm proximally to the ankle joint found that this method achieved a diagnostic accuracy for syndesmotic instability of 90.75% (sensitivity of 85% and a specificity of 95%), at a threshold of 0.53mm difference in mean distances. Comparatively, when performing AOT for the treatment of OLT. Methods: All study protocols were approved by the Institutional Review Board at the senior author’s institution. A retrospective cohort study using chart review for AOT procedures on 117 patients were included in the current study including two hundred and seventeen patients. Results: Nine months after surgery, patients in the FHL transfer group were more likely to be able to return to normal activities (91% vs. 73%, p < 0.01). Thirty months after surgical treatment, we found no difference in ATRS, AOFAS, ATRA, ankle plantarflexion strength, Tegner activity scores between study groups. Overall complications were reported in 6 patients in the FHL group (10.3%) and in 8 patients in the PAR group (13.6%). No major neurovascular or skin complications were encountered. Conclusion: The current study demonstrated satisfactory and comparable results and complications when comparing isolated endoscopic FHL tendon transfer or percutaneous Achilles tendon repair in the surgical management of acute Achilles tendon ruptures. A significant tendency towards an earlier return to preinjury levels of activity in the FHL group were observed, especially at nine months postoperatively. Level of evidence: Level III

Category: Ankle/Foot/Calf

Clinical Outcomes Of Autologous Osteochondral Transplantation for Osteochondral Lesions of the Talus: An Age-Based Multivariable Analysis

Abstract ID# 22579

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Summary:
Autologous Osteochondral Transfer can be implemented in patients of all ages. Data: Introduction: Osteochondral lesions of the talus (OLT) are common injuries that are often found in patients with chronic disabling pain after ankle sprains. One treatment utilized for this injury is Autologous Osteochondral Transfer (AOT). There is disagreement and a lack of strong evidence about the impact of age on outcomes of AOT. The purpose of this study is to examine trends in patient characteristics and clinical outcomes that occur with age as a statistical variable when performing AOT for the treatment of OLT. Methods: All study protocols were approved by the Institutional Review Board at the senior author’s institution. A retrospective cohort study using chart review for AOT procedures on approximately 80 patients from 2006 to 2019 performed by a single surgeon. Clinical outcomes of patients were evaluated via FAOS scores for Symptoms, Pain, Activities of Daily Living, Sports and Quality of Life. A multivariable linear regression was used to assess the independent factors predictive of the first post-operative FAOS after AOT. The independent variables included in the model were pre-operative FAOS, age, defect size, whether the lesion was a shoulder lesion, cystic lesion, or a result of a traumatic injury, and whether the patient had a prior microfracture surgery. A p-value <0.05 was considered significant and 95% confidence limits (95% CL) for regression coefficient estimates (est.) were calculated. Results: 78 patients were included in the analysis with an average age of 35.5 ± 13.6. The average follow-up was 54.4 months ± 18.9 months, average pre-operative FAOS was 54.3 ± 19.4 and the average post-operative FAOS was 83.4 ± 13.6. The average defect size was 109.3 mm2 (std. dev. = 62.4 mm). 56 patients had a shoulder lesion, 24 had a prior microfracture surgery, 42 had a cystic lesion, and 27 had a prior traumatic injury. The multivariable linear regression showed that the pre-operative FAOS was associated with a higher post-operative FAOS (est., 95% CL: 0.16, 0.012 - 0.307; p = 0.034). Defect size (est., 95% CL: -0.05, -0.097 -0.003; p = 0.0358), having a shoulder lesion (est., 95% CL: -9.686, -15.448 - -2.688; p = 0.006), or having a prior microfracture surgery (est., 95% CL: -7.07, -13.118 - -1.021; p = 0.0226) were associated with a

Category: Ankle/Foot/Calf

Outcomes of Percutaneous Achilles Repair Compared with Endoscopic Flexor Hallucis Longus Tendon Transfer To Treat Achilles Tendon Ruptures

Abstract ID# 21345

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Summary:
Satisfactory and comparable results and complications were demonstrated when comparing isolated endoscopic FHL tendon transfer or percutaneous Achilles tendon repairs in the surgical management of acute Achilles tendon ruptures, although a slightly significant tendency towards an earlier return to preinjury levels of activity in the FHL group especially at nine months postoperatively.
lower post-operative FAOS. Conclusions: The main finding of this study is patient age was not an independent risk factor for inferior clinical outcomes after AOT for OLT. Additionally, having a cystic lesion, or having a lesion because of a traumatic injury were not significantly associated with post-operative FAOS. Having a shoulder lesion had the largest marginal effect on post-operative FAOS. These findings provide important information for providers when counseling and selecting patients for AOT procedure for treatment of OLT.

Category: Ankle/Foot/Calf

**M1 And M2 Monocytes In Concentrated Bone Marrow Aspirate As Predictive Biomarkers For Clinical Response After Foot And Ankle Procedures**

Abstract ID# 23283
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Summary: This study aims to determine how the M1:M2 monocyte ratio in cBMA affects clinical outcomes after foot and ankle procedures.

Data:
Introduction: Concentrated bone marrow aspirate (cBMA) is a biological adjuvant used during orthopedic surgery procedures to enhance tissue repair and modulate inflammation by delivering cells and signalling factors within a scaffold. Although previous studies have investigated both the pro- and anti-inflammatory cytokines within cBMA, little work has been completed determining how cBMA cellular populations impact patient outcomes. Monocytes are one such cell type found within cBMA with the capability to exist on a spectrum between pro-inflammatory M1 and anti-inflammatory M2 populations. The global ratio of M1:M2 monocytes increases in pro-inflammatory diseases. This study aims to determine how the M1:M2 monocyte ratio in cBMA affects clinical outcomes after foot and ankle procedures. We hypothesized that patients who produced an "anti-inflammatory" cBMA with a lower M1:M2 monocyte ratio at the time of injection would have improved clinical outcomes. Methods: The study proposal was reviewed and approved by an Institutional Review Board. Patients aged 18-85 years old undergoing a foot and ankle procedure with cBMA injection were offered enrollment into this study. Patients with a history of inflammatory disorders, corticosteroid use, cancer, and previous injections in the past year were excluded. Samples of peripheral blood (PB), bone marrow aspirate (BMA), and cBMA were collected during the procedure. The samples were analyzed by automated cell counting and multicolor fluorescence activated cell sorting with specific antibodies recognizing monocytes (CD14+CD16+) and the M1 (CD86+) and M2 (CD163+CD206+) populations within that monocyte population. Cytokine concentrations within the samples were evaluated with ELISA.

Clinical outcomes were assessed with Patient-Reported Outcomes Measurement Information System (PROMIS) Global-10 and Foot and Ankle Outcome Score (FAOS) questionnaires on the day of the procedure, at the 3-month, 6-month, and 1-year follow-up visits. Results Currently, 38 patients have been enrolled in the study. The mean age was 49.3 years (range 18-84 years). cBMA had a mean fold increase of 5.3±5.5 for all leukocytes, 7.0±6.0 for monocytes, 9.2±9.4 for lymphocytes, 3.4±4.0 for neutrophils, and 10.7±14.0 for platelets when compared to BMA. No significant differences in M1 monocyte levels were found between PB, BMA, and cBMA (p>0.5). M2 monocytes were significantly more prevalent in PB than in BMA (p=0.0008) and cBMA (p=0.0027). The ratio of M1:M2 monocytes across all subjects trended higher in cBMA compared to PB (p=0.18). The patient had a significant effect on M1 (p=0.0093), and M2 (p=0.0001) levels, as well as M1:M2 ratio (p<0.0001) in PB, BMA, and cBMA. ELISA results and patient outcome comparisons are pending full enrollment of all planned subjects into the study. Discussion: Conclusion Both the cells and cytokines found within cBMA are important for generating its site-directed effects. cBMA preparation enriches multiple leukocyte populations involved in inflammation modulation including M1 and M2 monocytes. Due to the over-abundance of adjuvant therapeutic options, predicting responders and non-responders to any given treatment is necessary to provide high-quality patient care at reduced costs. The results of this study will enable orthopedic surgeons to evaluate the quality of a CBMA preparation and determine which patients should receive cBMA versus an alternative therapy.


Abstract ID# 23292
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Summary: Inferior extensor retinaculum reinforcement does not improve clinical outcome scores in patients undergoing lateral ankle ligament stabilization.

Data:
Background: Ankle sprains are common musculoskeletal injuries and the lateral ligament complex, most notably the ATFL, is involved in 85% of cases. First line therapy is conservative, but up to 20% of ankle sprains will not resolve with conservative therapy and progress to chronic lateral ankle instability. Patients with chronic lateral ankle instability after failed conservative management often require surgical intervention. Various arthroscopic procedures have been introduced to restore lateral ankle stability. Some arthroscopic procedures involve repair of only the ATFL with suture anchors, while others involve a procedure similar to the traditional modified Brostrom and utilize reinforcement with the inferior extensor retinaculum (IER). Studies directly comparing different arthroscopic techniques are limited. Purpose: The purpose of this meta-analysis was to compare clinical outcomes of patients receiving different arthroscopic lateral ankle ligament stabilization procedures in which only the ATFL was repaired vs procedures involving a Brostrom-like repair with IER reinforcement. We hypothesized that clinical outcomes would be superior in patients receiving a Brostrom-like arthroscopic ankle stabilization with IER reinforcement. Methods: A systematic review per PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines was conducted. The search net 867 results. Two independent reviewers subsequently conducted exclusion by title and abstract, resulting in 59 studies. The remaining studies then underwent full-text review to confirm they met the appropriate inclusion and exclusion criteria. The reviewers cross-referenced inclusive studies for references to ensure no studies were missed in the initial search. 19 studies were included in the final analysis. To assess the relationship of type of surgical procedure (repair of only the ATFL or repair of the ATFL plus IER reinforcement) to reported clinical outcomes based on the American Orthopaedic Foot and Ankle Society (AOFAS) score, the Karlson and Peterson Scoring System for Ankle Function (KAFS), and the Visual Analogue Score (VAS), we used the standardized mean difference (SMD) with a 95% confidence interval (CI) of preoperative to postoperative scores as an effect size. The method of random-effects models was used to calculate the overall summary estimates. Results: 19 studies were included in this meta-analysis to compare clinical outcomes of arthroscopic procedures to restore lateral ankle instability. Improvement of AOFAS, KAFS, and VAS scores from preoperative to postoperative periods were compared across studies to assess patient outcomes. In the meta-regression model, the type of surgical procedure had no significant difference on the preoperative to postoperative SMD score of AOFAS (P.value=0.315), KAFS (P.value=0.373), and VAS (P.value=0.942). Conclusion: There is no significant difference in clinical outcomes for patients receiving arthroscopic lateral ankle stabilization with repair of only the ATFL (without IER reinforcement) or repair of the ATFL with IER reinforcement. Patients receiving either modification of ankle arthroscopic surgery should achieve excellent functional outcomes. Disclosures: Military Identification: Benjamin C Murray, LT, MC, USN, NMFTEP Non-research disclaimer: The views expressed in this abstract are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government. Research Disclaimer: The views expressed in this abstract reflect the results of research conducted by the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government. Copyright Statement: I am a military service member. This work was prepared as part of my official duties. Title 17 U.S.C. 105 provides that “Copyright protection under this title is not available