they may be eligible for nonoperative treatment. It remains unclear whether it is necessary to distinguish between weightbearing stable fractures with (SER4a) and without (SER4a) concomitant stress instability and treat them differently. We undertook this study to evaluate outcome non-inferiority of weightbearing stable Weber B fractures with concomitant gravity stress radiographs considered unstable (SER4a) and stable (SER2) after a consistent treatment protocol using functional orthoses and weightbearing allowed. Methods We performed a prospective, non-inferiority study on 149 patients with stable weightbearing radiographs. Gravity stress radiographs were used to classify fractures as stable (SER2, n=88) or partially unstable (SER4a, n=61). All participants were treated with a functional orthosis and weightbearing allowed and were followed for two years. The primary outcome was the Manchester-Oxford foot and ankle questionnaire (MOxFQ; range 0-100; lower scores indicate fewer symptoms). A non-inferiority margin was prospectively defined as 7.5 points. Secondary outcomes included the Olerud-Molander Ankle Score, assessment of ankle congruence of injured ankles versus uninjured side, treatment-related adverse events, and thromboembolic events. Results Primary outcome data were available from 144 out of 149 (96.6%) participants at two years. The between-group difference was 1.0 MOxFQ points in favour of the SER2 group (95% confidence interval -1.4 through 3.4, P = .397). These findings were consistent with non-inferiority. We found no appreciable between-group differences for any other outcome. Conclusions In Weber B fractures that are stable on weightbearing radiographs, nonoperative treatment using functional orthoses and weightbearing allowed leads to excellent and non-inferior outcomes comparing patients with concomitant stress test instability (SER4a) and with stress test stability (SER2). These findings suggest that all weightbearing stable Weber B fractures may be treated functionally with orthoses, and identification of gravity stress instability seem redundant.

Category: Ankle/Foot/Calf

Long-Term Patient Outcomes For Treatment Of Difficult Osteochondral Lesions Of The Talus With Particulated Juvenile Allograft Cartilage Implantation ± Calcaneal Autograft

Abstract ID# 23310
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Summary:
While patients with and without calcaneal bone graft showed improvement, patients without calcaneal bone graft incorporation had significantly greater improvement in functional outcome scores. Whether these differences are due to graft incorporation or larger lesion size is unclear.

Data:
INTRODUCTION: Osteochondral lesions of the talus (OCLT) are common traumatic injuries that can be difficult to treat. To date, long-term patient reported outcome measures (PROMs) of patients with particulated juvenile allograft cartilage implantation with or without calcaneal autograft have not been compared. METHODS: From 2010-2012, thirteen patients with difficult to treat OCLTs underwent arthroscopic-assisted implantation of particulated juvenile allograft cartilage (DeNovo NT®) with or without autogenous calcaneal bone grafting by a single surgeon. Inclusion criteria included at least two of the following: 1) shoulder lesions, 2) lesion size >107mm2 and/or deeper than 5mm. Patients were fully evaluated using physical examination, patient interviews, and PROMs. Pre-operative and post-operative PROMs were compared with a Mann Whitney test. RESULTS: When comparing patients in regards to calcaneal bone graft implantation, no difference in age (43.8 ± 14.0 vs. 48.9 ± 10.0yr.s, respectively; p-value =0.667), BMI (28.4 ± 6.7 vs. 29.5 ± 4.5kg/m2 respectively; p-value =0.834), pre-operative PROMs (minn=0.110) or follow-up (100.8 ± 14.6 vs. 107.7 ± 11.3months respectively; p-value =0.153) was noted. However, calcaneal bone graft patients did have a significantly larger lesion size (188.5 ± 50.9 vs. 118.7 ± 29.4mm2 respectively; p-value = 0.027). VAS score final follow-up improvement did not significantly differ between cohorts (p-value=0.889), nor did the FAAM ADL score (p-value=0.522). The FAAM Sports score improved significantly more for the DeNovo alone group compared to the bone graft cohort (p-value=0.032). The AOFAS score improvement did not differ between cohorts (p-value=0.944), however, the SF-36 PCS improved significantly more for the DeNovo alone group compared to the bone graft cohort (p-value=0.038). No intraoperative/periporative complications were observed with calcaneal bone grafting. DISCUSSION AND CONCLUSION: This is the first reported study to compare patient reported outcomes of particulated juvenile allograft cartilage alone compared to particulated juvenile allograft cartilage with calcaneal bone autograft, demonstrating positive post-operative, self-reported functional outcomes. While patients with and without calcaneal bone graft showed improvement, patients without calcaneal bone graft incorporation had significantly greater improvement in functional outcome scores. Whether these differences are due to graft incorporation or larger lesion size is unclear.

Category: Ankle/Foot/Calf

Sustained Clinical Success at 7 Years Follow-Up After Arthroscopic Lift-Drill-Fill-Fix (LDFF) Of Primary Osteochondral Lesions of the Talus

Abstract ID# 22580
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Summary:
Arthroscopic LDFF for fixable chronic primary OLTs results in excellent pain reduction and improved functional outcome, with sustained results at long-term follow-up. These results indicate surgeons may consider arthroscopic LDFF as treatment of choice for fragmentous OLT.

Data:
Introduction: The purpose of this study is to describe the long-term clinical results of arthroscopic fragment fixation for chronic primary osteochondral lesions of the talus (OLT), using the Lift-Drill-Fill-Fix (LDFF) technique. Methods: 18 Patients (20 ankles) underwent fixation for a primary OLT with an osteochondral fragment by means of arthroscopic LDFF and were evaluated at a mean final follow-up of 7 years. Pre- and postoperative clinical assessment was prospectively performed by measuring the Numeric Rating Scale (NRS) of pain at rest, during walking and when running. Additionally, the change in Foot and Ankle Outcome Score (FAOS) and the procedure survival (i.e., no reoperation for the OLT) at final follow-up and complications were assessed. A Wilcoxon signed-rank test was used to compare clinical outcomes preoperatively and postoperatively. A two-sided level of P:<.05 was considered significant. Results: The median NRS during walking significantly improved from 7 (IQR: 5 - 8) pre-operatively to 0 (IQR: 0 - 1.5) post-operatively (p = <0.001). The NRS during running significantly improved from 8 (IQR: 6 - 10) to 2 (IQR: 0 - 4.5) (p < 0.001) and the NRS in rest from 2.5 (IQR: 1 - 3) to 0 (IQR: 0 - 0) (p < 0.001). The median FAOS at final follow-up was 94 out of 100 for pain, 71 for other symptoms, 99 for activities of daily living, 80 for sport and 56 for quality of life. The FOAS remained significantly improved post-operatively on all subscales, except for the symptom’s subscale. The procedure survival rate is 87% at final follow-up. No complications were reported. Conclusion: Arthroscopic LDFF for fixable chronic primary OLTs results in excellent pain reduction and improved functional outcome, with sustained results at long-term follow-up. These results indicate surgeons may consider arthroscopic LDFF as treatment of choice for fragmentous OLT.

Category: Ankle/Foot/Calf

Syndesmotic Malreduction Assessment Using Three-Dimensional Distance Mapping: A Cadaveric Weight Bearing CT Study

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S5
were assessed using a 3D distance map algorithm. Results: Significant tendency towards an earlier return to preinjury levels of activity in the FHL group was observed, especially at nine months postoperatively.

Summary:

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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 allowed 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 incisura 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 the ROC analysis was conducted using a logistic regression of unpaired data of the entire specimen population, the diagnostic accuracy for syndesmotic instability was smaller (74.24%) and achieved a sensitivity of only 40% and a specificity of 92%. Paired syndesmotic area and volumetric analyses had diagnostic accuracies for syndesmotic instability of 82.5% and 74.3%, respectively. Conclusion: Distance mapping WBCT algorithms could detect syndesmotic instability in a cadaveric model with a high accuracy. Moreover, malreduction and subsequent positioning change after flexibilization were identified by the system. Findings shown by this study might support the use of 3D WBCT algorithms in the clinical scenario as an ample instrument in diagnosing tibiofibular instabilities, malpositionings and its potential corrections. Further basic and clinical research is necessary to confirm this premise. KEYWORDS: Syndesmosis; syndesmotic instability; Weight Bearing; Weightbearing CT; WBCT; Malreduction; Three-dimensional; Distance Mapping LEVEL OF EVIDENCE: Level V, Cadaveric Study

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 level of activity was found in the FHL group especially at nine months postoperatively.

Data:

Background: Both percutaneous and endoscopically assisted methods are reported to produce good results in the surgical management of Acute Achilles tendon ruptures (AATR). The aim of this retrospective study was to compare between a percutaneous method and a recently described isolated endoscopically assisted Flexor hallucis longus (FHL) transfer method as surgical means of management in patients with acute Achilles tendon ruptures. Methods: One hundred and seventeen patients were included in the current study including two groups: 59 patients who underwent percutaneous Achilles repair (PAR Group), and 58 patients who underwent isolated endoscopic FHL transfer (FHL Group) were compared. Patients were clinically evaluated using AOFAS Ankle-hindfoot score, ATRS, and ATRA measures. In addition, ankle plantarflexion power, FHL dynamometry, Tegner activity levels and return to previous levels of activity were also documented for all 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 repairs 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 was 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% CI) 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% CI: 0.16, 0.012 - 0.307; p=0.034). Defect size (est., 95% CI: -0.05, -0.097 -0.003; p=0.0358), having a shoulder lesion (est., 95% CI: -0.068, -1.448 - 2.608; p=0.006), and having a prior microfracture surgery (est., 95% CI: -0.7, -13.118 -1.021; p=0.0226) were associated with a