Osteochondral Lesions of the Talus Associated with Isolated Syndesmosis Injury: A Retrospective MRI and Arthroscopic Assessment in Athletes

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Summary:
Osteochondral lesions of the talar dome can be found in 57.1% of athletes sustaining isolated unstable syndesmotic injuries. These injuries are commonly anterolateral and ICRS grade II with a mean area of 12.6 ± 4.9 mm². MRI showed a sensitivity and specificity for diagnosing osteochondral lesions of the talar dome of 66.7% and 33.3%, respectively.

Data:
Background: Osteochondral lesions of the talar dome (OLT) are frequently associated with traumatic injuries. They are present in 73% of ankle fractures and 50% of ankle sprains, although a minority have a specific reported location (28%) and individual patient OLT size (7%). This is worth noting for isolated syndesmosis injuries, in which OLT patterns have been scarcely described but have been correlated with delayed time to return to sports. Objective: The present study aimed to assess the incidence and characteristics of OLT in preoperative MRI and anterior ankle arthroscopy in professional athletes with isolated unstable syndesmotic injuries undergoing surgical treatment. Methods: A retrospective chart review was performed between January 2017 and October 2021. Inclusion criteria were: (1) professional athletes, (2) 18 years old, (3) who were treated for isolated unstable syndesmosis injury with fixation within the first 12 weeks post-injury, and (4) preoperative magnetic resonance imaging (MRI) with or without arthroscopic assessment. Syndesmosis instability was defined as (1) two-ligament injuries on MRI with a positive squeeze test or (2) two-ligament injuries on MRI with arthroscopic findings of 2-mm mortise widening. The primary outcome was OLT incidence in preoperative MRI and arthroscopic assessment, while secondary outcomes included the characterization of these lesions as follows: location was identified in MRI and arthroscopy using the nine-zone grid scheme of Raikin et al. Lesions were classified according to Hepple et al. and ICRS. Injury size (length, width, and area) was measured using MRI and arthroscopically. Results: A total of 27 athletes (88.9% male, 62.9% football players) were included. Seventeen patients (62.9%) had OLT on the preoperative MRI (55.6% isolated and 7.4% multiple). Nine defects (47.4%) were anteromedial: seven defects (36.8%) were anterolateral, two central (11.8%), and one posterior (5.9%). According to Hepple classification, twelve injuries were type 1 (62.2%), four type 2a (21.1%), two type 2b (10.6%), and one type 3 (5.3%). MRI mean defect length was 4.2 ± 2.2 mm (range, 1-10 mm). The width was not measurable on 13 lesions (68.4%). Twenty-one patients (77.8%) of this series had available operative reports from their anterior ankle arthroscopy. Twelve athletes (57.1%) had OLT, all isolated cartilage defects. Nine defects were located in zone 3 (75%), and the remaining three were located in zones 1, 2, and 6. Correspondingly, eleven lesions were ICRS grade II (91.7%) and one (8.3%) grade IV. The mean arthroscopic defect area was 12.6 ± 4.9 mm² (range, 6-28 mm²). MRI showed a sensitivity and specificity for diagnosing OLT of 66.7% and 33.3%, respectively (location ICC 0.04, 95% CI -0.15 to 0.22; length ICC 0.24, 95% CI -0.15 to 0.57). Conclusion: OLT can be found in 57.1% of athletes sustaining isolated unstable syndesmotic injuries. These injuries are commonly anterolateral and ICRS grade II with a mean area of 12.6 ± 4.9 mm². MRI showed a sensitivity and specificity for diagnosing OLT of 66.7% and 33.3%, respectively.

Category: Ankle/Foot/Calf
75% Survival Rate 15-Years After Arthroscopic Bone Marrow Stimulation For Osteochondral Lesions Of The Talus

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Summary:
75% of patients who undergo arthroscopic BMS for OLT do not undergo revision surgery for their OLT at an average follow-up of 15 years. From this cohort of consecutive patients from a tertiary referral centre no prognostic demographic or lesion factors for procedure survival could be identified. The present study shows that survival of BMS for OLT is fair, even in patients with less favourable lesion size.

Data:
Purpose: The most common surgical treatment for osteochondral lesions of the talus (OLT) is arthroscopic bone marrow stimulation (BMS). Although clinical outcomes can be considered satisfactory up to mid- and long-term follow-up, there is a concern in the literature that BMS may eventually fail over time and there is a clear paucity in the literature in long-term survival data. It was therefore the primary aim of this study to assess the 10-year survival rate following arthroscopic BMS for OLT. The secondary aim was to assess possible prognostic baseline demographic and lesion factors for revision surgery. Methods: All consecutive patients who underwent arthroscopic BMS for OLT with a minimum follow-up of 10-years were cross-sectionally included from a historic database of a tertiary academic referral centre. Patients were contacted and evaluated for the occurrence of revision surgery (i.e., reoperation of OLT or joint replacement/fusion after index surgery). The cumulative survival rate was evaluated and visualized using a Kaplan-Meier survival analysis for the primary outcome, namely the survival rate at 10 years follow-up, and at final follow-up. Additionally, the mean time to revision surgery was calculated. The secondary outcome concerned the evaluation of the following prognostic baseline factors on survival: primary or non-primary (i.e., previously failed surgical treatment) lesion, lesion size (<150mm² vs. >150mm²), cystic lesion morphology (cystic vs. non-cystic lesion), and sex (male vs. female), and were analysed using a Cox proportional hazards model. P<0.05 was considered significant. Results: 182 patients were included for final follow-up at mean 15.0 ± 4.6 years after their index BMS procedure. 59% of patients are males, 35 ± 11.6 years at baseline, and 75% presented with a traumatic injury aetiology. Concerning lesion characteristics, 69% of patients presented with a large (≥150mm²) lesion, 21% presented with a non-primary lesion, and 70% presented with a cystic lesion. Of the 182 patients, 42 patients underwent revision surgery at minimum 10-years follow-up, with a cumulative survival rate of 77% (95%-CI: 70% - 83%). At final follow-up, the cumulative survival rate was 72% (95%-CI: 65% - 78%) Average time to revision surgery was 4.3 ± 4.9 years. In terms of prognostic factors, the lesion size (<150mm²) lesion, and lesion size (P = 0.01), the presence of a cystic lesion (P = 0.01), and sex (male vs. female) (P = 0.01) were identified as statistically significant predictors of procedure survival.
Size - HR: 0.8 (95%-CI: 0.4-1.7), P = 0.6, primary vs. non-primary OLT (HR: 0.6 (95%-CI: 0.3-1.3), P = 0.2), cystic lesion morphology (HR: 1.2 (95%-CI: 0.6-2.3), P = 0.7), and sex (male vs. female - HR: 0.6 (95%-CI: 0.3-1.3), P = 0.1) were not significantly associated with survival. Conclusion: 75% of patients who undergo arthroscopic BMS for OLT do not undergo revision surgery for their OLT at an average follow-up of 15 years. From this cohort of consecutive patients from a tertiary referral centre no prognostic demographic or lesion factors for procedure survival could be identified. The present study shows that survival of BMS for OLT is fair, even in patients with less favourable lesion characteristics.

Category: Ankle/Foot/Calf

Genetic and Epigenetic Signals in Ankle Osteoarthritis

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Summary:
End-stage ankle OA synovial samples demonstrated a unique transcriptomic signature as compared to non-OA samples.

Data:
Introduction: Osteoarthritis (OA) of the ankle is a prevalent and debilitating condition that impacts millions of people and typically results from injury. However, current treatment strategies are focused on symptom management only and little is known about the cellular and gene level drivers of disease progression. Current literature has reported synovium specific findings in OA, but a clear understanding of its contribution to OA has not been established. The objective of the study was to use RNA-sequencing of synovium from OA and non-OA ankles to characterize the synovial transcriptome, and assess patient reported outcomes (PROs) of the cohort. We compared gene expression patterns in both OA and non-OA ankles to investigate alterations specific to ankle OA. Methods: Patients undergoing surgery for end stage ankle OA and patients undergoing arthroscopic surgery for non-OA conditions, were consented, samples harvested during surgery, and affected joint was scored using the Outerbridge scoring classification. PROs were collected from patients preoperatively and at 3, 6, and 12 months post operatively. PROMIS Physical Function (PF), Pain Interference (PI), Depression, Foot and Ankle SANE, Global Physical Health, and Global Physical Health scores were collected. Bulk 150 bp, paired-end RNA seq was performed using the Illumina NovaSeq6000 platform, and alignments made to Human Reference genome (GRCh38/hg38) using Hisat2 (v2.0.5). Adjustment using a scaling normalization factor and P-values were corrected using the Benjamini Hochberg method prior to differential expression was determined using the edgeR (3.22.5) package for R. Differences in PRO outcomes between non-OA and end-stage OA patients were determined non-parametrically using Mann-Whitney U tests. Results: Synovial samples from 30 end stage ankle OA and 31 from non-OA were used for analysis. Clear clustering of OA and non-OA samples were observed on principal component analysis. Functional enrichment analyses displayed enrichment in genes and pathways related to the extracellular matrix (ECM) and its organization, and collagen formation and degradation in the OA samples. Preoperative Foot and Ankle SANE (p = 2.75X10-5), PF (p = 0.027), and PI (p = 0.011) were significantly worse in the OA subjects compared to the non-OA subjects. The increases in foot and ankle SANE scores from pre-op to most recent follow-up were significant in both the OA (p = 0.001) and non-OA (p = 0.02) groups. Conclusion: Synovium samples from end-stage OA display a unique transcriptomic signature from non-OA. We identified an upregulation in genes and pathways related to gene expression and macromolecule processing in OA samples. Knowledge of specific cellular changes in OA tissues is crucial, as it identifies potential mechanisms of disease progression and targets for future disease modifying therapies. End-stage ankle OA patients demonstrated worse pre-operative PROs compared to the non-OA cohort, however no significant difference was observed at six months post-op. Further investigations of specific epigenetic signals associated with ankle OA may lead to therapeutic pathways mitigating OA following ankle injury.

Category: Ankle/Foot/Calf

Satisfactory Patient Reported Outcomes at 15-Years Follow-Up Of Arthroscopic Bone Marrow Stimulation for Osteochondral Lesions of the Talus

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Summary:
Patients with retained arthroscopic BMS for OLT reported satisfactory clinical outcomes at average 15-years follow-up. Patients with non-primary OLT may benefit less from the procedure due to inferior pain scores. Two in three patients report participating in sports at long-term follow-up. The present study shows that arthroscopic BMS remains a viable treatment option for OLT as clinical results are maintained over time in the majority of patients.

Data:
Purpose: Long-term clinical outcomes of arthroscopic bone marrow stimulation (BMS) for the treatment of osteochondral lesions of the talus (OLT) are rarely reported in the literature, even though the procedure remains the most common treatment for OLT. Understanding of long-term clinical outcomes in patients with retained (i.e., non-failed) BMS can inform clinicians on the sustainability of BMS and may justify its continued practice. It was therefore the aim of this study to assess the patient-reported outcome measures (PROMs) of patients with a minimum follow-up of 10-years after arthroscopic BMS for OLT who did not undergo revision surgery. The secondary aim of this study was to assess the influence of baseline demographic and lesion characteristics on PROMs. Methods: All consecutive patients who underwent arthroscopic BMS with retained results (i.e., no revision surgery for OLT after index surgery) were cross-sectionally contacted and included. PROMs were collected using the online CASTOR portal. The primary outcome was the numeric rating scale (NRS) for pain during walking. Additionally, the NRS during rest, stair climbing, and running, as well as the foot and ankle outcome score (FAOS) were collected. Participation in sports at follow-up and desired level of sports were also collected. A two-sample T-test was used to compare the primary outcome in sub-groups for prognostic factors; primary vs. non-primary lesions (i.e., failed prior surgical treatment), lesion size (> 150mm2 vs. < 150mm2), presence of cystic lesion, and sex. P < 0.05 was considered significant. Results: At final follow-up of mean 15.1 ± 4.7 years 102 patients were included. Patients were a mean 34.4 ± 10.8 years old at index surgery. 85 (83%) patients presented at baseline with a primary OLT. The average pre-operative lesion area was 279 ± 189 mm2, and 75% of patients presented with a cystic lesion. The primary outcome, the NRS during walking was 1.8 ± 2.4 out of 10 at final follow-up. Patients with a non-primary OLT reported a significantly higher NRS for pain during walking compared to primary OLT patients (2.9 ± 2.8 vs. 1.5 ± 2.3 out of 10, P = 0.04). Contrastingly, no significant differences were observed in the primary outcome when considering lesion size (P = 0.12), cystic lesions (P = 0.68), or sex (P = 0.56). The NRS during rest, stair climbing, and running was 0.8 ± 1.8, 1.5 ± 2.5, and 2.2 ± 3.0 out of 10, respectively. The following FAOS sub-scales were reported; symptoms: 69.8 ± 19.6, pain: 82.8 ± 19.7, ADL: 99.2 ± 1.4, sport: 67.1 ± 28.3, QoL: 62.6 ± 27.5. At final follow-up, 66 (65%) patients participated in sports. Of these, 61% reported participating in sports at their desired level, while 33% reported other reasons for not reaching their desired level of sports, and 6% of patients reported being restricted in their desired level of sports due to their ankle complaints. Conclusion: Patients with retained arthroscopic BMS for OLT reported satisfactory clinical outcomes at an average 15-years follow-up. Patients with non-primary OLT may benefit less from the procedure due to inferior pain scores. Two in three patients report participating in sports at long-term follow-up. The present study shows that arthroscopic BMS remains a viable treatment option for OLT as clinical results are maintained over time in the majority of patients.