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Factors affecting the healing of arthroscopic microfracture and the role of MRI in follow-up: Talus osteochondral lesions

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ABSTRACT

Introduction: The aim of this study is to compare preoperative and postoperative clinical and radiological findings of patients with talus osteochondral lesion who underwent arthroscopic microfracture surgery.

Materials and Methods: Thirty-two patients who underwent arthroscopic treatment for talus osteochondral lesion between 2014-2017 at the Department of Orthopedics and Traumatology of a tertiary hospital were evaluated retrospectively. Preoperative and postoperative AOFAS and VAS scores were recorded, and the results were compared with demographic data. Twenty-four patients with magnetic resonance imaging were evaluated with the MOCART system. Results were compared with AOFAS, VAS scores, and demographic data.

Results: Of the 32 patients included in the study, 13 (40.6%) were male, and 19 (59.4%) were female. The mean body mass index (BMI) of the patients was 26.1 kg/m². In 14 (43.8%) patients, there was a history of trauma. The number of smokers was 12 (37.5%). Twelve (37.5%) patients had a BMI≤25 kg/m², and 20 (62.5%) patients had a BMI>25 kg/m². The mean age of the patients was 42.62 years. The mean follow-up period was 20.9 months. The mean MOCART value of the patients with MRI after surgery was 56.11.

Conclusion: It was found that there was no correlation between cartilage healing detected with MRI and clinical improvement, function, and patient satisfaction. The body mass indexes of the patients and smoking did not have a significant effect on the results.

Keywords: Arthroscopy, Microfracture, Osteochondral lesion, Talus

Introduction

Osteochondral lesions of the talus; these are the lesions of the talus on the joint surface of the ankle including the cartilage and subchondral bone. Talus osteochondral lesions are a common problem affecting many people every year, and many studies have been done for this problem.[1] Although its etiology has not been fully clarified, the most prominent etiological factor is trauma.[2]

Although direct radiography, computed tomography and magnetic resonance imaging can be used as imaging

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methods, magnetic resonance imaging is the most commonly used imaging method that provides the clearest information about the condition of the cartilage, the location, size and depth of the lesion.[3] In this study, in our patients with talus osteochondral lesions that we treated with arthroscopic microfracture between 2014-2017; it was aimed to evaluate the arthroscopic microfracture application, which is a bone marrow stimulation method, with many different parameters; if there is a post-operative correlation between the clinical conditions of the patients and MRI or not, and to determine the progression, pain, satisfaction, range of motion of the patients with functional and clinical scores.

Materials and Methods

In this study, patients who were operated on with the diagnosis of talus osteochondral lesion and received microfracture treatment in the Orthopedics and Traumatology Clinic of a tertiary hospital between 2014-2017 were evaluated retrospectively. The preoperative and postoperative Visual Analogue Scale (VAS), American Orthopedic Foot and Ankle Society Ankle-Hindfoot score (AOFAS) values of the patients were recorded, and Magnetic Resonance Observation of Cartilage Tissue (MOCART) scores were examined to evaluate the cartilage healing following the microfracture procedure. Thirty-two patients were included in the study. Patients with a previous operation history in the ankle joint, revision cases, and patients with advanced stage osteoarthritis were excluded from the study.

Arthroscopic microfractures were performed on all 32 patients (Fig. 1). The patients were followed up postoperatively at the 3rd, 6th, 12th month and annually after 12 months. The time elapsed between the last control of the patients and the date of surgery was considered the follow-up period. VAS and AOFAS values in the final postoperative evaluations of the patients were used in the study. MRI and the MOCART scoring system were used for clinical correlation and monitoring the healing of cartilage tissue.

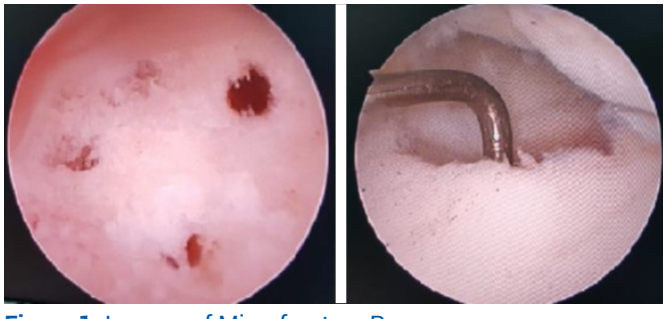

Figure 1. Images of Microfracture Process.

In our study, the IBM Statistical Package for the Social Sciences (SPSS) program was used to evaluate the statistical data. Descriptive statistical methods (frequency, mean, median), as well as the Mann-Whitney U test, were used to compare quantitative data between two groups. The Wilcoxon Signed Ranks Test was used to compare parameters within groups. Relationship analysis between parameters was performed using Spearman's Rho and Student's T correlation analysis. Results were evaluated at a 95% confidence interval and a $p<0.05$ was considered significant.

Results

Considering the inclusion and exclusion criteria, a total of 32 patients were included in our study. Of these, 13 were male (40.6%), and 19 were female (59.4%). The mean age of our patients was 42.62±12.87 years (range, 16-65). The mean body mass index of the patients was 26.1±3.88 kg/m² (range, 18-33.30). Fourteen patients (43.8%) had a history of previous trauma. Regarding the smoking habits of the patients; 12 patients (37.5%) were smokers, and 20 (62.5%) were non-smokers.

In 30 patients (93.8%), the lesion was medial, while in 2 (6.2%) the lesion was lateral. When the lesion locations are divided into 9 parts by numbering the talus from anteromedial to posterolaterally; 3 patients (9.4%) were in zone 1, 2 patients (6.3%) in zone 3, 20 patients (62.5%) in zone 4, 1 patient (3.1%) in zone 5, and 6 patients (18.8%) were in zone 7.

The mean follow-up period for the patients was 20.90±10.38 months (range, 12-56). The mean preoperative AOFAS score was 55.68±9.96 (range, 40-78) and the postoperative mean was 90.46±7.66 (range, 70-100), with a statistically significant difference ($p<0.05$).

The mean preoperative VAS score was 8.4±1.13 (range, 5-10) and the postoperative mean was 2.03±1.46 (range, 0-7), also showing a statistically significant difference ($p<0.05$).

Patients were divided into two groups based on their smoking status. The mean postoperative AOFAS score for the smoking group was 89.45±4.56 (range, 80-100), compared to 91.83±7.98 (range, 70-100) for the non-smoking group, with no significant difference ($p=0.424$). The mean postoperative VAS score was 1.72±1.09 (range, 0-3) in the smoking group, compared to 2±1.57 (range, 0-7) in the non-smoking group, again with no significant difference ($p=0.716$) (Table 1).

Table 1. Data by Demographic Groups

		Smoking		BMI				Trauma	
	All	+	-	≤25	>25	<30	≥30	+	-
PreOp VAS	8.4	8.1	8.5	8.75	8.2	8.4	8.1		
PostOp VAS	2.0	1.72	2.1	1.66	2.05	1.79	2.4	2.2	1.6
PreOp AOFAS	55.6	58	54.3	58	54.3	56.8	52.1	54.1	56.4
PostOp AOFAS	90.4	89.5	91.8	92.5	89.8	90.4	93.2	90.5	91.2

Twenty-four of the 32 patients (75%) followed up had an MRI examination at least 12 months after the operation date, and these patients were evaluated with MOCART. The mean MOCART values for these patients were 56.11±7.77 (range, 45-75).

The correlation between the patients' MOCART values, age, BMI, lesion size, AOFAS score, VAS score, and follow-up time was investigated using Spearman's Rho test. No significant correlation was detected with MOCART value and age (p=0.123), lesion diameter (p=0.97), follow-up time (p=0.173), BMI (p=0.238), AOFAS score (p=0.615), or VAS score (p=0.920).

Arthrosis development was detected in 2 of our patients (6.25%) in the postoperative period, and superficial soft tissue infection was detected in 1 patient (3.1%), who recovered with antibiotic treatment without the need for surgical intervention. One of the 2 patients who developed arthrosis in the ankle had mild symptoms and was managed with conservative treatment. Although surgical treatment was recommended for the other patient due to more severe symptoms, it was not performed as the patient refused the operation. Secondary arthroscopy was performed in 1 patient, where fibrous cartilage formation was observed (Fig. 2).

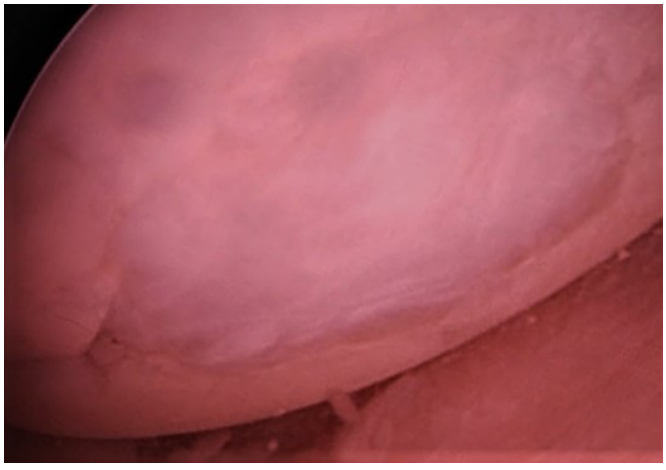

Figure 2. Arthroscopic View of Fibrous Cartilage Formation.

Discussion

Many studies have demonstrated significant increases in AOFAS values in patients with osteochondral lesions of the talus treated with microfractures.[4-8] Similarly, improvements in VAS scores have been reported with the microfracture method.[9,10] In our study, a significant increase in AOFAS values and a decrease in VAS values were observed.

Although there are studies indicating that body mass index does not affect the outcomes of microfracture,[4,7,11] Domayer et al.[12] reported worse outcomes in patients with a BMI>25 kg/m² and a significant correlation between BMI and clinical outcomes. In our study, patients were divided into groups based on a BMI of 25 kg/m², the upper limit of a healthy BMI, and a BMI of 30 kg/m², the threshold for obesity. In both divisions, no significant correlation was found between BMI and clinical outcomes. Based on our study and literature, limiting BMI in patient selection was not considered necessary.

The literature search revealed no studies on the relationship between smoking and the outcomes of microfracture treatment for talus osteochondral lesions. However, Balain et al.[13] investigated the impact of smoking on patient satisfaction and functional outcomes after knee microfracture and found that despite lower satisfaction levels in smokers, no significant difference was noted compared to non-smokers. Furthermore, no significant relationship was found between smoking and functional outcomes. Our study also found no significant difference between smoking and clinical outcomes. While direct comparisons with the literature are not possible, the detrimental effects of smoking on microcirculation and regeneration are known. To fully understand the relationship between smoking and outcomes, it would be necessary to isolate other variables that could affect results.

Canata et al.,[14] in their study, reported that the presence of trauma is one of the factors affecting outcomes in the microfracture method. Chuckpaiwong et al.,[15] investigating the results of the microfracture method applied to osteochondral lesions of the talus and the factors affecting these outcomes, found that past trauma negatively and significantly impacts results. Conversely, Choi et al.[11] reported that previous trauma does not significantly affect clinical outcomes. We divided our patients into two groups based on the presence of trauma and compared their AOFAS and VAS scores, finding that previous trauma did not significantly impact results. The literature presents conflicting views regarding the relationship between trauma and clinical outcomes, with the majority suggesting a negative effect of trauma on clinical results. Our study's limited patient number and the strong association between lateral lesions and trauma, considering only two patients had lateral lesions, could have influenced our findings. A more comprehensive study on this topic would be beneficial.

Aurich et al.[16] monitored patients with talus osteochondral lesions postoperatively using VAS, AOFAS, and MOCART and reported no correlation between MOCART and clinical outcomes. D'Ambrosi et al.,[17] comparing VAS, AOFAS values with radiography, CT, and MRI findings, also noted no significant relationship between MRI results and clinical outcomes. Our observations regarding MOCART are in line with the literature, indicating no correlation between postoperative MOCART values and clinical improvement or functional outcomes.

Conclusion

After the microfracture procedure for talus osteochondral lesions, no correlation was found between MRI-detected cartilage healing and clinical improvement, function, or patient satisfaction. The body mass indexes of patients did not significantly affect the outcomes. Smoking was shown to have no significant impact on the healing of microfracture in osteochondral lesions of the talus in terms of patient satisfaction and function.

Disclosures

Ethichs Committee Approval: This study was approved by Health Sciences University Izmir Bozyaka Training and Research Hospital Clinical Research Ethics Committee (Date: 18.04.2018, Number: 3).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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