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Original Article

Outcomes of arthroscopic debridement and microfracture for osteochondral lesions of the talus

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Abstract

Aim: Osteochondral Lesions of the Talus (OLT) is a common pathology in orthopedic injuries. Recently arthroscopic microfracture treatment is widely used as a simple technique with clinically satisfactory outcomes. The present study aimed to reveal the outcomes of arthroscopic OLT treatment and determine the appropriate patient group.

Material and Methods: 21 patients who underwent arthroscopic debridement and microfracture for OLT were evaluated retrospectively between March 2015 and May 2016. The clinical assessment was performed by using The American Orthopaedic Foot & Ankle Society (AOFAS) and Visual Analog Scale (VAS) prior to the surgery and at the final follow up.

Results: The mean diameter of lesions were measured as 1.1 cm² (0.7-1.7) arthroscopically. The mean age of the patients was 35 (18-55) years. Lesions were located at the medial side in 17 patients and lateral side in 4 patients. The mean value of preop AOFAS score was 65.4±7.3 (55-78) and it was 86.6 ± 8.3 (68-100) at the final follow up. VAS scores of the patients were 6.7±1.2 (5-9) prior to the surgery and 2.2±1.3 (0-5) at the final follow up.

Conclusion: Arthroscopic treatment of OLTs is a beneficial technique with low complication rate in broad range of patients. Patient's age and lesion size are guideway in patients requiring arthroscopic treatment. As the age and lesion size increase, surgical treatment becomes less beneficial.

Keywords: Talus; Osteochondral lesion; Microfracture.

INTRODUCTION

Osteochondral lesions of the talus (OLT) are widely seen in orthopedic clinics. The reasons of OLT include ankle sprain, ankle fractures, local avascular necrosis, degenerative joint disease, joint malalignments and genetic predisposition (1-3) Ankle sprain is the most common reason; 2 million cases of ankle sprain were reported in USA each year and chondral injury was detected in approximately half of these patients (4). The high rate (73%) of chondral injury was reported following the ankle sprain (5).

Arthroscopic stimulation of bone marrow (drilling and microfracture), tissue implantation (autogenous and allogenous) and autologous chondrocyte implantation are performed in daily practice. Besides, biological materials, such as concentrated bone marrow aspiration and hyaluronic acid, are used to repair bone marrow after microfracture practices (6). There are still concerns about the most appropriate treatment method.

Arthroscopic microfracture is frequently performed in OLT and good functional outcomes are obtained (7). As arthroscopic microfracture technique is a simple and minimally invasive approach with low postoperative morbidity rate, it is a primary technique in orthopedic clinics. In this technique, microfractures created in subchondral bone initiates healing process in the defected region. Fibrin clot formation, mesenchymal stem cell migration and vascular formation are associated with healing. As a result, fibrocartilage scar tissue develops in the affected area (8). Recently, there are several studies involving various outcomes about disseminating microfracture technique in OLT lesions. In these studies, it was stated that factors such as lesion size, age of patient and localization of lesion were affected the outcomes and these factors should be considered for surgical planning (9, 10). In the present study, the clinical effects of these factors on the outcomes were studied for an accurate patient selection in arthroscopic microfracture treatment.

MATERIAL and METHODS

A total of 21 patients who underwent arthroscopic debridement and microfracture procedure for

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osteochondral lesion of the ankle were retrospectively evaluated between March, 2015 and May, 2016. The common complaint of the patients was pain increasing during exercise and at rest. Pain accompanying swelling was typically seen in the patients. The history of trauma was present in 13 patients.

The primary mechanism of trauma was ankle sprain. Active and passive range of motions at the ankles were evaluated. Instability examinations were performed. Ankle pathologies were examined by obtaining radiographs in anterior-posterior, lateral and mortise positions and MRI views. The clinical assessment was performed by using The American Orthopaedic Foot & Ankle Society (AOFAS) and Visual Analog Scale (VAS) prior to the surgery and at the final follow up. The range of motion of joints was measured by goniometer. All patients were informed prior to the surgery and informed consents were obtained. AOFAS system considers a score of ≥ 90 as excellent, 80–89 as good, 70–79 as fair, and ≤69 as poor. Pain was evaluated by the 10-point visual analog scale (VAS); 10 represents the highest degree of pain and 0 represents no pain.

Exclusion criteria were as follows: an age older than 55 years, existence of bony ankle impingement, ankle instability, global lesions (tibia + talus), osteochondral lesion larger than 2cm² and history of surgical treatment due to different pathologies. Patients followed up for at least 8 months were included in the study.

Statistical Analysis

The normality of distribution of numerical variables was tested by Shaphiro Wilk test. Paired sample t test was used to compare numerical variable from 2 related samples. Multiple linear regression models were used to evaluate effect of several factors on AOFAS and VAS scores. Preop AOFAS and VAS values were included to model to eliminate effect of preop scores. Statistical analysis was performed with SPSS for Windows version 24.0 and a P value < 0.05 was accepted as statistically significant.

Surgical Technique

All patients underwent arthroscopic debridement and microfracture operation. Operations were performed under spinal and general anesthesia in 18 and 3 patients, respectively. The patients were operated on using a pneumatic tourniquet under the pressure of 300 mmHg. Anteromedial and anterolateral portals were used during the operation. Debridement was performed to synovial tissues to enhance the field of view after entering through anteromedial portal to the joint.

The localization of osteochondral lesion was detected. Unstable and unhealthy cartilage tissue of osteochondral lesion was removed until obtaining a stabile cartilage tissue. After debridement of necrotic tissues in the lesion, microfractures were performed by using a microfracture awl with an angled tip (30, 60°, and 90°). The indicator of adequate depth was considered as the presence of fat droplets in the microfracture holes (Figure 1).

Short leg splint was applied after the operations. Swelling was reduced and splint was removed at the postoperative 3rd day. Active and passive range of motions exercises were initiated and mobilization was provided with crutches to avoid load on extremities for 6 weeks.

Figure 1. 45 years old male patient with medial OLT, **1A)** Direct roentgenogram, **1B)** MRI, **1C)** Arthroscopic view of OLT in medial side of talus, 1D) After debridement of the lesion, intact cartilage rim, 1E) Microfracture with angled awl

RESULTS

Data from 21 patients (13 men and 8 women) who underwent surgery due to OLT were evaluated retrospectively at our institute. The mean patient age was 35 years (range 18-55). The mean follow-up period was 16.4 months (range, 8-26 months). The mean duration of symptoms was 21 months (range, 14- 32 months).

The lesions were localized at the right ankle in 12 patients and left ankle in 9 patients. Seventeen lesions were located laterally and 4 medially. All the lateral lesions were located on the anterolateral aspect of the ankle. The localization of medial lesions was anteromedial (n=8), central-medial (n=7) and posteromedial (n=2). The diameter of lesions was measured arthroscopically and mean diameter was found as 1.1 cm² (range, 0.7-1.7). The mean AOFAS score was 65.4±7.3 (range, 55-78) and 86.6±8.3 (range, 68- 100) before the operation and at the final follow-up, respectively (Table 1).

The scores of all patients showed varying levels of increase. According to the AOFAS, scores were excellent in 7 patients (n=7, 33%) and good in 10 patients (n=10, 48%). Poor result was only obtained in 1 patient. Totally, good or excellent results were obtained in 81% of the patients.

The mean of VAS scores of patients was 6.7±1.2 (range, 5-9) and 2.2±1.3 (range, 0-5) before the operation and at the final follow-up, respectively (Table 1).

A significant variation was detected in AOFAS and VAS scores at the final follow-up period of patients in comparison to preoperative period (p<0.001) (Table 1).

No complication (infection, neurovascular deficit) was developed at the postoperative period. Range of motion was normal for all patients except one.

Table 1. Comparison of Pre and post op AOFAS and VAS scores

	Preop (n=21)	Postop (n=21)	P
AOFAS	65.43±7.31	86.62±8.29	0.001*
VAS	6.67±1.19	2.19±1.29	0.001*

*Significant at 0.05 level; Paired sample t test

DİSCUSSION

There are various surgical methods for the treatment of OLT. Arthroscopic treatment is a popular method and it's used more frequently in the recent years with good outcomes (7).

The size of lesion, age of the patient and the localization of lesion are among the important parameters for orthopedic surgeons in the treatment that will be performed during the assessment of patients who will undergo surgery due to OLT. Our aim is to clarify the affects of these parameters in our patient group and define more precise indications. The influence of these parameters on treatment outcomes were evaluated by preop/postop radiographic examinations, and as well as AOFAS functional scoring and VAS pain scoring. The outcomes were compared with similar studies in the literature.

Keun-Bae Lee et al. stated that the mean AOFAS score improved from 63 to 90, and good and excellent results were obtained in 89% of the patients. However, the mean size of the lesion was 0.9 cm² and patients with lesion of <1.5 cm² were included in the study (7) Patients were younger than 50 years and the mean age was 39 years.

Chuckpaiwong et al. reported that the mean AOFAS score improved from 41 to 68 (9). In their study, 30% of the patients had lesion of >1.5 cm², the values of preop/postop AOFAS scores were relatively low.

In the study of Giannini et al., the mean AOFAS score improved from 40.5 to 90.5, and the score gradually decreased during the follow ups and it was regressed to 80.6 at the end of 36th month. The mean age was 28 and the mean size of lesion was 1.4 cm² (10).

In our study, preoperative VAS value was 6.5 and it was regressed to 2.2 after the operation. A regression was observed in VAS scores of all patients.

From an overview of the literature, similar results were found in VAS scores in our study. The mean VAS scores in the studies of Keun-Bae Lee et al. (7) and Chuckpaiwong et al. (9)were regressed from 6.6 to 2.1 and 8.2 to 3.7, respectively. In the study of Chuckpaiwong et al., the high levels of preoperative and postoperative VAS scores was explained with the presence of larger lesions.

In the present study, there was a close relationship between the size of lesion and the number of patients who benefit from the surgery. As the size of lesion increases, a decrease was observed in the preoperative and postoperative values of AOFAS scores. When the size of lesion increases 1 cm², the postoperative value of AOFAS scores was decreased about 16.82 points (Table 2).

Giannini recommended to perform mosaicplasty in lesions >1.5 cm² (10). Chuckpaiwong stated that the success rate was decreased in lesions >1.5 cm² (9).

The mean values of postoperative AOFAS scores of lesions <1.5 cm² and 1.5-2 cm² were found as 88.2 and 80, respectively (p=0.035) (Table 3). The mean values of postoperative VAS scores of lesions <1.5 cm² and 1.5-2 cm² were found as 1.9 and 3.5, respectively when the relationship between VAS scores and the size of lesion was evaluated. It was found that VAS scores were significantly affected from the larger size of lesions (p=0.013). Although these data provide to make inference, the number of patients with lesion size between 1.5-2 cm² was 4 and studies with larger sample size are required for obtaining more significant results.

There are studies in the literature emphasizing the effect of the localization of lesion and it has been reported that the outcomes are worse in medial lesions (11). However, in our study, AOFAS and VAS scores were not affected from the localization of lesion (Table 2,3).

Giannini stated that patients aged <50 years of age were seen to benefit more from the surgery (10). Keun-Bae Lee (7) and Choi WJ (11) reported that age factor did not have a significant impact on the clinical outcomes. In our study, we found that the age factor affected the clinical outcomes and the increasing age was associated with the worse outcomes. The overall AOFAS score decreased 0.46 points with the one-year increase in age (Table 2). No relationship was detected between VAS scores and age.

Postoperative clinical outcomes showed that surgery provided benefit to all patient groups. Most likely debridement for soft tissue impingemet was a part of improvement of clinical results. In the literature, although arthroscopy was not recommended in patients >50 years, the age of 50 years should not be determined as absolute limit.

Likewise, surgical treatment provided benefit to patients aged between 50-55 years in our study. No difference was found in terms of gender; however, the VAS scores of women were significantly higher than men (Table 2,3).

In our study, 21 patients were included and they were followed up for 16.4 months. Clinical outcomes become worse and AOFAS scores were gradually decreased in various studies. Low number of patients and relatively short follow up times are limitations of our study.

Therefore, it is a fact that performing studies with larger sample size and longer follow up periods will give more accurate outcomes.

Table 2. Multiple linear regression model results for post operative AOFAS scores

	Unstandardized Coefficients		Standardized Coefficients		
Model (R^2=88%)	B	Std. Error	Beta	t	P
(Constant)	124,190	16,775		7,403	0,001*
Age	-,457	,106	-,663	-4,293	0,001*
Gender	-3,119	2,347	-,187	-1,329	0,207
Lesion size (cm^2)	-16,823	3,230	-,741	-5,208	0,001*
Location	1,932	2,269	,094	,851	0,410
PREAOFAS	-,006	,169	-,005	-,037	0,971

Dependent Variable: POSTAOFAS
*Significant at 0.05 level, Multiple linear regression

Table 3. Multiple linear regression model results for post operative VAS scores

	Unstandardized Coefficients		Standardized Coefficients		
Model (R2=89%)	B	Std. Error	Beta	t	P
(Constant)	,035	,015	,326	2,328	0,037*
Age	,078	,366	,030	,213	0,834
Gender	2,871	,460	,814	6,242	0,001*
Lesion size (cm^2)	-,377	,333	-,118	-1,130	0,279
Location	-,083	,421	-,023	-,197	0,279
PREAOFAS	,035	,015	,326	2,328	0,037*

Dependent Variable: POST VAS
* Significant at 0.05 level, Multiple linear regression

CONCLUSION

Arthroscopic treatment of OTL is a favorable surgical technique for a broad spectrum of patients. Complication rates are relatively low. The age of patients and the size of lesions are important factors before deciding for arthroscopic microfracture surgery. In our study, we saw that surgical treatment provided less benefit to the patients as the age and size of lesion increased. However, larger sample size and longer follow up period were required to make more accurate conclusions.

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