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PŮVODNÍ PRÁCE

Comparison of Arthroscopic Microfracture and Retrograde Subchondral Drilling in the Treatment of Osteochondral Lesions of Talus

Porovnání artroskopických mikrofraktur a retrográdních subchondrálních návrtů v léčbě osteochondrálních lézí talu

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ABSTRACT

PURPOSE OF THE STUDY

In our study, it was aimed to evaluate the efficacy of microfracture and retrograde subchondral drilling on clinical outcomes in patients who underwent ankle arthroscopy due to osteochondral lesion of medial talus.

MATERIAL AND METHODS

Twenty eight patients with osteochondral lesion of talus less than 1.5 cm^2 treated with ankle arthroscopy were evaluated retrospectively. Microfracture was performed in 16 patients and retrograde subchondral drilling was performed in 12 patients that there was no loss of integrity in the cartilage layer or cartilage layer is partially preserved during ankle arthroscopy. Postoperative evaluations of the patients were done with Foot and Ankle Ability Measure (FAAM) and results of both group were compared statistically.

RESULTS

The mean activities of daily living scale was 93.4±3.2 and sportive activity scale was 90.1±5.7 in the retrograde drilling group. In the micro-fracture group, mean activities of daily living scale was 93.8±4.1 and mean sportive activity scale was 88.9±9.5. No significant difference was found as a result of statistical comparisons of both groups results.

DISCUSSION

It has been determined that the size and preservation of the integrity of talar osteochondral lesions are important factors on clinical results. Results of arthroscopic debridement, microfracture and drilization are not good in lesions larger than 1.5 cm^2 and lesions with impaired integrity. In our study, depending on the general literature, osteochondral lesions in talus were less than 1.5 cm^2 in patients who underwent arthroscopic micro fracture and retrograde drilling.

CONCLUSIONS

Both microfracture and retrograde subchondral drilling are effective treatment methods with good clinical results for talar osteochondral lesions less than 1,5cm^2. Retrograde subchondral drilling can be an alternative treatment method with the reliability of clinical results in patients with no loss of the integrity of the cartilage layer or cartilage layer is partially preserved.

Key words: talus, osteochondral lesion, microfracture, subchondral drilling.

INTRODUCTION

Ankle traumas and ischemia are the most common etiologic causes of osteochondral lesions in the talus (1). Those due to ischemia are usually located on the medial side and those due to trauma are located on the lateral side of the talus (14).

There are several surgical treatment methods for talar osteochondral lesions. These surgical treatment methods are open or arthroscopic excision and debridement, curettage drilling, micro-fracture, autologous chondrocyte transplantation and autografting or allografting (17, 24). Arthroscopic microfracture and subchondral drilling are frequently performed treatment methods for talar osteochondral lesions less than 1.5 cm^2. It is observed that there is no loss of integrity of the cartilage layer or cartilage layer is partially preserved in some osteochondral lesions during ankle arthroscopies. Retrograde subchondral drilling is a treatment method that can be performed in such osteochondral lesions (12).

It is an important disadvantage that the fibrous cartilage that emerges after microfracture and drilling is not like the original hyaline cartilage (18). Detection of radiological signs of degenerative arthritis has led to concern that fibrocartilage may be susceptible to deterioration 5 to 7 years after arthroscopy. It may adversely affect the long-term clinical status and functional outcomes after microfracture (13).

In our study, it was aimed to evaluate and compare the efficacy of microfracture and retrograde subchon-

dral drilization on clinical outcomes in patients who underwent ankle arthroscopy due to osteochondral lesion in the medial talus.

MATERIAL AND METHODS

This study was conducted with approval of the institutional ethics committee (2022–10/07). Patients who had an osteochondral lesion with a surface measurement of 1.5 cm^2 or less in the medial talus and underwent arthroscopic micro-fracture and retrograde drilling between 2018 and 2020, were evaluated retrospectively. Inclusion criteria in our study were patients aged between 18–60 years with at least 1 year of follow-up and patients with FAAM scores in their follow-up files (2). Exclusion criteria from the study were patients under the age of 18 and over the age of 60, patients with no FAAM score in their follow-up files, and patients with a follow-up period of less than 1 year.

Surgical treatment and post operative period:

Prophylaxis was performed with 1 g cefazolin sodium before surgeries. Surgeries were performed under tourniquet application. Arthroscopies were performed using standard anteromedial and anterolateral ankle portals. After diagnostic arthroscopy if osteochondral lesion has detachment on the cartilage surface, debridement and microfracture was performed (Fig. 1). If there was no detachment on cartilage surface or cartilage layer is partially preserved retrograde drilling was performed under arthroscopy and fluoroscopy control (Fig. 2). In the postoperative period, patients did not load their operated extremities for 1 month. Patients were given low molecular weight heparin for deep vein thrombosis prophylaxis for one month after surgery. At the end of the first month, patients were included in the same physical therapy program to increase proprioception and range of motion.

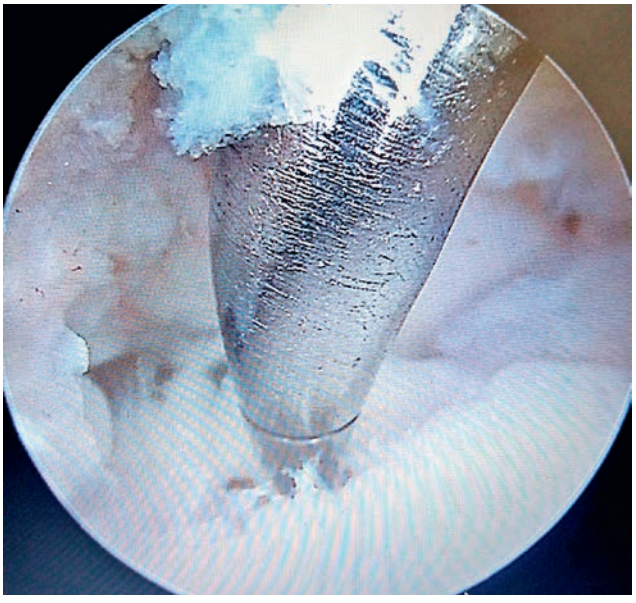

Fig. 1. Arthroscopic view of microfracture.

Fig. 2. Retrograde drilling under fluoroscopy control.

Evaluation of patients

In our clinic, arthroscopic micro fracture treatment is performed for osteochondral lesions with a surface measurement of 1.5 cm^2 or less in the talus. Retrograde drilling is performed in patients who do not have a full-thickness defect in the cartilage layer and do not have an unstable chondral fragment during arthroscopy. According to the results of the retrospective examination, it was determined that there were 28 patients who met the study criteria. It was determined that 16 patients underwent arthroscopic microfracture and 12 patients underwent retrograde drilling during arthroscopy. Patients were divided into two groups according to treatment methods. The mean age, mean follow-up time and mean FAAM scores of the patients were determined. Postoperative magnetic resonance imaging (MRI) of the patients were evaluated. Complications such as reflex sympathetic dystrophy and cellulite were determined as possible post-surgical complications.

Statistical method

The compatibility of the data with the normal distribution was tested and since they were not normally distributed, the Mann-Whitney U test, which is a non-parametric method, was used to compare the numerical variables, and the $p<0.05$ value was considered statistically significant at the 95% confidence interval.

RESULTS

The mean age of the patients was 36.8±4.2 years. Mean age was 35.7±4.9 years in the retrograde drilling group and mean age was 37.6±3.9 years in the micro-

fracture group. The mean follow-up period was 14±1.2 months. The mean follow-up period was 13.8±0.8 months in the retrograde drilling group, and 14.1±1.1 months in the micro-fracture group. The mean activities of daily living scale was 93.6±3.7 and sportive activity scale was 89.5±9.6 for both groups together. The mean activities of daily living scale was 93.4±3.2 and sportive activity scale was 90.1±5.7 in the retrograde drilling group. In the micro-fracture group, mean activities of daily living scale was 93.8±4.1 and mean sportive activity scale was 88.9±9.5. No significant difference was found as a result of statistical comparisons of both groups ($p>0.05$). (Table 1). 12 patient has post operative MRI. 8 of them were in microfracture group and 4 of them were in retrograde drilling group. It was determined from MRI of 11 patients that a new cartilage layer was formed in the osteochondral lesion area. 2 patients had subchondral cyst formation detected under the osteochondral lesion area in the retrograde drilling group. Reflex sympathetic dystrophy was detected in two patients and the patients recovered with physical therapy. In 1 patient, superficial cellulitis was detected in the early post-operative period and the patient recovered with antibiotic treatment.

DISCUSSION

Strengths of our study is the clear determination of the cartilage problems in talus with arthroscopy, and regular clinical follow-up and evaluation of the patients after surgical treatment. The lack of radiological evaluation of all patients after the surgery, the lack of patient scores before the surgery, and the lack of objective criteria in determining the method of treatment of the cartilage problem detected during arthroscopy limit our study.

Studies comparing microfracture and retrograde drilling methods are very few in the literature. For this reason we think that our study will contribute to the literature. In the study by Choi et al., patients with small and medium size ocd in the talus were divided into two groups, The clinical results of patients who underwent subchondral drilling and micro-fracture were compared, and no statistically significant difference was found between the results of both groups, and the clinical results of both treatment methods were found to be successful (3). According to the results of our study, it was determined that the clinical results of the patients who had micro-fracture and retrograde drilling were followed up for more than 1 year, and there was no statistically significant difference between the clinical results of the two groups. Our findings were similiar to the results of Choi et al. 35% of the patients showed worsening in the 5-year follow-up of patients who underwent retrograde drilling and microfracture (8). Mean follow-up period was 14 months in our study. 12 patients had post operative MRI and 11 patients had new cartilage layer among 12. We think that long-term clinical results will also be good due to radiological improvement.

It has been determined that the size and preservation of the integrity of talar osteochondral lesions are important factors on clinical results. Results of arthroscopic debridement, microfracture and drilization are not good in lesions larger than 1.5 cm^2 and lesions with impaired integrity (6). In our study, depending on the general literature, osteochondral lesions in talus were less than 1.5 cm^2 in patients who underwent arthroscopic micro fracture and retrograde drilling. Since patients with lesions larger than 1.5 cm^2 were not included in the study. Our results are compatible with the literature.

Retrograde drilling prevents articular surface penetration in most cases, but control of drill depth and drill placement can be challenging and may require radiographic guidance (9). In order to prevent the perforation of the hyaline cartilage and its surroundings. Retrograde drilling close to the subchondral with damage control is a suitable technique in which the cartilage surface is preserved (11). In our study, in patients who underwent retrograde drilling, the drilling procedure was performed under fluoroscopy and arthroscopic control and intra-articular penetration was not detected during surgeries.

It has been reported that more subchondral hematoma and increased bone marrow stimulation are provided because the depth of the holes drilled during drilling is greater (19). In addition, in the treatment of talar osteochondral lesions with drilling, the penetration of the synovial fluid into the subchondral bone may occur, and the synovial fluid may cause destruction and cyst formation in the subchondral bone (16, 21). But in general, 90% success rates have been reported with arthroscopic assisted retrograde drilling of talar osteochondral lesions (26). Kumai reported successful results of arthroscopic guided drilling (10). In our study, the mean activities of daily living scale was 93.4±3.2 sportive activity scale was 90.1±5.7 in the group that underwent arthroscopy-guided retrograde drilling, which is con-

Table 1. Demographic and clinical values of patients

	All patients	Microfracture group	Retrograde drilling group	P-value
Number of patients	28	16	12	
Mean age (years)	36.8±4.2	37.6±3.9	35.7±4.9	0.510
Mean follow up period (month)	14±1.2	14.1±1.1	13.8±0.8	0.426
Mean FAAM activities of daily living scale (0–100)	93.6±3.7	93.8±4.1	93.4±3.2	0.526
Mean FAAM sportive activity scale (0–100)	89.5±9.6.	88.9±9.5	90.1±5.7	0.862

sistent with the clinical results in the literature. Subchondral cysts were detected in post-operative radiological controls in 2 of the patients who underwent retrograde drilling. The clinical outcomes of these 2 patients were good. We think that subchondral cysts have no effect on early clinical outcomes.

There are publications indicating that the long-term clinical results of the treatment of talar osteochondral lesions with arthroscopic microfracture are good (15, 20). The survival rates of 45 patients with 45 talar osteochondral lesions and arthroscopic microfractures were 93.3% and 84.4% after 10 years of follow-up. While all patients were satisfied with their results, 90.4% of the patients recommended the surgical procedure (5). Treatment of talar osteochondral lesions smaller than 150mm2 with arthroscopic microfracture has good early and moderate clinical outcomes (7). In the micro-fracture group, mean activities of daily living scale was 93.8±4.1, mean sportive activity scale was 88.9±9.5 and our early results were evaluated as good. Our results are compatible with the literature.

It is an important advantage that no heat is released and thermal necrosis does not occur during the microfracture application, as in drilling (22). Although our follow-up period was short, we did not detect any unsatisfactory clinical outcomes that may occur as a result of thermal necrosis. There was no statistically significant difference between the clinical results of both groups.

Although the clinical results of the patients were good in the follow-ups after the primary arthroscopies, it was determined that the osteochondral lesions in the talus did not fully heal in 36% of the patients, after the secondary arthroscopies performed 3.6 years later. When magnetic resonance and arthroscopic evaluation of cartilage healing were compared, some limitations were found (25). After surgical treatment of talar osteochondral lesions, it was determined that MRI and radiological controls were not correlated with clinical results for 1 year after surgery (23). Cartilage layer formation was detected in the control MRI performed in 11 of 12 patients. Although it was determined that the radiological results and clinical results were compatible, the short follow-up period and the lack of postoperative radiological images of all patients limit our study.

Chuckpaiwong et al. determined that the treatment of talar osteochondral lesions with a diameter of less than 15 mm with microfracture is an effective treatment method independent of the localization of the osteochondral lesion (4). It has been reported that the functional results of the treatments performed with microfracture of lateral osteochondral lesions are better (15). Patients with medial talar osteochondral lesions were included in our study. The inclusion of osteochondral lesions in the lateral talus limits our study.

CONCLUSIONS

According to our results, arthroscopic micro-fracture treatment and retrograde drilling treatment with arthroscopy in osteochondral lesions smaller than 1.5 cm^2 of the talus are successful in early period results. Retrograde drilling is a good treatment alternative in lesions where the cartilage layer is partially preserved or no loss of the integrity of the cartilage layer during arthroscopy.

Level of clinical evidence: *3*

Ethical approval *for this study was obtained from ethics board of Bahçeşehir University, Faculty of Medicine with approval number (2022-10/07).*

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