Bone and Arthrosurgery Science, 2024, Volume 2, Issue 1
http://ojs.bbwpublisher.com/index.php/BAS

The Effect of Arthroscopic Microfracture in the Treatment of Ankle Osteoarthritis Combined with Cartilage Damage

Zongwei Li*

Mianyang Orthopedic Hospital, Mianyang 621000, Sichuan Province, China

***Corresponding author:** Zongwei Li, lzw_mysgkyy@163.com

Abstract: *Objective:* To observe the specific effect of arthroscopic microfracture treatment on patients with ankle osteoarthritis and cartilage damage. *Methods:* 60 patients with ankle osteoarthritis combined with cartilage damage treated in our hospital from January 2022 to December 2022 were selected and divided into the control group and the experimental group using the random number table method, each with 30 cases. Subjects in the experimental group were treated with arthroscopic microfracture, while subjects in the control group were treated with conventional surgery. *Results:* After the intervention, the total treatment effectiveness of the experimental group was higher than that in the control group ($P < 0.05$); the inflammatory factor levels in the experimental group were lower than those in the control group ($P < 0.05$); the pain scores of the experimental group were lower than those in the control group ($P < 0.05$); the quality of life in the experimental group were higher than those in the control group ($P < 0.05$). *Conclusion:* During the treatment process of the experimental group, patients with ankle osteoarthritis combined with cartilage damage were given arthroscopic microfracture therapeutic intervention, and the post-treatment effect was relatively good. After treatment and intervention, the patients' symptoms were significantly relieved, the inflammatory reaction was improved, the pain was reduced, and the quality of life was enhanced.

Keywords: Arthroscopic microfracture; Treatment effect; Ankle osteoarthritis and cartilage damage; Pain level

Online publication: March 20, 2024

1. Introduction

Ankle osteoarthritis is clinically a multiple chronic joint disease [1]. The disease mainly manifests as degenerative lesions of articular cartilage, and it is often accompanied by limb dysfunction. As the disease progresses, it will gradually worsen, seriously affecting the patient's health. Patients require timely and active therapeutic intervention, and drug therapeutic intervention is often used in clinical practice. Although it can alleviate the patient's symptoms to a certain extent, the prognosis is poor. Conventional joint debridement also fails to achieve the ideal therapeutic effect, and patients often suffer from various complications after surgery. As an emerging treatment method, arthroscopic microfracture has relatively tiny wounds, patients generally

have good recovery after surgery and improved symptoms and joint function [2,3]. This paper aims to study the specific effect of this treatment measure on patients with ankle osteoarthritis and cartilage damage.

2. General information and methods

2.1. General information

The research subjects were 60 patients with ankle osteoarthritis and cartilage damage treated in our hospital from January 2022 to December 2022. After enrollment, the patients were divided into the experimental group and the control group using a random number table method, each with 30 patients. There were 16 males and 14 females in the control group, the age range was 41 to 80 years old, with an average of 67.69 ± 3.64 years old; the disease duration ranged from 1 to 5 years, with an average of 3.02 ± 0.24 years. The; In the experimental group, 17 cases were male, and 13 were females; the age range was 42 to 79 years, with an average age of 67.71 ± 3.69 years old; the disease duration ranged from 2 to 6 years, with an average of 3.13 ± 0.17 years. The basic information (gender, age, disease duration) of the observed subjects was compared and analyzed by statistical software. There was no difference in the results ($P > 0.05$).

Inclusion criteria included patients with good mental state and communication skills; patients who voluntarily participate in the study, are informed of its content, and provide their consent. Exclusion criteria were patients with other malignant tumors; patients with other hematological diseases and major infections; patients with other serious heart, liver, and kidney diseases, and those with contraindications for surgery.

2.2. Methods

In the control group, conventional surgical intervention was implemented. After a detailed and comprehensive examination, routine joint debridement treatment and intervention was carried out based on the actual condition. The patient was assisted to assume a prone position, and after the administration of general anesthesia or epidural anesthesia, a standard three-portal scope was selected to perform the entrance. The corresponding water cannula, arthroscope, and other instruments and equipment were placed, and a curette under the arthroscope, probes, etc., were used to perform corresponding cleaning of the patient's articular cartilage defect, the loose cartilage was removed, the defect edge and lower bone surface were cleaned, then the joint cavity was flushed until clean, and then the debris was cleaned up [4]. After the surgery, ice packs were applied to the affected area intermittently for 24 to 48 hours.

The experimental group implemented arthroscopic microfracture treatment intervention. The patient was put in the supine surgical position, and after performing general anesthesia or epidural anesthesia, a standard three-portal scope was selected to perform the entrance. Arthroscopy was used to sequentially explore the patient's medial recess, medial cartilage, joint capsule, lateral cartilage, lateral recess, and other parts to comprehensively understand the patient's cartilage and ankle joint injuries. Under arthroscopy, the patient's cartilage damage site was treated, the site of synovial hyperplasia was excised, the periphery of the cartilage defect was selected in the vertical direction, and the surrounding normal cartilage tissue was shaped to remove the damaged basal calcified tissue altogether. The vertebral tip of the microfractured vertebra was used to perform the drilling operation in the vertical direction from the edge. It should be noted that the center of the same hole is the center of a circle, and the distribution from the center to the edge is circular, and that there should be three to four holes per centimeter. During the drilling operation, the bone marrow and blood leaking out of the bone cavity can effectively promote the formation of new articular cartilage with blood clots in the defective location. After the fluid in the joint was drained, normal saline was used to flush the joint, and the arthroscope was withdrawn to close the wound. After the surgery, ice packs were applied to the affected area

intermittently for 24 to 48 hours.

2.3. Observation indicators

(1) Total effective rate of treatment: Through the observation and evaluation of the patient's symptoms, such as pain, swelling, joint effusion, etc., the results were divided into markedly effective, effective, and ineffective. The significant relief of symptoms was assessed as markedly effective, and the relief of symptom was effective. Still, it was ineffective if there was no symptom relief or the symptoms worsened. Total effective rate of treatment = Markedly effective + Effective

(2) Levels of inflammatory factors: The specific changes in patients' IL-6 (interleukin-6), TNF-α (tumor necrosis factor-α), and CRP (C-reactive protein) were recorded during the study process.

(3) Pain score: The patient's pain level changes were recorded using the VAS (visual analog scale), with 0–10 points. The score was directly proportional to the pain experience.

(4) Quality of life: The SF-36 (36-Item Short Form Health Survey) scale was used to analyze and understand the specific changes in patients' mental health scores, physiological function scores, and social function scores. Each dimension was scored from 0 to 100, with the scores directly proportional to the results.

2.4. Statistical analysis

SPSS26.0 was used for statistical analysis, the enumeration data between groups were compared using the chi-square test, the measurement data conformed to the normal distribution was mean ± standard deviation (SD), *t*-test was used as the test method, and the statistical difference was based on $P < 0.05$.

3. Results

3.1. Total treatment effectiveness

Table 1 shows the changes in the total treatment effectiveness of the two groups of patients after treatment. The experimental group (96.67%) had a significantly higher total treatment effectiveness than the control group (70.00%) ($P < 0.05$).

Table 1. Comparison of total treatment effectiveness [n (%)]

Group	Markedly effective	Effective	Ineffective	Total effective rate
Control group (n = 30)	8 (26.67)	13 (43.33)	9 (30.00)	21 (70.00)
Experimental group (n = 30)	14 (46.67)	15 (50.00)	1 (3.33)	29 (96.67)
χ^2	-	-	-	7.680
P	-	-	-	0.006

3.2. Levels of inflammatory factors

Table 2 shows the changes in the levels of inflammatory factors in the two groups of patients after treatment. The levels of IL-6, TNF-α, and CRP of the experimental group were lower than those of the control group ($P < 0.05$).

3.3. Pain scores

Table 3 shows the changes in pain scores of the two groups of patients after treatment. The pain scores of the experimental group were lower than those of the control group ($P < 0.05$).

Table 2. Comparison of inflammatory factor levels (mean ± SD)

Group	IL-6 (ng/L)	TNF-α (ng/L)	CRP (mg/L)
Control group (n = 30)	56.43 ± 13.47	112.25 ± 61.51	60.39 ± 17.31
Experimental group (n = 30)	48.27 ± 12.84	79.63 ± 32.42	30.26 ± 8.34
t	2.402	2.570	8.589
P	0.020	0.013	0.000

Table 3. Comparison of pain scores (mean ± SD, points)

Group	Before intervention	After intervention
Control group (n = 30)	7.36 ± 4.15	6.12 ± 3.18
Experimental group (n = 30)	7.28 ± 4.28	4.38 ± 2.07
t	0.073	2.512
P	0.942	0.015

3.4. Quality of life measurements

Table 4 shows the changes in the quality of life measurements of the two groups of patients after treatment. The mental health score, physiological function score, and social function score of the experimental group were higher than those of the control group ($P < 0.05$).

Table 4. Comparison of quality of life measurement (mean ± SD, points)

Group	Mental health score		Physiological function score		Social function score	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group (n = 30)	57.23 ± 5.34	71.37 ± 4.64	56.68 ± 5.67	72.13 ± 4.62	55.31 ± 3.65	70.92 ± 3.13
Experimental group (n = 30)	57.79 ± 5.35	80.16 ± 4.28	56.93 ± 5.72	81.28 ± 4.61	55.37 ± 3.69	80.13 ± 3.24
t	0.406	7.627	0.170	7.679	0.063	11.198
P	0.686	0.000	0.866	0.000	0.950	0.000

4. Discussion

Ankle osteoarthritis combined with cartilage damage is a common disease. This disease has a serious impact on patient's daily life and work, causing a sudden drop in their quality of life and often bringing varying degrees of pain to patients. The patients are mainly middle-aged and older adults. Their articular cartilage degenerates, gradually exposing the lower bones, causing cartilage destruction and contracture of tissues around the joint capsule [5], creating a vicious cycle. Patients will develop limb movement disorders as the disease progresses. To improve this condition, timely and active treatment is necessary. There are many available clinical treatment approaches, including drug treatment and surgical treatment. Although conventional joint debridement can relieve the patient's symptoms, its long-term effect is poor. Arthroscopic microfracture treatment can improve the patient's symptoms [6,7], relieve the patient's pain, promote the recovery of ankle joint function to the greatest extent, and has a better prognosis.

In this study, the experimental group underwent arthroscopic microfracture treatment intervention. The symptoms of the patients in this group were better improved after treatment. Compared with the control

group, the total effective rate of treatment in the experimental treatment group was higher ($P < 0.05$); the IL-6, TNF-α, and CRP in the experimental group were lower ($P < 0.05$) and the patients' inflammatory response was improved; the pain score of the experimental group was lower ($P < 0.05$), and their pain was relieved; the mental health, physiological, and social function scores of the experimental group were higher ($P < 0.05$), the patients' quality of life was improved. This is similar to the results reported by Shi [8], indicating that the effect of arthroscopic microfracture treatment was better after intervention. As an emerging bone marrow stimulation technology, arthroscopic microfracture treatment can better treat localized cartilage damage while protecting joint function. The application of cellulose blood clots to fill cancellous bone marrow mesenchyme can effectively promote the production of local growth factors, further repair the cartilage [9,10], and achieve the purpose of replacing articular cartilage. The microfracture awl used in the operation does not release too much heat when drilling. With many angles, it is more conducive to performing surgical operations perpendicular to the bone surface in the ankle joint, making it easier to drill holes by hand. Deep control can effectively maintain good limb mechanical balance and stability and improve clinical symptoms.

5. Conclusion

The above comprehensive evidence proves that arthroscopic microfracture treatment is more effective when treating ankle osteoarthritis with cartilage damage. The treatment can improve the patient's symptoms, inflammatory response, pain, and quality of life. Compared with conventional surgical treatment measures, arthroscopic microfracture is suitable for widespread promotion.

Disclosure statement

The author declares no conflict of interest.

References

[1] Li Q, Han S, Jia E, et al., 2022, Repair and Reconstruction of Ankle Fractures Accompanied by Deltoid Ligament Injury. Chinese Tissue Engineering Research, 26(11): 1793–1798.

[2] Liu N, Wei H, Tian X, et al., 2023, Clinical Observation of Arthroscopic Debridement Combined with High Tibial Osteotomy in Treating Early Varus Knee Osteoarthritis. Clinical Misdiagnosis and Mistreatment, 36(2): 85–89.

[3] Shi L, Pang M, Chen L, et al., 2021, Expression of Transforming Growth Factor-β1 in Cartilage and Serum of Ankle Osteoarthritis. Chinese Journal of Orthopedics, 29(23): 2194–2196.

[4] Huang Z, Deng L, Zou L, et al., 2023, Arthroscopic Debridement Combined with Platelet-Rich Plasma in Treating Traumatic Ankle Arthritis. Chinese Journal of Orthopedics, 31(23): 2124–2129.

[5] Wang K, Zhao Y, Zhang Y, et al., 2023, Comparison of Percutaneous Ligament Reconstruction and Microscopic Ligament Repair for Chronic Lateral Ankle Instability. Chinese Journal of Orthopedics, 31(3): 193–198.

[6] Zhu W, Shi F, Sun H, et al., 2021, Arthroscopic Treatment of Ankle Impingement Syndrome. Journal of Nantong University (Medical Edition), 41(1): 55–57.

[7] Yao J, Liu Z, Liu X, 2022, Study on the Clinical Efficacy of Minimally Invasive Arthroscopic Treatment in Patients with Secondary Osteoarthritis After Ankle Fracture Surgery. Sichuan Journal of Physiological Sciences, 44(3): 552–554.

[8] Shi H, 2021, Effect of Arthroscopic Minimally Invasive Ankle Fusion on Patients with Advanced Traumatic Ankle Arthritis. Heilongjiang Medical Sciences, 44(1): 193–194.

[9] Wang G, Feng K, Shen J, et al., 2023, Research Progress on the Treatment of Ankle Osteoarthritis. Gansu Science and Technology, 39(7): 95–99, 126.

[10] Zhao H, Liang J, 2022, Current Status of Stepwise Treatment of Ankle Osteoarthritis. Electronic Journal of Foot and Ankle Surgery, 9(1): 107–111.