



## Early functional results of arthroscopic surgery for ankle lesions

### *Ayak bileği lezyonlarında artroskopik cerrahinin erken dönem fonksiyonel sonuçları*

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**Amaç:** Ayak bileği patolojilerinde artroskopik tedavinin erken dönemdeki fonksiyonel sonuçları incelendi.

**Çalışma planı:** Ayak bileği artroskopisi yapılan 32 hasta (15 kadın, 17 erkek; ort. yaş 35; dağılım 17-54) incelendi. Yirmi bir olguda talusta osteokondritis dissekans (OKD), altı olguda izole sinovit, dört olguda sıkışma sendromu, bir olguda sinovyal kondromatozis vardı. On beş hastanın sol, 17 hastanın sağ ayak bileğine girişim yapıldı. Osteokondral lezyonlar radyografik olarak Berndt-Harty, artroskopik görüntüler Ferkel-Cheng sınıflamasına göre; ameliyat öncesi ve sonrası fonksiyonel durum Freiburg ayak bileği skorlama sistemiyle değerlendirildi. Ortalama izlem süresi 42 aydı (dağılım 11-84 ay).

**Sonuçlar:** Ameliyat öncesi Freiburg skorları ortalaması 66 olan OKD'li hastaların hiçbirinde ameliyat sonrası ilk dokuz haftada skorlarda iyileşme görülmedi. Ameliyattan 3.5 ay sonraki skorlarda ise belirgin iyileşme (ort. 88) vardı. İlk dokuz haftada ortalama skor, sinovitli hastalarda 72'den 90'a, sıkışma sendromlu hastalarda 80'den 95'e yükseldi. Sinovyal kondromatozisli olguda ameliyat sonrası ikinci ayda tüm semptomlar kayboldu (skor 100). Komplikasyon olarak, bir hastada drillleme sırasında drill ucu kırıldı; bir diğer hastada ameliyat sonrasında refleks sempatik distrofi gelişti.

**Çıkarımlar:** Ayak bileği artroskopisi, özellikle OKD, sinovit ve sıkışma sendromu olan olgularda morbiditeyi belirgin olarak azaltan, fonksiyonel iyileşmeyi hızlandıran bir tekniktir.

**Anahtar sözcükler:** Ayak bileği eklemi; artroskopi/yöntem; eklem hastalıkları/cerrahi; manyetik rezonans görüntüleme; osteokondritis dissekans/cerrahi; hareket açıklığı, artiküler; subtalar eklem/cerrahi; talus/patoloji/cerrahi.

**Objectives:** We evaluated early functional results of arthroscopic surgery in the treatment of ankle pathologies.

**Methods:** A total of 32 patients (17 males, 15 females; mean age 35 years; range 17 to 54 years) underwent arthroscopic surgery for ankle lesions, which included osteochondritis dissecans (n=21), synovitis (n=6), impingement syndrome (n=4), and synovial chondromatosis. Arthroscopic surgery was performed in the left ankle in 15 patients, and in the right ankle in 17 patients. Osteochondral lesions were assessed by the Berndt-Harty, arthroscopic views by the Ferkel-Cheng classification systems. Preoperative and postoperative functional evaluations were made using the Freiburg ankle scoring system. The mean follow-up was 42 months (range 11 to 84 months).

**Results:** There was no improvement in Freiburg scores within nine weeks in patients with osteochondritis dissecans, whose preoperative mean score was 66. However, at the end of 3.5 months, the Freiburg scores manifested a marked increase to a mean of 88. Functional scores increased from 72 to 90, and from 80 to 95 in patients with synovitis and impingement syndrome, respectively, at the end of nine weeks. The patient with synovial chondromatosis became symptom-free after two months. Complications included breakage of a drill in one patient and development of reflex sympathetic dystrophy in another.

**Conclusion:** Arthroscopic surgery for ankle lesions decreases surgical morbidity and promotes functional improvement, especially in patients with osteochondritis dissecans, synovitis, and impingement syndrome.

**Key words:** Ankle joint/surgery; arthroscopy/methods; joint diseases/surgery; magnetic resonance imaging; osteochondritis dissecans/surgery; range of motion, articular; subtalar joint/surgery; talus/pathology/surgery.

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Arthroscopy has been used widely in the last twenty years for the treatment of pathologies regarding the ankle. It shortens the duration of diagnosis, decreases morbidity and enables a rapid rehabilitation permitting a faster return to work, social and sportive activities.[1,2]

It is used, as a diagnostic tool when there are symptoms of unexplained or continuous pain, edema, joint stiffness, instability, locking, catching or popping sensation in the ankle and also as a therapeutic tool in the presence of intraarticular soft tissue or ligament injury, bone or soft tissue impingement, osteochondral defects, subchondral cysts, joint stiffness, synovitis, loose bodies and osteophytes.[1-10] Ankle arthroscopy is also used for ankle fractures, ankle arthrodesis and for ligament stabilization procedures.[5,9,11] It is being used more frequently as a diagnostic and therapeutic tool in the cases of septic arthritis.[1]

In this study we investigated the clinical results of the ankle arthroscopy cases and tried to find out the effect of arthroscopy on the early functional results.

### Patients and methods

Thirty-two patients (15 female, 17 male; mean age 35; range 17-54 years) who had undergone ankle arthroscopy between October 1995- June 2002 were included in this study. Arthroscopy was performed on 15 left and 17 right ankles.

Twenty-one patients had osteochondritis dissecans (OCD) of talus, 6 had isolated synovitis, two had posterior impingement, one had anterior impingement, one had anterolateral impingement and one had synovial chondromatosis. Patients were diagnosed with the aid of patient history, physical examination, x-rays and magnetic resonance imaging (MRI).

Osteochondral lesions were classified radiologically according to Berndt and Harty classification (table 1), (figure 1) and arthroscopically according

**Table 1.** Berndt and Harty Classification

Type1	Compressed fragment
Type2	Disrupted, not displaced
Type3	Partially displaced
Type4	Displaced fragment

to Ferkel and Cheng classification (table 2), (figure 2).[10] Functional status of the ankles were evaluated both pre and postoperatively according to Freiburg ankle scoring system over 100 points (table 3).[6]

### Arthroscopic Procedure

Seven patients were operated under general anesthesia and 25 under spinal anesthesia in supine position with the knees held free in 90 degrees of flexion and a tourniquet applied to the upper thigh. Non-invasive traction was used by hanging weights to a sling, which crossed over the dorsum of the foot and posterior part of the ankle in all but three of the patients. Standard anterolateral and anteromedial portals together with a 2.7 mm, 30 degrees angled scope were used in all patients. Drills and Kirschner wires were used for subchondral drilling. Marcaine (5ml; 50% diluted with isotonic NaCl solution) was injected into the joint following the procedure.

Patients were mobilized without weight bearing starting from the postoperative first day. Ankles were immobilized with the aid of a below knee cast during the first three weeks. At the fourth week the cast was removed and range of motion (ROM) exercises were begun, again without weightbearing. At sixth week, protected weightbearing was allowed and they were all allowed full weightbearing as tolerated at ninth week. All patients were given strengthening exercises and proprioceptive training. They were called to follow-up with 3 weeks intervals during the first 9 weeks and after that with 1.5, 3, and 6, 12 months intervals. Mean follow-up period was 42 months (range 11-84 months).

### Results

External fixator was used for traction in the first three cases. We used 2.7mm wrist scope and did not face any restrictions of vision using the ankle sling; we applied noninvasive traction to the rest of the cases.

**Table 2.** Ferkel and Cheng's Arthroscopic Classification

TypeA	Smooth/intact cartilage
TypeB	Rough Surface
TypeC	Fibrillations/fissures
TypeD	Flap present or bone exposed
TypeE	Loose, undisplaced fragment
TypeF	Displaced fragment

Four (19%) of 21 talar OCD cases were classified as type1, 12 (57%) as type2, 3 (14%) as type3, 2 (9,5%) as type4 according to Berndt and Harty classification. Trauma history was present in 17 (80.9%) of 21 OCD and all (100%) of 6 synovitis patients. Concomitant Berndt and Harty type 2 osteochondral lesions were detected in 3 (50%) of 6 patients operated with the diagnosis of synovitis. According to

Ferkel and Cheng's arthroscopic classification, typeB lesions were detected in 4 (19%) patients, typeC in 12 (57%), typeD in 3 (14%) and type F in 2(9,5%) patients.

In all but one patient who were operated with the diagnosis of OCD, the lesion sites were debrided with shavers and upon reaching the subchondral bone, a bleeding base was obtained by drilling. One

**Table 3.** Freiburg Ankle Scoring System

Category	Points	
Pain	No pain	30
	Temporary pain under stress (sport)	
	No impairment in everyday life	25
	Little pain under stress (sport)	
	Minor impairment in everyday life	20
	Significant pain under stress, sport not possible, Major impairment of everyday life, temporary pain at rest/night, analgesics on request	15
	Constant pain, analgesics continually	10
Instability: walking/running insecurity	No insecurity	10
	Little insecurity walking/running on rough ground	8
	Insecurity walking on flat ground, running impossible	6
	Walking possible only with orthotic device/brace	0
Functional Impairment: pain-free walking distance/time (limit caused by ankle)	Unlimited walking distance, no (or almost no) functional impairment	10
	Painfree walking distance/time less than 1 hour	6
	Only few steps possible/ in the apartment/ with cane/crutches	0
Gait	Fluent, no limping	10
	Fluent, slight limping	8
	Slow, significant limping	6
	Cane/ crutches	0
Circumference (difference injured / healthy)	0cm	10
	0-2 cm	6
	>2cm	0
Range of Motion: Dorsiflexion	30°	10
	20°	8
	10°	6
	Not possible	0
Plantar Flexion	40°	10
	30°	8
	20°	6
	10°	4
	Not possible	0
Strength/stability	Toe rise possible: 10 repetitions	10
	Toe rise possible: 5 repetitions	8
	Toe rise possible: only once	6
	Toe rise not possible	0

patient, in whom debridement and drilling was carried out by open approach because of technical difficulties was not functionally evaluated. We used transmalleolar drilling in hard-to-reach sites.

All 4 patients (100%) who were operated with the diagnosis of impingement had positive history of trauma. Two patients with posterior impingement syndrome were professional dancers and they reported sudden onset of pain when they rose up on their fingertips. In these patients, following synovectomy, the foot was plantar flexed and the soft tissues and the capsule, which were caught between the articular surfaces with this maneuver, was debrided with a shaver. The patient with anterolateral impingement was also a dancer. The synovial tissue that was caught between the articular surfaces was debrided. In the patient with anterior impingement syndrome, release of the anterior capsule and excision of impinging synovial tissues was performed through the anterolateral and anteromedial portals using an angled shaver.

In 5 of 6 patients with synovitis, hypertrophic synovial tissue was excised with a synoviator. In one patient, steroid was injected to the joint following

minimal synovectomy. Also in three patients, osteochondral lesions were managed with the above-mentioned method.

In the case of synovial chondromatosis following excision of 12 loose bodies, all synovial tissue, which could be seen, was debrided arthroscopically. Vacuum drainage was placed from the lateral portal to prevent hematoma formation. There was no recurrence during 1,5 years follow-up. The patient lives an active life without pain and with full range of motion.

As a complication, a drill bit was broken in one patient during the operation. The drill bit was extracted from the anterior portal with the aid of pens. After this patient, Kirschner wires were used for drilling and this kind of a complication did not recur. One patient had reflex sympathetic dystrophy after the operation, which resolved completely following appropriate physical therapy.

Regarding the Freiburg ankle scores which was applied pre and post-operatively, between 100-78 points was accepted as good, 77-51 as average, less than 50 points as bad result. Scoring was repeated for every patient during all follow-up visits. At this



**Figure 1:** A case of Berndt-Harty type2, Ferkel-Cheng TypeD osteochondritis dissecans (a) anteroposterior X-ray. (b) Same case, magnified view of osteochondral lesion



**Figure 2:** Coronal plane magnetic resonance image of Berndt-Harty type1, Ferkel-Cheng Type C osteochondral lesion

stage the patients were divided into three groups: OCD, synovitis, impingement syndrome.

The pre-operative mean score of OCD patients was 66 (range 55-100), and there was no improvement of post-operative scores in any patients during the first 9 weeks. The main reason for this was the increase in pain levels. After 3,5 months there was a marked improvement of scores (mean 88). Pain diminished in all but one patient.

The pre-operative mean score of patients with synovitis was 72 (range 65-95) and there was a marked improvement of scores during the first 9 weeks (mean 90). Following physical therapy and proprioceptive training, all patients became asymptomatic.

Mean preoperative scores of patients with impingement syndrome were 80. The main problem of these patients was restriction of plantar or dorsiflexion due to the site of the lesions (figure3). The mean scores improved to 95 during the first 9 weeks period.

All symptoms of the patient with synovial chondromatosis improved in the second month of follow-up. Freiburg score which was 60 preoperatively raised to 90 at the end of 9 weeks and to 100 at 3,5 months follow-up.

### Discussion

Arthroscopy enables most accurate diagnoses with the advantage of direct vision in patients with persistent ankle problems. It can also be used to treat the diagnosed pathology at the same session. Many procedures that were done by open methods can be done arthroscopically today. Osteochondral lesions,[5,6,9,10,12,13] post-traumatic talar cysts,[3] anterior and posterior impingement syndromes,[8,10,14-17] ligament injuries,[18] osteoid osteomas of talus,[19] synovitis,[10] can be diagnosed and treated with this method. Arthroscopy can be used both for diagnostic and therapeutic purposes in acute ankle fractures,[9] and subtalar joint pathologies.[4,6]

Treatment of osteochondritis dissecans depends on the classification of lesions and the degree of symptoms. Application of osteochondral transplantation in the presence of large lesions has gained a



**Figure 3:** Sagittal magnetic resonance image of the case of anterior impingement syndrome

widespread use in the last years.[20] This is a technically demanding technique done by open methods and requiring surgical experience. Because of this, arthroscopic debridement of the lesion site till reaching subchondral bone followed by drilling to reach bleeding tissue in order to enable filling of the defect with fibrocartilaginous tissue is still a common procedure.[5,6,10,11,21] Many studies reported successful clinical results with this method although the defect is filled with type 1 cartilage, which is biomechanically less strong than normal type 2 hyaline cartilage.[20] We applied this treatment method to OCD patients who represent the majority (60%) of our study group. At post-operative 6th week, when partial weight bearing was allowed, all patients had complaints of pain but at a mean of 3 months all patients had achieved a painless and non-restricted range of motion.

Ankle arthroscopy represents an important part of treatment not only in synovial disorders like rheumatoid arthritis or villonodular synovitis but also in non-specific traumatic synovitis. In our study, the synovitis group of five patients became asymptomatic at a mean of 2 months (1,5-2,5 months) and they were the group, which showed improvement in the earliest period. In these patients, to gain pain free range of motion, strengthening exercises and proprioceptive training is very important. As these cases usually have a history of trauma, they probably have ankle instability and post-operative immobilization followed by exercises and physical therapy program will help resolve this problem.

Functional results were excellent in two dancers with posterior impingement. These cases returned to their everyday life at a mean of 2 months and to their active professional studies at 6 months. The extent of excision without compromising stability is an important issue. Regarding this, non-invasive traction enabling free motion of the joint helps to determine the extent of excision. When the foot is brought to full plantar flexion, the tissue caught up in the posterior part of the joint roughly shows the part to be excised. Same method can be used for anterior impingement syndrome with the foot brought to dorsiflexion.

Choice of portals is also an important issue. Mostly anterolateral and anteromedial portals are used but posterior portals[17] can be used for anterior

or median[22] and posterior talar lesions. In all cases we used anterolateral and anteromedial portals and observed that even the osteochondral lesions posterior to the talar dome can be reached when the foot is brought to plantar flexion as Van Dijk and Scholte[21] had reported. We did not use any other portals in our cases.

There is no consensus in the literature regarding post-arthroscopy rehabilitation programmes, there are several applications. Compressive bandage and 3-5 days protected weight bearing followed by full weight bearing;[17,21] two weeks toe touch weight bearing followed by full weight bearing;[5] one week compressive bandage followed by full weight bearing with restriction of running, jumping and high impact sports for 3 months;[3,13] non-weight-bearing for 5 weeks, protected weight bearing at 5th week, full weight bearing after 6th week;[12] immediate full weight bearing followed by active rehabilitation;[16,18] five days immobilization followed by exercise with a splint for 3 weeks then full weight bearing;[19] weight bearing after one month immobilization;[22] 8 weeks non-weight bearing;[11] 6 weeks non weight bearing without immobilization[2] are the examples of different applications. What attracts attention is, despite these differences between authors, almost all of them suggest active flexion and extension exercises starting from the first post-operative day.[3,5,11-13,16-18,21,23]

Ankle arthroscopy, in addition to the advantages of minimally invasive surgery, is a technique with a shorter learning curve when compared to the wrist arthroscopy. It both decreases morbidity (especially in OCD patients) and enables a good functional outcome.

Use of an elastic K-wire instead of a drill bit both helps to drill in different angles and to prevent a problem like drill bit breakage.

Use of an ankle sling instead of an external fixator for joint distraction facilitates manipulation by the surgeon and prevents post-operative pain at the distractive pin site. We believe that post operative painful period in our first three cases was due to traction by an external fixator. Also it should be known that traction might not be necessary in all cases.

Application of short-term immobilization followed by physical therapy and proprioceptive train-

ing aids in the treatment of ankle instabilities, which may coincide, with synovitis.

Because impingement syndrome is frequent in ballet dancers, it should be kept in mind if there is persistent ankle pain in a dancer.

In patients who had undergone ankle arthroscopy, patience is mandatory regarding functional outcome. Three months is needed in OCD, and 2 months in synovitis and impingement syndrome patients for functional well being.

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