Case report

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ARTHROSCOPIC TREATMENT OF THE ANTEROLATERAL IMPINGEMENT OF THE ANKLE: CASE REPORT

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In this paper, we present a patient who sustained an ankle injury without a fracture of the malleolus but with damage to the ligaments on the lateral side. The aim of this paper is to highlight the importance and role of the arthroscopic method in the treatment of ankle joint pathology.

The patient was treated conservatively with a plaster cast and physical therapy. Six months after the injury, the patient continued to experience pain, limited dorsiflexion of the foot, and a reduced gait. An MRI of the ankle joint revealed an avulsion of the anterior talofibular ligament (ATFL) with a 6 x 4 mm bone fragment at its end, a capsule lesion, cartilage damage on the anterolateral side of the talus, and synovial hypertrophy of the ankle joint. The arthroscopic method was used to remove the hypertrophic synovium, free chondral bodies from the joint, scar tissue, and the bone fragment from the lateral sinus of the ankle. Consequently, the lateral recess of the ankle joint was decompressed and freed from all factors contributing to painful contact.

The treatment outcome was excellent; pain disappeared, and complete foot function was restored.

Ankle arthroscopy has advantages over the traditional surgical approach in the treatment of anterolateral ankle impingement following injury. It is a minimally invasive technique that preserves soft and bony tissues, allows for the removal of scar tissue and synovial and chondral lesions, and facilitates faster patient recovery.

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Introduction

Ankle sprains are a common injury, accounting for approximately 25% of all musculoskeletal injuries, with the highest incidence occurring on the lateral side. Around 60−70% of affected individuals develop chronic lateral ankle instability, which is characterized by persistent pain, instability, recurrent injuries, and functional impairment (1−3). The mechanism of a sprain typically involves an acute episode of excessive foot supination and external leg rotation while the kinetic chain is locked.

The lateral ankle ligament complex plays a crucial role in providing stability to the ankle joint. It consists of the anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL), and posterior talofibular ligament (PTFL). In 85% of cases, ankle sprains occur with the foot in a varus position, and in 62% of these cases, the ATFL is affected—either through partial rupture or avulsion from the apex of the fibula (4). Chronic ankle instability can lead to the development of anterolateral impingement syndrome, characterized by painful contact between bone and soft tissues in the anterolateral recess of the ankle joint. The anterolateral recess is a pyramidal space formed by the tibia on the medial side, the fibula on the lateral side, the anteroinferior tibiofibular ligament (AITFL) above (which is part of the tibiofibular syndesmosis), the calcaneofibular ligament (CFL) below, and the ATFL and capsule in front (5).

Anterolateral impingement syndrome presents with localized pain during internal and external rotation, along with restricted dorsiflexion of the foot. Several factors contribute to impingement, including hemarthrosis, chronic reactive synovitis, thickening of the anterior-inferior tibiofibular ligament (AITFL) (6), the presence of an accessory ligament beneath the

AITFL (7), avulsion injuries from the fibular apex or anterolateral tibia (8), ATFL scarring (9), osteochondral lesions of the anterolateral talus (10), and adhesive capsulitis of the ankle (11). These factors contribute to chronic ankle instability (Chronic Ankle Instability – CAI) and the progression of impingement syndrome. Repetitive microtraumas and soft tissue bruising lead to inflammation, hypertrophy, and scarring, resulting in painful soft tissue friction and impingement. Additionally, hypertrophy of the lower ATFL or its avulsion from the lateral malleolus often occurs when a small bone fragment is pulled along with it (9, 12, 13).

Our research question was: What is the outcome of arthroscopic treatment in a patient with a rare consequence of anterior tibiofibular ligament injury? Our working hypothesis was that arthroscopy would provide excellent results in treating the consequences of ankle joint distortion with damage to the anterior tibiofibular ligament. The aim of this paper is to present the arthroscopic treatment of anterolateral ankle impingement.

Case report

We present the case of a patient who sustained a right ankle injury due to slipping and falling. Clinical examination and radiographic findings ruled out a malleolar fracture. The patient was initially treated conservatively with a plaster cast for two weeks. After cast removal, he continued to experience pain in the lateral malleolus region and in the projection of the lateral sinus of the ankle. Despite undergoing physical therapy, persistent pain, swelling, and restricted dorsiflexion impaired gait and activity levels. Six months post-injury, pain and restricted movement persisted.

Ultrasound and MRI examinations of the ankle joint confirmed an ATFL rupture at the apex of the lateral malleolus, along with the presence of a small bone fragment, capsular thickening, soft tissue changes in the anterolateral recess, a small fluid accumulation, and chondral lesions on the lateral side of the talus (Figure 1). The patient developed anterolateral impingement and chronic lateral ankle instability (Scheme 1).

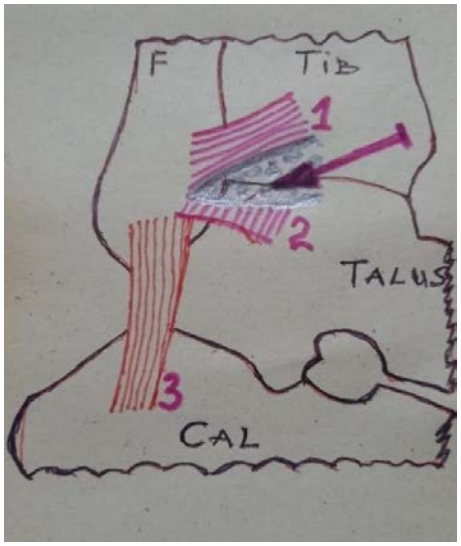
To confirm the diagnosis, we used the anterior drawer test and the external rotation stress test, both of which were positive, indicating lateral ankle instability (14). These tests involve dorsiflexion of the foot, during which the anterolateral talus exerts pressure on the anterolateral recess. If pathological tissue is present, it obstructs dorsiflexion, leading to soft tissue compression and significant pain on the lateral side of the ankle (15).

To assess pain severity, we used the Visual Analog Scale (VAS), which ranges from 0 to 10 points (16). A score of 0 indicates no pain, while a score of 10 represents severe pain. Pain levels were categorized into three groups: 0–3 points (mild pain, does not interfere with sleep), 4–6 points (moderate pain, allows sleep), and 7–10 points (severe pain, disrupts sleep). Chondral lesions of the talus were classified according to the Berndt and Harty classification (17). A first-degree lesion involves compression of a small area, while a second-degree lesion presents as a partial rupture of the osteochondral fragment. A third-degree lesion is characterized by a complete rupture of the osteochondral fragment without displacement, and a fourth-degree lesion involves separation and displacement of the osteochondral fragment. To assess intra-articular fibrosis, we used the Utsugi et al. (18) classification, where Grade B0 indicates no fibrosis, Grade B1 represents a moderate extent of fibrosis, and Grade B2 signifies extensive fibrosis with impingement. Following treatment, functional outcomes were evaluated using the Olerud–Molander scoring system (19).

The procedure began with the injection of 20 ml of physiological solution into the ankle joint to expand the joint space and dilate the capsule. An anterolateral approach was made 1 cm below and 1 cm in front of the apex of the lateral malleolus, extending along the anterior edge of the fibula (16). This entry point was selected to avoid damage to the tibialis anterior tendon and the lateral branch of the superficial peroneal nerve. Upon entering the joint space, we observed hypertrophic synovium, third-degree cartilage damage on the outer upper side of the talus (according to the Berndt and Harty classification), a moderate volume of intra-articular fibrosis (type B1), and a relaxed ATFL, indicating avulsion (Figure 2). In the anterolateral recess, soft tissue hypertrophy was noted. Below the apex of the lateral malleolus, a 6 x 4 mm bone fragment was identified, which was fixed to the ATFL and confirmed as an avulsion of the malleolus. A 3.5 mm shaver was used to remove hypertrophic synovium, fibrous bands, free bodies, and cartilage fragments from the anterolateral talus. No auxiliary ligament was found beneath the AITFL, ruling out the presence of the Bassett ligament, which occurs in 21% of cases (7, 20), (Figure 3, Scheme 2). The bone fragment, along with a small amount of soft tissue and fibrous scar tissue, was removed, thereby decompressing the anterolateral recess and the surrounding lateral malleolus area (Figure 4). Following the procedure, a plaster cast was applied with the foot in plantar flexion and valgus positioning for two weeks. Antibiotics were administered for two days. Weight-bearing on the operated leg was restricted for two weeks, after which the cast was removed and gradual weight-bearing was allowed within the patient's pain tolerance. Physical therapy was then initiated.

According to the Visual Analogue Scale (VAS), the patient reported moderate pain before surgery but was able to sleep. Postoperatively, the pain resolved completely. The Olerud–Molander scoring system showed an improvement from 68

points preoperatively to 96 points postoperatively. After eight weeks, the patient's ankle range of motion improved, with painless varus positioning and dorsiflexion. By four months, complete recovery was achieved, with full, pain-free movement of the ankle.



Scheme 1. Lateral ligaments of the ankle: 1. Anterior inferior tibiofibular ligament (AITFL). 2. Anterioror and posterioror talofibular ligament (ATFL, PTFL). 3. Calcaneofibular ligament (CFL). The place of the most common impingement of the talus and fibula (arrow).

Figure 1. MR findings of the ankle joint. Below the top of the lateral malleolus, a bone fragment is observed that is fixed to the ATFL and represents an avulsion of the malleolus.

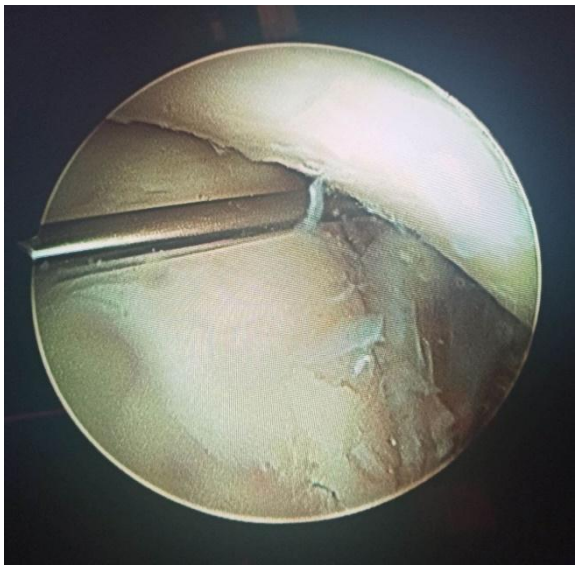


Figure 2. Talus cartilage lesion and synovial hypertrophy.

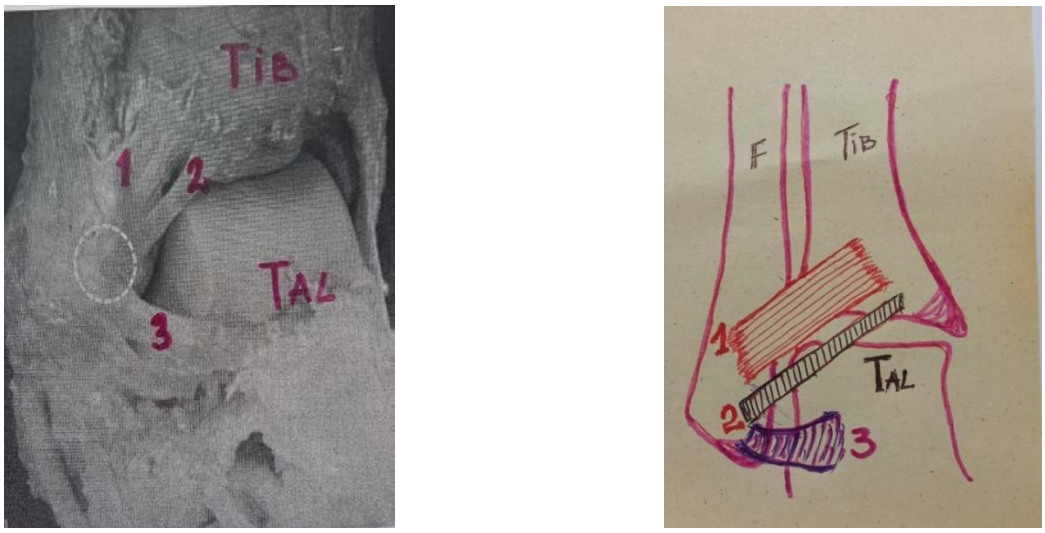


Figure 3 and Scheme 2. Anatomical and schematic representation of the ankle joint. 1. Anterior inferior tibiofibular ligament (AITFL). 2. Inferior fascicle of the anterior inferior tibiofibular ligament – Basett's ligament. 3. Anterior talofibular ligament (ATFL).

Figure 4. Bone fragment detached from the apex of the fibula with scar tissue.

Discussion

XGPN is well known as the "great imitator" This study demonstrates that a more severe form of ankle sprain can lead to damage to the anterior talofibular ligament (ATFL) and the cartilage in the lateral column of the ankle joint.

Anterolateral impingement syndrome of the ankle is caused by obstruction of the anterolateral recess. It is characterized by localized pain during internal or external rotation and restricted dorsiflexion of the foot. Several factors contribute to this syndrome, but it most commonly occurs following an ankle sprain, which results in significant hemarthrosis and reactive synovitis in response to the injury (5, 9). Feng et al. (16), in a series of 37 patients, identified the presence of an avulsion fracture at the apex of the lateral malleolus as the cause of impingement in 2 patients (5.4%). The recommended treatment was resection of the small bone fragment along with the surrounding soft scar tissue. Similarly, in our patient, we identified a small bone fragment resulting from ATFL avulsion at the apex of the lateral malleolus, which we removed along with the surrounding soft tissue, thereby relieving the obstruction in the anterolateral recess.

For acute ATFL avulsions, many authors recommend anchoring the bone fragment to the apex of the lateral malleolus and tightening the ligament (21, 22). However, in chronic injuries, this approach is not indicated due to ligament shortening and fibrotic scar tissue formation. In such cases, debridement of the chondral surfaces, synovium, and scar tissue is advised (13, 23). Monden et al. (8) reported similar findings in their

study of 111 patients, where fragment excision was performed in 95 patients (85.6%), while fragment osteosynthesis was carried out in 16 patients (14.4%) due to the acute nature of their injuries. We applied the same approach in treating our patient.

The advantages of ankle arthroscopy for impingement syndrome include a minimally invasive approach that avoids arthrotomy, the ability to remove pathological tissue (hypertrophic synovium, thickened capsule, and scar tissue) with minimal damage to vital structures, direct visualization of the anterior inferior tibiofibular ligament (AITFL) and associated accessory ligaments, as well as thorough debridement of the anterolateral recess to remove hypertrophic tissue or bone fragments from the apex of the lateral malleolus (24). However, ankle arthroscopy carries certain risks, including iatrogenic cartilage damage and injury to the superficial branch of the peroneal nerve or the tibialis anterior tendon. The incidence of such complications is reported to be up to 4% (25). In our case, we encountered no complications. This case study highlights the successful treatment of ATFL rupture and chondral lesions of the ankle joint using arthroscopy. A limitation of this study is that it presents only a single case and lacks a comparative analysis with cases treated through open surgical methods.

Conclusion

This study demonstrates that ankle arthroscopy offers significant advantages in the treatment of anterolateral impingement following injury. As a minimally invasive procedure, it preserves soft tissue integrity, maintains vascularization, and facilitates a faster postoperative recovery.

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ARTROSKOPSKO LEČENJE ANTEROLATERALNOG NAGNJEČENJA SKOČNOG ZGLOBA: PRIKAZ SLUČAJA

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U radu se prikazuje slučaj pacijenta kod kojeg je došlo do povrede skočnog zgloba bez preloma maleolusa, ali sa oštećenjem ligamenata lateralne strane. Cilj ovog rada bio je da se ukaže na značaj i ulogu artroskopske metode u lečenju skočnog zgloba.

Za lečenje pacijenta korišćene su konzervativne metode: gipsana longeta i fizikalna terapija. Šest meseci nakon povrede pacijent je imao bolove, ograničenu dorzalnu fleksiju stopala i umanjenu sposobnost kretanja (hoda). Urađena je magnetna rezonanca skočnog zgloba i utvrđena avulzija prednjeg talofibularnog ligamenta (ATFL), na čijem su kraju registrovani koštani fragment veličine 6 mm x 4 mm, lezija kapsule, oštećenje hrskavice na prednjoj lateralnoj strani talusa i hipertrofija sinovije skočnog zgloba. Artroskopskom metodom uklonili smo hipertrofisanu sinoviju, hondralna slobodna tela iz zgloba, ožiljačno tkivo i koštani fragment iz lateralnog sinusa skočnog zgloba; tako je lateralni recesus skočnog zgloba oslobođen i rasterećen svih faktora koji su izazivali bolni kontakt.

Rezultat lečenja bio je odličan – bolovi su nestali, a stopalo je povratilo kompletnu funkciju.

Artroskopija skočnog zgloba ima prednosti u odnosu na klasičan hiruški pristup u lečenju anterolateralnog nagnječenja skočnog zgloba nakon povrede budući da pošteđuje meko i koštano tkivo, omogućava uklanjanje ožiljačnog tkiva i sinovijalnih i hondralih lezija i čini oporavak pacijenta bržim.

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***Ključne reči**: avulzija apeksa fibule, artroskopija skočnog zgloba, nagnječenje skočnog zgloba*