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Case Report
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Anatomical Graft Reconstruction of the Anterior Tibiofibular Ligament for Chronic Injury of the Syndesmosis after Ankle Fracture

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Abstract

Chronic syndesmosis injury is defined as symptomatic injuries more than 6 months after the primary event. It is a rare pathology but with great implications in the patient's life as it can produce chronic instability that leads to early ankle osteoarthritis and chronic pain. In order to avoid the appearance of this injury, a good diagnosis of syndesmal lesions and correct treatment in an acute manner, is essential. Once the chronic injury and osteoarthritis appear, it can be treated by arthrodesis, total arthroplasty or joint preservation techniques such as ligament reconstruction. This procedure is used for young patients with high-demand or athletes. The goal of this paper is to describe the surgical technique for an anatomical reconstruction of the Anterior-Inferior Tibiofibular Ligament (AITFL) for chronic injuries of the tibiofibular syndesmosis using an allograft.

Keywords: Chronic syndesmosis injury; Ligament reconstruction; Technique; AITFL

Abbreviations

AITFL: Anterior-Inferior Tibiofibular Ligament; PITFL: Posterior-Inferior Tibiofibular Ligament; CT: Computerized Tomography; MRI: Magnetic Resonance Imaging; AOFAS: American Orthopaedic Foot & Ankle Society

Introduction

Chronic syndesmosis injury is defined as symptomatic injuries more than 6 months after initial trauma. It is an uncommon pathology that could appear due to overlooked or inadequate treatment of syndesmosis ligament injury in ankle fractures. Patients could present chronic pain, instability, premature joint degeneration, lameness or missing work. If there is no osteoarthritis, preservation procedures will be indicated by different techniques such as anatomical reconstruction of Anterior-Inferior Tibiofibular Ligament (AITFL) and reduction of syndesmotic joint. On the other hand, if there is osteoarthritis or patients with low-demand, other techniques as arthrodesis or arthroplasties will be indicated [1].

Case Presentation

Twenty six years old female presented in December 2019 at emergency service with right ankle trimalleolar fracture after sprain (Figure 1). That day we did open reduction and internal fixation with lag screw, neutralization plate and quatricortical fixation of syndesmosis associated with lag screws at medial malleolus (Figure 2).

Postoperatively, the patient remained with pain and limitation of range motion in ankle (30° dorsiflexion and 30° extension). Seven months after surgery, we removed material and we requested a Computerized Tomography scan (CT) where we observed pseudoarthrosis of the fracture focus, shortening and malrotation of the fibula, decreasing of the intra-articular spaces and posterior malleolus fracture unnoticed, already consolidated (Figure 3). Ten months after first surgery, we requested weight-bearing X-rays where we could see anterolateral impingement at the tibiotalar joint with signs of asymmetric osteoarthritis associated with fibula malrotation and shortening (Figure 4). At that day we also requested a Magnetic Resonance Imaging (MRI) for assessment of syndesmosis ligaments with its disruption in the anterior slope.

Given those findings, we decided to perform a new surgical procedure to reconstruct AITFL. We did an ankle arthroscopy, where antero-external osteochondral lesion of the talus and a fibrous

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Figure 1: Lateral and anteroposterior X-rays of the initial fracture in 2019. Suprasyndesmal ankle fracture type C associated with internal malleolus fracture is observed.

Figure 2: Lateral and anteroposterior X-rays after first surgery in 2019. Reduction of internal malleolus fracture and fixation of syndesmosis is observed with 2 quatricortical screws and neutralization plate.

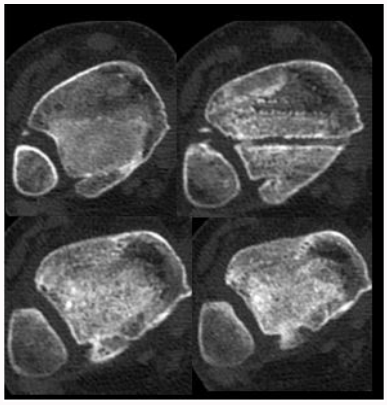

Figure 3: Computed tomography scan with axial images of syndesmosis 7 months after first surgery. It is seen pseudoarthrosis on fibula fracture with fibula shortening and malrotation. In addition, it is seen osteoarthritis and overlooked fracture of the posterior malleolus, already consolidated.

scar of the syndesmosis were observed. We did debridement of the syndesmosis intraarticularly and extraarticularly and an osteotomy in proximal fibula is performed in the area of the primary fracture focus to get tricortical graft. Next, a distal osteotomy was performed on the fibula in order to obtain its length and correct rotation, fixed with a blocked plate using the tricortical intercalary graft previously extracted. After that, we stabilized syndesmosis with a tightrope type

Figure 4: Weight-bearing anteroposterior and lateral X-rays 10 months after first surgery. It is seen anterolateral impingement of the tibiotalar joint with signs of asymmetric osteoarthritis and fibula malrotation.

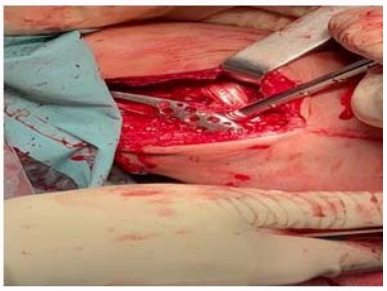

Figure 5: Intraoperative image where it is seen the reconstruction graft of the Antero-Inferior Tibiofibular Ligament (AITFL) of the syndesmosis with gracilis tendon homograft. It was fixed with a biotenodesis screw. It is also visualized blocked fibula plate that fixed fibula osteotomy.

Figure 6: Weight-bearing anteroposterior and lateral X-rays 1 year after reconstruction surgery. It is observed consolidation of osteotomy and fracture with correct position of syndesmosis.

dynamic system and the AITFL reconstruction ligamentoplasty of the syndesmosis was performed openly with gracilis tendon homograft from tissue bank. Then, a blind tunnel was drilled in tibia identifying the entry point into the Tillaux tubercle, approximately 30 mm deep and a fibula tunnel from the Wagstaffe tubercle to the posterior area of the peroneal malleolus, both 6 mm in diameter (the size of our graft). The graft is then fixed using a biotenodesis screw (Figure 5).

Results

One year after surgery, the patient presents clinical improvement with a complete flexion and limitation of 10º in the dorsiflexion, with ambulation without the help of crutches and painless ankle (Figure 6).

Discussion

There are several strategies in the literature that can be used for a chronic lesion of syndesmosis, including arthroscopic debridement, syndesmosis screw fixation with suture button, arthrodesis of the syndesmosis, passing through different types of reconstruction ligamentoplastie. Furthermore, in patients with ankle fractures, such as the one presented here, we should request a CT scan in order to assess fibula shortening and malrotation and in order to perform osteotomies of elongation and reductions with bone graft in search of a correct syndesmotic reduction and anatomical joint alignment if it is necessary [1].

In the case of arthroscopic debridement and stabilization of syndesmosis by ankle arthroscopy, first debridement of the scar tissue is performed and then syndesmosis is stabilized with screws or dynamic systems. This technique has the advantage of being simple and it is being able to visualize the correct reduction of the joint. However, in large instabilities or instabilities of long evolution it is not effective in isolation, it may limit ankle motion and, also, subsequent surgery may be necessary to remove transindesmal screws, if they are used. It is also seen worse results than anatomical reconstruction [1].

Arthrodesis of syndesmosis is another therapeutic option, but it is done as a rescue procedure or for low-demand patients. This technique has complications as stiffness and most of patients are not able to perform sports life anymore [1].

Finally, anatomical reconstructions of syndesmosis with grafts have been developed since the 60s with different techniques. A gracilis or extensor hallucis longus allograft is used, depending on availability, used commonly in young patients or athletes. The main technique consists of reconstructing the AITFL in isolation (procedure used in our case) or associated with the Posterior-Inferior Tibiofibular Ligament (PITFL). The latter is similar to the one used in our case, adding a fibula tunnel from Volkman tubercle in posterior-anterior direction in order to introduce the graft [1].

PITFL reconstruction is a more anatomical technique and it is very useful for high-demand patients, however, it presents a greater risk of nerve injury, fibula or tibia fracture due to multiple bone tunnels. It is also frequent seeing patients with peroneal tendon's irritation because of the posterior bundle of graft and the double tunnel in tibia. It is a demanding technique and its results are the same as those patients operated with AITFL reconstruction technique. That was the reason why in our patient we performed isolated reconstruction of the AITFL, presenting a lower rate of complications and being an easier technique to perform. The use of one technique or another depends on the surgeon's preference because of the lack of clinical evidence comparing them [1].

There are several studies in literature that support the realization of AITFL reconstruction, such as the one published by Vilá-Rico, Sanchez et al. or by Lui with good clinical-functional results [2,3]. A systematic review of the reconstruction of syndesmosis with grafts has been carried out, with good results. They saw reduction of instability and increase at the functional scale of the American Orthopaedic Foot & Ankle Society (AOFAS). However, this review has limitations because they included studies with short follow-up and different methods of performing grafts, so it presents results with high heterogeneity, lowering its level of evidence [4].

Conclusion

Although syndesmosis injuries are an uncommon pathology, it is very important to suspect them after an ankle fracture, as well as to perform a good anatomical reduction of the syndesmosis since it is the most important predictor of functional outcome following operative treatment. In the case of chronic injury, it is important to make a correct diagnosis and a good therapeutic planning with images as weight-bearing X-rays, CT scan and MRI, which allow us to choose which surgical technique should be performed.

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