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Arthrodesis For The Treatment of Chronic Lateral Subtalar Dislocation with Ilizarov Frame Application: A Case Report

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1. Abstract

1.1. Introduction & Improtance

Insufficiency of the tibialis posterior tendon is the main cause of chronic lateral subtalar dislocation, which is sometimes called acquired flat foot in adults. If this happens, debilitating foot deformities occur, resulting in a substantial restriction of the affected patients' daily activities. Addressing & managing those pathologies can significantly improve the quality of life of the patients. Chronic tendinopathy is the cause of tibialis posterior tendon insufficiency.

1.2. Case Presentation

A 68-years-old male patient with a history of long-standing diabetes & hypertension. Complained of left hindfoot pain for a very long time. After clinical examination and performing the required imaging, he was diagnosed with tibialis posterior tendon dysfunction & chronic lateral subtalar dislocation. The management aimed to minimize the patient's suffering, including arthrodesis of the subtalar joint, fixation of both the talonavicular and calcaneocuboid joints. A tibial foot Ilizarov frame was applied to allow immediate weight bearing during the postoperative period.

1.3. Clinical Discussion

Most of the described cases of lateral subtalar dislocation result from acute trauma. Not enough literature is found to direct the management the patients with chronic subtalar dislocation. Furthermore, the literature did not describe surgically treating a case of a lateral subtalar dislocation that had been left untreated for such a long period of time.

1.4. Conclusion

we present a case with chronic subtalar lateral dislocation resulting from tibialis posterior tendon insufficiency. When addressed and managed meticulously, both the patient and his treating physician were satisfied with the final functional outcomes.

2. Introduction

Subtalar joint dislocation is a rare pathology accounting for approximately 1% of all dislocations, and this type of injury commonly happens due to high-energy trauma. However, obese and elderly patients can sustain subtalar dislocation from twisting injuries and falling from standing [1]. In this context, an uncommon lateral subtalar dislocation may result from a chronic flatfoot deformity or Charcot neuroarthropathy. When chronic and lasting for a long period, debilitating foot deformities result, affecting the patient's daily life activities [2]. Therefore, recognizing and treating them has become a necessity. Chronic tendinopathy is the cause of tibialis posterior tendon insufficiency, and it is mostly seen in patients who are obese, have hypertension (HTN), or diabetes mellitus (DM) [3].

Foot deformities or destruction, including chronic peri-talar dislocations, are not a pure bony pathology. Multiple pathologies are involved, and posterior tibial tendon insufficiency or dysfunction is the most common cause of lateral subtalar joint dysfunction, also known as acquired flatfoot deformity [4]. This is what happens in patients with long-standing diabetes mellitus. And when this occurs, destruction of the foot's bony architecture results, known as Charcot foot.

Here we present a patient who has a long-standing history of

DM with chronic lateral subtalar dislocation, which resulted from tibialis posterior tendon insufficiency as confirmed by both physical examination and imaging. The patient was successfully treated with joints arthrodesis and using an Ilizarov frame, aiming for immediate weight-bearing during the postoperative period.

3. Case Presentation

A 68-years-old male patient with a long-standing history of DM and HTN for the last 40 years, sought medical advice as he was fearful that he might be developing a pressure ulcer over his left foot.

Going back in history, the patient claimed that he suffered from hind foot pain many years ago and that he was diagnosed with tibialis posterior tendon insufficiency, as shown in the reports he brought with him. At that time, the surgical option was brought to the table after failed non-operative management and, reluctantly, was declined by the patient. Around 6 years ago, as the patient said, his foot became disfigured and distorted, for which a special and custom-made shoe ware became, sadly, a must for him to mobilize.

Upon examination, the patient had an insensitive foot that did not react to the Weber 2-point discrimination test. Redness over the weight-bearing area of the inner hindfoot was noticed. Even though no difference in temperature was found between the two feet.

The foot was disfigured with severely rigid hindfoot eversion and forefoot abduction [Figure 1]. And those deformities were, unfortunately, unamenable to reduction. Examining the ankle joint, the range of motion was from -5 to + 30 degrees. Minimal mobility was noted at the Lisfranc joint.

His radiographs showed dislocated Chopart's joints, with the talar head being the main weight-bearing osseous structure [Figure-2].

A CT and an MRI were obtained to better understand the pathology and the extent of involvement of the surrounding joints and soft tissues. While the talus was in its anatomical position at the talocrural joint, the subtalar and the Lisfranc joint had dislocated laterally [Figures 3A and 3B]. The tibialis posterior tendon was ruptured, retracted and its muscle belly was atrophied.

Figure 1

Figure 2

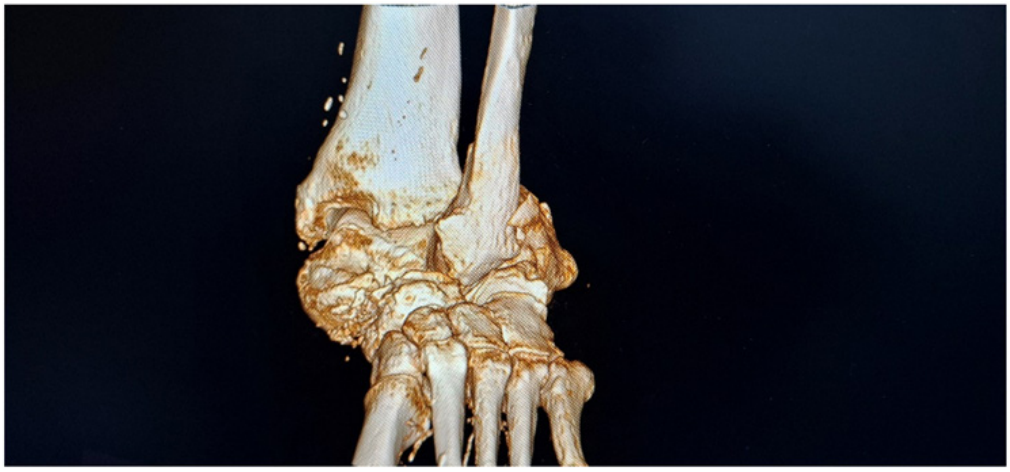

Figure 3:

After the decision for surgical management was made, and this time the patient agreed to proceed with the suggested plan. In a stepwise fashion and under general anesthesia, the surgery was carried out. Firstly, through a laterally modified Ollier's approach, the subtalar joint was reduced. With two cannulated screws, arthrodesis was achieved [Figures 4A and 4B]. Secondly, the talonavicular joint was identified through a medial approach, and with difficulty, the reduction of the Lisfranc joint was achieved. Thirdly, arthrodesis of the talonavicular and calcaneocuboid joints was performed, and fixation was done with staples [Figures 4A and 4B]. Lastly, a standard tibial foot Illizarov frame was applied, aiming to neutralize the construct and allow the patient to bear weight on his foot [Figures 5A and 5B].

Five months after the surgery, the Ilizarov frame was removed [Figures 6A and 6B]. A below-knee weight-bearing full cast was applied for another month.

At follow-up, two years later, the patient was satisfied with the results. He was using custom-made footwear for protection against injuries, since the patient has no sensation in both feet. Clinically, he has a good range of movement at his ankle joint, minor external rotation of his hindfoot, and solid union at the level of the triple arthrodesis [Figures 6A and 6B].

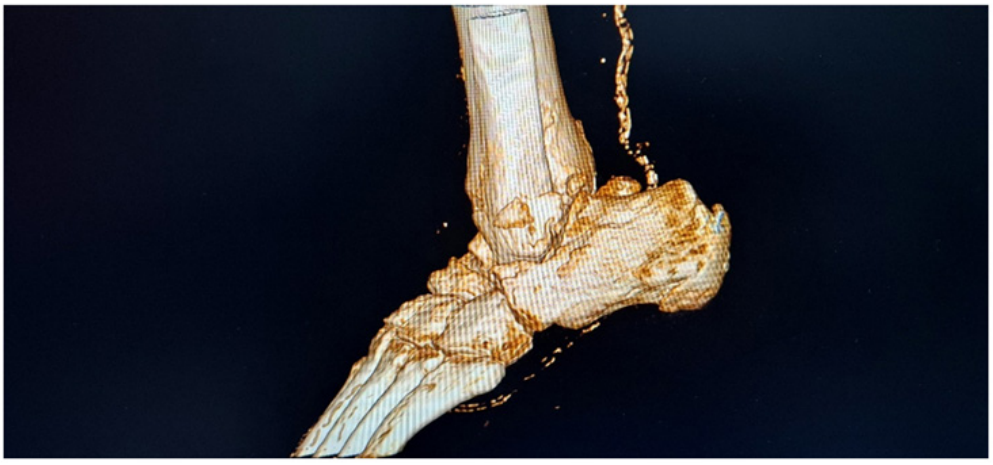

Figure 4:

Figure 5:

Figure 6:

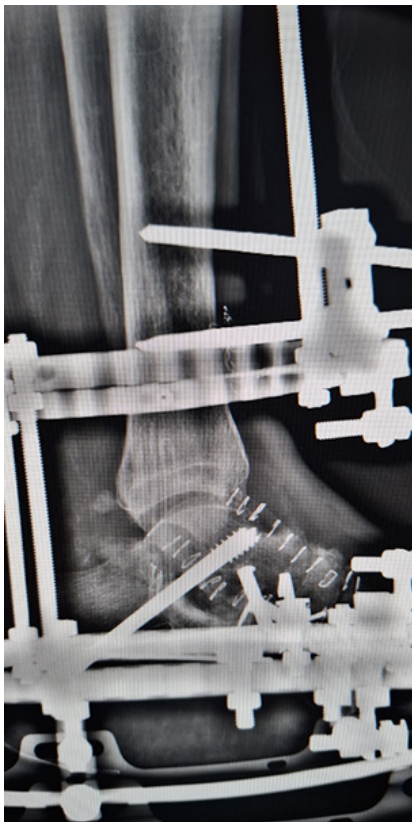

Figure 7:

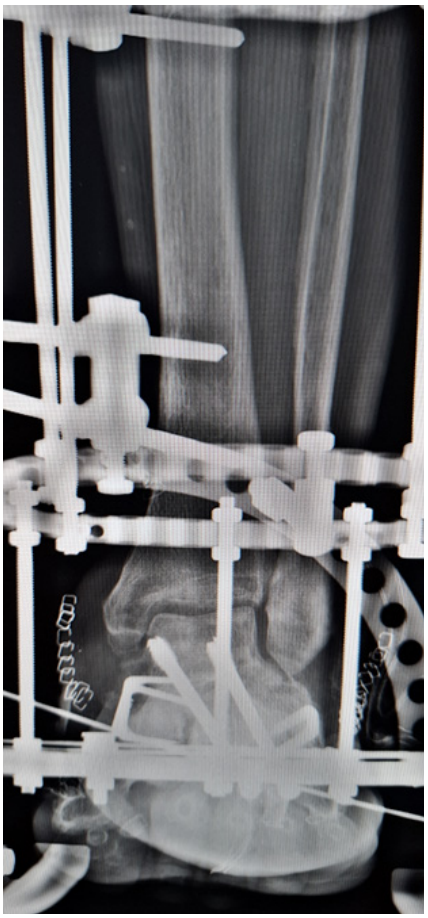

Figure 8:

Figure 9:

Figure 10:

4. Discussion

Subtalar dislocations are rare injuries accounting for approximately 1% of all dislocations. When classified, lateral subtalar dislocation is not frequently encountered, as only 15-20% of all subtalar dislocation types are lateral [1]. Reviewing the literature, most of the research described lateral subtalar dislocation resulting from acute trauma. Stating that, it is logical that most of the literature focuses on treating acute lateral subtalar dislocations.

However, other forms of lateral subtalar dislocation may be seen in patients with long-standing DM with Charcot neuropathy [2]. Diabetic patients are at increased relative risk of about 32 % and 24% for having foot and ankle fractures, respectively [5]. This form of dislocation is frequently chronic and gradual in course. Thickening of the tendon, loss of collagen organization, and calcification all increase the risk for tendon attenuation in patients with DM [6]. Attenuation of the tibialis posterior tendon in those patients leads to lateral subtalar dislocation, which is most probably what happened with our patient.

Most of the described cases of lateral subtalar dislocation result from acute trauma. Not enough literature is found to direct the management the patients with chronic subtalar dislocation. Furthermore, the literature did not describe surgically treating a case of a lateral subtalar dislocation that had been left untreated for such a long period of time.

In this report, we present a rare case with a long-standing history of chronic lateral subtalar dislocation. The limited literature to date has not included a clear management plan for a case with such a long history of dislocation. Our patient had a lateral subtalar dislocation due to tibialis posterior tendon insufficiency, which most probably happened due to the long-standing history of DM. The consequences were drastic to the point of limiting the patient's daily activities. When a lateral subtalar dislocation occurs, skin tension develops, blisters form, and necrosis of the skin can occur, [7] which is why our patient sought medical advice.

Decision for surgical intervention was made after thorough discussion with the patient, since he was previously opposed to any kind of operations. However, his current condition, dependence on others, and difficulty performing his regular duties, among others, were all encouraging factors for him to proceed with the proposed surgery.

Before deciding on the surgery, all the patient's factors were taken into account, and most importantly, his diabetes. Since patients with DM have higher rates of complications, this can be attributed to the changed normal physiology, including the higher levels of pro-inflammatory cytokines [5]. Multiple surgical options were reviewed. A 2019 study included a total of 16 patients with chronic lateral subtalar dislocation who were treated. The etiology of their dislocation was divided between severe flatfoot deformities and Charcot foot deformities. All patients ended up with functional limbs at follow-up, regardless of the surgical method used. The surgical option was chosen when all the conservative measures failed [2].

Triple arthrodesis was found to be an effective surgical option for subtalar joint dislocation, relieving pain and improving functional deficits [8]. In another study reviewing 44 patients treated with subtalar arthrodesis for multiple indications, including acquired foot deformities resulting from dysfunction of the tibialis posterior tendon, the study concluded that the mentioned procedure yielded satisfactory results for the aforementioned pathology [9].

The Ilizarov frame was applied to allow the patient to bear weight immediately after surgery. Direct weight bearing after the surgery has been shown to improve the clinical outcomes [10]. The frame was first documented as part of the treatment for chronic subtalar dislocation in a case report published in 2019, which concluded that the Ilizarov frame can be an effective method for managing both bony and soft tissue pathologies [11].

Two years after the surgery, the patient had nearly returned to his status of acceptable functionality. Almost deleting the need for others to carry out his regular daily activities.

5. Conclusion

We encountered a rare case of chronic lateral subtalar dislocation resulting from tibialis posterior tendon insufficiency, which was successfully treated by arthrodesis and the use of the tibia foot Ilizarov frame, allowing for full weight-bearing after surgery.

From here, we state that even in the case of long-standing lateral subtalar dislocation, reduction and fixation are still possible with reasonable functional outcomes.

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