

Open Ankle Dislocation Without Associated Malleolar Fracture: Case Report

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Abstract

Open pure tibiotalar dislocations are rarely recorded cases with superficial fibular nerve damage. Case presentation: The authors describe a case of open tibiotalar dislocation without a fracture and a deep deltoid ligament damage as a result of a bad fall. Six hours after the trauma, debridement, open reduction, and casting were done. Following a 4-week checkup, the results were positive and infection-free. Conclusion: Early reduction and appropriate wound care of an open tibiotalar dislocation with delayed repair of an associated deep deltoid ligament tear led to a successful outcome.

Key words: Tibiotalar joint; Ankle; Adult; Dislocation.

Introduction

In 1913, Peraire presented the first case of a pure ankle dislocation [1]. The term "pure ankle dislocation" refers to an ankle dislocation without a concurrent malleolar fracture. Due to the strength of the ligaments around the ankle joint, pure tibiotalar dislocations are extremely uncommon. In contrast to the over 99% fracture-dislocations, that make up 0.5% of all ankle dislocations [2]. In the literature, there were only 73 instances recorded up to 1995 and 154 cases up till 2017 [3] and 50% were open. This

condition can arise due to various factors such as traumatic accidents, high-impact sports injuries, low-energy mechanisms such as a misstep or fall or even degenerative joint diseases. Although relatively rare, these dislocations holds significant clinical importance, as it can lead to severe pain, joint instability, and potential long-term complications if not promptly diagnosed and treated.

Understanding the critical aspects of this injury, including its aetiology, clinical presentation, diagnostic evaluation, and

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treatment options, is crucial for healthcare professionals to manage and optimize patient outcomes effectively. This case report aims to provide a comprehensive description of an open dislocation without an associated fracture, highlighting its unique characteristics and the evidence-based approaches guiding its management.

Case description

A 20-year-old female in good health fell into a 4-meter-deep hole and hurt the right ankle. The mechanism of the injury was as follows: the patient fell and landed on the ground with the right leg bearing all of the weight. The patient presented to the emergency department of Hassahisa teaching hospital 3 hours following the fall with a deformity of the right ankle. The results of the clinical examination revealed a medial deviation in the right ankle. Through a 12 cm laceration on the anterolateral side of the ankle joint, the distal end of the tibia was revealed and

protruded through the skin. Both the posterior tibial and dorsalis pedis pulses were feeble, and the capillary refill period was prolonged (3–4s). Although the patient's sensation was still intact, the pain prevented the patient from moving the foot or toes. No X-ray was available at that time in the hospital.

The patient was hospitalised to continue receiving antibiotics and had the extremities elevated. The patient was ready for anesthesia-assisted wound cleaning and debridement in the trauma theater. Under spinal anaesthetic, the ankle joint was thoroughly irrigated with saline solution before the incision was explored.

There were some foreign bodies discovered and the wound was polluted with soil. The deep deltoid ligament was completely severed, and there was some superficial venous hemorrhage as well. The bleeding stopped, and gentamicin was applied.



Figure 1: Patient at presentation; Right posteromedial open ankle dislocation with wound emerging the distal Tibia in the antero lateral aspect of the ankle contains mud and other soil particles with no obvious bleeding or exposed tendon.

By applying longitudinal traction while keeping the knee flexed, the deformity was first reduced; subsequently, by inverting the foot and then everting it, the deformity was increased. Reduction was confirmed by checking the alignment of the ankle and the range of motion. The wound was repaired with No 2 Nylon sutures. Post-operative examination after recovery from anesthesia confirmed the stability of the ankle joint, intact dorsiflexion/plantar flexion and intact

distal pulses with O₂ saturation of 100%. The ankle was immobilized in a posterior slap with the ankle in 90 degrees dorsiflexion for 3 weeks. On day 10 the sutures were removed. At the follow-up visit in the hospital after three weeks, the slap was taken off, an ankle splint was put on, and the patient began putting some weight on the foot. An MRI was ordered, and the patient is planned to be reviewed by the foot and ankle department and physiotherapy.



Figure 2: After thorough irrigation with 6 litres normal saline and extensive debridement while maintaining the articular cartilage intact. The deep deltoid ligament is shown here, and it's ruptured.



Figure 3: After reduction was done, the wound was sutured interruptedly with nylon and clinical alignment was achieved. Distal pulses were checked and were equal bilaterally.



Figure 4: Below knee posterior slap was done.



Figure 5: Anteroposter and lateral view of right ankle joint showing maintained joint alignment and no obvious fracture.

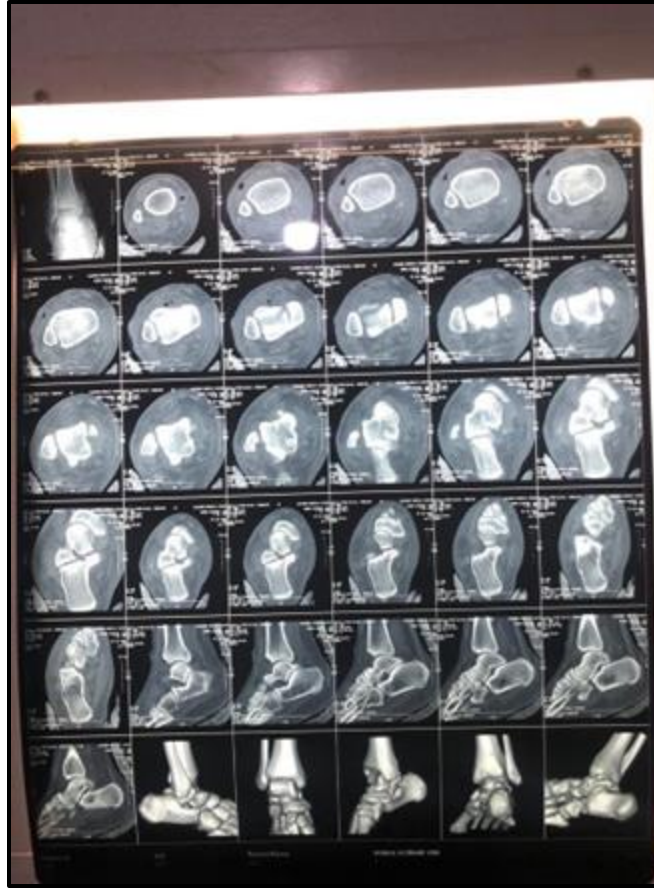


Figure 6: CT scan of right ankle joint showing normal ankle joint, articular surface, Tibial Plafond, talus, calcaneus, distal fibula and no loose body.

Discussion

The anatomy of the ankle joint must be understood in order to comprehend the history of tibiotalar dislocations. The fibula, tibia, and talus bones create the ankle, a complex hinge joint that is supported by a web of ligaments, tendons, and muscles. The tibia forms the main weight-bearing bone of the lower leg, while the talus is located just beneath it, acting as a key connection point between the leg and the foot [4]. The deltoid ligament, tibiofibular syndesmosis, and lateral collateral ligaments are three groups of ligaments that keep the joint stable. The bones are relatively weak in relation to the

strength of the supporting ligaments [5]. Because of the large amount of force required to rupture the ligaments and the inherent stability of the tibiotalar joint, dislocation of the ankle joint is rarely seen without an associated fracture.

Ankle dislocations were divided into five categories by Fahey and Murphy based on how far the talus moved from the ankle mortise: anterior, posterior, medial, lateral, and combination [6]. The most frequently described isolated ankle dislocation is the posteromedial dislocation [7], resulting from the reflexive inversion and flexion of the plantar surfaces of the foot and ankle when

falling, which has been demonstrated in cadavers by Fernández [8]. By placing the foot in maximum plantar flexion and applying pressure to either the inversion or eversion, which caused a medial or lateral ankle dislocation without a fracture, he was able to simulate this injury. The narrow portion of the talar body is located inside the ankle mortise, making plantar flexion the unsteady position of the tibiotalar joint [4].

The talus is strained in this posture, which could cause the capsular and ligamentous attachments to rupture. This might have predisposed the patient to tear of the deltoid ligament that happened after a posteromedial dislocation of the right ankle. According to earlier findings, we believed that landing on one foot with ankle inversion and plantarflexion caused the injury by applying axial force [9,10]. 73% of the cases reported in the literature occurred in males, probably due to increased participation in outdoor activities [11]. There are different risk factors for ankle injuries for men vs. women.

Body weight is an important factor for both groups, but it was a risk for only those extremely obese for men, while for women those who were categorized as overweight were also at increased risk. In the present study, the patient was a young, obese female. Prognostic associations between BMI and recovery are less well understood but a recent study speculated that obese patients may be more prone to dislocations [12]. One of the primary causes of pure tibiotalar dislocation is sudden trauma, often resulting from high-velocity accident, such as motorcycle accidents or fall from heights, (40%) or from sports-related injuries (35%). [13,14]. The

distal tibia had a 12-cm transverse wound in this case, which involved an incredibly uncommon open dislocation. The patient fell into a 4 meter deep hole, breaking the right ankle. Ligamentous laxity, Internal malleolus hypoplasia, weak peroneal muscles, and recurrent ankle sprains are predisposing characteristics mentioned in similar research that contributed to the pathophysiology of pure ankle dislocations [15,16].

The patient's medical history offered no evidence of recurrent ankle trauma or surgical history. However, the patient suffered a tibial fracture on the left leg a while ago, making the patient land preferentially on the right leg and focusing the whole body weight on it during the fall.

Although there isn't a single, widely accepted method of treating both open and closed talotibial dislocations, most writers agree that early reduction, sufficient ankle stability, and a brief period of immobilization can help prevent ankle contracture and produce positive clinical outcomes. In this case immediate intervention reduced the risk of vascular and neurological complications. The reduction was performed under spinal anaesthesia to permit complete relaxation of the muscles. The hindfoot was held with one hand, while the patient's knee was flexed, which allows relaxation of the gastrosoleus muscles. After appropriately reducing the foot, we put on a posterior splint. After manipulation and splinting, we tested for toe movement, capillary refill, palpable pulses, and foot sensation. Post-reduction radiographs were also used to ensure the correct anatomic alignment. We carried out intravenous therapy with antibiotics

(cephazoline, 1 g every 8 hours, together with gentamicin, 80 mg every 8 hours), tetanus prophylaxis and thorough debridement. The patient's ankle was temporarily immobilized at a dorsiflexed position for 6 weeks. We believe that this assists in a faster recovery and shortens the disability period. Although open dislocation permits exploration and repair of ligamentous injuries, there are limited studies discussing the necessity of early ligaments repair. Emerging evidence suggests that early surgical intervention may result in better outcomes, [17,18] recommending the repair to be at the time of debridement, while other research revealed that there was no discernible difference in terms of ankle joint function and other associated issues between patients with repaired ligaments and those without repairs [19-21].

Repair of the ruptured deltoid ligament took longer in the current study. It's fascinating that, despite severe ligament damage, instability is rarely felt and that such dislocations usually have a positive outcome and a good prognosis. Wight et al. discovered that most patients were asymptomatic after receiving the appropriate care in a comprehensive study of pure ankle dislocations. Females made up the majority of the symptomatic group, and which expressed stiffness or post-traumatic arthritis. The most decisive factors influencing the clinical result were the accuracy of the reduction and the sex of the patient [22]. Early reduction, young age, and the absence of neurovascular injury were associated with a better overall prognosis in this case. There is not sufficient evidence suggesting what is a reasonable time period to reduction when there's no

neurovascular or obvious skin compromise. Would delaying reduction for a short time for X-rays to be taken negatively affect treatment outcomes? It's sometimes recommended that radiographs and other imaging studies be obtained only after the dislocated ankle has been reduced so that the risk of complications such as neurovascular damage, pressure necrosis of the overlying skin, chondrolysis, and avascular necrosis of the talus is minimized. However, Hastie et al. found that the rate of re-manipulation was much higher (44% before x-ray vs. 18% after x-ray; $p=0.03$) [23].

In this case, an X-ray machine wasn't available at the time of presentation, the post reduction radiographs indicated satisfactory ankle alignment and there was no need for remanipulation. The patient was told not to put any weight on the wounded foot before being released. Despite the rarity of compartment syndrome following pure ankle dislocations [24,25] it can be a devastating complication and therefore, the patient was also informed about the symptoms and indicators of compartment syndrome.

When checked again at the hospital four weeks after surgery, the patient had satisfactory ankle function and had begun partial weight bearing and rehab. No signs of wound infection. She's planned for a follow up 1 month later. We report a successful ankle dislocation case in a young female patient who had early reduction and immobilization without ligament repair.

Conclusion

In conclusion, immediate reduction of the dislocated ankle (within 6 hours) and care of

the vulnerable soft tissues are crucial in the case of an open complete dislocation of the ankle joint. Standardized management can result in better results by providing steady temporary immobilization, stable analgesia, complete debridement, wound care, and injectable antibiotics. In the author's opinion, Immobilization for more than 4 weeks has no beneficial effect on the ankle. A period of one month seems more reasonable to the author and largely sufficient to begin a fairly early rehabilitation. Walking is authorized as soon as the cast is removed. To develop a more practical therapeutic strategy, more clinical studies on such uncommon trauma are necessary.

Patient's consent

Written consent was obtained from the patient and the next of kin. The patient was informed that data concerning the case would be submitted for publication, and the patient provided consent.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Conflicts of Interest

The authors declare no conflicts of interest.

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