

Case report; Subtalar Dislocation with Concomitant Fracture of posterior process talus

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ABSTRACT

Fracture of the entire posterior process of talus with concomitant subtalar dislocation is extremely rare but associated with significant morbidity as it involves two articular surfaces, the ankle and subtalar joints. Management of these rare injuries may be challenging due to the complex anatomy of the talus closeness of neurovascular bundle. Surgical approaches to this area are not commonly used and significant pain and disability can result if these injuries are not recognized or treated well.

In this case report, we present a 39-year-old male, who sustained a medial subtalar dislocation after closed reduction of the subtalar joint. Computed tomography was done which demonstrated displaced fracture of the entire posterior process of the talus and concomitant displaced anterior process of calcaneum fracture. To our best knowledge, such a combination of injuries has not been reported so far. Fracture of posterior process talus was treated with an open reduction and internal fixation as well calcaneal anterior process fracture.

The purpose of this article is to highlight the importance of early diagnosis and operative fixation of this rare type of fractures.

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Introduction

The posterior process of the talus includes the medial and lateral tubercles. The lateral tubercle (the larger of the two) projects more posteriorly than the medial and serves as the talar attachment for the posterior talofibular ligament. The medial tubercle also serves as a site for attachment of the posterior tibiotalar ligament. A groove passes between the two tubercles, and the flexor hallucis longus runs through this groove. The Y-shaped bifurcate talocalcaneal ligament inserts onto each tubercle and forms a roof over this groove [1].

Fracture involves either tubercles is rare, fracture involves entire process is even less frequent, fracture of posterior process talus with subtalar dislocation is extremely rare.

Fracture of the posterior process of talus is easily missed specially if associated with subtalar dislocation. If the fracture is not anatomically reduced, it will lead to malunion and cause early arthritis of both the ankle and subtalar joints. Furthermore, for fractures involving the groove between tubercles, the malunion can cause irritation of the FHL tendon, arthritis and chronic pain [2] [3].

Here, we present a case of closed subtalar dislocation with entire posterior process of talus and fractures of the anterior calcaneal process, including operative reduction and fixation of the fractures.

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Case presentation

A 39-year-old man was admitted to our emergency room at Prince Rashid Bin Al-Hassan Hospital in the North of Jordan, on 22nd of November 2016, about three hours after the injury, with severe left ankle pain and swelling. He had fallen from a ladder about 3 m height and what he described was an inversion and plantar flexion injury of his left ankle after landing on a hard surface. On physical examination, he was observed to have swelling and deformity of his left ankle with the foot shifted medially. No signs of neurovascular injury were observed. X-ray examination showed dislocation of the talonavicular and talocalcaneal joints (medial subtalar dislocation) with a fracture fragment of unknown origin (Figure 1).



Figure 1: X-Ray shows medial subtalar dislocation

With the patient under adequate intravenous sedation, closed reduction was done and after that, the computed tomography revealed a comminuted fracture of the posterior process of the talus in both the medial and lateral tubercles of the posterior process and displaced fracture of the anterior process of calcaneus Figure 2 (A-D), Patient was kept on posterior slab for 12 days after the injury, until the swelling decreased. Patient was then sent to the operating theatre for open reduction and internal fixation of these fractures.

Surgical technique

In the operating room, under general anesthesia, the patient was placed in prone position and non-sterile pneumatic tourniquet was applied on the left thigh. One gram of cefazolin was administered intravenously. The posterior aspect of the talus was then followed using posteromedial approach longitudinal incision placed medial to the medial margin of the achilles tendon (Figure 3A), which was retracted laterally (Figure 3B), the flexor hallucis longus (FHL) sheath was opened and the FHL and the posterior tibial neurovascular bundle were then identified and protected by means of careful retraction to the medial aspect of the surgical wound, using two kirschner wires were applied at the posterior surface of tibia to retract soft tissues medially and laterally (Figure 3C). The posterior capsule were incised and reflected by exposing the fracture of the posterior process of the talus, including the medial and lateral tubercles. Small loose bodies were removed and the fracture was reduced under direct vision and then temporarily stabilized with 2 kirschner wires. The reduction was confirmed with image-intensification fluoroscopy. Definitive fixation was then achieved by using two screws 2.7 mm fully threaded self-

tapping. The heads of screws buried flush with the articular surface after use of countersunk (Figure 3D). The wound was closed in layers. Another incision was done over the calcaneocuboid joint with anterolateral foot approach Fig. 3E, retraction of extensor digitorum brevis, identification of fracture site and reduction. The provisional fixation using two kirshner wires was carried out as well. Then, the definite fixation using 2.7 mm screws was done and was confirmed by fluoroscopy and then the closure in layers and short leg cast was applied for 3 weeks. Later, the patient sent to physiotherapy for six months, and 12 months after surgery clinical evaluation was done using American Orthopedic Foot and Ankle Society (AOFAS) ankle-hindfoot scale score, it was 95, which considered excellent outcome (Figure 4A and 4B).

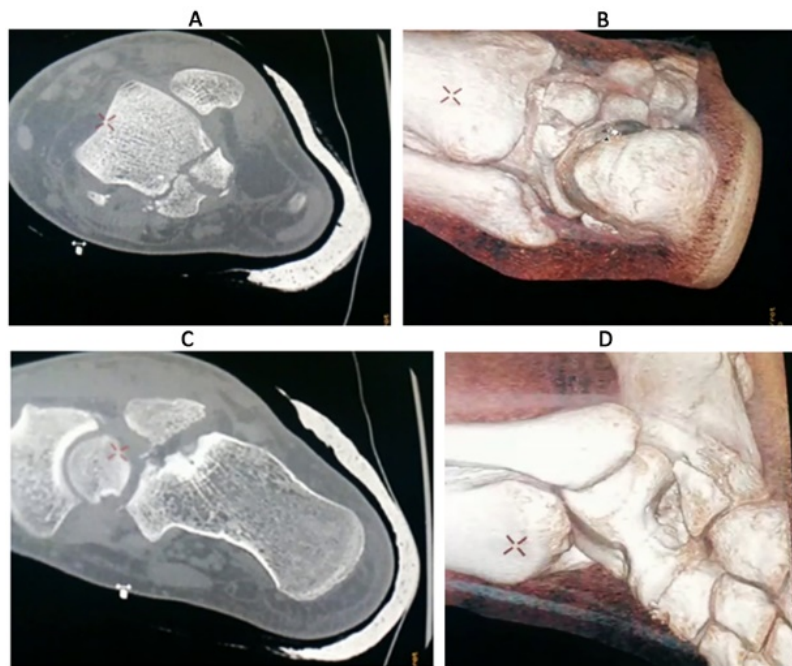


Fig. 2 2A, 2B: CT scan shows entire posterior process talus fracture with comminution, 2C, 2D: CT scan anterior process calcaneal fracture.



Figure 3: 3A: skin incision just medial to Achilles tendon, 3B: incision of flexor hallucis longus fascia, 3C: temporary fixation of posterior process fracture with k. wires, 3D: definitive fixation of posterior process fracture with screws, 3E: anterolateral approach for fixation of anterior process of calcaneum fracture.



Figure 4: Postoperative X-ray done two weeks postoperatively.

Discussion

Fractures involving the posterior process of talus with concomitant subtalar dislocation are extremely rare and easily missed. If ended with malunion, it may lead to severe complications [2] [4].

The posterior process of talus is composed of medial and lateral tubercles and separated by a groove for the FHL, tendon. The lateral tubercle (Steida's process) is larger than the medial and more posteriorly placed. However, there is some confusion regarding the classification of the posterior process fractures in literature [2] [4].

Anatomically, fractures involving posterior talus, either involve entire process, or are confined to medial tubercle or lateral tubercle.

The first fracture described in the posterior part of talus was by Shepherd in 1882 based on anatomical dissections which included the lateral tubercle (Steida's process) [5]. Medial tubercle fractures were first described by Cedell in 1974 [6]. He described an avulsion injury secondary to a pronation-dorsiflexion force with avulsion of talotibial ligament [6]. Fracture of posterior process is less common than either of the tubercle fracture, as it involves both tubercles, fracture of the entire posterior process of talus with subtalar dislocation is extremely rare in literature and it involves both the ankle and the subtalar joint. The mechanism of injury that causes entire posterior process fractures is still unclear [7] [8]. Nasser and Manoli believed that maximum plantar flexion of the ankle could cause compression of the posterior part of the tibia on the posterior part of calcaneum and fracture the posterior process [7]. It can be easily missed, if subtalar dislocation has occurred simultaneously or when a fracture fragment is small.

The first report of subtalar dislocation was in 1811 [4] [9], which was defined as the dislocation of the talocalcaneal and talonavicular joints. The mechanism of a medial subtalar dislocation is believed to be forceful inversion of the foot, with the sustentaculum used as the fulcrum causing the talus to leave the subtalar and talonavicular joints. The most common pattern is medial dislocation about 85% with most of them occurring in younger aged men [9].

Forced plantar flexion with inversion could cause fracture of the posterior process of the talus with concomitant subtalar dislocation [3]. We need a high index of suspicion for diagnosis of associated fractures, and early surgical management for a displaced fracture.

Regarding the surgery in posterior process fractures, most authors believe that fracture displacement (>2 mm) and joint involvement is an indication for open reduction and internal fixation to minimize the risk of complications [10] [8]. Undiagnosed displaced fractures may lead to posterior impingement, subtalar arthritis, and entrapment of the FHL tendon, malunion of the groove for the FHL tendon and can might cause FHL tendinitis [3].

Regarding surgical approach, open reduction internal fixation was performed either through the posterolateral [11] or posteromedial approach [8] [1]. The posteromedial approach is the most common approach used in posterior process fractures and may be more reliable, provide good surgical exposure and easier, because the FHL tendon can be used as a guide. The disadvantage to a lateral approach is the risk of injuring the sural nerve.

Comprehensive knowledge of the local anatomy and various surgical techniques for fracture reduction and fixation to obtain optimal results and gentle handling of the neurovascular structures is important. Fixation of the fracture can be done by plates, screws (cancellous screws, headless screws, absorbable screws), or kirschner wires.

Nyska et al have described displaced fractures of the posterior process of the talus in four patients which were initially missed and treated conservatively. He reported poor outcome with malunion, pain, and early onset arthritis [12].

Anterior process of calcaneus fractures often result from a forced inversion and plantar flexion injury, which increases tension on the bifurcate ligament, and produces an avulsion fracture [13]. This mechanism is consistent with our patient's injury.

Conclusion

Posterior process fractures associated with subtalar dislocation are extremely rare, and easily missed, hence, it is important to do computed tomography post reduction for assessment and planning management. Open reduction internal fixation using posteromedial approach for displaced fractures produces good results.

Conflict of interest

No conflict of interest

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