



Posterior dislocation of the subtalar joint: A case report

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The Foot and Ankle Online Journal 9 (3): 2

Dislocation of the talocalcaneonavicular or subtalar joint is a rare occurrence. Posterior subtalar dislocations are even rarer among subtalar dislocations. The injury is characterized by a simultaneous dislocation of talocalcaneal and talonavicular joints while tibiotalar and calcaneocuboid articulations remain intact. Although many of these dislocations result from a high-energy injury, such as a fall from a height or RTA, a significant number of these injuries occur as a result of athletic injuries. Closed reduction and immobilization remains the treatment of choice. Early anatomical reduction is the key to preventing long term complications such as midtarsal joint arthritis and faulty foot mechanics. However, if closed reduction is unsuccessful in some patients, open reduction is required. A variety of bone and soft tissue structures may become entrapped, resulting in obstruction of closed reduction. This is a unique case report which presents an unsuccessful closed reduction of a closed posterior subtalar dislocation that required open reduction.

Key words: subtalar joint dislocation, foot trauma, STJ, joint dislocation

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Subtalar joint (STJ) dislocation is a rare injury of the foot and ankle with most reported cases occurring after major trauma. The rarity of this injury can be attributed to the presence of strong ligament connecting the talus and the calcaneus, the strong biomechanical properties of the ankle and the tight joint capsule. When a dislocation occurs to this joint, it is considered a serious injury due to the instability that can occur across Chopart's joint [1].

Main and Jowett described this dislocation type injury occurring at the midtarsal joints with a classification system to help the physician decide the best course of treatment (Table 1) [2].

The dislocation results in substantial distortion of the foot shape. Fractures of the fifth metatarsal, the talus, anterior process of calcaneus and the malleoli are often a result of with subtalar dislocations [3]. Subtalar dislocations without associated fracture are rare because of the inherent instability of these types of injuries (the talus has two articular surfaces which contribute in the formation of talonavicular and talocalcaneal joints) [4].

It has also been demonstrated that injury in this area can easily dislocate the subtalar joint. In most of the cases the calcaneus and the rest foot is dislocated medially. Dislocation can be reduced spontaneously [5].

The purpose of this study is to report a rare case of a posterior subtalar dislocation with associated fractures in which closed reduction failed, and ultimately open reduction and internal fixation was done. We also describe the mechanical patterns resulting in subtalar dislocation, s-pitfalls that arise during closed reduction, choosing the right patient for open reduction.

Case Report

A 48 years old male presented with a history of one day old injury to right ankle following an accidental fall by slipping on a slope, with the right foot being forced mainly into hyperplantar flexion and eversion. He presented with complaints of pain, swelling, deformity just distal to the ankle and proximal foot, and was unable to bear weight on right foot.

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Direction of Deforming Force	Resulting displacement/Deformity	Prognosis
Medial	Fracture-sprains, fracture-subluxation/dislocation and swivel	Good
Longitudinal	Undisplaced fractures of the navicular, displaced fractures of the navicular, crushing injuries to the navicular, cuneiforms and talus.	Lateral longitudinal: poor Medial Longitudinal: good
Lateral	Fracture-sprains, fracture-subluxations and swivel	Poor
Plantar	Fracture-sprains and fracture-subluxation/dislocations	
Crush	No constant pattern of injury	Variable
Dorsal	None described	

Table 1 Main and Jowett classification for midtarsal joint injuries [2].

Clinical examination showed the foot being fixed in plantar flexion, mild eversion with diffuse swelling and tenderness in midfoot and proximal 3rd shaft of right fibula region without any type of external wound. A prominent rounded bony prominence was palpated at the talonavicular articulation, suggestive of talonavicular dislocation with palpable talar head. Skin over the dorsum was stretched and edematous. All movement (passive and active) of the right ankle was painful and restricted completely. There was no distal neurovascular deficit. The plain radiographs of right ankle and right leg in AP and lateral views showed posterior talonavicular dislocation with a very mild lateral displacement in the right foot with fracture of anterior process of the right calcaneum and plain radiographs of leg showed fracture of proximal 1/3rd shaft of right fibula (Figures 1 and 2). Initial closed reduction under spinal anaesthesia failed and thus resulting in open reduction with a dorsolateral approach. The talus was explored through a dorsolateral incision and the tendon of tibialis anterior was found to be interposed between the talus and calcaneus. The head of the talus was impacted onto the navicular bone, hindering the attempt for closed reduction. Tibialis anterior tendon was retracted and talar head had to be levered back into anatomical position after opening the talonavicular joint capsule (Figure 3). The reduction was confirmed under C - arm (Figure 4) and then a thick Kirschner wire was inserted from the calcaneus into the talus to hold the reduction (Figure 5). A below knee splint was applied after placing a sterile dressing at the operative site.



Figure 1 Subtalar dislocation, fibula fracture.



Figure 2 Preoperative x- rays of the patient injured foot.

Discussion

Subtalar joint dislocations were first described in 1811 and have also be referred to as peritalar or subastragalar [6,7]. A more accurate term for subtalar joint dislocations would be talocalcaneal navicular (TCN) dislocations.

The most widely used classification has been described by Broca in 1852 [5], who distinguished 3 types of subtalar dislocation (Table 2): (1) the medial dislocation; (2) the lateral; and (3) the posterior dislocation. Direction of the rest foot in relation to the talus was the determinant element to classify dislocation as medial, lateral or posterior [5]. Subtalar dislocations are rare accounting for approximately 1% of all dislocations; 85% are medial dislocations with the other 15% accounting for lateral and the very rare anterior and posterior dislocations [9].

The incidence of posterior dislocation which was first described by Luxembourg in 1907 and it ranges from 0.8% to 2.5% of all TCN dislocations in different studies [3,4]. Posterior dislocation occurs when forces applied on the dorsum of the foot result in forceful extreme plantar flexion of the forefoot. It is hypothesized that pure hyperplantar flexion could lead to a progressive subtalar ligament weakening that may result in a complete ligament rupture if the plantar flexion force is prolonged [3]. This excessive hyperplantar flexion is normally the result of either a fall from a height or direct blunt force and trauma.



Figure 3 Intraoperative pictures from left to right; i) tibialis anterior tendon interposing between the talar head; ii) tendon retracted and joint capsule opened exposing the talar head; iii) talar being lever back into anatomical position; iv) post reduction of subtalar joint; v) K – wire fixation post reduction of subtalar joint.

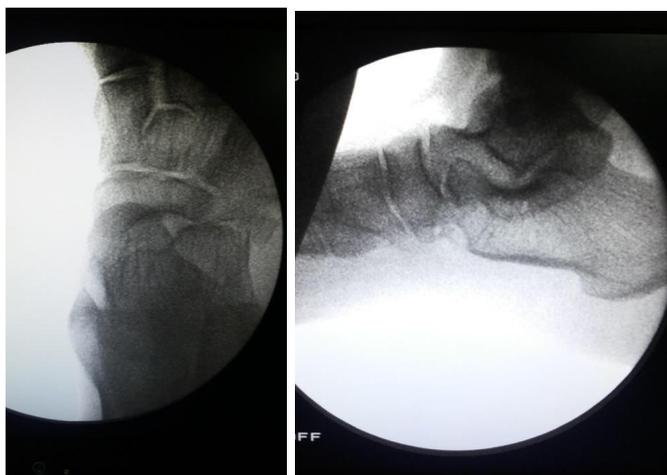


Figure 4 Intraoperative images showing talonavicular joint i) pre reduction, ii) post reduction.

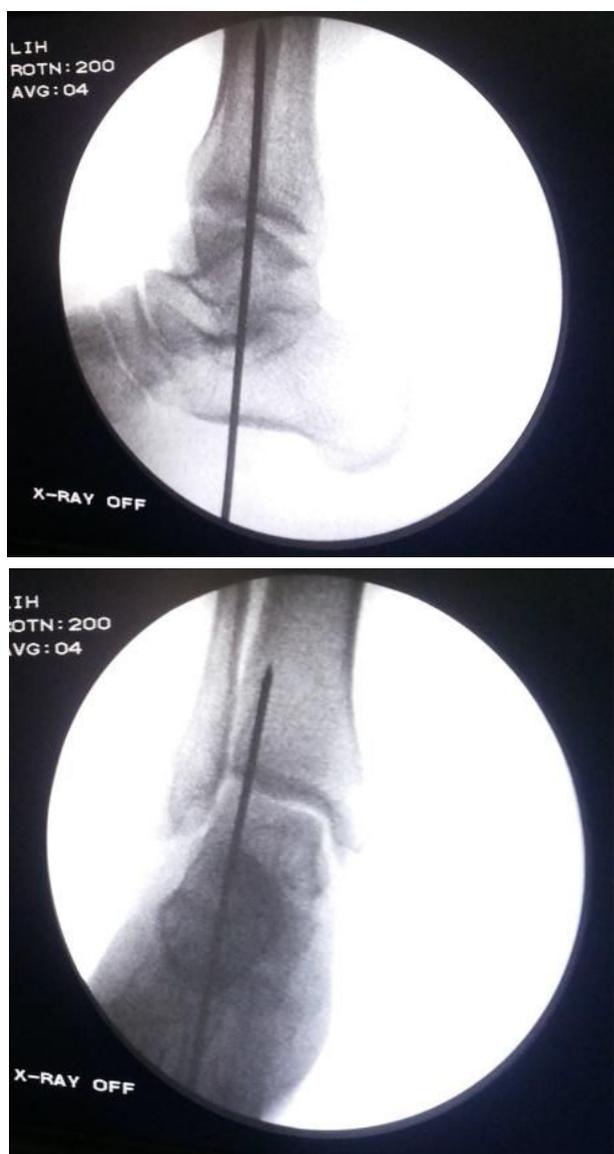


Figure 5 Intraoperative images showing stabilisation of the talonavicular joint using K-wires.

Direction of Dislocation	Frequency of Dislocation
Medial	65-80%
Lateral	15-35%
Posterior	0.8-2.5%
Anterior	1%

Table 2 Broca and Malgaigne's classification of talocalcaneal navicular joint dislocation with frequency [16].

This could be observed in the presence of good bone quality and if the force is applied distally at the navicular bone. The interosseous ligament and medial and lateral ligaments of the ankle joint are torn [9]. Generally there is no rotational component to posterior displacements of the TCN joint. The instances of posterior dislocations with rotational components were open injuries [10].

The diagnosis of posterior TCN dislocation can be confirmed with lateral and anteroposterior radiographs (Figure 3). On lateral radiographs, the head of the talus is atop the navicular, and the posterior portion of the talus will be in contact with the posterior subtalar facet of the calcaneus [11]. According to Inokuchi et al, the frontal view should show no significant medial-lateral displacement or rotation of the foot [3].

Immediate reduction under general or spinal anesthesia is recommended to avoid soft tissue complications and reduce the chances of avascular necrosis of the talus. Posterior dislocations are also very unstable due to the fact that the talus is balancing on two points, the navicular and the facets of the calcaneus, respectively. With posterior TCN dislocation, reduction can be achieved with no fixation by manual traction [9]. A radiograph should be performed to ensure the reduction of the dislocation and to exclude any iatrogenic fracture.

Associated fractures as cited in the literature include, talar neck and body fractures, anterior process of the calcaneus, posterior process of the talus, posterior malleolus chip fractures of the navicular, cuboid fractures, and associated osteochondral fractures [3,4,10,12]. A recent case report by Budd et al, showed that a posterior displacement was irreducible due to an anterior process fragment [12].

In general posterior dislocations do not require internal or external fixation. Fixation of associated fractures is required depending on the type of fracture, displacement, and timing of the injury. In general posterior dislocations do not require internal or external fixation. Fixation of associated fractures is required depending on the type of fracture, displacement, and timing of the injury. Good functional outcomes for closed posterior TCN dislocation have been uniformly reported in the literature [3]. Post-reduction immobilization in a non-weight bearing cast is required for TCN dislocation. In general we follow the protocol set forth by Jungbluth et al in 2010, consisting of six weeks in a short-leg cast with aggressive rehabilitation and full weight bearing thereafter [12]. Radiographs at 6-8 weeks are a usual protocol to ensure no vascular necrosis of the talus. This can also be done with the use of CT and MRI.

Most commonly, subtalar dislocation is an injury resulting from high energy trauma and, more frequently, it involves active young men. Between 10% and 40% of subtalar dislocations are open [7]. Open injuries tend to occur more commonly with the lateral subtalar dislocation pattern and probably as the result of a more violent injury. Long term follow - up demonstrated very poor results with open subtalar dislocation [7].

The duration of immobilization remains controversial. Lasanianos et al [13] suggested that for uncomplicated medial subtalar dislocations, if passive and active range of motion exercises and partial weight bearing are started earlier, the outcomes regarding functionality are better when compared to those of longer immobilization periods [14].

In our case presentation, the patient had sustained a high-energy trauma leading to a posterior subtalar dislocation. Following the initial failed closed reduction attempt under spinal anaesthesia and hence open reduction was required. We identified the tibialis anterior tendon and the impaction of the talar head on the navicular bone obstructing the possible closed reduction. This case report shows successful open reduction of a posterior subtalar dislocation with Kirschner wire fixation.

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