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Unusual case of lateral subtalar joint dislocation associated with calcaneal fracture and lateral malleolus fracture

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ABSTRACT

Introduction: Subtalar dislocation is defined by a simultaneous total separation of the talocalcaneal and talonavicular joints. Lateral variety is the rarest. It is the result of a high energy trauma. It occurs following forced eversion, with the foot locked in a rut with pressure on the lateral aspect of the leg. Articular fractures of the calcaneus occur as a result of axial impact on the greater tuberosity.

We report the case of a lateral subtalar dislocation associated with a calcaneal fracture.

Case presentation: A 62-year-old man who presented to the emergency room following a 9 m fall. Initial examination revealed a swelling of the right foot and ankle with a deformity giving the appearance of a "flat foot" without skin opening. The neuro-vascular examination was normal.

A radiological assessment including an antero-posterior and lateral X-ray of the right ankle and a axial view if the calcaneus, showed a calcaneal articular fracture and a lateral dislocation of the subtalar joint. CT scan confirmed the diagnosis. Closed reduction by external maneuvers failed. Through a lateral mini-approach centered on the subtalar joint, open reduction of the dislocation was achieved and controlled fluoroscopically. Osteosynthesis of the calcaneal fracture was performed using a percutaneous pinning. Consolidation was obtained at 3 months post-operatively. At the last follow-up, the patient reported occasional pain. The radiological assessment showed early arthritic changes of the subtalar joint.

Conclusion: In rare cases of subtalar dislocation, the direction of displacement, associated bone injuries, and open reduction would be responsible for a poor functional outcome. At present, there is no certain way to avoid subtalar osteoarthritis.

Introduction

Combined dislocation of both the subtalar and talonavicular joints, constitute a rare lesion pattern known as subtalar dislocation [1]. This injury accounts for less than 1 % of all dislocations [2]. The medial dislocation is the most common type. It represents about 79.5 % of all subtalar dislocations. The lateral dislocations accounts for 17 %. Posterior (2.5 %) and anterior (1 %) subtalar dislocations are even rarer [1].

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Subtalar dislocation is associated to a fracture in 50 % to 100 % of cases. Fracture are more common in lateral dislocations. The most commonly reported fractures are osteochondral injuries of the subtalar and talonavicular joints. Fractures of the ankle, calcaneus and forefoot are uncommon. Deep deltoid and calcaneofibular ligament injuries have also been described [3–6].

We describe a pattern of a rare complex injury of subtalar joint, its mechanism, management and outcomes.

Case report

We report the case of a 62 year old male patient, with no previous personal and family medical or surgical history, who was a victim of a domestic accident: fall from a nine m height landing on the left lower limb. The patient was brought to the emergency room on the same day with a main complaint of a painful deformed left ankle.

On the clinical examination, the patient was hemodynamically stable. After ruling out any vital emergency, the orthopedic examination showed a swollen ecchymotic and deformed left foot and ankle. The foot was in pronation and abduction. A bony protrusion was palpated subcutaneously on the medial aspect of the ankle. Palpation of the calcaneus and lateral malleolus was painful. The skin was intact and there were no associated neuro-vascular complications in the left lower limb.

Initial radiographic exploration revealed a lateral subtalar dislocation and associated ipsilateral comminuted fracture of the calcaneus and fracture of the lateral malleolus (Fig. 1). For a better fracture assessment and preoperative planning, a computed tomography (CT) scan was also performed confirming the previously described injuries and classifying the calcaneal fracture as type 3 according to Sanders classification (Fig. 2).

The diagnosis of a subtalar dislocation associated to a fracture of the calcaneus and lateral malleolus was made.

The patient was immobilized in a posterior plaster splint, and immediately admitted to the orthopedic ward and kept nil per mouth for surgery.

The patient was taken to the operating room 6 h after the injury. The procedure was done by a senior registrar in orthopedic surgery. A tourniquet at the root of the left lower limb was used and inflated to 300 mmHg. Under general anesthesia, a first attempt of a closed reduction consisting in inline traction applied to the hind foot associated to a forceful varus of the calcaneus failed to reduce the displaced subtalar dislocation. A percutaneous reduction using the “joystick technique” after inserting a Steinman pin in the calcaneus tuberosity was also unsuccessful. A lateral mini approach overlying the subtalar joint was made and a mini open reduction was achieved after levering back into position the dislocated talus using a hohmann retractor. The reduction was controlled fluoroscopically (Fig. 3). The calcaneal fracture was reduced percutaneously and fixed by pinning. The fracture of the lateral malleolus was comminuted and very distal and seemed not amenable for any sort of solid fixation. The ankle was stable. The lower left limb was immobilized in posterior plaster splint. A post-operative x-ray imaging confirmed the reduction of the subtalar dislocation and the calcaneal fracture as well as the good alignment of the lateral malleolus (Fig. 3).

The posterior plaster splint was kept for 6 weeks, and partial weight bearing was begun at 9 weeks. The removal of the pins was done at 3 months postoperatively. However, one migrated pin was left in situ.

At 12 months after surgery, the patient was able to walk without crutches and reported occasional mechanical ankle pain especially after a long walk on uneven surfaces. This pain improved with pain killer medication. The ankle was stable. The ankle joint range of motion was 20° of dorsiflexion and 30°of active plantar flexion, with limited subtalar motion (Fig. 4). X-rays at the last follow-up showed early post traumatic arthritic changes (Fig. 5).

Discussion

Simultaneous dislocation of the subtalar (talocalcaneal) and talonavicular joints define Subtalar dislocations. They are rare ankle injuries. They usually occur following a high-energy trauma such as fall from a height or motor vehicle accident.

In 1853, Broca [2] described this type of dislocation for the first time and classified it by subdividing it into medial, lateral or posterior forms, based on the position of the foot in relation to the talus. In 1856 Malgaigne and Burguer [7] ll

added the anterior dislocation type. The most commonly type was medial (72–85 %), with the foot and calcaneus displaced medially [8]. Lateral subtalar dislocation accounts for 10–15 % with reciprocal positioning to medial dislocation.

Subtalar dislocation associated to fracture are more often described than pure dislocations. The latter seem to have a more favorable prognosis. These added injuries increase the incidence and severity of complications and impose to prolong the immobilization period.

Calcaneal fractures represent 60 % of all tarsal injuries and 2 % of all fracture [9]. Our case is rare due to the unusual associated lateral subtalar dislocation to calcaneal fracture.

A review of the literature using the keywords “lateral subtalar dislocation” and “calcaneus fracture” found a total of 12 reports including 25 cases of calcaneal fracture–dislocations. Most of the 12 studies were case reports and literature reviews.

Colegate [10] described a case report similar to ours. He suggested that the mechanism responsible for the genesis of this injury was that on impact, the calcaneus was split in two parts (anteromedial and posterolateral) by the primary fracture line [10]. With the progression of the vulnerating force, the lateral aspect of the calcaneus is separated from the body realizing a three part fracture [9,11]. The significantly displaced lateral fragment abuts against the lateral malleolus causing it to fracture [11]. The calcaneus fragment then recoils but is unable to reduce as it is wedged against the lateral talar edge [10].

(caption on next page)

Fig. 1. AP view x ray of the left ankle (a) showing sub luxation of the tibio talar joint (black star) associated to undisplaced fracture of the lateral malleolus (white arrow). Lateral view (b) shows a comminuted fracture of the calcaneus. The subtalar joint is difficult to assess. The subtalar dislocation (black triangle) is diagnosed on the axial view (c).

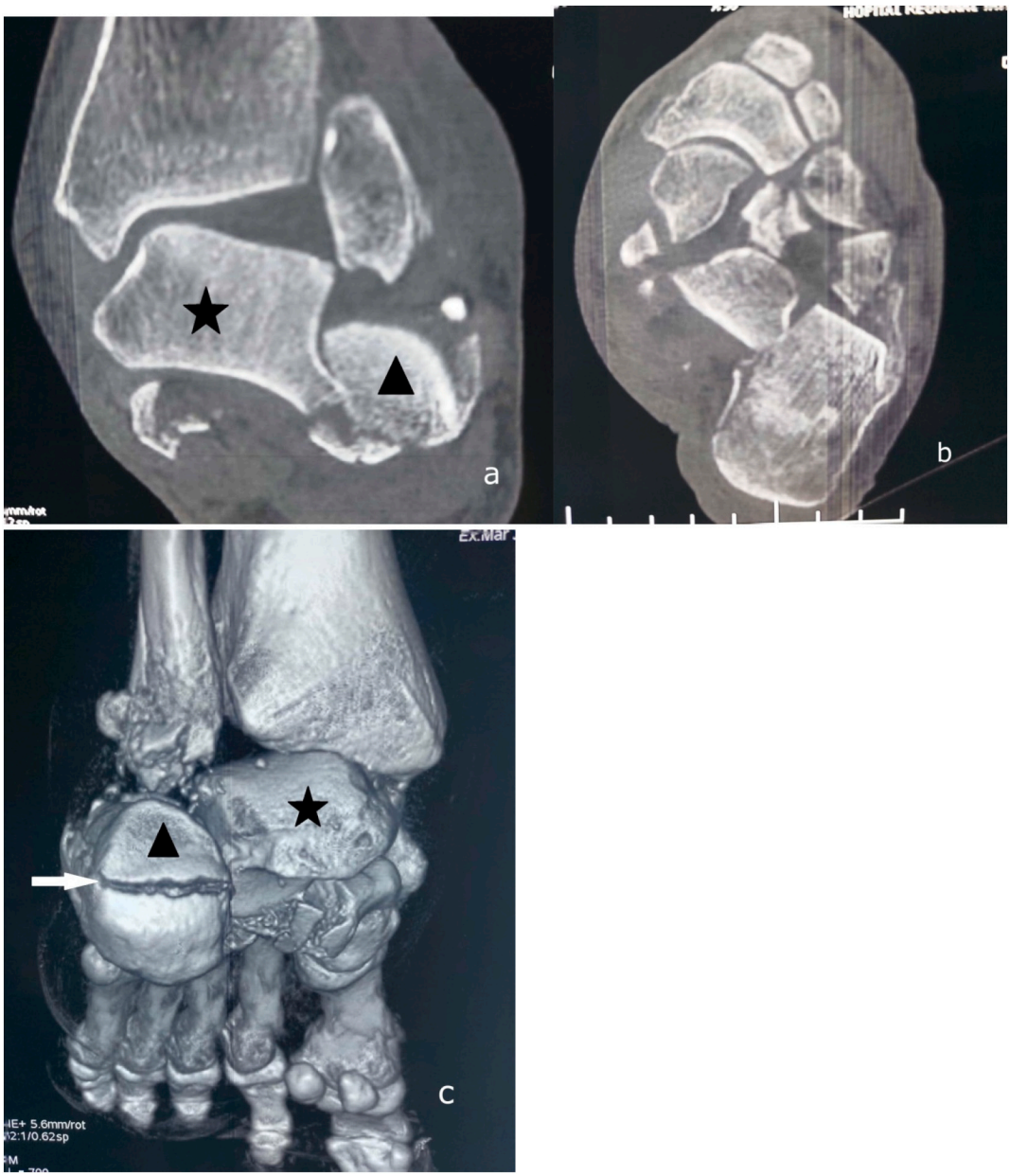

Fig. 2. The coronal (a), axial (b) views and 3D reconstruction (c) of the CT scan of the left ankle show the lack of contact between the articular surfaces of the talus (star) and the calcaneus (triangle).The white arrow delineates the calcaneal fracture line.

Fig. 3. per operatively fluoroscopy (a and b) shows the accuracy of the reduction of the tibio talar and subtalar joints with a good reduction of the calcaneal fracture. Post operatively AP and axial views of the left ankle confirm the good reduction.

Soft tissue impairment was the mostly reported complication. Calcaneal fractures are renowned to be frequently associated with soft tissue damage. For this reason, reduction must be urgent and preferably done under general or regional anesthesia. Approximately 15–20 % of lateral subtalar dislocations cannot be reduced closed secondary to ligamentous impingement, bony or associated fracture blocks or interposed tibialis posterior tendon [12,13].

Several fixation techniques are used in the stabilization of the calcaneus fracture such as plating, cannulated screws and percutaneous pinning [14]. If this latter technique is chosen, we recommend bending the pins before cutting them to avoid the pin migration that was noted in our case report. This complication wasn't of much clinical significance in our patient even though the pin was transfixiating the calcaneo-cuboid joint.

The prognosis is usually poor because all dislocations are inevitably associated with osteochondral fractures [8,10]. The osteoarthritis of subtalar joint was frequent. However, its clinical manifestation is usually mild with most patient reporting moderate pain without major functional impairment.

Conclusion

Lateral subtalar dislocation associated to calcaneal fracture and lateral malleolus fracture is a rare and complex injury association. An adequate radiological examination is paramount for a good lesion assessment without delaying treatment. Further fractures are frequently found with a higher risk of closed reduction failure and surgical fixation. Regarding the frequency of associated osteochondral fractures, the prognosis is usually poor.

Fig. 4. clinical results at the last follow-up.

Fig. 5. At the last follow up radiological results (NB: note the migrated pin left in situ).

Ethical approval

Ethical approval was granted by the Ethical Committee of MTM hospital.

Consent to participate

Consent to participate was obtained from all patients for publication of the publication.

Consent to publish

Written informed consent was obtained from all patients for publication of the publication.

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CRediT authorship contribution statement

All the authors participated in the design, performance, analysis and drafting of this manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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