An irreducible ankle fracture dislocation; the Bosworth injury

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Abstract

Irreducible fracture-dislocations of the ankle present infrequently, but are true orthopedic emergencies. We present a case in which a fracture-dislocation appeared irreducible because of a fixed dislocation of the proximal fibula fragment behind the lateral tibia ridge. This so-called Bosworth fracture-dislocation was however initially not appreciated from the initial radiographs, but was identified during urgent surgical management.

The trauma-mechanism, radiographs, treatment, and literature are discussed

Keywords

Fibula; Ankle; ORIF; Fracture-dislocation; Bosworth

Introduction

Acute fracture-dislocations of the ankle occur infrequently but are a true orthopedic emergency. Besides the intense pain and distress caused to the patient, the gross displacement may cause pressure necrosis of the anterior skin, vascular and neurologic impairment, and compressive damage to the cartilage of the talar dome and tibia joint surface. Immediate reduction of the fracture, and thereby relieving the compromised neurovascular structures provides overall good results.

There are several case reports and series reporting on non-reducible fracture-dislocations of the ankle[1-3]. The most frequently occurring cause for the inability to reduce a dislocated ankle is interposition of soft-tissues (e.g. tibialis posterior tendon [4-5] or the posteromedial ankle tendons and neurovascular bundle [6]). Another cause is the entrapment of fracture-fragments (e.g. the medial malleolus [7] or posterior malleolus [8]) in the ankle joint.

An unusual cause of an irreducible fracture-dislocation of the ankle is when the proximal fragment of the distal fibular fracture is caught behind the posterior tibial tubercle, the so called Bosworth fracture-dislocation [9]. In the current case we report on a Bosworth fracture-dislocation which was initially not appreciated on the radiographs.

Case report

A 32-year old female presented at the Emergency Department (ED) after falling down the stairs. She reported a twisting injury of the ankle and an additional fall on her lower leg, which was caught underneath her.

At the ED she had severe pain, an obvious abnormal alignment of her ankle (Figure 1A), with a reddish discoloration of the skin at the anterior part of the distal tibia. Sensibility and pulsations were intact at that time. Radiographs were taken showing a posterior displaced Weber B ankle fracture-dislocation, which was initially classified as a Lauge-Hansen Supination ExoRotation (SER)-4 injury (Figure 2A, B).

The first attempt to reduce the fracture was undertaken using a hematoma-block, which was unsuccessful showing an identical alignment in plaster. Secondly, a closed reduction under sedatives was tried, which again failed to reduce the fracture. The patient was subsequently taken to the OR for emergency surgery.

The ankle was first approached via a straight lateral incision to the distal fibula, at this point it was noted that the proximal part of the fibular fracture was displaced behind the tibia (Figure 1B). The fixed dislocation could not be reduced with a Homan retractor over the proximal fibula, therefore an additional incision was made over the anteromedial side, medially from the reddish discoloration, for suspected interposition of soft tissues. A large slip of the anterior capsula was ruptured and lodged in between the tibia and the talus, there was no interposition of the deltoid ligament at the medial malleolus. After removing the capsula slip from the joint, the fibula could be reduced easily (Figure 1C). It was stabilized using a one-third tubular plate and two three-cortical syndesmotic screws (Figure 3A, B). The ankle joint was copiously irrigated, revealing two small osteochondral lesions of the anterior talar dome (Figure 1D). Both incisions were subsequently closed in two layers. Post-operatively she was kept non-weight bearing in a lower leg cast for 6 weeks. The syndesmotic screws will be removed in case of complains after a minimum of 12 weeks [10].

Discussion

This case describes a fracture-dislocation of the ankle, which appeared irreducible because of a fixed dislocation of the fibula behind the distal tibia. This type of fracture dislocation was first described as a specific clinical entity by Bosworth in 1947 [9 11]. However, similar injuries had been described over a century earlier [11-12].

The trauma mechanism was difficult to recollect by the patient in the current case, which is well known from the literature, but biomechanical studies have shown a Maisonneuve type of injury [11].

The abnormal alignment included an external rotation of the foot and ankle in relation to the tibia. The radiographs, and especially the mortise view, were therefore made in extreme internal rotation, making the interpretation, and appreciation of the type of injury, more difficult, as anteroposterior views did not show increased overlap of tibia and fibula [13-14]. A frequently visible sign on the radiographs at the ED is 'the axilla sign' [13]. This cortical radiodensity was noted on the AP/mortise view at the axilla of the medial tibial plafond, because of the extreme inwards rotation patients are placed in an attempt to create an adequate mortise view (Figure 1A).

Perry et al. performed a cadaver study to unravel the trauma-mechanism of the Bosworth fracture-dislocation [11]. They identified an injury very similar to the Maisonneuve injury. A Supination-External Rotation injury is followed by seven stages of injury [11].

A literature review by Bartonicek et al, describing sixty patients showed that most fracture-dislocations (88%) showed a Weber type-B fracture-pattern [12]. The syndesmotic ligaments were torn, which is a common finding in this injury [12-13].

A closed reduction of a Bosworth fracture-dislocation is difficult and frequently (>70%) impossible [11]. In the current case an additional incision was made anteromedially to remove torn capsula from the joint, making the reduction possible. The deep medial tendons were

found to be intact, which was similar to previously reported peroperative findings [11 13]. However, the superficial ligaments were deemed to be rupture, judging from small avulsion fractures on the medial malleolus.

In conclusion, a high index of suspicion of a Bosworth fracture-dislocation is needed in a case of an irreducible ankle fracture-dislocation. Urgent operative management provides overall good outcome.

References

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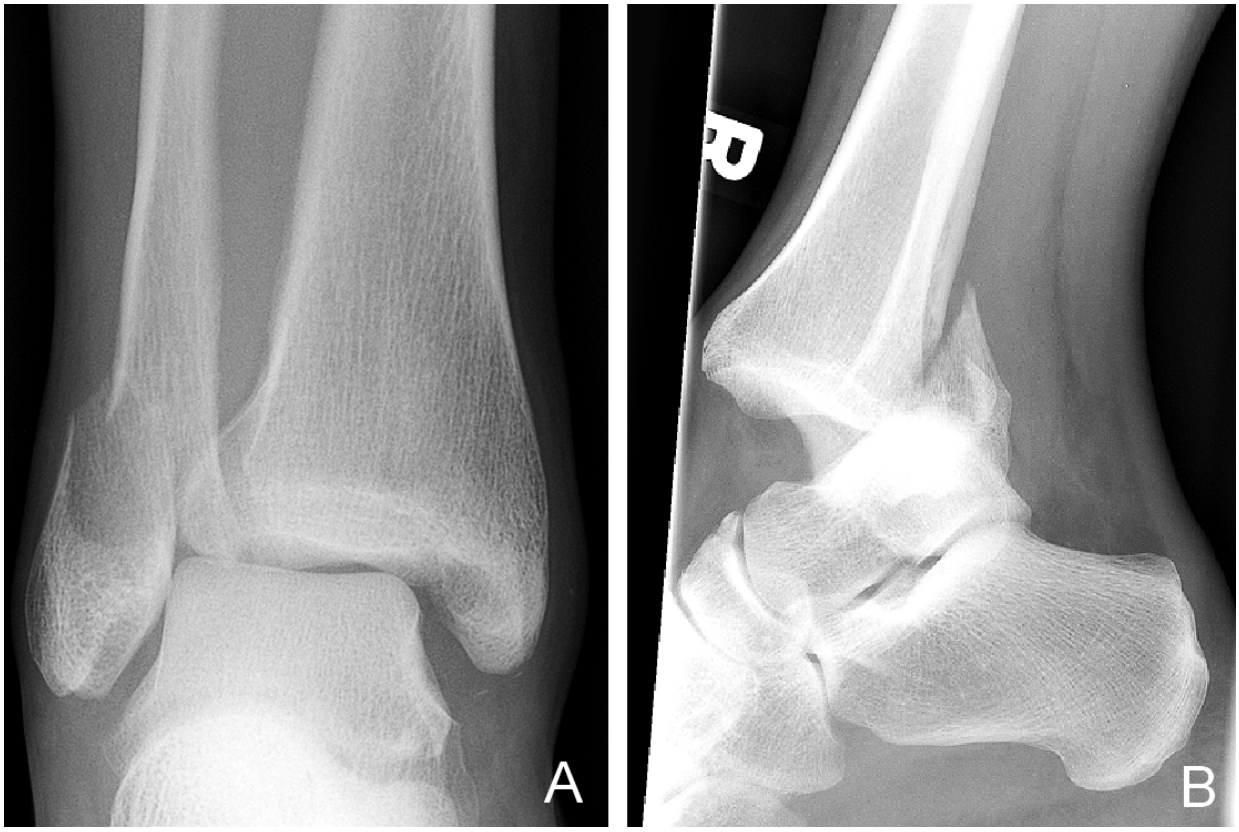
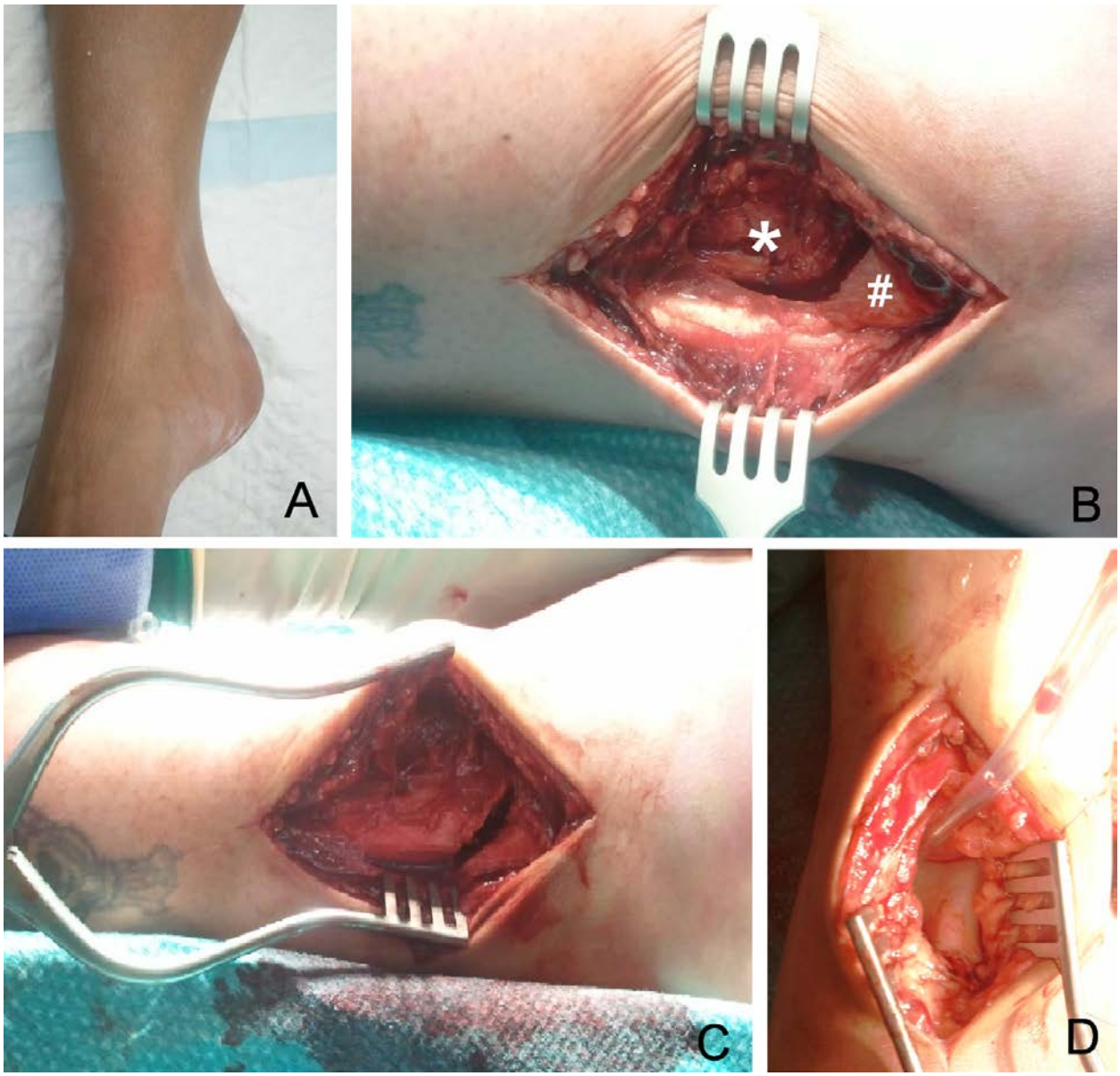
Figures

Figure 1. Initial conventional radiographs showing a Weber-B type ankle fracture-dislocation



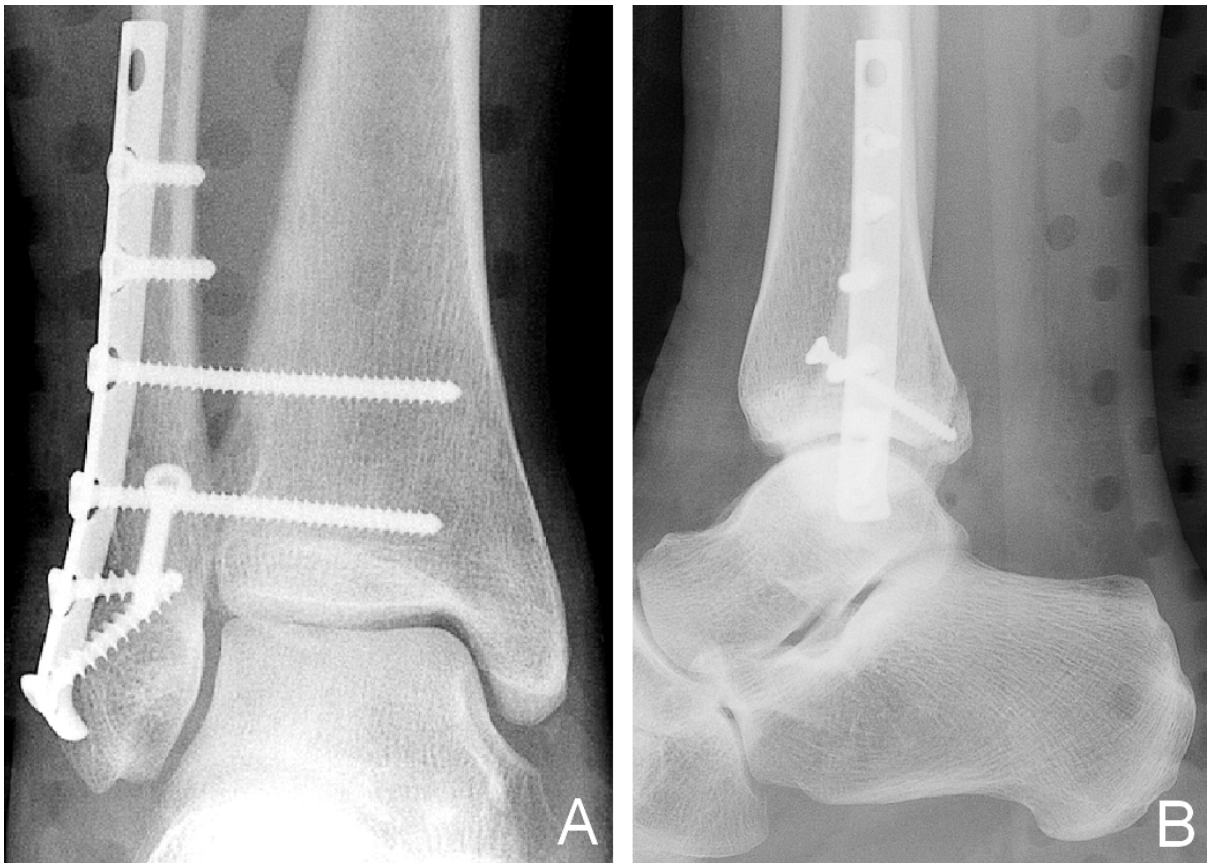
Anteroposterior/mortise (A) and lateral (B) radiographic views of the ankle pre-operatively

Figure 2. Peroperative images



Peroperative images of lateral approach: lower leg and foot in an external rotation with discoloration at the dorsal aspect of the ankle (A), distal aspect of fibula visible (#), at the level of the proximal fibula there is a direct view on the lateral side of the tibia (*) (B), view after freeing of the proximal fibula from behind the posterior ridge of the distal tibia (C), view on the anteromedial talus dome showing two small osteochondral lesions caused by the trauma and prolonged dislocation (D).

Figure 3. Control radiographs at follow-up



Anteroposterior (A) and lateral (B) radiographic views of the ankle post-operatively