Case Report

Bosworth fracture dislocation of the ankle: - Two case reports with perioperative illustration

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SUMMARY

The Bosworth fracture dislocation of the ankle is rare and present difficulties in treatment if not immediately recognized. Here we present two cases with pre- and postoperative x-rays and perioperative image of the dislocation. The fracture dislocations were further complicated by talocrural dislocations and were treated with open reduction and internal fixation.

Introduction

The Bosworth fracture is a rare fracture dislocation of the ankle caused by extreme external rotation of a supinated foot. The proximal part of the fibular oblique fracture becomes dislocated and trapped behind the posterolateral ridge of the lateral tibial tubercle. Here we present two cases admitted two weeks apart; a 27-year-old male and a 60-year-old male supported by x-rays and perioperative photographs.

Case 1

In 2016 during soccer the male patient was tackled from behind and landed on his supinated foot in plantar flexion. He was seen in the emergency room less than 30 min after the injury. Clinically his foot was pale and pulseless and posteriorly dislocated relative to the tibia. It was immediately reduced and the pulse in dorsal pedis artery (ADP) returned. Following the immediate reduction to a satisfactory clinical alignment a plaster cast and an ankle x-ray was planned. Prior to x-ray the patient felt that his foot was sliding in the cast. The x-ray showed posterior dislocation of the talus relative to the tibia and an oblique fracture of the fibula (Fig. 1A). There were no fractures in the proximal fibula. The foot had normal sensation and capillary response. In the emergency room the patient received a peripheral analgesia using popliteus blockade. The cast was removed after 20 min and the talocrural dislocation was reduced manually. The fibular alignment was, however, not restored (Fig. 1B). The patient was admitted to the orthopaedic department for open reduction and internal fixation of the fracture. Four hours after the trauma, the patient underwent surgery under general anesthesia.

A posterolateral approach to the ankle was used. The distal part of the fracture was fixed to the tibia with an intact anterior tibiofibular ligament. The proximal part of the fracture was entrapped behind the posterolateral edge of the distal tibia (Fig. 2). The proximal fibula was easily reduced applying an anterolateral pressure on the proximal fibula. The fibular fracture was then fixed using a semitubular buttress plate with distal fixation. The syndesmosis was stressed under fluoroscopic guidance and found unstable. Hence, it was reduced and secured using a syndesmotic screw (Fig. 1C). The neurovascular conditions were restored postoperatively.

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The postoperative treatment consisted of immobilization in a walker with partial weight bearing for 6 weeks. The outcome was good with radiological fracture healing within 6 weeks. He was referred to physiotherapy-guided rehabilitation and lost to follow-up.

Case 2

A 60-year old man slipped on a slippery step out of a shop and sustained a supination injury to his left ankle joint. In the emergency room it was noted that there was a posterior dislocation of the left foot relative to the tibia. The neurovascular status of the foot was intact. An unsuccessful attempt to reduce the ankle was made. A plaster cast was applied and the patient was referred to the radiology department for an x-ray examination. The x-rays showed that the proximal fibula was trapped behind the tibia and in addition there was fracture of the lateral and medial malleolus (Fig. 3A). In the lateral plane a posterior dislocation of the talus in the
tibiotalar joint was noted together with a fracture of the posterior malleolus (Fig. 3A).

Operative treatment under general anesthesia was performed starting with a posterolateral approach in order to reduce the talus back in place in the tibiotalar joint. It was difficult to do because fibula blocked the reduction, however, when fibula finally was reduced forward it was possible to reduce and fix the fibular fracture with a semitubular plate and screws. Thereafter a small 3.5 mm cancellous screw was used to fix the posterior malleolar fracture and finally the medial malleolar fracture could be reduced and fixed with 2 crews (Fig. 3B). The syndesmosis was stable after the procedure.

The postoperative treatment consisted of immobilization in a walker for 6 weeks without weight bearing during the initial 4 weeks followed by partial weight bearing. The outcome was excellent with full radiological fracture healing within 3 months where a clinical examination revealed a normal motion of the ankle joint without swelling. The patient was able to resume his preinjury occupation.

Discussion

The Bosworth fracture was initially described by DM Bosworth in 1947 [1]. The injury mechanism was later confirmed by cadaveric studies by applying external rotation force while supinating the foot [2]. The fibula is forced posteriorly out of the notch with rupture of the anterior (stage 1) and posterior (stage 2) tibiofibular ligaments. The anteromedial part of the capsule ruptures (stage 3) followed by tearing of the interosseous membrane (stage 4) and a subsequent posterior entrapment of the fibula (stage 5). Further rotation of the talus results in a short oblique fracture of the fibula (stage 6) and finally a fracture of the medial malleolus or rupture of the deltoid ligament (stage 7). Hence, a Bosworth fracture-dislocation may present with an intact fibula, while fibular displacement indicates a completely ruptured syndesmosis requiring internal fixation. The syndesmosis was found to be unstable during surgery in Case 1 despite the presence of an intact anterior tibiofibular ligament. The instability must be explained by the simultaneous rupture of the posterior tibiofibular ligament and the interosseous membrane so stability could not be maintained by one ligament alone. In the present cases the stage 7 Bosworth fractures was further complicated by a talocrural dislocation. This may represent an even more advanced fracture stage, which however is not documented by cadaver studies. The severity of the injury was supported by the addition of neurovascular deficits at admission in Case 1.

The identification of the fracture represents initial challenges on x-ray. Khan and Borton described the “Axilla sign” as a consistent finding on plain anterior-posterior radiographs of the mortise in previously published Bosworth injuries [3]. Because of the entrapment of the dislocated fibula closed reduction is considered unachievable in a recent review of 15 previously reported cases [4].

Fig. 3. Representative x-rays of Bosworth fracture dislocation in patient number two. Top is anterior-posterior view and bottom is lateral view. A) Unsuccessful outcome after closed reduction attempt of posterior luxation of the tibia relative to the talus, which was still subluxated. The proximal fibular fragment still dislocated posteriorly B) Postoperative result.
Identification of the Bosworth fracture dislocation and early surgical intervention is important to prevent soft tissue damage and compartment syndrome has also been reported in association with the Bosworth fracture [5,6]. Delay in sufficient treatment has been associated with an inferior clinical outcome [5,7].

In conclusion, the Bosworth fracture is a difficult diagnosis on initial x-rays and closed reduction is generally not achievable. The fracture dislocation requires open reduction and internal fixation. Perioperative testing of the syndesmosis after plate fixation of the oblique fibular fracture is mandatory and stabilization of an unstable syndesmosis is required. Correct diagnosis and early intervention is required for a satisfactory clinical outcome.

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