Case study

Management of Bosworth fracture: Case Report and Literature Review

ABSTRACT

Introduction: Bosworth fracture is an uncommon fracture that involves the distal fibula associated with a dislocation of the proximal fibula fragment being posterior to the tubercle of the tibia distally. As the proximal fibula fragment becomes entrapped behind the Tibia it subsequently makes it irreducible which then necessitates the correction of this fracture surgically. Making an initial diagnosis of this fracture is quite difficult as it is rare and few data in our setting have been recorded with only a handful of documented cases worldwide. Although attempts have been made to reduce this fracture with closed reduction, the outcomes are generally unfavourable and counterproductive. Bosworth fracture is well documented in medical literature but often not easily picked at presentation.

Case Presentation: This case report evaluates a 19 year old female student who presented with a 2 hours history of pain and deformity to her right ankle after she had accidentally externally rotated her ankle with the foot in a prone position while running down the stairs. Examination revealed a deformed and swollen right ankle joint, overlying skin was intact, tender limitation of joint movement. She had a failed closed reduction and was subsequently counselled for open reduction and internal fixation with plates and screws.

Key words - Bosworth, ankle, surgery, internal fixation.

1. INTRODUCTION

Historically, the term “Bosworth fracture “was published in 1947 by David Bosworth following 5 different patients in which the proximal fibula shaft was trapped behind the posterior tibial tubercle following trauma to the ankle [1]. Limitations to adequate diagnosis of this complex fracture exist even with standard radiologic views [2,3]. In a similar case Report done in 2020, which involved an atypical ankle irreducible fracture-dislocation, it was stated that Bosworth fracture should have a strong differential diagnosis once closed reduction has been attempted and has proved unsuccessful [4]. In a study by Bartonice, only 17 patients out of 108 underwent successful closed reduction while the rest needed surgical intervention however the functional status of the patients post closed reduction had few data in-terms of their rehabilitation [5].

To adequately correct this unusual ankle fracture dislocation open Reduction and internal fixation is recommended. We present this case report as the first reported diagnosis in our hospital with surgical fixation preferred as the line of care.

2. 1 PRESENTATION OF CASE

A 19yr old female student presented at the Accident and Emergency with a 2 hour history of pain and deformity to her right ankle after she had accidentally externally rotated her ankle with the foot in a prone position while running down the stairs. There was progressive swelling and inability to bear weight on the right lower limb. She had no other injuries elsewhere in the body and Vital signs were all stable at presentation. Her X-ray revealed a displaced talus (Figure 1).

Examination of the right ankle joint revealed a deformed and swollen right ankle joint, overlying skin was intact, tender limitation of joint movement, nil sensory and motor deficit, dorsalis pedis pulsation was prompt and palpable, the knee joint and proximal fibula were

both examined and found to be normal. The foot and ankle were both stabilized with a splint and an Urgent x-ray of the ankle was requested for which revealed disruption of the ankle mortise, posterioly displaced proximal fibula fragment, oblique fracture of the distal fibula above the syndesmosis, posterior dislocation of the talus, soft tissue swelling and intact medial malleolus. She sustained a Danis weber grade C fracture to the distal fibula which further made the ankle functionally unstable.

Closed reduction was attempted manually under haematoma block to correct the talocrural deformity which was adequately reduced but failed to give adequate stability to the disrupted distal tibio-fibular syndesmosis and fracture of the distal fibula. She was subsequently counselled for open Reduction and internal fixation with plates and screws. The procedure was carried out at 2 weeks post injury following adequate Reduction of the swelling over the lateral malleolus with the aim of reducing the risk of wound breakdown.

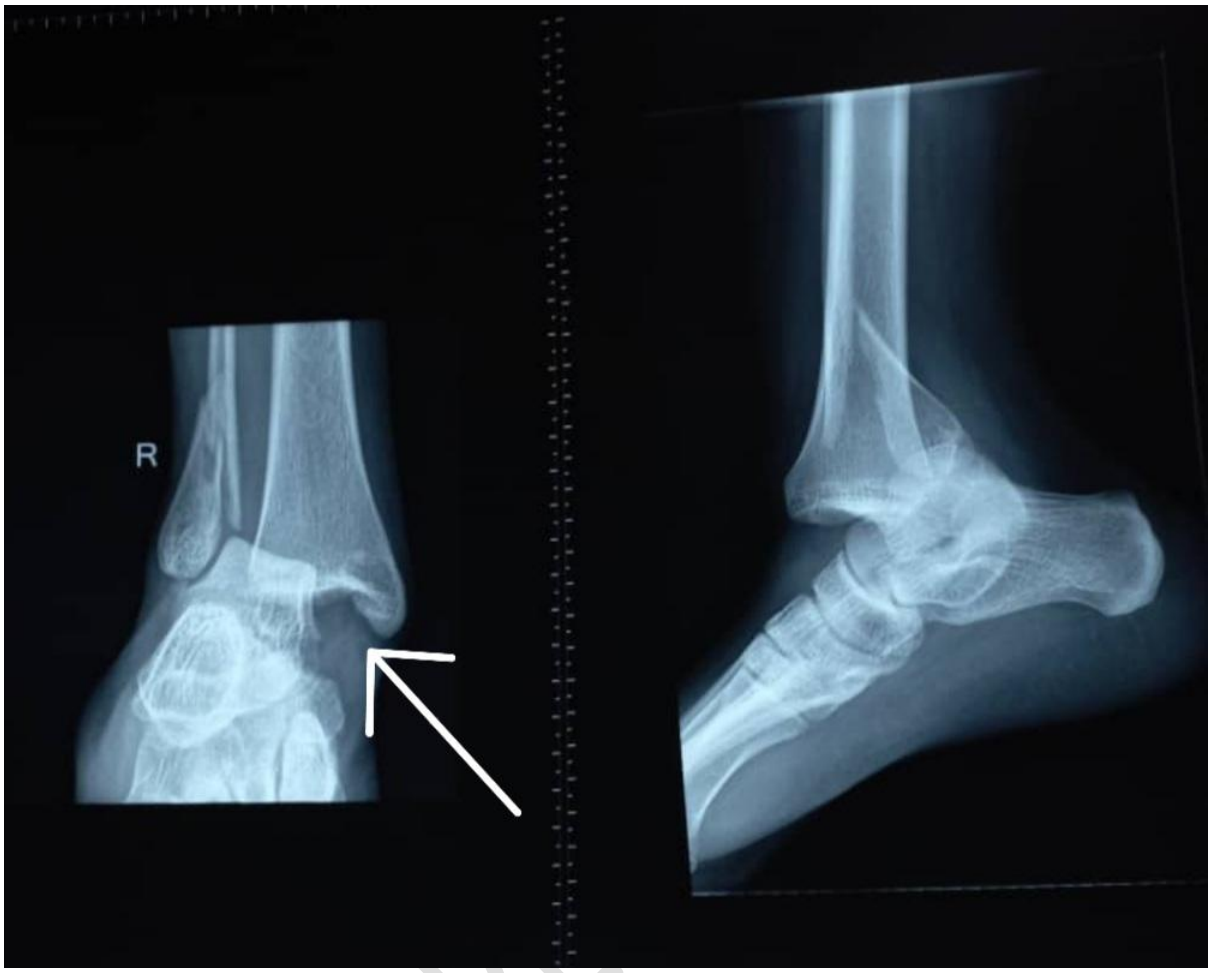

Figure 1: Anterior posterior and lateral radiograph showing posteriorly displaced talus and the arrow represents the “Axilla sign” present at the medial malleolus characteristic of Bosworth fracture.

2. 2 SURGICAL MANAGEMENT

Under combined spinal and epidural anaesthesia, a posterolateral incision to the Right distal fibula was made exposing the fracture site .Intraoperatively the proximal fibula component was seen to be trapped behind the posterolateral aspect of the distal tibia and this was adequately reduced under C-arm guidance. An initial lag screw was used to bring the two fragments together then, a 7 hole semi tubular plate was then placed over the fracture site and fixed with 3.5mm cortical screws while the distal tibiofibular syndesmosis was stabilized with a syndesmotic screw under fluoroscopic guidance and the tibiofibular and deltoid ligament assessed for injury (Figure 2).

Post-operatively the patient was placed on non-weight bearing axillary crutches for 8 weeks after which the syndesmosis screw was removed and was converted to an air-cast walking boot following normal clinical evaluation and x-rays. The air-cast boot offered her support for 1 month finally which she was able to ambulate unaided.


Ankle R, Lateral
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Figure 2: The anteroposterior and Lateral views of the post op radiograph showing the semi tubular plate with screws and the syndesmotic screw fixation and the ankle well aligned anatomically.

3. DISCUSSION

Commonly Bosworth fracture occurs following excessive external rotation with the ankle in prone position which was also the mechanism of injury for our index patient. If taken into full comparison with other fractures, Bosworth fractures are associated with more complications such as compartment syndrome, neurological deficit, avascular necrosis of the talus and subsequently Osteoarthritis [6]. Khan and cols derived a new radiological sign called the "axilla sign "that could help easily identify patients with Bosworth fracture and therefore used as a stand out feature reducing the error at missing out the diagnosis. The features of the axilla sign include a cortical density at the medial aspect of the tibia plafond due to the rotation of the tibia [7]. Some authors have advised the use of computer tomography Scan to adequately help delineate the extent of injury however does not change the Intra-operative findings linked to Bosworth fracture [8]. Because of the disruption in the distal tibiofibula joint, a syndesmotic screw should be used to offer more stability and further protect the interosseous membrane from further damage which should be removed between 6-8 weeks before commencement of partial weight bearing [9,10]. To adequately help describe the extent of injury before an x-ray was requested in the client reported the Ottawa ankle rule was used as she had tenderness at the distal 6cm on the lateral aspect of the ankle and difficulty to take 4 steps which prompted the use of x-rays to further help our diagnosis. The Ottawa ankle rule was developed to help emergency Doctors avoid the use of unnecessary x-ray imaging and has been reported to have a high sensitivity [11].

In terms of the mechanism of injury of the patient the ankle was in a prone position, externally rotated and adducted with this type of injuries having a risk of injuring the deltoid ligament (widening of the medial gutter) and a spiral oblique fibular Danis weber fracture as was also observed in the patients x-ray but damage to the anterior inferior tibiofibular could be occult as explained using the Lauge-Hansen classification [12]. She had an oblique Danis - weber grade C which was unstable therefore the possibility of a syndesmotic injury was equally high as seen by the disruption of the ankle mortise on the Anterior posterior pre-operative x-ray views which directly would need a syndesmotic screw to offer adequate stabilty to the ankle joint. The rehabilitation process following surgery is important as it helps to integrate patients who have had ankle injuries into their normal way of life and this usually consist of assessing the postural stability, gait, muscle strength, neuromuscular control & educating them on use of walking aids/supports [13]. As Bosworth fracture is characteristically irreducible due to the locking of the proximal fracture fragment of the fibula behind the distal Tibia as this what separates it from Danis weber fracture. Hence, a Bosworth fracture is that which combines a Danis weber grade C fracture and an entrapment of the proximal fibular fracture fragment behind the tibia therefore open Reduction and internal fixation is advised.

Conclusion

Bosworth fracture should be considered based on the mechanism of injury and radiological features. This ankle injury cannot effectively be stabilized with closed reduction. Early identification of this fracture pattern would therefore offer better prognostic and functional outcomes.

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