

Ankle Arthrodesis using Retrograde Nail in Case of Bosworth Fracture with Ankle Dislocation : A Rare Case Report

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Learning Point of the Article:

Management of open Bosworth fracture is challenging. Early diagnosis and treatment play a key role in limb salvage.

Abstract

Introduction: The Bosworth fracture is a distal fibula oblique fracture with proximal fibula posterior dislocation behind the posterior tibia tubercle. Extreme external rotation of the supinated foot causes it. These types of fractures and their treatment are infrequently described in the literatures.

Case Report: A 72-year-old female pillion rider on a two-wheeler had a Road traffic accident. The patient arrived at the emergency room with a Bosworth fracture along with an open ankle dislocation (Gustilo-Anderson Type 2B). She underwent a staged procedure in form of an external fixator and later on definitive fixation in the form of ankle fusion with retrograde nailing. Since there is very little information regarding treatment modality for an open Bosworth fracture with an ankle dislocation, this case report is very rare. Fracture united well within 8 weeks.

Conclusion: These fractures in elderly patients with comorbidities if poorly managed can lead to severe consequences like an amputation. Awareness of these fractures patterns and their treatment can play a potential role in limb salvage.

Keywords: Bosworth fracture, ankle fusion, retrograde nailing, amputation, limb salvage, diabetic patient.

Introduction

Bosworth published a study in 1947 describing five cases of an irregular ankle fracture-dislocation in which closed reduction failed to produce adequate results. On open exposure, a situation was discovered that had never been documented before, to the author's knowledge [1]. Bosworth and Simonovich were the first to examine the mechanism of injury in the Bosworth lesion [2]. Perry et al. defined the latest widely accepted mechanism based on cadaver experiments. The capsule's anteromedial region was ruptured first, followed by the interosseous ligament.

The interosseous membrane tore 4–6 cm above the ankle mortise. As external rotation persisted, the fibula was dragged posteriorly by the ankle's uninjured lateral collateral ligament and became entangled at the back of the posterolateral border of the tibia. The rotation of the talus over the preserved medial malleoli as well as deltoid ligament resulted in the fibula fracture in a supination-external rotation pattern. The final step of the injury is tearing of the deltoid ligament or medial malleolus fracture [3].

The aim of the treatment is to hold the foot in plantar flexion, correct the deformity of foot, restore bony

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Figure 1: X-ray of right ankle joint (anteroposterior/lateral view) showing bosworth fracture with ankle dislocation.

stability, and avoid skin necrosis. The role of Intramedullary fixation for cases of ankle arthrodesis had been identified as providing rigid fixation, least soft tissue damage, correction of the deformity, decreased vascular disturbance, and an improved functional outcome [4]. In old age patients with articular ankle fractures, tibiotalar calcaneal nailing was an appropriate treatment choice, allowing early weight-bearing and decrease incidence of complication [5]. This case highlights the role of ankle fusion in cases of acute trauma.

Case Report

A 72-year-old female, a housewife by occupation, belong to the state of Karnataka, known case of hypertension and type 1 diabetes mellitus with poor glycemic control was brought to the department of trauma and had chief complaints of pain, deformity, and open wound (Gustilo-Anderson Type 2B) was present over the medial malleolus of the tibia. The patient was unable to bear weight after the trauma. No neurovascular injury was present. On examination, there was tenderness present over the ankle joint, range of motion was painful and restricted. An open wound of 5×5 cm was present over the medial malleolus of the tibia. X-ray showing a Bosworth fracture with tibiotalar dislocation (Fig. 1).

Operative management

A closed reduction was performed, with the ankle being pulled anteriorly along with traction and foot in dorsiflexion. After an unsuccessful attempt the patient was taken to operation theatre under spinal anaesthesia, ankle joint was reduced with traction, and ankle spanning external fixator was applied along with debridement of the open wound and primary closure (Fig. 2).

Post-operatively infection was present over the medial sutured wound. The culture was sent and antibiotics started according to the culture sensitivity. A second procedure was performed after 10 days of the first surgery in the form of debridement along with vacuum-assisted closure

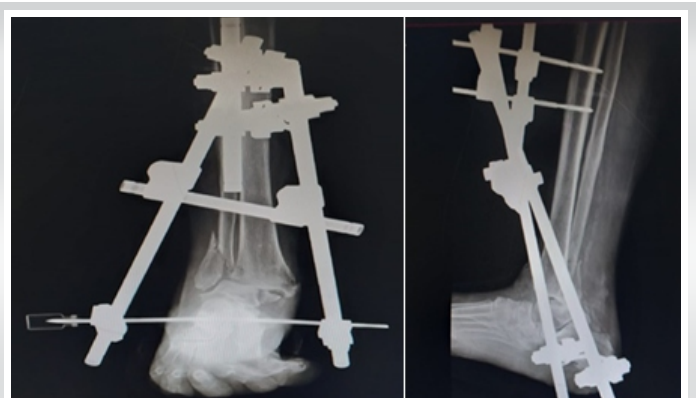


Figure 2: X-ray of right ankle joint (anteroposterior/lateral view) with ankle spanning external fixator.



Figure 3: Debridement with vacuum-assisted closure dressing.

attached to the jig was then pushed distal to proximal (retrograde) from the calcaneus, subtalar and via ankle joints, into the medullary canal of the tibia. Calcaneus was locked distally in a dynamic mode, allowing compression at the ankle joint with axial forces and weight-bearing. One screw was passed through the fibula into the talus. Proximal locking was done with one static and one dynamic screw (Fig. 4). The limb was kept elevated in a BB splint.

dressing of the right ankle joint (Fig. 3). Once the infection was settled, definitive fixation was planned. Transfibular osteotomy was performed through a lateral approach. The ankle joint's articular cartilage was removed; the surface of the dome to the talus and tibial pilon were smoothed. Articular cartilage was detached from the subtalar joint. A stab incision (4 cm) was made over the plantar aspect of the foot. After separating the fascia, guidewire was passed through the calcaneus, subtalar and ankle joint upto the medullary canal of the tibia under fluoroscopic guidance. Hindfoot must be aligned with the tibia, and the ankle must be in favourable varus/valgus alignment. The guide pin must be placed centrally in the hindfoot and tibia medullary canal. After that, a cannulated drill was used to enter the medullary canal. The canal was reamed up to the desired height and diameter using adjustable reamers, as measured during preoperative preparation. The intramedullary nail



Figure 4: Post-operative X-ray showing retrograde nailing through the ankle and subtalar joint.

Post-operative protocol

Limb Elevation, ice packs, and medication were given to reduce pain and swelling. Hip and knee active range of motion, hip strengthening and upper extremity strengthening were started on day 2. The patient was allowed non-weight-bearing walking day 2 onwards with the help of a walker. Non-weight-bearing walking was advised for 6 weeks. After 6 weeks full weight-bearing using walking aid (Fig. 5).

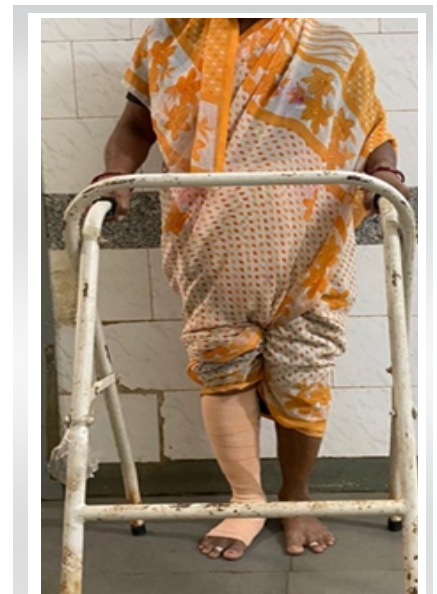


Figure 5: Full weight-bearing after 6 weeks post-operatively.

Discussion

Until recently, tibiototalcaneal arthrodesis had been published infrequently, with generally promising outcomes [6]. There is a high risk of damage to the various structures around the ankle including the skin, plantar aponeurosis of the foot, muscles of plantar aspect, tendons, as well as neurovascular structures. Pochatko and his colleagues showed six zones injuring the plantar structures on cadaver specimens while passing an intramedullary nail (retrogradely). The location of the nail was placed central pre-requisite that the nail passed through the calcaneum at the zone between sustentaculum tali and calcaneum body [7]. Fusion of subtalar joint along with ankle joint is a drawback of retrograde nailing. Dorsiflexion is reduced by 50% and plantarflexion is reduced by 70% after an ankle fusion, with Chopart and Lisfranc joints exhibiting residual motion [8]. In cases where the subtalar joint is fused, it becomes mandatory to position the joint in mild degree of eversion. Intramedullary implants have a higher biomechanically stability for achieving union

when compared with compression screws in terms of fixation. Early weight-bearing is also possible with intramedullary nail fixation, which is essential in this community of patients [10].

Conclusion

The optimum management for the Bosworth type of fracture along with ankle dislocation is undetermined. In elderly patients with open injury and comorbidities, ankle fusion with retrograde nailing gives a better option in terms of fusion rate and early mobilization.

Clinical Message

Bosworth fracture with ankle dislocation is a rare presentation for which early diagnosis and management play a key role in limb salvage.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.
Conflict of interest: Nil **Source of support:** None

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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