

# Variation of the Bosworth Fracture Presenting as a Displaced Left Trimalleolar Ankle Fracture Dislocation with Syndesmotic Disruption: A Case Report

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## Introduction:

Bosworth fractures represent a rare subset of ankle injuries characterized by the entrapment of a posteriorly dislocated proximal fibula fragment behind the posterior tibial tubercle. First described by David Bosworth in 1947<sup>1</sup>, this fracture-dislocation pattern is frequently caused by external rotation of a supinated foot.<sup>2</sup> Open reduction internal fixations (ORIF) are the most common treatment of Bosworth fractures because of their stable fixation to prevent further displacement and ability to allow for early mobilization of the ankle.<sup>3,4,5</sup>

## Case:

A 43-year-old woman with past medical history of morbid obesity, asthma, hypertension, pulmonary embolism, bilateral knee replacement, and deep vein thrombosis presented with isolated left ankle pain after a fall and “rolling her ankle”. On initial bedside x-ray, the patient was found to have fractures of the left distal tibia, fibula, second and fourth proximal metatarsals (Figure 1). After reduction of her left ankle was attempted unsuccessfully, computed tomography (CT) demonstrated left distal fibula fracture with tibiotalar dislocation such that tibia was displaced medially and anteriorly to the talus (Figure 2). Pre-operative diagnosis based on patient history and x-ray was displaced left bimalleolar ankle fracture dislocation with possible syndesmotic disruption which was unsuccessfully attempted to be reduced and did remain significantly posterolaterally dislocated. Treatment was determined to be ORIF of trimalleolar ankle fracture without fixation of the posterior malleolus of the left ankle as well as ORIF of syndesmotic injury of the left ankle. Post-operative diagnosis was confirmed to be an irreducible entrapped Bosworth type fracture with syndesmotic disruption (Figure 3).

## Discussion:

Bosworth fractures are rare, comprising 1.62% of total ankle fractures.<sup>6,7</sup> The relative paucity of available case studies limits our understanding of the injury, its treatment, and prognosis, and there are major sequelae associated with this type of fracture if undertreated. Thus, it is important to document each diagnosed case and study the patient characteristics and outcomes to better understand and apply knowledge of the Bosworth fracture to wider populations. Bosworth fractures can be challenging to diagnose due to the non-specific physical findings and inadequate x-rays. CT imaging and 3D reconstruction, both of which were used in this case, are recommended to guide surgery because they allow visualization of the soft tissues.<sup>6</sup> However, it is unable to clearly show the extent of syndesmotic disruption. Radiographically, it is difficult to visualize the posterior displacement of the fibular fracture piece due to overlap of the distal fibula and tibia. When examining post reduction x-rays, it appears to be reduced but it is unsuccessful compared to post reduction CT scans. Difficulties and delays in diagnosis can exacerbate complications of the fracture and treatment. There are two major prognostic factors that have been observed to lead to poorer outcomes: delayed surgical reduction and repeated attempts at closed reduction.<sup>4</sup> Both are due to the misdiagnosis of the Bosworth fracture, making early recognition and prompt surgical reduction key factors to avoiding complications associated with Bosworth fractures. This case differs from a classical Bosworth fracture because of the extensive nature of the injuries and the past medical history of the patient. While one review found that 70% of Bosworth fracture cases had an associated posterior malleolar fracture, trimalleolar fractures are rare in ankle fractures, with an incidence of about 40 in 10,000.<sup>9,10</sup> Thus, the combination of these two rare conditions is notable. Entrapment of the fibula between the fibular notch is common in Bosworth fractures, but fibular displacement or entrapment behind the posterior malleolus have been rarely documented. To our knowledge, the constellation of tibial and fibular fractures, trimalleolar fracture, total syndesmotic disruption, talotibial displacement, and proximal metatarsal fractures are novel.

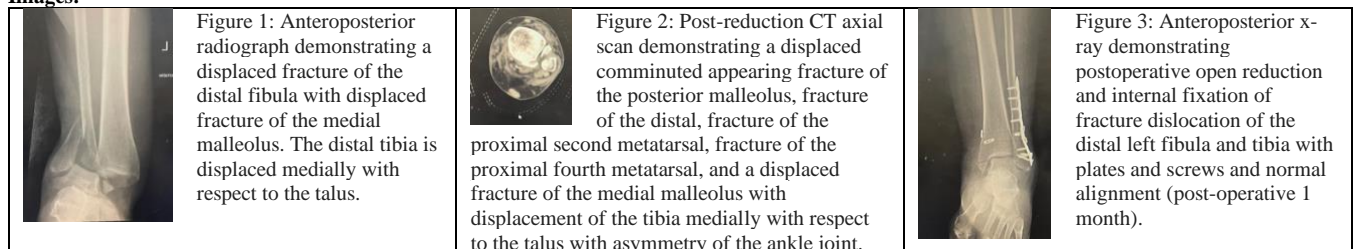
## Significance and Clinical Relevance:

The Bosworth fracture is an uncommon, frequently misdiagnosed condition that should be considered in the differential diagnosis of irreducible ankle fracture-dislocations. The discussion on rare aspects of Bosworth that this patient experienced highlights the variability of this fracture pattern as well as the importance of documenting each case to determine the implications for future patients with similar presentation.

## References

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