

# Talar Neck Fracture with Dislocation Combined with Bimalleolar Ankle Fracture: A Case Report

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
Funds Collection G

ABCDEFG **Ahmad M. Radaideh**  
ABF **Ziad A. Audat**  
ACF **Abdullah A. Saleh**

Department of Orthopedics, King Abdullah University Hospital, Jordan University of Science and Technology, Irbid, Jordan

**Corresponding Author:** Ahmad M. Radaideh. e-mail: [ahmadmr1970@yahoo.com](mailto:ahmadmr1970@yahoo.com)  
**Conflict of interest:** None declared

**Patient:** Male, 37  
**Final Diagnosis:** Talar neck fracture dislocation combined with bimalleolar ankle fracture  
**Symptoms:** Mild ankle pain  
**Medication:** —  
**Clinical Procedure:** Open reduction and internal fixation  
**Specialty:** Orthopedics and Traumatology

**Objective:** Rare co-existence of disease or pathology

**Background:** Fractures of the talus are uncommon injuries that usually involve the talar neck, rather than the talar body. This report is of a rare case of combined left talar neck fracture and adjacent joint dislocation with an ipsilateral bimalleolar ankle fracture.

**Case Report:** A 37-year-old man presented with an injury to his left foot following a motor vehicle accident. When he presented to the hospital emergency department, his left foot and ankle were swollen, the overlying skin was intact but badly contused, and there was no neurovascular deficit. Radiographs of the left ankle showed a fracture of the talar neck and bimalleolar fracture. An initial closed reduction under anesthesia failed. Therefore, open reduction and rigid stabilization of all fractures were achieved surgically, followed by the application of an external fixator spanning the ankle and the subtalar joints. The external fixator was removed at six weeks, range of motion (ROM) exercises were commenced, and a non-weight-bearing mobilization protocol was continued for 12 weeks. At four-year follow-up, radiographs confirmed solid union of all fractures, and although avascular necrosis (AVN) of the talus and secondary ankle arthritis developed, the functional outcome was satisfactory.

**Conclusions:** The immediate management of talar neck fracture with dislocation combined with a bimalleolar fracture is important to prevent soft tissue complications and to improve the functional ROM of the ankle. However, AVN and post-traumatic osteoarthritis at both the ankle and the subtalar joints are still common sequelae of talus fracture.

**MeSH Keywords:** Ankle Fractures • Osteoarthritis • Osteonecrosis • Talus

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## Background

Talar fractures are relatively uncommon, accounting for less than 1% of all bone fractures, and result from high-energy injuries [1]. Displaced talar neck fractures usually occur as a result of forced ankle dorsiflexion and rotation, which are mechanisms that occur during falls from a height or during motor vehicle accidents. Talar fractures more frequently involve the neck of the talus than fractures of the body or the head of the talus [2].

The Hawkins classification is a widely used classification system for talar neck fractures, and includes three types based on the initial fracture displacement: a non-displaced fracture (Type I), a displaced fracture where the subtalar joint is subluxated or dislocated (Type II), and a displaced fracture with dislocation at both the subtalar and tibiotalar joints (Type III) [3]. A type IV fracture was subsequently added by Canale and Kelly, which consists of dislocation at the subtalar, tibiotalar, and talonavicular joint (Table 1) [4]. Recently, Hood et al. described a more comprehensive classification system, the Malvern classification system, for defining fractures in the talar head and neck region [5].

Hawkins Type III talar neck fractures include dislocation of the tibiotalar and subtalar joints, with the goal of management of this fracture being anatomic reduction, which requires restoration of rotation, length, and angulation of the talar neck [1,6].

Combined talar neck fracture and adjacent joint dislocation are commonly associated with significant soft-tissue injuries and frequently result in osteoarthritis of ankle and subtalar joints. The particular combination of talar neck and bimalleolar fracture described in this case has rarely been previously reported.

## Case Report

A 37-year-old man presented to a peripheral hospital with an injury to his left foot, following a motor vehicle accident. The mechanism of injury was forced dorsiflexion and ankle inversion. The patient was initially managed with a trial of closed reduction of the fracture, with dislocation of the ankle, followed by application of a short leg cast. The patient was then referred to the emergency room of our tertiary hospital, 18 hours following the initial injury, at which time, he was still complaining of severe left ankle pain. On examination, there was swelling of the left ankle and foot, associated with extensive skin ecchymosis and hemorrhagic skin blistering. A white patch of skin was noticed over the medial aspect of the ankle as a result of pressure effect from the dislocated talar body (Figure 1). The patient had no neurovascular deficit. Radiographs showed a displaced left talar neck fracture with dislocation at the subtalar and tibiotalar joints (Hawkins Type III), and an ipsilateral bimalleolar fracture (Figure 2).

**Table 1.** Hawkins classification of talar neck fracture.

Type I	<ul style="list-style-type: none"><li>• Non-displaced talar neck fracture</li></ul>
Type II	<ul style="list-style-type: none"><li>• Talar neck fracture with mild displacement</li><li>• Subluxation of the subtalar joint</li></ul>
Type III	<ul style="list-style-type: none"><li>• Talar neck fracture with moderate displacement</li><li>• Subluxation of the subtalar and ankle joint</li></ul>
Type IV	<ul style="list-style-type: none"><li>• Talar neck fracture with severe displacement</li><li>• Subluxation of the subtalar, ankle, and talonavicular joints</li></ul>



**Figure 1.** Pre-operative image of the left medial ankle. Skin ecchymosis and hemorrhagic blisters are present with a patch of white skin over the medial ankle, due to the pressure effect of the displaced talar body (arrow).

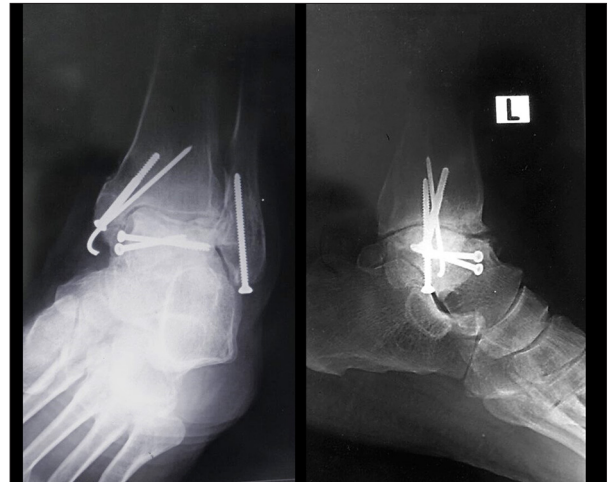


**Figure 2.** Pre-operative left ankle radiograph. The left ankle radiograph shows a combined left talar neck fracture and adjacent joint dislocation (Hawkins III) with a left bimalleolar fracture.

An initial closed reduction under anesthesia failed. Therefore, an urgent open reduction was performed, immediately after hospital admission, via an antero-medial ankle approach.



**Figure 3.** Postoperative photograph, taken three weeks following surgery. Photograph of the left ankle taken three weeks following surgery shows the Ex-Fix in place and a healed surgical site.



**Figure 4.** Left ankle radiograph at four years following surgery. At four years postoperatively, the solid union is seen of all fractures; there is joint space narrowing, sclerosis and collapse of the talar dome, and anterior osteophytes of the ankle.



**Figure 5.** Postoperative photograph, taken four years following surgery. Photograph of the left ankle taken four years following surgery shows equal bilateral ankle dorsiflexion and plantar flexion.

Surgical exposure was gained through the fractured medial malleolus. The tendons of the *tibialis posterior* and *flexor digitorum longus* were found to be incarcerated between the fracture fragments preventing reduction. Surgical washout of the ankle was done with removal of bony debris and derotation of the talar body, which had been severely compressing the medial skin. Anatomic reduction and cannulated screw fixation of the talar neck fracture was achieved using two 5.0 mm screws in a cross configuration. The medial malleolus fracture was reduced and fixed using a malleolar screw and a K-wire. A closed reduction and percutaneous retrograde intramedullary screw fixation of the lateral malleolus fracture was performed, and a spanning external fixator was applied to the ankle and the subtalar joints.

At three-weeks following surgery, the surgical wound and skin blisters had healed well (Figure 3). No wound dehiscence or post-operative infection developed. At six-weeks follow-up, the external fixator was removed, and range of motion (ROM) ankle exercises commenced with a non-weight-bearing mobilization protocol for 12 weeks. Early signs of avascular necrosis (AVN) appeared on radiographs at six-week follow-up, with an absent Hawkins sign and osteosclerosis of the talar dome.

At four-year follow-up, radiographs confirmed solid union of all fractures (Figure 4). Minimally disabling post-traumatic ankle arthritis was the only complication but had a satisfactory clinical outcome. His functional ROM of the ankle was between 0-40° (Figure 5).

## Discussion

Fractures of the talus bone have a great effect on the functional outcome of the ankle joint [2]. However, previously published literature has rarely described the combination of left talar neck fracture, adjacent joint dislocation, and a bimalleolar fracture [7–9]. Ipsilateral fracture of the talus and both malleoli is an uncommon fracture combination with only two previous case reports in the published literature [10,11]. In 1986, Montane and Zych reported a combined bimalleolar ankle fracture with a talar neck fracture [10]. Only one other case report published in the literature has included a bimalleolar ankle fracture with a talar body fracture in a patient with multiple traumatic injuries [11].

Most fractures that involve both the ankle and the talus include a talar body fracture and a single malleolar fracture [9,12]. Talar neck fractures can be associated with medial malleolar fractures. Hawkins found that 15 out of 57 (26%) patients, and Canale and Kelly found that 10 out of 71 (14%) patients with talar neck fractures had additional medial malleolus fractures [3,4].

Avascular necrosis (AVN), or osteonecrosis, is the most common complication following displaced fractures of the talus, due to interruption of the blood supply to the sinus tarsi and the tarsal tunnel. Hawkins reported no osteonecrosis in six cases of Type I fractures, a 42% incidence in 24 cases of Type II fractures, and a 91% incidence in 27 cases type III fractures [3]. However, Canale and Kelly reported an incidence of osteonecrosis of 13% in 15 cases of Type I fracture [4].

Most of the talar surface is covered with articular cartilage, and so ankle and subtalar arthritis can result from chondral damage at the time of injury or abnormal joint mechanics [15]. Post-traumatic osteoarthritis of the ankle and subtalar joint is a recognized complication of displaced talar fractures [16]. In a study of displaced talar neck fractures, Sanders reported

that the incidence of secondary arthritis varied from 47% to >90% [17].

Infections and problems in wound healing are common following the surgical management of talar fractures, as the surgical wound is made through swollen tissue and there is soft tissue disruption caused by the trauma itself. The use of an external-fixator helps in reducing post-operative complications, as it decreases articular impaction and allows good recovery of soft tissue damage [18].

This case reports a rare case of combined left talar neck fracture and adjacent joint dislocation with an ipsilateral bimalleolar ankle fracture that was successfully managed using a spanning external fixator of the ankle and subtalar joints, which facilitated the best soft tissue care. However, although avascular necrosis (AVN) and post-traumatic arthritis of the ankle occurred, the functional outcome in this patient was satisfactory.

## Conclusions

Displaced fractures of the talus represent a surgical challenge for the orthopedic surgeon, and correct diagnosis and management require an understanding of the bony anatomy and vascularity of the talus. Treatment outcomes vary widely and are related to the initial degree of fracture displacement. This case has demonstrated that combined left talar neck fracture, adjacent joint dislocation and associated bimalleolar fracture should be managed as soon as possible to reduce soft tissue complications and improve the functional range of motion of the ankle. Avascular necrosis (AVN) and post-traumatic osteoarthritis of both the ankle and the subtalar joints should be recognized as common sequelae of fracture of the talus.

## Conflict of interest

None.

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