Ashdin Publishing
Journal of Orthopaedics and Trauma
Vol. 1 (2011), Article ID 235378, 3 pages
doi:10.4303/jot/235378

Case Report

Pantalar Dislocation without Extrusion

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Received 23 September 2010; Revised 7 February 2011; Accepted 19 March 2011

Abstract Open hindfoot injuries result from high-energy trauma and include soft tissue disruption, joint dislocations, with possible chondral and osseous injuries. The term "total talus dislocation", is an uncommon open hindfoot injury associated with talar extrusion. However, a total talus dislocation without extrusion has not been reported. This case presents an open hindfoot injury with dislocations of the tibiotalar, subtalar, and talonavicular joints without total extrusion of the talus. In our opinion, such injuries should be termed "pantalar dislocation without extrusion." With this injury subtype, the talus should be preserved, if possible, despite its extensive soft tissue disruptions. Our approach contradicts previous total talar treatment recommendations for talar excision. Continued long-term follow-up is necessary to ensure that post-traumatic problems involving the talar dome do not arise.

Keywords talus; dislocation; extrusion; hindfoot

1 Introduction

A total talus dislocation consists of subtalar, tibiotalar, and talonavicular joint disruption with talar extrusion out of the body. The management of this injury is controversial [1, 2, 3, 4, 5, 7, 8, 11, 12, 13]. Treatment options include (1) reimplantation of the talus; (2) talectomy; (3) talectomy with subsequent salvage procedure (i.e. tibiocalcaneal fusion). Recent studies have suggested that reimplantation may result in satisfactory results [1]. Timely treatment of all components of this complex hindfoot injury will, hopefully, minimize the incidence of the potentially devastating "terrible talar triad"-osteonecrosis, infection, and painful arthrosis [6].

We report the case of 21 year-old female who was involved in a motor vehicle accident and sustained an unusual open hindfoot injury. Physical and radiographic examination revealed dislocations of the tibiotalar, subtalar, and talonavicular joints without extrusion. In our opinion, such injuries, therefore, should be termed "pantalar dislocation without extrusion." The patient underwent open reduction and immobilization of the injury with favorable results.

2 Conflict of interest and patient privacy

The authors report no actual or potential conflict of interest in writing this article. The authors did not receive any financial support for this project. We obtained the patient's written informed consent for the purpose of print and electronic publication of this report.

3 Case report

A 21-year-old female presented to our level 1 trauma center after a motor vehicle collision occurring at approximately 45 miles per hour. She was an unrestrained front seat passenger involved in the head on collision after her vehicle hit a tree. The patient had obvious injuries involving the face, right knee, and right ankle. Glasgow Coma Score was 14 on arrival. A 9-cm medial-based laceration at the level of the subtalar joint with an exposed talar head was evident. The tibialis anterior tendon was medial to the talar neck, preventing extrusion of the talus. The wound was clean. Pulsatile bleeding from the posterior tibial artery was controlled with direct pressure. The patient sustained an Oestern and Tscherne Grade III open dislocation of the right hindfoot [10]. The dorsalis pedis pulse was palpable, and the neurological status of the lower extremity was intact. Intravenous antibiotic coverage consisting of Cefazolin 1 g every 8 hours and Gentamicin 400 mg every 24 hours was started within 6 hours of the initial injury. Tetanus prophylaxis was administered. Right foot and ankle radiographs demonstrated tibiotalar, subtalar, and talonavicular joint disruptions (Figures 1(A), 1(B), and 1(C)).

Irrigation with 6 liters of normal saline was performed in the emergency department. Under conscious sedation, the wound was cleansed and reduction of the talus was performed. The reduction required a longitudinal traction of the forefoot with digital pressure on the talar head in a posterolateral direction combined with hindfoot inversion. An antibacterial-soaked sterile dressing was placed on the open wound and a short leg splint was applied.

The patient had a formal irrigation and debridement under general anesthesia performed 10 hours after the initial injury. The dislocations were reduced. Intraoperatively, the

Figure 1: AP, oblique, and lateral radiographs of the ankle demonstrating dislocation of the tibiotalar, subtalar, and talonavicular joints.

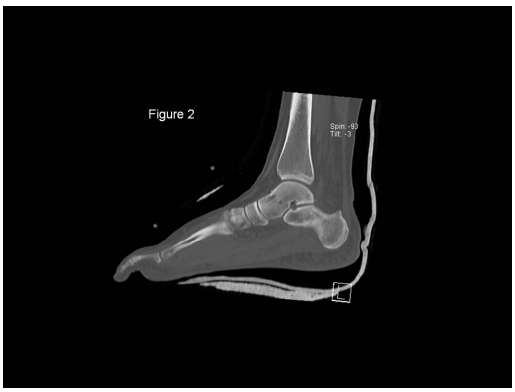

Figure 2: CT sagittal view of foot following reduction of pantalar dislocation. There is concentric reduction of subtalar, talonavicular, and tibiotalar joints on this view.

hindfoot was stressed under fluoroscopy. This examination demonstrated concentric and stable reductions of the tibiotalar, subtalar, talonavicular joints. A fracture of the lateral process of the talus was also noted. The traumatic wound was closed over suction drainage and the right lower extremity was splinted. Intravenous antibiotics were continued for 48 hours following debridement. Computer tomography (CT) was obtained to rule out the presence of occult fractures, fracture fragments in the subtalar joint, and to confirm joint and fracture reduction. The tibiotalar, subtalar, and talonavicular joints remained concentrically reduced as demonstrated by CT scan (Figure 2). This confirmed the presence and extent of a lateral process of the talus fracture (Figure 3).

The patient was immobilized in the short-leg splint for 2 weeks and subsequently placed into a functional boot for an additional 10 weeks. Her traumatic wounds healed uneventfully. She remained non-weight-bearing for a total of 12 weeks. At 6 weeks, she initiated ankle and subtalar range of motion exercises. At the 6-month follow-up, the patient ambulated without a brace or walking aid. She denied any significant hindfoot pain with weight-bearing or with tibiotalar or subtalar joint motion. She was able to return to her normal daily activities without limitation. Radiographs failed to demonstrate a crescent sign or evidence of talar collapse.

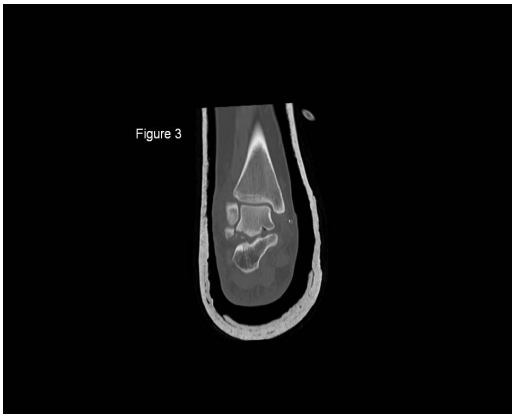

Figure 3: CT coronal view of the foot demonstrating the lateral process of the talus fracture.

4 Discussion

The open total talus dislocation is associated with disruption of the subtalar, the tibiotalar, and the talonavicular joints with extrusion of the talus. Ritsema described the mechanism for such an injury as forced supination or pronation in a plantarflexed position resulting in a medial or lateral subtalar dislocation [5]. With continued force, the talus is forced out of its bony mortise and the surrounding soft-tissue envelope, resulting in a total talus dislocation. In this case, there was a lateral subtalar dislocation and medial displacement of the talar head. The tibialis anterior tendon remained medial to the talar neck and head, and is the likely soft tissue restraint preventing complete talar extrusion. A pantalar dislocation without extrusion of the talus has never been documented. The degree of displacement (mortise extrusion versus body extrusion) is thought to be a critical factor in the preservation of osseous perfusion.

The articular surfaces of the talus are extensive; therefore, blood vessels providing osseous perfusion are limited to nonarticular surfaces. Talar perfusion is supplied by branches of the posterior tibial, anterior tibial, and perforating peroneal arteries [9]. The predominant blood supply to the talar body is the artery to the tarsal canal, a branch of the posterior tibial artery [9]. This artery anastomoses with the artery of the sinus tarsi, a branch of the perforating peroneal artery [9]. Injuries associated with extensive ligamentous and capsular disruption may disrupt the bone's vascular supply. Osteonecrosis may

lead to microfracture and eventual talar dome collapse, a devastating sequale. In this instance, the talus was dislocated from the mortise, but not totally extruded and thus soft-tissue attachments were likely maintained. Perfusion to the talus was likely maintained through the artery of the sinus tarsi as the patient had sustained an injury to her posterior tibial artery.

The management of this injury is controversial [1, 2,3,4,5,7,8,11,12,13]. Treatment options include (1) reimplantation of the talus; (2) talectomy; (3) talectomy with subsequent salvage procedure (i.e. tibiocalcaneal fusion). In 1969, Detenbeck et al. reported on nine patients with total talar dislocations. They observed an unacceptable rate of osteonecrosis and infection with talar salvage. Therefore, they recommended that the talus be excised [3]. Loss of the talus has considerable functional implications since it acts as an intercalary segment vital to normal subtalar, tibiotalar, and talonavicular joint mechanics.

However, more recent studies have suggested that reimplantation may result in satisfactory results [1,2,4,12]. Timely treatment of all components of this complex hindfoot injury will, hopefully, minimize the incidence of the potential devastating effects of osteonecrosis, infection, and painful arthrosis [3]. Nonetheless, ankle and subtalar joint stiffness is common with talar retention [1,6,9,10]. Isolated talectomy has fallen out of favor since patient outcomes are inferior when compared to combined talectomy and arthrodesis [12]. The decision to discard or retain the talus should be based on the experience and judgment of the surgeon [6].

In our opinion, most pantalar dislocations can be managed with timely irrigation and debridement, intravenous antibiotics, and reduction unless extenuating circumstances (such as gross contamination or severe chondral injury) exist. If osteonecrosis or deep infection develops, reconstructive procedures such as joint arthrodesis or talar resection and tibiocalcaneal fusion may be undertaken as salvage procedures as necessary.

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