CHAPTER 17

FRACTURE OF THE POSTERIOR PROCESS OF THE BODY OF THE TALUS WITH LATERAL ANKLE LIGAMENT RUPTURE

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INTRODUCTION

Fracture of the posterior process of the body of the talus is a relatively uncommon injury of the ankle. This pattern of injury is often undiagnosed or misdiagnosed due to subtle radiographic findings. Therefore, complete understanding of the mechanism of injury is essential to making the diagnosis and initiating treatment. Fracture of the posterior process of the body of the talus has been infrequently described. Most authors present a case study, and several have proposed a mechanism of injury, including direct trauma, extreme pronation, extreme plantarflexion, avulsion, and subtalar dislocation.[1-9] It is generally accepted that open reduction internal fixation (ORIF) is the treatment of choice for most of these injuries, especially where there is severe comminution or displacement.[10]

This presentation of a fracture of the posterior process of the body of the talus, with associated lateral ankle ligament rupture, is unique in that this combination of injury patterns has not been previously described. Although the mechanism of injury, severe plantarflexion, and inversion, has been well described, it is usually associated with medial dislocation of the subtalar joint.[1,3,8,11] In this case, the subtalar joint remained intact, while the lateral ankle ligaments failed.

CASE REPORT

A 35-year-old man with no previous foot or ankle injuries was playing volleyball on grass when he landed in a hole and severely inverted his right foot. The patient noted immediate pain, swelling, and was unable to bear weight. The patient was evaluated in the emergency room and indicated that he had "rolled" his ankle to describe the mechanism of his injury. The right ankle demonstrated severe edema laterally, with mild edema medially. There was mild ecchymosis noted plantar-laterally. Pain was elicited on palpation of the anterior talofibular and calcaneofibular ligaments. The presentation at this point was typical of a grade III ankle sprain, but pain was also noted posterior to the medial malleolus, and with active and passive range of motion of the ankle.

Plain film radiographs demonstrated an irregularly shaped fracture at the posterior talar body (Figure 1). The anteroposterior projection demonstrated a small fleck-type fracture at the tip of the lateral malleolus, consistent with ligamentous injury (Figure 2). Computed tomography (CT) scans were then obtained to better visualize the injury to the talus. The posterior medial talus was found to be comminuted and displaced, with displacement of approximately 4 mm and the largest fragment measuring 28mm (Figures 3, 4).

SURGICAL TECHNIQUE

A posterior medial approach was utilized for open reduction performed via a curvilinear incision over the tibialis posterior tendon. The incision was then deepened until the deep fascia separating the flexor digitorum longus and tibialis posterior was

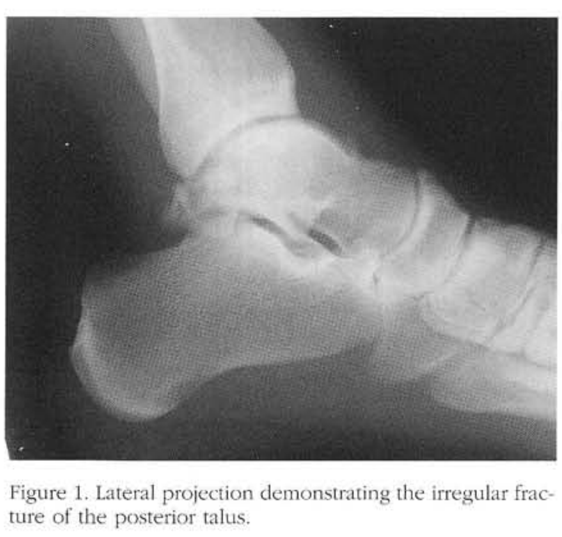

Figure 1. Lateral projection demonstrating the irregular fracture of the posterior talus.

Figure 2. Anterior-posterior projection demonstrating small avulsion fracture off tip of lateral malleolus.

Figure. 3. Coronal CT view of depressed and comminuted posterior talar process fracture.

Figure. 4. Axial CT view of displaced posterior talar process fracture.

Figure. 5. Anterior-posterior projection following reduction and fixation of the talar fracture

identified. The fascia and synovial tissues were then sharply incised, allowing the flexor digitorum longus to be reflected inferiorly, and access gained to the medial aspect of the talar body. Evaluation demonstrated the presence of two large principal fragments as seen on CT. The fragments were oriented with one above the other, both displaced from the body of the talus. The superior and inferior fragments were first fixated to one another with a single 2.0 mm AO/ASIF screw. The combined fragment was then reduced. Three additional 2.0 mm AO/ASIF screws were then placed in a medial to lateral direction in order to secure the combined fragment to the body of the talus (Figure 5). Any remaining small fragments were excised at this time, and the wound closed using standard technique. Special attention was required when the synovial and retinacular tissues were reapproximated to ensure adequate function of the flexor digitorum longus tendon.

STRESS RADIOGRAPHY AND PRIMARY ANKLE REPAIR

After the talus was repaired, attention was directed to the lateral collateral ankle ligaments. Utilizing intraoperative fluoroscopy, a talar tilt examination was performed. The examination demonstrated gross instability with a tilt of ~20° (Figure 6). At this time it was deemed necessary to repair the ruptured collateral ankle ligaments.

A curvilinear incision was placed just distal to the lateral malleolus. Following adequate dissection, the ruptured calcaneofibular and anterior talofibular ligaments were easily visualized and repaired utilizing a modified Brostrom technique.[12] Lateral stability was significantly improved. The lateral incision was then closed in standard fashion and a compressive dressing with fiberglass shell applied.

FOLLOW-UP EXAMINATION

The patient was reevaluated 35 months after the injury. The patient reports no limitation or disability. The patient is active and regularly runs up to three miles and engages in vigorous court sport participation including tennis. The patient has had no re-injury of the ankle and reports no subjective instability. Radiographs did not demonstrate any significant joint space narrowing, however there is calcification within the deltoid ligament complex (Figures 7, 8). Stress radiographs confirm a stable lateral ankle (Figure 9), and CT assessment demonstrates complete osseous union with a normal posterior talar contour (Figures 10, 11).

DISCUSSION

A review of the literature demonstrates a variety of possible injury mechanisms for the fracture of the posterior talar process. It is important to note that there needs to be a clear identification of the involved anatomy. The posterior talus is composed of a medial and lateral tubercle, with the tendon of the flexor hallucis tendon lying in a groove between them. The lateral tubercle is a sight of common pathology, while isolated medial tubercle fractures are relatively rare. The true posterior talar process fracture must involve both the medial and lateral tubercles of the posterior talus. The anatomic description is essential to avoid confusion regarding etiology and treatment options.

The mechanism resulting from direct trauma, such as an object directly striking the talus, needs little explanation, however the pronatory mechanism is less clear. With severe pronation and dorsiflexion, the posterior talotibial ligament becomes tight and will either rupture or avulse the posterior medial tubercle of the body of the talus.[2,3,8,9,11] Because this fracture is often associated with motor vehicle accidents, this mechanism will explain a large portion of the posterior medial injuries. This mechanism can account for the isolated, smaller posterior medial process fractures These fractures require open reduction when their size warrants, but often can be excised without long-term sequelae.[2,13]

The true posterior process fracture, if displaced greater than 3 mm requires open reduction.[3,10] There is little debate with regard to treatment of this fracture, but a consensus regarding mechanism of injury does not exist. Nasser and Manoli proposed a severe plantarflexion motion compressing the posterior process between the posterior lip of the tibia and the calcaneus.[6] This may certainly be possible, however several cases have demonstrated this fracture without a prominent appearing posterior process. In addition, the likelihood of a pure plantarflexion injury occurring with a fall or motor vehicle accident seems unlikely. These types of accidents tend to yield a dorsiflexion motion or a plantarflexion-inversion motion. Plantarflexion-inversion has been discussed, but only with an associated subtalar dislocation.[1,3,8,11] The presence of dislocation introduces avulsion as a possible factor, but has difficulty accounting for the comminution seen in the current case. This case demonstrates a patient exhibiting an inversion-type injury with associated rupture of the lateral collateral ligaments. The patient was in a plantarflexed attitude when a forced inversion ruptured the lateral ligaments allowing the talus to rotate its posterior medial shoulder against the tibia, causing the fracture. The unstable ankle allowed for increased rotation and the ability to deliver a substantial axial load to the talus resulting in the comminuted injury is described in the above case. It may be possible that the previously described posterior process fractures involved an unidentified inversion motion as a possible cause of the injury. This injury pattern has significant ramifications with regard to treatment of posterior process fractures because identification and surgical repair of the ruptured lateral collateral ligaments may be overlooked due to the presence of talar fracture. Perhaps more importantly, is the possibility of misdiagnosis of a posterior talar process fracture in a patient with a severe lateral ankle injury. This case demonstrates the importance of a detailed examination and evaluation of radiographs following severe inversion injuries. In the presence of suspicious radiographic findings, CT examination should be used to evaluate the extent of injury to the talus.

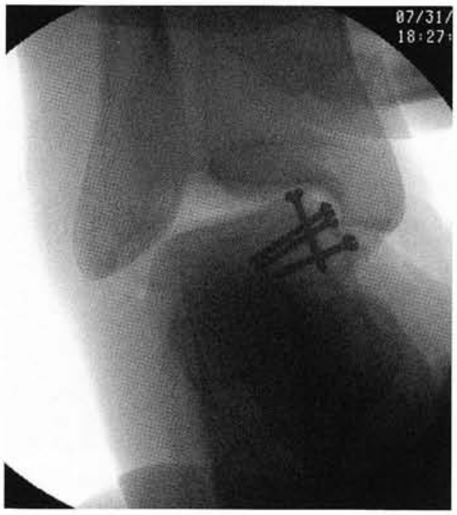

Figure. 6. Stress inversion examination demonstrating a talar tilt of 20°. Note location of fracture.

Figure. 7. 35-month follow-up demonstrates healed fracture with fixation in place

Figure. 8. 35-month follow-up demonstrates healed fracture with mild deltoid calcification.

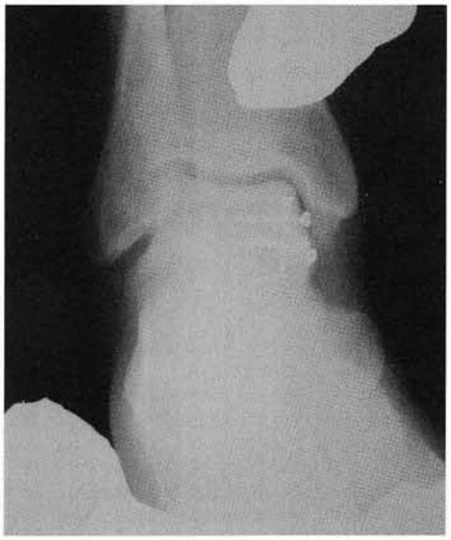

Figure. 9. 35-month follow-up stress inversion study demonstrates stability of lateral ankle ligaments

Figure. 10. Axial CT at 35-month follow-up demonstrates healed fracture without sign of avascular necrosis.

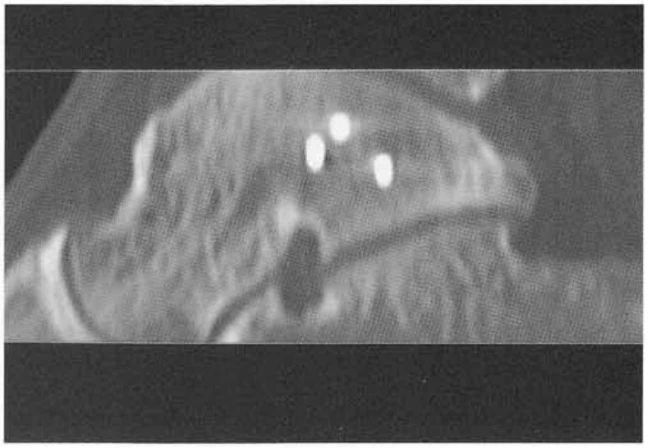

Figure. 11. 35-month follow-up sagittal CT reconstruction reveals normal appearing subtalar and ankle joints.

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