



A Complication of Posterior Malleolar Fracture Fixation



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ABSTRACT

We present a case of tibial nerve impingement by an anteroposterior screw inserted for stabilization of a posterior malleolar fracture. This specific complication has not previously been described in published studies, although numerous reports have described various forms of peripheral nerve entrapment. We discuss the merits of fixation of these fractures using a posterolateral approach.

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Ankle fractures are among the most common fractures encountered by orthopedic and foot and ankle surgeons (1). Operative management aims to achieve a stable ankle with maximal function, reduce the risk of post-traumatic degenerative changes, and minimize the risk of complication (2–5).

Fractures of the posterior malleolus can occur in conjunction with fibular and medial malleolar fractures or in isolation (5). Most Lauge-Hansen patterns of injury can lead to posterior malleolar fractures from avulsion by the posterior inferior tibiofibular ligament. The posterior malleolar fragments will vary in size and will most frequently be posterolateral (6).

The indications for fixation of the posterior malleolus remain controversial. The affect these fractures have on joint congruity and stability has been investigated; however, no evidence-based guidelines have been established to determine which warrant fixation (2,4–9). The current indications are varied and evolving and include fractures involving >25% to 33% of the articular surface, displacement >2 mm, ankle instability with concomitant syndesmotic injury, and persistent posterior subluxation of the talus (3,6,7,9–15).

Several operative approaches and techniques for internal fixation of posterior malleolar fractures have been reported (2,5,6,15). Although significant surgical variation exists, indirect reduction and stabilization with anteroposterior (AP) screws remains the most common method (7,15). In 1 recent study, 83% of posterior malleolar fractures were fixed using AP screws (8).

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We present a case of symptomatic tibial nerve impingement (entrapment) caused by an AP screw used to fix the posterior malleolus in a trimalleolar ankle fracture. This complication has not been previously reported. Avoidance of this complication, together with several additional advantages, make fixation using a posterolateral approach the optimal method for treating these fractures.

Case Report

A 34-year-old care worker with no significant medical history presented to the emergency department with a supination, external rotation type 4 injury to her right ankle after falling down 3 steps. She had sustained an isolated, right closed trimalleolar ankle fracture dislocation with no neurovascular deficit. The dislocation was promptly reduced on arrival, and a below-the-knee backslab was applied (Fig. 1).

The next day, she underwent open reduction and internal fixation. The fibula was fixed first using an interfragmentary 3.5-mm cortical screw in lag mode and a 9-hole one third tubular neutralization plate. Next, a 4.0-mm Asnis III cannulated screw (Stryker®, Kalamazoo, MI) was inserted to secure the medial malleolar fracture. To both address persistent posterior malleolar malreduction and improve syndesmotic stability, the posterior malleolus was reduced indirectly by ankle dorsiflexion and stabilized with a single, percutaneously inserted, AP, 4.0-mm Asnis III cannulated screw (Stryker® Orthopaedics, Mahwah, NJ; Fig. 2). A below-the-knee backslab was applied, and she was discharged in non-weightbearing status the next day.

On review 10 days postoperatively, she was recovering well, and no neurovascular deficit was noted. The radiographs, when compared with the intraoperative fluoroscopic images, suggested the anteroposterior screw was more prominent and had possibly migrated posteriorly (Fig. 3). It also appears that the postoperative lateral



Fig. 1. Postreduction (A) anteroposterior and (B) lateral radiographs of the right ankle.

radiograph, when compared to the intraoperative lateral fluoroscopic image, was more medially rotated, as the position of the fibula was more posterior relative to the tibia in the fluoroscopic image. A below-the-knee non-weightbearing fiberglass cast (3M Healthcare™, Bridgend, UK) was applied.



Fig. 2. Intraoperative lateral fluoroscopic image demonstrating internal fixation of the trimalleolar fracture.

After her initial postoperative visit, the patient reported developing progressive neuropathic pain with altered sensation in the sole of her foot. The clinical evaluation at 6 weeks postoperatively demonstrated paresthesia in the distribution of the medial and lateral plantar nerves, although no clinical evidence of a motor deficit was found. Her progress was otherwise satisfactory, with well-healed wounds, clinical and radiographic fracture union, and no vascular compromise. Repeat radiographs revealed significant protrusion of the AP screw through the posterior tibial cortex (Fig. 3).

A subsequent computed tomography scan showed that the screw extended 8 mm into flexor hallucis longus and was impinging on the tibial nerve (Fig. 4). Union of the posterior malleolar fracture was shown.

Given the clinical and radiologic findings, the AP screw was removed without complications. On review at 2 weeks after screw removal, the patient reported her symptoms had settled. Clinically, the dysesthesia in the distributions of the medial and lateral plantar nerves had improved, and tibial nerve function was essentially normal. On review 12 months later, the symptoms had completely resolved. This case was managed from September 2012 to September 2013.

Discussion

The objective of fixation of posterior malleolar fractures is to attain an anatomically reduced and stable posterior malleolus, which provides an essential buttress to contain the talus, reduces shear forces in the sagittal plane (6), stabilizes the syndesmosis (6,12,13), and minimizes the risk of post-traumatic osteoarthritis (2–4). Currently, individual preference and a wide range of fracture-related factors dictate the choice of the various reduction and fixation techniques available (7).

Tibial nerve irritation secondary to AP screw placement for posterior malleolar fixation is an as yet undescribed complication. The posterolateral approach to the ankle is a well-described, effective approach for treating these fractures (14–16), and fixation through this approach with protection of the tibial nerve throughout could have prevented this complication.

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