The Journal of Emergency Medicine, Vol. 43, No. 2, pp. e101–e106, 2012
Published by Elsevier Inc.
Printed in the USA
0736-4679/$–see front matter

doi:10.1016/j.jemermed.2009.08.059

Clinical Communications: Adults

COMPARTMENT SYNDROME OF THE FOOT AFTER CALCANEAL FRACTURE

Rajeev Kalsi, MD,* Amy Dempsey, PA-C,† and Edward Bradshaw Bunney, MD*

*Department of Emergency Medicine, University of Illinois at Chicago, Chicago, Illinois and †Department of Emergency Medicine, Our Lady of Resurrection Hospital, Chicago, Illinois

Reprint Address: Rajeev Kalsi, MD, Department of Emergency Medicine, University of Illinois at Chicago, 1740 W. Taylor St., Chicago, IL 60612

□ **Abstract—Background: Compartment syndrome of the foot as a result of a calcaneal fracture has received only occasional consideration in the recent Emergency Medicine literature, yet it remains a challenging diagnosis to make. The devastating consequences of untreated compartment syndrome of the foot include clawing of the lesser toes, stiffness, chronic pain, motor weakness, neurovascular dysfunction, and fixed deformities of the foot. In addition to decreased quality of life, this also leads to lost time at work and lost wages. Calcaneal fractures can lead to devastating long-term disability that is often permanent and life-altering for patients suffering from this injury. Approximately 10% of patients with these fractures develop compartment syndrome of the foot. The pathogenesis of calcaneal fractures is well recognized, and the surgical treatment techniques continue to evolve. Objectives: The objectives of this case report are to increase understanding of the pathophysiology of compartment syndrome and its short- and long-term consequences, to improve the ability to diagnose compartment syndrome, and to emphasize the need for emergent surgical treatment. Case Report: A 37-year-old man sustained an isolated comminuted, extra-articular calcaneus fracture that resulted in compartment syndrome of the foot. The diagnosis required measurement of several compartments in the foot. He subsequently received emergent operative decompression and experienced a positive outcome. Conclusion: Diagnosis of compartment syndrome of the foot is a clinical one, and diagnostic tools such as radiographic imaging and compartment pressure monitoring can help confirm the diagnosis. It is also important to understand the long-term sequelae of this injury and to involve a specialist early in the decision-making and treatment process. Published by Elsevier Inc.**

□ **Keywords—calcaneus fracture; compartment syndrome; fasciotomy; foot**

INTRODUCTION

Compartment syndrome of the foot as a result of a calcaneal fracture has received only occasional consideration in the recent Emergency Medicine literature, yet it remains a challenging diagnosis to make. The long-term sequelae of untreated compartment syndrome of the foot include clawing of the lesser toes, stiffness, chronic pain, motor weakness, neurovascular injury, and fixed deformities of the foot (1–4). Lost time at work and lost wages are additional problems caused by untreated compartment syndrome. Calcaneal fractures can lead to devastating, long-term disability that is often permanent and life-altering for patients suffering from this injury. Approximately 10% of patients with these fractures develop compartment syndromes of the foot (1–6). The pathogenesis of calcaneal fractures is well recognized, and the surgical treatment techniques continue to evolve.

CASE REPORT

A 37-year-old man presented to the Emergency Department (ED) with a chief complaint of excruciating

RECEIVED: 20 December 2008; FINAL SUBMISSION RECEIVED: 26 July 2009;
ACCEPTED: 30 August 2009

right foot and ankle pain and swelling. He had jumped off a 6-foot fence 6 h earlier. He landed flat on his feet, but felt immediate pain in his right foot after the landing, yet he was able to ambulate home by placing only partial weight on his injured foot.

On physical examination, his vital signs were: temperature 37.1°C (98.8°F), blood pressure 147/90 mm Hg, heart rate 99 beats/min, and respiratory rate 23 breaths/min, with a pulse oximetry saturation of 100% on room air. He was noted to be in significant pain and was unable to bear weight on the affected limb. Physical examination to look for concomitant injuries (evaluation of the back, hips, knees, and contralateral foot and ankle) revealed no gross injuries. Physical examination of his right foot and ankle revealed no gross deformities except for significant swelling of the right foot from just proximal to the ankle joint to the toes. The skin was shiny and tense. Range of motion at the ankle was significantly limited by pain. There was erythema from just proximal to the right ankle, progressing to ecchymosis distal to the ankle and confluent with the entire plantar surface of the foot and to the dorsum of the right foot. Dorsalis pedis and posterior tibialis pulses were palpable and determined to be symmetric with the unaffected foot. The patient's sensation to light touch was grossly intact in the affected foot, but his two-point discrimination was diminished. The patient had hyperesthesia to passive motion of the toes. The lateral radiograph of the right foot demonstrated a comminuted, non-displaced extra-articular fracture of the calcaneus (Figure 1). Bohler's angle was maintained within the normal range (20–40°) and was specifically measured at 40° (Figure 1).

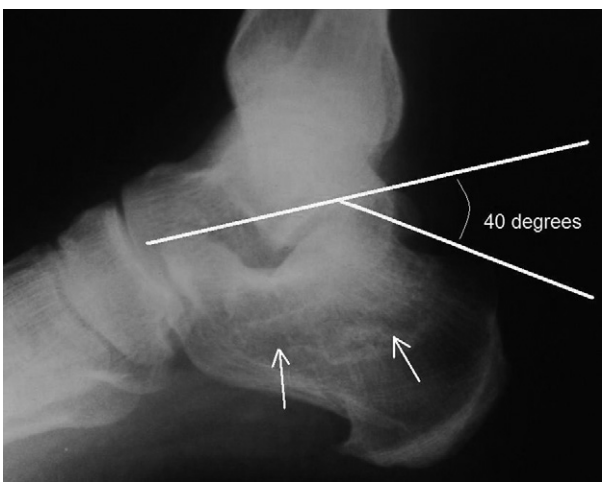

Figure 1. A radiograph of the foot (lateral view) demonstrating a minimally displaced, extra-articular fracture of the calcaneus and measuring a Bohler's angle of 40 degrees (within normal range, 20–40 degrees).

Figure 2. A computed tomography scan of the foot (axial view) demonstrating a minimally displaced, extra-articular fracture of the calcaneus.

Due to the findings on the initial radiographs and the patient's disproportionate pain with passive motion of the toes, a podiatric surgeon was consulted to evaluate the patient for compartment syndrome. The consultant requested a computed tomography (CT) scan of the affected foot with three-dimensional reconstruction. The CT scan demonstrated a comminuted fracture of the calcaneus with very minimal displacement of the fracture fragments, and no intra-articular involvement of the subtalar joint. The CT axial view demonstrated an extra-articular, minimally displaced calcaneal fracture (Figure 2). The CT coronal view also demonstrated an extra-articular, minimally displaced calcaneal fracture (Figure 3). A CT sagittal view also demonstrated an extra-articular, minimally displaced calcaneal fracture (Figure 4).

The consultant podiatric surgeon measured compartment pressures in six compartments with Stryker monometry (Table 1).

Based on the compartment pressures and the clinical presentation, the patient was diagnosed with acute compartment syndrome of the right foot. The podiatric surgeon performed emergent operative decompression of the patient's right foot. In the operating room, a three-incision (first intermetatarsal space, third intermetatarsal space, and plantar medial calcaneal compartment) fasciotomy was performed successfully.