Compartment Syndrome After Isolated Closed Transverse Fibular Shaft Fracture

Abstract

In the lower extremity, compartment syndrome has been associated with fractures of the tibial plateau, shaft, and plafond. The patient was an 89-year-old male driver involved in a T-bone type motor vehicle accident. He sustained a closed transverse fibular shaft fracture and initially had fullness in his anterior/lateral compartments but no pain with passive and active range of motion of his ankle. Because of previous cardiac stenting, he was on dual anticoagulation therapy. Serial examination demonstrated tense compartments with notable pain during ankle range of motion. He was taken emergently to the operating room for four-compartment fasciotomies. On postoperative day 2, he returned to the operating room for débridement and underwent primary closure. The remainder of his hospital course was normal. Two-month follow-up did not demonstrate any compartment syndrome sequelae. In conclusion, patients on dual anticoagulation therapy are at a higher risk of developing compartment syndrome secondary to high-energy trauma, despite simple fracture patterns.

Case Report

The patient was an 89-year-old man with a medical history notable for hypertension, hyperlipidemia, and coronary artery disease with previous stenting on full-dose aspirin and Plavix who presented with complaints of headache and left leg/ankle pain after a motor vehicle collision. He subsequently developed impending compartment syndrome requiring emergent fasciotomy. The patient provided informed consent for reporting this case.

Compartment syndrome is an orthopaedic emergency and frequently diagnosed clinically with or without intracompartment pressure monitoring.1-4 Several studies have shown a correlation between compartment syndrome and lower extremity fractures of the tibia, including the plateau, shaft, and plafond.5 To our knowledge, no published articles exist describing compartment syndrome with an isolated fibula fracture. In this case report, we present a patient involved in a high-speed motor vehicle accident who sustained an isolated non-displaced fibular shaft fracture and
was the restrained driver of a T-bone motor vehicle accident where the other motorist collided into the driver side at approximately 45 mph.

On initial examination, the patient was in no acute distress but was noted to be swollen in the left calf with associated tenderness along the proximal fibula. His lateral/anterior compartments were soft but full, and he reported minimal discomfort with active dorsiflexion/plantar flexion of his ankle. He was otherwise neurovascularly intact. Imaging studies demonstrated a transverse non-displaced left fibular shaft fracture (Figure 1). Imaging studies of his ankle did not demonstrate an injury. The patient was initially given an elastic compression bandage for comfort and made weight bearing as tolerated. His head laceration was repaired by the trauma service, and he was subsequently admitted for 24-hour observation. Neurovascular examinations were performed on the left lower extremity every 2 hours. On the first examination, the patient was noted to have increased swelling in his posterior calf but denied paresthesias and had minimal discomfort with dorsiflexion/plantar flexion of his ankle. The second evaluation demonstrated tense compartments and notable pain with passive ankle dorsiflexion/plantar flexion. The patient was evaluated by the attending surgeon and was emergently taken to the operating room for fasciotomies due to concerns for impending compartment syndrome.

Intraoperatively, the patient underwent a dual-incision four-compartment fasciotomy. On release of compartments, the muscles in all compartments were viable and contractile without evidence of necrosis.

Postoperatively, the patient was admitted to the trauma intensive care unit secondary to respiratory distress and failed extubation. He was seen by Cardiology and changed from the dual anticoagulation therapy (Plavix/aspirin) to Lovenox 40 mg SQ. On postoperative day 2, the patient returned to the operating room for débridement and primary closure. The next day, he was successfully extubated and transferred to the floor. The remainder of his hospital course was largely normal, and he was subsequently discharged home on postoperative day 10.

The patient was seen in the clinic approximately 3 weeks from the date of fasciotomy, and his sutures were removed. Repeat radiographs were obtained, which were not markedly different from admission (Figure 2). He was neurovascularly intact, and his left leg compartments were soft. He was subsequently seen two months postoperatively and noted to have painless ambulation without compartment syndrome sequelae. Repeat radiographs demonstrated a healing fibular shaft fracture (Figure 3). His incisions were well healed, and he was instructed to follow up as needed.

**Discussion**

Compartment syndrome is a well-recognized complication associated with tibial fractures; however, currently, no studies exist that describe compartment syndrome with an isolated fibula fracture.

Allmon et al. evaluated the radiographic predictors of compartment syndrome occurring with tibial fractures. They retrospectively reviewed 978 adults with tibial plateau, shaft, and pilon fractures (326 patients with each type of fracture). The presence or absence of an associated fibula

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fracture was also examined. Their primary outcome was the diagnosis of compartment syndrome. Fifty-six of the 978 patients developed compartment syndrome (6%), with the majority occurring in combination with tibial plateau fractures (39), followed by shaft (10) and pilon fractures. They concluded that Schatzker VI plateau fractures were at highest risk and had an increased risk with an associated fibula fracture. However, compartment syndrome in tibial shaft and pilon fractures did not have a higher prevalence with associated fibula fractures.

Although our patient did not have an associated tibial fracture, his impending compartment syndrome was likely multifactorial. First, the patient was on dual anticoagulation therapy, including full-dose aspirin and Plavix. Furthermore, his mechanism of injury was secondary to a high-energy mechanism, resulting in a transverse fibular shaft fracture. The patient was hit on the driver side at approximately 45 mph, resulting in a direct impact to the proximal tibia/fibula region. On presentation, the patient was noted to have fullness in his compartments, which progressed to tense compartments with worsening pain during passive dorsiflexion/plantar flexion of his ankle on serial examinations.

After dual-incision four-compartment fasciotomy, the patient underwent successful primary closure on postoperative day 2 and had no complaints at his 2-month follow-up with no compartment syndrome sequelae. Early diagnosis of compartment syndrome with prompt fasciotomy is essential to prevent sequelae as demonstrated by Rorabeck and Macnab.10

**Conclusion**

Although compartment syndrome is frequently thought of in correlation with tibial fractures in the lower extremity, our case report demonstrates the importance of considering this diagnosis with isolated fibular shaft fractures. Patients on dual anticoagulation therapy involved in high-energy trauma are at a substantially higher risk. We recommend performing a through neurovascular examination in patients with isolated fibular shaft fractures and consider monitoring compartments if high risk of compartment syndrome.

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