Ankle Injuries in Spiral Distal Tibial Shaft Fractures: Results From an Institutional Change in Imaging Protocol

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Background/Purpose: Posterior malleolus and other articular ankle injuries are known to concomitantly occur with tibial shaft fractures, especially spiral fractures of the distal one-third diaphysis (OTA 42-A1). Recent publications utilizing CT have shown that the rate of this combined injury is higher than previously reported with an incidence of 39% to 49%. Due to our heightened awareness of this combined injury, our department instituted a new preoperative ankle imaging protocol for all distal one-third spiral tibia shaft fractures. The purpose of this study was to evaluate the effectiveness of an imaging protocol involving radiographs, CT, and MRI in a distal one-third spiral tibia fracture cohort.

Methods: All operatively treated patients with a spiral distal one-third tibial shaft fracture (OTA 42-A1) from February 2012 to March 2013 underwent a standardized ankle imaging protocol. Patients had preoperative orthogonal ankle radiographs as well as a CT scan of the tibia that included the ankle. All ankle imaging was scrutinized by the on-call orthopaedic resident for evidence of an articular ankle injury such as a posterior malleolus fracture (PMF), medial malleolus fracture (MMF), or other tibial plafond fracture variant. If no articular ankle fracture was identified, patients would then undergo ankle MRI. All patients with an acute distal one-third spiral tibial shaft fracture and completion of the imaging protocol were included for analysis. Patients less than 16 years of age and individuals with evidence of a prior ankle fracture and retained surgical implants were excluded.

Results: 25 patients met the inclusion and exclusion criteria for this study. The average patient age was 47.4 years (range, 16.9-94.6) and 52% (13/25) were male. Of these patients, concomitant ankle injuries were identified by radiograph and CT in 56% (14/25) of cases. The remaining 44% (11/25) of patients had no evidence of a combined injury by radiograph or CT and therefore underwent MRI. Of the MRI cohort, 64% (7/11) were found to have an occult articular ankle fracture including five occult fractures of the posterior malleolus (71%), one fracture of the medial malleolus (14%), and one AITFL (anterior inferior tibiofibular ligament) avulsion fracture (14%). The overall incidence of a combined injury using our protocol was 84% (21/25). Identification of an occult injury led to a change in the surgical plan or rehabilitation for all of these patients.

Conclusions: Concomitant ipsilateral articular ankle and distal one-third spiral tibial shaft fractures are more common than previously reported. Utilizing an imaging protocol that consisted of orthogonal ankle radiographs, CT, and MRI, we found that the incidence of this combined injury was 84%. The addition of MRI to our imaging protocol resulted in a 50% increase in the diagnosis of these combined injuries. Recognition of the ankle fracture component in this tibial shaft cohort can be important as it may alter the surgical plan and postoperative management.

See pages 99 - 147 for financial disclosure information.