

**Syndesmotic Disruption in Tibial Plafond Fractures:
What Are The Risk Factors for Missing the Diagnosis?**

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Purpose: Missed syndesmotic injury is associated with poor functional and radiographic outcomes. The purpose of this study was to identify the incidence of syndesmotic injury in tibial plafond fractures, describe fracture characteristics associated with syndesmotic injury, and report the incidence of posttraumatic osteoarthritis (PTOA).

Methods: Following IRB approval, we retrospectively reviewed all tibial plafond fractures treated at 2 Level-I trauma centers from 2006-2015. Patients were grouped into 2 categories: acutely diagnosed syndesmotic injury and missed syndesmotic injury. Acutely diagnosed syndesmotic injury was based on positive intraoperative manual stress examination. Missed syndesmotic injury was based on standing ankle radiographs demonstrating absent tibiofibular overlap with lateral talar subluxation or postoperative CT scan demonstrating syndesmotic malreduction. Fracture characteristics including Chaput and Volkmann fragment size, logsplitter injury, fibula avulsion fracture, Chaput malreduction, and ligamentous syndesmotic disruption were recorded.

Results: During the study period, 705 tibial plafond fractures were treated. 105 fractures in 102 patients (105 of 705, 15%) had a syndesmotic injury. 91 syndesmotic injuries (87%, 91 of 105) were diagnosed acutely. 14 fractures (14 of 705, 13%) had a missed syndesmotic injury. Volkmann fragment <10 mm and fibular avulsion fracture were significantly more common in missed syndesmosis injuries. Of the 105 fractures, 83 fractures (14 of 14 missed, 69 of 91 acute) had >12 months follow-up (mean 26 months; range, 12-102). Overall deep infection rate was 19% (16 of 83), and 13 fractures developed nonunion (13 of 83, 16%). All patients with missed syndesmosis injury developed moderate or end-stage PTOA, and 40% (33 of 83) of plafond fractures with acute syndesmosis injury developed moderate or end-stage PTOA. Patients who received syndesmotic fixation with either <10 mm Chaput or Volkmann fragment and/or distal fibular avulsion fracture were less likely to develop PTOA than if they had a similar pattern fracture without syndesmotic fixation (7 of 31 vs 10 of 10, P <0.01).

Conclusion: Syndesmotic disruption was identified in 15% of tibial plafond fractures. Patients with missed syndesmotic injury are likely to develop moderate to severe PTOA. For tibial plafond fractures with Chaput fragment <10 mm, Volkmann fragment <10 mm, and/or distal fibular avulsion fracture, the authors recommend syndesmotic fixation.