

Syndesmosis Malposition Assessed on Weightbearing CT Is Common After Operative Fixation of Intra-Articular Distal Tibia Plafond Fracture

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Purpose: Syndesmosis disruption is commonly associated with rotational ankle fractures. In contrast, syndesmotic injury, reduction, and fixation strategies are not commonly discussed in tibia plafond fractures. The syndesmosis is most reliably assessed using 3-dimensional imaging, and the availability of weightbearing CT (WBCT) is potentially important. The purposes of this study were to (1) evaluate the reliability of measurement techniques for syndesmosis position after operative fixation of tibia plafond fracture on WBCT, (2) identify risk factors for syndesmosis malposition, and (3) determine if syndesmosis malposition is associated with worse patient-reported outcomes (PROs).

Methods: Individuals with surgically treated tibia plafond fractures from 3 Level I trauma centers were enrolled. Bilateral WBCT scans and PROs were obtained between 12 and 18 months after injury. Two radiographic measurements (Phisitkul and Nault) were used to assess syndesmotic alignment in the injured and uninjured, contralateral ankles. Inter-rater reliabilities were assessed among 10 randomly selected subjects measured by 5 reviewers. A single reviewer recorded bilateral measurements (injured and uninjured) using both techniques. Greater than 2-mm difference in syndesmosis position predicts worse PROs after rotational ankle fractures; therefore, greater than 2 mm of displacement was classified as malpositioned. Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function (PF) and Foot and Ankle Ability Measure (FAAM) were compared between subjects with and without syndesmosis malposition.

Results: 26 patients underwent bilateral WBCT between 12 and 18 months after operative fixation of a tibia plafond fracture. Inter-rater reliability for syndesmosis position measurements was excellent for the Phisitkul technique on both injured and healthy ankles (intraclass correlation coefficient [ICC]: 0.93 to 0.98). The Nault technique demonstrated moderate to excellent inter-rater reliability (ICC: 0.67 to 0.98), apart from the angle of rotation measurement for injured ankles (ICC: 0.18 to 0.67). Syndesmosis malposition was seen in 16 of 26 subjects (62%) using these 2 methods. There was an insignificant trend toward more severe injuries (43C3 and open fracture) being associated with syndesmosis malposition. Patients with syndesmosis malposition reported lower FAAM-Activities of Daily Living scores (malpositioned median, 58.3 [interquartile range (IQR)] 39.3-78.6 versus well-positioned median, 88.1 [IQR 79.8-91.7]; $P = 0.0324$); other recorded PROs were not significantly different.

Conclusion: Measurement techniques for syndesmosis position on WBCT were reliable after operative fixation of tibia plafond fracture. Syndesmosis malposition is common after these fractures and predicted impaired physical function. WBCT may be an important advance in assessing syndesmosis position.