Minimal Radiographic Displacement of Posterior Malleolus Fractures Occurs With Tibial Intramedullary Nail Placement

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Purpose: Recent studies demonstrate a high incidence of occult posterior malleolar fractures (PMFs) associated with tibial shaft fractures (TSFs). Our aim was to assess PMF morphology, treatment strategies, and radiographic outcomes to further define the clinical significance of this combined injury.

Methods: This is a multicenter, retrospective, observational cohort study of skeletally mature patients with acute TSFs and confirmed PMFs on radiographs or cross-sectional imaging. Fracture-, injury-, and patient-related factors were assessed. Outcomes of different PMF treatment strategies were evaluated using descriptive statistics and demographic data were compared using t-tests and $\chi 2$ analysis.

Results: 500 patients with TSFs were screened, with 19% (n = 95) having an associated PMF and being included in this analysis (mean age = 46 years, standard deviation 14 years; 58% male). The most common location of TSF was distal third (97%), the most common TSF morphology was spiral (72%), posterolateral oblique was the most common PMF morphology (60%), and low-energy trauma was the most common injury. 92% of PMFs united by final follow-up, with an average union time of 2.6 months (standard deviation 1.4 months). A total of 31% (n = 30) of PMFs underwent posterior “malleolus first” fixation. In this group, the PMF size averaged 40% of the articular surface, was displaced 1.0 mm at the time of injury, and postoperative displacement decreased to 0.2 mm on average. Conversely, PMFs that were not treated with “malleolus first” fixation on average comprised 26% of the articular surface, were displaced 0.9 mm at the time of injury, and 1.0 mm postoperatively.

Conclusion: This study demonstrates PMFs associated with TSFs on average displace only 0.1 mm when an intramedullary nail is inserted in the absence of preliminary articular fixation. Furthermore, almost all PMFs associated with TSFs achieved union in under 3 months, regardless of whether malleolar fixation was.