Is Displacement of Posterior Malleolus Fractures After Intramedullary Tibial Shaft Fracture Fixation Related to Nail Position?

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Purpose: Tibial shaft fractures are common injuries and are frequently treated with intramedullary nail (IMN) fixation. With the advent of CT, there has been an increased appreciation of incidence of occult, nondisplaced posterior malleolus fractures (PMFs) associated with tibial shaft fractures. Due to concern that IMN placement could displace an occult PMF, some surgeons have advocated a CT-based screening protocol with prophylactic fixation of any detected PMFs. However, our institution has typically not performed routine CT screening, and we have not routinely placed prophylactic fixation in nondisplaced fractures. The purpose of this study is to report on the incidence of pre- and postoperatively detected PMF in the patients with tibial shaft fractures, and to describe the radiographic and clinical consequences of these injuries.

Methods: This is a retrospective, observational cohort study of adult tibial shaft fractures treated at a Level-I trauma center over a 10-year period. Patients were identified with isolated tibial shaft fractures (excluding all intra-articular fractures with the exception of PMFs). Data were extracted from the medical records including demographic information, fracture morphology, and distal extent of IMN placement as measured by the distance from the tip of the nail to the plafond. Risk of PMF was quantified using the previously described fracture-to-plafond (FTP) ratio. Preoperative, immediate postoperative, and final radiographs were reviewed for the presence of a PMF.

Results: 755 patients were identified with extra-articular tibial shaft fractures, of whom 542 (72%) were defined as “high risk” for PMF due to a FTP ratio of >0.224. Of the 542 high-risk patients, nondisplaced PMFs were visible in 90 (16.6%) patients on preoperative ankle films. There were 71 patients with PMFs on immediate postoperative films, of which 48 were nondisplaced and 23 were displaced. Final follow-up films were obtained at an average of 12.3 months postoperatively, and all of the nondisplaced fractures were radiographically united and no longer visible by that time. Of the 23 displaced fractures, 19 were still apparent and displaced at time of final follow-up. No patients had new radiographic evidence of arthritis. The distance from the tip of the nail to the plafond was evaluated as an independent predictor of postoperative PMF displacement. Of the high-risk patients with a nail placed within 14 mm of the plafond, a new postoperative PMF was visible in 6.0% (25/415) of the patients, while in those where the nail tip was a distance of 14 mm or more from the plafond, a postoperative PMF was seen in 0.8% (1/123) of the patients, which was statistically significant (P = 0.015).

Conclusion: Posterior malleolus fractures after intramedullary nail fixation of tibial fractures is common and may be related to distal extent of implant placement, although radiographic arthritis is uncommon.