

Incidence, Predictors, and Fracture Mapping of (Occult) Posterior Malleolar Fractures Associated with Tibial Shaft Fractures

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Purpose: The purpose of this study was to (1) evaluate the incidence of posterior malleolar fractures (PMFs) in patients with tibial shaft fractures (TSFs) using advanced imaging; (2) identify predictors for patients at risk for an (occult) PMF; and (3) describe PMF characteristics to guide “malleolus-first” fixation.

Methods: In a Level-I trauma center, 164 patients were treated with intramedullary nailing for TSFs that underwent low-dose postoperative CT-scans to assess rotational alignment. We did an analysis of advanced imaging for presence of PMFs, and used uni- and multivariate analyses to identify predictors. Qualitative analysis of PMFs was undertaken by fracture mapping. Outcome measures were (1) incidence of PMFs in patients with TSFs as diagnosed on postoperative CT-scans, (2) independent predictors for the presence of PMFs, and (3) PMF patterns.

Results: One in 5 patients with a TSF has an associated PMF (22%), increasing to 1 in 2 in patients with simple spiral fractures (56%). In 25% these fractures were occult. Univariate analysis identified simple spiral and distal third TSFs, proximal third and spiral fibula fractures, and low-energy trauma as predictors for PMFs. Multivariate analysis demonstrated that distal third and simple spiral TSFs were the only independent predictors. Haraguchi Type I and Bartonicek type IV are the patterns specific to PMFs associated with TSF (Fig. 1).

Conclusion: Half of patients presenting with a simple spiral TSF have an associated PMF. In 1 in 4 these are occult. Additional preoperative CT imaging may be considered in patients presenting with simple spiral distal third TSFs, despite negative lateral radiographs, so that PMFs can be identified and managed with “malleolus- first” fixation. Because the PMFs consist of relatively large posterolateral oblique fragments, they seem excellently suited for AP fixation with lag screws. These lag screws may be aimed slightly oblique with reference to the true sagittal plane, in order to lag perpendicular to the fracture line.

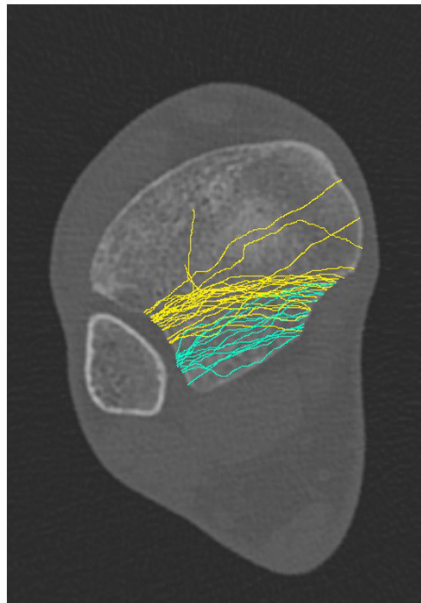


Figure 1. Fracture map of 33 Haraguchi type I posterior malleolar fractures. Twenty-one (64%) entered the tibiotalar joint in the middle third of the fibula incisura, corresponding to Bartonicek type 4 (yellow lines); and twelve (36%) entered the tibiotalar joint in the posterior third of the fibula incisura, corresponding to Bartonicek type 2 (blue lines).

See the meeting app for complete listing of authors' disclosure information.