

Posterior Malleolar Fracture Morphology Determines Outcome in Rotational Type Ankle Fractures: A Prospective Clinical Trial

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Purpose: Rotational type ankle fractures with a concomitant fracture of the posterior malleolus are associated with a poorer clinical outcome compared to ankle fractures without. However, clinical implications of posterior malleolar fragment morphology and pattern have yet to be established. Many studies on this subject report on fracture size, rather than fracture morphology. The purpose of this prospective cohort study was to analyze whether morphology of the posterior malleolar fragment, based on CT quantification, is associated with functional outcome. We hypothesize that there is no difference in outcome between the different types of posterior malleolar ankle fractures.

Methods: From 2009 to 2014 ankle fractures at our Level I trauma center were prospectively included and characterized using pre- and postoperative CT scans as part of the EF3X-study protocol. 73 patients treated operatively for ankle fractures with a posterior malleolar fracture were classified according to Haraguchi: 20 type I fractures, 21 type II, and 32 type III. The Foot and Ankle Outcome Score (FAOS) and Short Form-36 (SF-36) at 12 weeks, 1 year, and 2 years postoperative were obtained. Statistical analysis included a multivariate regression analysis and a secondary mixed model analysis.

Results: Haraguchi type II compared to Haraguchi type I and III posterior malleolar ankle fractures demonstrated significantly poorer outcome scores during and at 2 years of follow-up. Mean FAOS domain scores at 2-year follow-up were significantly worse in Haraguchi type II as compared to type III, respectively: Symptoms 48.2 versus 61.7 ($P = 0.03$), Pain 58.5 versus 84.4 ($P = 0.001$), and Activities of Daily Living 64.1 versus 90.5 ($P = 0.001$).

Conclusion: Posterior malleolar fractures with medial extension (Haraguchi type II) are associated with a significantly poorer functional outcome. The current dogma to fix posterior malleolar fractures that involve at least 25% to 33% of the tibial plafond may be challenged, as posteromedial fracture pattern and morphology, rather than posterior malleolar fragment size, seem to determine outcome.