Intra-Articular Extension in Tibial Shaft Fractures: It’s Not Just the Posterior Malleolus

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INTRODUCTION: The purpose of this study was to identify specific radiographic parameters that are predictive of any type of intra-articular extension in TSFs.

METHODS: All TSFs presenting over a 6-year period were identified. A radiographic review of plain radiographs and CT scans included: identification of intra-articular extension, classification using the OTA System, measurements of the obliquity angle (FOA), absolute and relative distance from distal extent of fracture to plafond (DFP and DFP%), and presence and level of any associated fibular fractures. Patients with and without intra-articular extension were statistically compared. Multivariate logistic regression determined independent predictors of intra-articular extension.

RESULTS: 405 TSFs in 397 patients were identified, with 145 TSFs with intra-articular extension (24 TSFs had multiple intra-articular fractures): 94 (23.2%) posterior malleolar fractures, 19 (13.1%) medial malleolar fractures, 42 (29.0%) lateral malleolar fractures involving the syndesmosis and 14 (9.7%) Chaput fragments. There was no difference with respect to demographics between the groups. Multivariate regression demonstrated AO/OTA classification type 42-A1, 42-B1 or 42-C1 (OR 2.3 [95%CI 1.3–4.0]; p=0.003), FOA greater than 45° (OR 2.7 [95%CI 1.5 – 4.8]; p=0.001) and fracture extension to the distal third of the tibia, defined as DFP% less than 33% (OR 4.1 [95%CI 2.0–9.0]; p=0.005) were independent correlates of intra-articular extension regardless of mechanism of injury or fibula fracture presence or location. Area under the ROC of this regression was 0.76 (95%CI 0.72–0.8).

DISCUSSION AND CONCLUSION: Different patterns of intra-articular extension beyond posterior malleolar fractures can occur in TSFs. Fracture angles greater than 45° and extent into the distal 33% of the tibial shaft are independent predictors of distal intra-articular extension in TSFs regardless of mechanism of injury.