

3D Mapping: Has the Mystery of Proximal Tibia Fractures Been Solved?

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Purpose: One of the major limitations of the 2D fracture evaluation (Schatzker classification) is its failure to adequately assess fracture lines in the frontal plane and fracture displacement in the anteroposterior direction. 3D fracture line mapping includes a steric assessment, which can aid decision-making with regard to the surgical approach and fixation scheme. We hypothesized that there are consistent fracture patterns and zones of comminution for proximal tibial fractures.

Methods: Radiographic data from 228 proximal tibia fractures were retrospectively included in this study. Fracture lines and zones of comminution were graphically superimposed onto a 3D template of an intact tibia after virtual reduction and normalization to identify major patterns of fracture and comminution.

Results: Out of 206 male and 21 female patients, 89 had a fracture of the lateral condyle only (Schatzker I and II), 53 involved the medial plateau only (Schatzker IV), and 86 had a high-grade fracture involving both the condyles (Schatzker V and VI). 64.5% of the fracture lines involving the medial plateau alone were in the coronal plane and this number was even less (44.2%) in medial plateau involvement of bicondylar fractures. In bicondylar fractures, lines were usually not seen to pass directly through the posteromedial region.

Conclusion: Medial tibial plateau fractures have a mix of coronal or sagittal fracture alignment. A clearer understanding of the 3D orientations of fractures based on CT scans can aid in diagnosing the pattern of fracture, and adequate positioning of plates can be done to eventually improve operative outcomes.

