3D Quantification of Posterior Malleolar Fragment Reduction Predicts Clinical Outcome in Prospective Trial

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Purpose: In ankle fractures involving the posterior tibial margin, articular congruity is believed to be a strong predictor for clinical outcome. In the current prospective study, the aim was to correlate quantitative 3-dimensional CT (Q3DCT) fracture displacement with clinical outcome.

Methods: 31 patients with an ankle fractures including a posterior malleolar fragment were included. Postoperative CT scans were evaluated using Q3DCT modeling techniques. Posterior fragment size (%), postoperative gaps (mm^2), step-off (mm), and overall multidirectional displacement of the posterior fragment were quantified. We evaluated early posttraumatic arthrosis, Foot and Ankle Outcome Score (FAOS) pain and symptoms subscales, AOFAS (American Orthopaedic Foot & Ankle Society), and Short Form-36 (SF-36) at 1 year.

Results: Total gap surface showed a median of 12.6 mm^2 (Fig. 1) but did not correlate with posttraumatic arthrosis, FAOS, AOFAS, or SF-36 scores. However, step-off (median 0.7 mm) (Fig. 2) correlated significantly with FAOS pain and symptoms subscales. The size of the fragment correlated significantly with early posttraumatic arthrosis. Overall multidirectional displacement with a mean of 0.96 mm (SD 0.8) did not show any significant correlation with any of the outcome scores.

Conclusion: In rotational type ankle fractures involving the posterior tibial margin, the size of the fragment and intra-articular step-off significantly correlate with development of early posttraumatic arthrosis and patient-reported pain and symptoms.
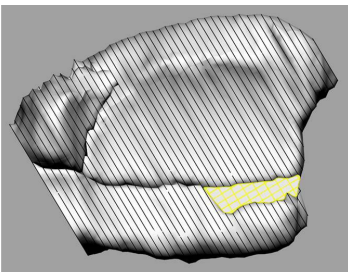
POSTER ABSTRACTS

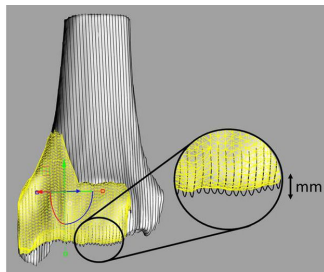**Figure 1.** Example of gap surface measurement in mm^2 (yellow grid)

Figure 2. Example of step-off after virtual reduction of fragment
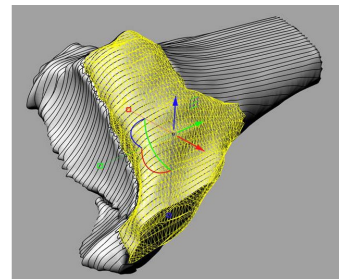
Figure 3. Combined multidirectional displacement is calculated as a vector of displacement in X (blue), Y (green) and Z (red) axis