

The Comparative Efficacy of Surgical Techniques for Tarsometatarsal Dislocations and Fracture-Dislocations: A Network Meta-Analysis and Metaregression

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Purpose: There is controversy related to the fixation strategy for tarsometatarsal (TMT) injuries. We sought to evaluate the comparative efficacy of primary arthrodesis, open reduction and internal fixation (ORIF) with screws, and ORIF with plates for fixation for complete TMT dislocations and fracture-dislocations. We were specifically interested in how these techniques perform in different injury patterns.

Methods: We searched all available databases to identify observational studies and randomized trials related to surgical treatment of acute TMT injuries. We conducted an extensive Bayesian network meta-analysis using raw and adjusted estimates to determine the comparative efficacy of the 3 fixation methods. We evaluated the impact of fracture-dislocation versus dislocation. The primary outcome included serious surgical complications, unplanned reoperations, or the need for arthrodesis (or revision arthrodesis).

Results: We identified 29 data sources including 8139 patients. ORIF with screws had a complication rate of 26.7%. Fusion had a lower odds of a complication (odds ratio [OR] 0.78, 95% confidence interval [CI] 0.60 to 1.02, $P = 0.06$) equating to a 5.1% decrease in event rate (95% CI 1.9 to 8.3%, $P = 0.002$). Plate fixation had a nonsignificant reduction in adverse events (OR 0.80, 95% CI 0.46 to 1.36, $P = 0.41$). Model estimates for plate fixation versus fusion showed equivocal results (OR 0.99; $P = 0.97$). Fusion had a higher aggregated mean American Orthopaedic Foot & Ankle Society (AOFAS) score by 7 points than ORIF with screws (95% CI 4.1 to 9.9, $P < 0.001$) but not plate fixation (95% CI -4.4 to 5.4, $P = 0.85$). Fusion reduced the event rate in studies with purely ligamentous injuries (OR 0.63, 95% CI 0.56 to 0.72, $P < 0.001$) whereas ORIF may be advantageous in fracture-dislocations (OR 1.35, 95% CI 0.98 to 1.85, $P = 0.06$). There was no difference in AOFAS score (mean difference 1.96, 95% CI -1.5 to 5.4, $P = 0.27$). Plate fixation resulted in a 6-point advantage ($P = 0.007$) in fracture dislocations and an 11-point difference in ligamentous injury ($P < 0.001$) versus ORIF while fusion had an 8-point advantage over ORIF for ligamentous injury ($P < 0.001$).

Conclusion: The use of fusion was an advantage in AOFAS scores and event rate only in purely ligamentous injury as compared with ORIF with screws. Screw only fixation had a lower event rate than fusion for fracture dislocations. Plate fixation had a lower event rate and higher AOFAS scores than screw-only fixation for all injuries and was comparable to fusion in event rates.