Dual Mini-Fragment Plate Fixation of Midshaft Clavicle Fractures Reduces Risk of Reoperation Compared to Single Plate Fixation Techniques

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Purpose: Dual plate fixation has been proposed as a solution to the high reoperation rate following operative management of midshaft clavicle fractures. The purpose of this study was to compare reoperation rates among patients who underwent single superior, single anterior, and dual plating while adjusting for risk factors. We hypothesized lower reoperation rates among patients with dual plate fixation.

Methods: This was a retrospective study of all patients with a midshaft clavicle fracture who underwent open reduction and internal fixation (ORIF) between 2007 and 2021 at a Level I trauma center. Patient demographics, fracture pattern, plating technique, postoperative complications, and reoperation were documented. Hazard ratio (HR) estimates were calculated using a multivariate multilevel mixed-effects parametric survival model, which accounted for patients with multiple reoperations and adjusted for covariates (age, smoking status, high-risk fracture morphology).

Results: 256 patients (mean age 39.1 ± 14.9 years) with 56 z-type (21.9%), 102 transverse (39.8%), and 98 oblique fractures (38.3%) were identified. Patients were treated with superior plate (101, 39.5%), 92 anterior plate (35.9%), and 63 dual plate constructs (24.6%). 31 reoperations took place among 22 patients (8.6%)—1 reoperation following dual plating, 18 reoperations (12 patients) following superior plating, and 12 reoperations (9 patients) following anterior plating. Reoperation rate was 0.031 per person-years for superior plating, 0.026 per person-years for anterior plating, and 0.005 per person-years for dual plating. Patients who underwent single plating had a nearly 8-times greater risk of reoperation when compared to patients who underwent dual plating (HR: 7.62, 95% confidence interval [CI]: 1.02–56.82, P = 0.048). More specifically, patients who underwent superior plating had more than 8-times greater risk of reoperation compared to patients who underwent dual plating (HR: 8.36, 95% CI: 1.10–63.86, P = 0.041). Patients who underwent anterior plating, however, did not demonstrate a statistically significant difference in risk of reoperation compared to patients with dual plating (HR: 6.79, 95% CI: 0.87–52.90, P = 0.068).

Conclusion: Dual plate fixation represents an excellent treatment for displaced midshaft clavicle fractures, with low rates of nonunion and reoperation. When compared to single pre-contoured locked superior or anterior plate fixation, dual plate fixation has a nearly 8-fold lower risk of reoperation related to a significantly lower risk of implant removal.