Outcomes of Operative Management of Lateral Malleolus Fixation Comparing 3 Types of Plate Fixation

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Purpose: Recently plate fixation options for distal fibula fractures associated with torsional ankle injuries have expanded to offer location-specific implants with locking options. Potential advantages or implant-specific complications have not been well addressed. In this study, we aimed to evaluate the differences in complication rates and unplanned secondary procedures based on type of plate fixation applied to lateral malleolus fractures.

Methods: Between 2019 and 2020, 382 adult patients who presented to a Level I trauma center with an ankle fracture (OTA / AO 44) were reviewed. 100 patients managed nonoperatively, 22 lacking follow-up, and 12 receiving surgical treatment other than open reduction and internal fixation (ORIF) were excluded. Of the remaining 248 patients, 208 underwent ORIF of the lateral malleolus. Unplanned secondary procedures and complications were recorded. Following normality testing, univariate analysis was conducted with analysis of variance and Kruskal-Wallis tests with Tukey post hoc tests. Multivariate analysis was conducted via backward stepwise logistic regression.

Results: Of the 208 ORIF lateral malleolus fractures, 68 received distal fibular locking plates, 64 received 1/3 tubular (nonlocking) plates, and 76 received 1/3 tubular locking plates. There were no differences in sex, body mass index (BMI), tobacco use, substance use, or open fracture rate among the groups. The conventional 1/3 tubular plate cohort was younger in age compared to the 1/3 tubular locking and distal fibular locking cohorts (40 vs 47 vs 58, $P<0.001$). Distal fibular locking plates were more likely to require an unplanned secondary procedure compared to 1/3 tubular locking (19% vs 5%, $P = 0.035$). Multivariate analysis identified use of distal fibular locking plate ($P = 0.044$, odds ratio [OR] = 2.40) as a risk factor for secondary procedure following ankle ORIF (overall model, $P = 0.02$). Alternatively, female sex ($P = 0.005$, $OR = 0.218$) and standard 1/3 tubular plate ($P = 0.074$, $OR = 0.312$) were identified as protective factors for early complications including wound complications, and superficial and deep infections (overall model, $P = 0.002$).

Conclusion: While distal fibular locking plates were associated with higher rates of unplanned secondary procedures, it was also the oldest cohort in the study with potentially more medical comorbidities due to age. Similarly, 1/3 tubular nonlocking plates were associated with lower rates of early complications and was the youngest cohort. Further studies should better characterize the role of age in the conclusions from this study.