Distal Radius Volar Plate Design Predicts Volar Prominence to Watershed Line in Clinical Practice: Comparison of Soong Grading of 2 Common Low-Profile Plates in 400 Patients

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Purpose: Tendon rupture following volar plate malpositioning in distal radius fracture fixation is a recognized complication when the plate is positioned too volar. Soong et al. demonstrated that plates prominent at the watershed line increased the risk of tendon injury. Plate design may direct plate positioning in clinical practice, and thus increase the chance of tendon rupture based on design factors rather than surgeon factors. Therefore, the purpose of this clinical study is to compare plate positioning in clinical practice of the 2 most commonly used volar locking plate designs with respect to the watershed line as quantified by the Soong grading system.

Methods: A total of 400 patients who underwent open reduction and internal fixation between November 2013 and January 2018 were included in this study. Cohort 1 was defined as 200 consecutive patients treated with DVR plates (Zimmer Biomet) in this period. Cohort 2 were 200 consecutive patients who had volar plate fixation with Variable Angle LCP plates (DePuy Synthes) in this period. There were no differences in baseline demographics between both cohorts. Surgery was carried out by 67 different respective primary surgeons, representing daily practice, and improving generalizability of this study. Two independent reviewers categorized postoperative standardized lateral wrist radiographs into Soong Grade 0, 1, or 2. Chi-square test was applied to determine if the differences in Soong categorical ratings between the 2 cohorts were significant.

Results: In cohort 1, 87 plates (43.5%) were not prominent volar to the watershed line (Grade 0), 95 plates (47.5%) demonstrated Grade 1 prominence and 18 plates (9.0%) demonstrated Grade 2 prominence. In cohort 2, 63 plates (31.5%) were Grade 0, 103 plates (51.5%) were Grade 1, and 34 plates (17%) had Grade 2 prominence on and volar to the watershed line. These radiographic results show a greater incidence of volar plate prominence with respect to the watershed line, as defined as Soong Grades 1 and 2 in cohort 2 (chi-square test, P = 0.003).

Conclusion: This non-industry-sponsored study shows that the use of the Variable Angle LCP plate results in more prominent volar positioning with respect to the watershed line in clinical practice in a large cohort of patients in the hands of a large group of orthopaedic trauma surgeons, as compared to the DVR plate.