

Is Bony Congruence at the Distal Radioulnar Joint Predictive of Need for Fixation Following Traumatic Wrist Injury?

Richard A. Pizzo, DO; Bishop Saad, DO; Frank A. Liporace, MD; Richard S. Yoon, MD; John T. Capo, MD

Jersey City Medical Center - RWJ Barnabas Health, Jersey City, NJ, United States

Purpose: The distal radioulnar joint (DRUJ) is a complex and inherently unstable articulation that may be disrupted with traumatic injury about the wrist. DRUJ injuries can often lead to pain, instability, and arthritis. Stability of this articulation is conferred, in part, by bony congruency between the sigmoid notch of the distal radius and the ulnar head. Several distinct sigmoid notch morphologies have been described and are theorized to lend varying degrees of stability to the DRUJ. Studies of sigmoid notch morphology, until this point, have been anatomic cadaveric studies and have not been analyzed in the setting of distal radius fracture. The purpose of this study is to report the incidence of the described sigmoid notch morphologies in patients with traumatic wrist injury and assess the impact of these anatomic variations on fracture pattern and DRUJ stability.

Methods: Retrospective institutional database review was performed to identify all distal radius fractures and any associated or isolated DRUJ injuries diagnosed at a single academic medical center from 2015 through 2019. Only patients with CT scans at time of injury were included in this analysis. Exclusion criteria were not having undergone CT scan or skeletal immaturity at time of injury. Demographic information and radiographic parameters were extracted using a predetermined spreadsheet by two independent reviewers. Statistical analysis was performed using χ^2 test and Fisher exact test.

Results: Final analysis included 96 patients, 48 males and 48 females. Mean age at time of injury was 50 years (standard deviation 17). 93 patients had distal radius fractures and 3 had isolated DRUJ injuries. Sigmoid morphology was flat-face in 14 patients (15%), ski-slope in 26 patients (27%), "C" type in 49 patients (51%), and "S" type in 7 patients (5%). Males and females had significant differences in sigmoid morphology ($P < 0.05$). Females were more likely to have flat-face notches, while males were more likely to have ski-slope morphologies. No correlation was found between sigmoid morphology and specific fracture patterns, likelihood of requiring supplemental DRUJ fixation, or involvement of the volar or dorsal lunate facet.

Conclusion: Differences in sigmoid notch morphology have been theorized to confer varying degrees of bony stability to the DRUJ. This study finds that while sigmoid notch morphologies are not associated with patterns of injury or DRUJ instability, significant differences are present in the bony morphology of males versus females, with males being significantly more likely to have "ski-slope" morphology. A detailed understanding of this bony morphology and any gender-related variations is important for treating these injuries and restoring optimal function to the hand and wrist.