

Use of Plain Radiography of Uninjured Wrists As Patient-Specific Markers of Successful Reduction of Unilateral Distal Radius Fractures

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BACKGROUND

The standard of care of distal radius fractures requiring operative intervention involves re-establishing anatomic alignment radiologically by comparing pre-operative films and intra-operative fluoroscopy to established values based on population norms.¹ Multiple studies have demonstrated that unacceptable radiological reduction is associated with worse patient-reported outcomes.² However, the specific radiological parameter that correlates to worse outcomes remains controversial, and the frequency at which hand surgeons achieve this goal of anatomic realignment is poorly documented. The objective of this study is to retrospectively evaluate the use of plain radiographs obtained from the uninjured wrist of patients who present with unilateral displaced distal radius fractures requiring operative intervention as a measure of successful achievement of anatomic realignment.

METHODS

A retrospective review was performed on 93 consecutive patients who presented to our institution from August 2020 to February 2021 with diagnosis of unilateral distal radius fracture as confirmed on three-view plain radiography. Patients who had bilateral three-view wrist plain radiographs and underwent open reduction and internal fixation were included. Patients managed conservatively or lost to follow up were excluded. Primary outcome measure was comparison of a set of distinct radiological parameters (radial inclination, radial height, tilt, ulnar variance) measured by three observers on preoperative, 1-week post-operative, and uninjured contralateral wrist films. These parameters were compared to the accepted population norms to determine frequency at which successful radiological reduction was achieved. Secondary outcome measure includes the Disabilities of the Arm, Shoulder and Hand (DASH) Score. Statistical analysis was performed using paired t test and intraclass correlation coefficient (ICC).

RESULTS

Fourteen patients were included for analysis. The median age of participants was 57 years, and the majority of participants (64.3%) were female. 71.4% of patients underwent open reduction and internal fixation with only a volar locking plate. Radiologic examination of the uninjured extremity revealed a mean radial inclination of 23.5°, radial height of 11.8 mm, volar tilt of 9.2°, and ulnar variance of 1.0 mm. Comparison of postoperative radiologic parameters to the contralateral uninjured extremity revealed a mean radial inclination difference of 3.0°, radial

height difference of 1.9 mm, volar tilt difference of 6.6°, and ulnar variance difference of 0.7 mm. Average post-reduction radial height was found to deviate from contralateral radial height significantly more than from the historic radial height parameter (1.9 vs. 0.6 mm, $p < 0.01$). Of note, ICC equaled 0.93, indicating excellent reliability between observers. DASH surveys were obtained one month post-operatively from five patients with an average score of 66.8.

CONCLUSION

Normal radiologic reduction parameters likely vary between patients. Attempts at achieving distal radius fracture reduction to within historic normal limits may result in an increased deviation from patient-specific anatomic parameters, especially with respect to radial height.

REFERENCES

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