

## Which Parameters Predict Delayed Fracture Displacement of Distal Radius Fractures Resulting in Surgical Treatment?

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**Purpose:** Distal radius fractures (DRFs) are common injuries and represent 17% of all adult upper extremity fractures. Some fractures deemed appropriate for nonsurgical management following closed reduction and casting exhibit delayed secondary displacement (greater than 2 weeks from injury) and require late surgical intervention. This can lead to delayed rehabilitation and functional outcomes. This study aimed to determine which demographic and radiographic features can reliably predict delayed fracture displacement.

**Methods:** This is a multicenter retrospective case-control study using radiographs extracted from our Analytics Data Integration, Measurement and Reporting (DIMR) database, using diagnostic and therapeutic codes. Skeletally mature patients aged 18 years or older with an isolated DRF treated with surgical intervention between 2 and 4 weeks from initial injury, with two or more follow-up visits prior to surgical intervention, were included. Exclusion criteria were patients with multiple injuries, surgical treatment with fewer than two clinical assessments prior to surgical treatment, or surgical treatment within 2 weeks of injury. The proportion of patients with delayed fracture displacement requiring surgical treatment will be reported as a percentage of all identified DRFs within the study period. A multivariable conditional logistic regression analysis was used to assess case-control comparisons, in order to determine the parameters that are mostly likely to predict delayed fracture displacement leading to surgical management. Intra- and interrater reliability for each radiographic parameter will also be calculated.

**Results:** A total of 210 case-controlled pairs were identified, with 81% being female and a mean age of 50.2 years (standard deviation = 14.1). Variables assessed in the model included prereduction and postreduction radial height, radial inclination, radial tilt on the lateral radiograph, volar cortical displacement, injury classification, intra-articular step or gap, ulnar variance, radiocarpal alignment, and cast index. Decreased prereduction radial height ( $P < 0.001$ ), decreased prereduction radial inclination ( $P < 0.001$ ), and increased prereduction volar cortical displacement ( $P = 0.046$ ) were significant predictors of delayed fracture displacement beyond a minimum of 2-week follow-up.

**Conclusion:** Cast immobilization is not without risks and delayed surgical treatment can result in a prolonged recovery. Therefore, if reliable and reproducible prereduction and immediate postreduction parameters can be identified that predict delayed fracture displacement, this information will aid in counseling patients with DRFs, and may lead to earlier surgical intervention, when indicated.