

Digital Edema Predicts Early Progression to Functional Plateau Following Volar Locked Plating for Distal Radius Fractures

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Purpose: The majority of operatively treated distal radius fractures will achieve good or excellent functional outcomes at 1-2 years postinjury followed by plateau. There is a paucity of data suggesting clinical predictors for rapid or delayed achievement of functional plateau. The purpose of the present study is to identify early clinical examination findings, including digital edema and finger range of motion (ROM), that predict postoperative recovery following distal radius fractures treated by open reduction and internal fixation with locked volar plating.

Methods: Patients treated for unstable distal radius fractures with locked volar plating from 2012-2014 were prospectively recruited and followed for 12 months postoperatively. Patients were excluded if they were less than 18 years of age, had distal radius fractures treated with any method other than locked volar plating, history of prior fracture or deformity to either upper extremity, or had medical conditions that compromise the ability to maximize functional recovery. Specific clinical examination findings were recorded at 1 week, 4-6 weeks, 12 weeks, 6 months, and 1 year postoperative including digital edema (defined as circumference at the proximal interphalangeal [PIP] joint level of index through small finger), wrist and forearm ROM, pinch and grip strength, and finger ROM (measured as middle finger nail distance to the distal palmar crease). The primary outcome measure was the validated Patient Reported Wrist Evaluation (PRWE). Secondary outcomes were the Disabilities of the Arm, Shoulder and Hand (DASH) and the Pain Catastrophizing Scale (PCS). Patients were classified as functionally plateaued if the PRWE score differed by ≤ 10 points, the minimal clinically important difference.

Results: 58 patients were successfully recruited as study participants, 23 of whom were followed for a minimum of 12 months postoperative. At the first postoperative visit, 26% of patients had a 0-mm fingernail to palm distance and 61% had digital edema ≤ 0.5 mm difference compared to the contralateral side. The mean PRWE score at last follow-up was 12.6 ± 15.3 , while the mean DASH score was 15 ± 16.7 and PCS 2.3 ± 5.3 . 69% of the patients reached a PRWE plateau prior to the 12-month postoperative visit. Digital edema difference ≤ 0.5 mm was 75% sensitive and 57% specific as a test to predict early functional plateau while fingernail to palm distance demonstrated no correlation as a predictive test. Linear regression analysis demonstrated a trend between 1 week postoperative digital edema and final follow-up PRWE score but this did not reach significance ($P = 0.12$). No relationship was appreciated between digital edema and DASH score ($P = 0.48$). There was no association of digital edema or finger ROM with the PCS score at final follow-up.

Conclusion: The present study introduces digital edema measured at the first postoperative visit following locked volar plating of displaced distal radius fracture as a predictor for early functional plateau. Measuring digital edema as the circumference around the PIP joints of the operative hand and comparing to the noninjured contralateral is a safe, reproducible physical examination technique. Furthermore, increased digital edema at the first postoperative visit trended toward worse PRWE functional outcome scores at final follow-up. This information can help guide postoperative care and set patient expectations for rapidity of functional recovery.