How to Measure Outcomes of Distal Radius Fracture Treatment

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KEYWORDS

• Distal radius • Outcomes • Colles • Function • Fracture • Volar plate • Recovery

The goal of any outcome measure in medicine is to evaluate the improvement or detriment of a given treatment of a condition, disease, or injury. In order for a measure to be useful, it must be easily understood and administered and have consistent reliability and validity over a wide array of demographic groups. Ultimately, a reliable outcome measure should aid in predicting the outcome of a given treatment of a specific population and then be able to guide further treatment for the benefit of patients.

Distal radius fractures represent one-sixth of all fractures evaluated in the emergency department, with greater than 450,000 fractures occurring every year in the United States.[1,2] These fractures can be treated conservatively or operatively for fracture stabilization until healing. The operative treatment of these fractures includes many modalities, such as external fixation, percutaneous pin fixation, dorsal internal fixation, and volar internal fixation, with open reduction and internal fixation via a volar approach being the most common method used today. In a recent demographic study of the Medicare population by Chung and colleagues,[3] distal radius fractures were more likely to be treated with open reduction internal fixation (ORIF) if treated by a hand surgeon rather than a general orthopedic surgeon. However, most wrist fractures are still treated nonoperatively.

Multiple outcome measures have been described to measure the success of the treatment of distal radius fractures. These measures include general and anatomy-specific patient-reported subjective outcomes, objective measurements, and radiographic measurements. To date, there is no widely accepted outcome measure for wrist fractures that is considered the gold standard to accurately predict function after treatment. This review provides an overview of the currently used measures with an evidence-based evaluation of the advantages and disadvantages of each method and their practicality for use in clinical care.

GENERAL PATIENT-REPORTED SUBJECTIVE OUTCOMES

The 36-Item Short Form Health Survey

The 36-Item Short Form Health Survey (SF-36) is a widely used tool to estimate the general health of a population and is a commonly used outcome measure in distal radius fracture care. It was originally introduced in 1980 as a 108-question booklet for clinical practice and research, health policy evaluation, and general population surveys

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Important Points and Objectives for Recall

- Only reliable and valid outcome measures should be used to assess functional recovery in clinical research.
- The 36-Item Short Form Health Survey (SF-36) and European Quality of Life-5 dimensions survey (EuroquOL-5D) evaluate patients as a whole and are not specific to the extremity or injury that is being measured.
- The Disabilities of the Shoulder, Arm, and Hand (DASH) questionnaire is a validated outcome measure of the upper extremity, and although it is frequently used to assess distal radius fracture outcomes, it can be skewed by ipsilateral injury to the upper extremity and neck.
- The Patient-Rated Wrist Evaluation (PRWE) is one of the more frequently used outcome measures to assess distal radius fracture outcomes because it is more specific to wrist function.
- The Jebsen-Taylor test (JTT), Michigan Hand Outcomes Questionnaire (MHQ), and Brigham scores were developed to measure outcomes in the management of hand and finger pathologic conditions but have also been used to evaluate distal radius fracture recovery.
- The Gartland and Werley score is one of the most widely used outcome measure because it takes into consideration objective measurements to predict overall recovery; however, it has not been validated in a standard fashion to date.
- The Arthritis Impact Measurement Scale (AIMS2) is used in rheumatoid arthritis and osteoarthritis to gauge function and has been sporadically used in the measurement of distal radius fracture outcomes.
- Physical examination is one of the most important predictors of overall functional outcomes. However, the contralateral extremity may be an unreliable control. In addition, average values are highly dependent on sex, age, comorbidity, and hand dominance.
- Radiographic parameters have been created to establish normal anatomy, although they may not be predictive of functional recovery, specifically in the elderly population.
- There are few comparative trials to compare outcome measures when discussing distal radius fracture management, and there is no universally accepted gold standard to evaluate recovery.

as part of the Medical Outcomes Study.[4] It was thought to be too long and difficult for the average patient, so a condensed version was created to shorten the responses and improve patient compliance with completion.[5] The shortened form, the SF-36, includes 8 dimensions or scales: physical functioning, social functioning, role limitations (physical problems), role limitations (mental problems), mental health, vitality, pain, and general health perception. Brazier and colleagues[6] confirmed that the SF-36 was an acceptable measurement tool because it achieved both high reliability and constructive validity scores.

The SF-36 has been used in the outcome analysis of distal radius fracture management either using an entire score or as a specific subgroup analysis. Matschke and colleagues[7] compared volar and dorsal plate fixation of distal radius fractures and showed that the SF-36 score improved in both groups but there was no difference regarding the type of fixation method. These findings were similar to the Disabilities of the Shoulder, Arm, and Hand (DASH) questionnaire and physical examination measurements at 6 months, 1 year, and 2 years. Neidenbach and colleagues[8] compared the results of nonoperative management with a cast in patients with or without closed reduction for displaced distal radius fractures. The SF-36 was used as a primary outcome measure, and results showed that fractures treated with closed reduction lost their anatomic reduction but maintained their activities of daily living (ADL) and overall function. Lastly, Kreder and colleagues[9] used only the bodily pain subscore of the SF-36 and found a significant improvement in the 1-year outcomes when comparing percutaneous fixation with ORIF.

EuroQol Group Survey

Similar to the SF-36, the EuroquOL-5D was developed to aid research and create a reliable measure for health-related quality of life. This outcome measurement tool includes a 5-part utility index and a visual analog scale. In a study on patients with rheumatoid arthritis, Hurst and colleagues[10] found moderate to high correlations between the EQ-5D and measures of impairment and high correlations with disability measures. They concluded that the scoring system was simple to use, valid, and reliable for group comparisons.