

## A study of correlation between radiological and functional outcome of distal radius fracture treated by various modalities

Jati S, Goyal D, Awasthi D

*Investigation performed at Department of Orthopaedics, SAIMS and PGI, Indore, Madhya Pradesh, India*

### Abstract

**Background:** Distal radius fractures are one of the most common injuries to the musculoskeletal system. Functional outcome in these fractures depend on many factors. Our main aim was to study if good radiological outcome has any effect on functional outcome and to compare various modalities of treatment of fracture distal end radius

**Method:** We retrospectively studied 120 patients. 30 cases were treated with conservative management & 30 cases with volar plating, percutaneous pinning and JESS fixator (Joshi's External Stabilizing System).

**Results:** Most of the patients were between 40-60 years (Mean 50.35 years). Most common mode of injury was RTA (50.3%), Right side was predominantly affected (60.3%) and most common fracture type was AO type C1. Mean pain score & Function score Patient Rated Wrist Evaluation (PRWE) were less among patients where radiological parameters were restored.

**Conclusion:** From this study, we conclude that restoration of radiological parameters will help in good functional outcome in treatment of intra-articular and extra articular fractures of distal end of radius and volar plating has better results in radiological parameter restoration and functional outcome.

**Keywords:** Distal radius fractures, extra and intra-articular fractures, Functional outcome, Radiological outcome.

**Address for Correspondence:** Dr Divyanshu Goyal,  
Department of Orthopaedics, SAIMS and PGI, Indore, Madhya Pradesh, India

Email:

**How to site this article:** Jati S, Goyal D, Awasthi D. A study of correlation between radiological and functional outcome of distal radius fracture treated by various modalities. OrthopJMPC 2017;23(1):32-35.

### Introduction

Distal radius fractures are one of the commonest fracture. Good long-term outcome depends on factors like type of fracture and type of treatment used. Therefore, the outcome is not same in all cases after treatment. Treatment should help to restore normal anatomy of wrist with good radiological outcome, prevent loss of

reduction and functional rehabilitation of patient. [1,2]

### Materials and Methods

We retrospectively studied 120 patients with intra-articular and extra articular distal radius fracture managed with various modalities of treatment at Department of Orthopaedics, SAIMS, Indore. Aims and objective of study

was to find correlation between radiological and functional outcome of distal radius

fractures treated by different modalities of treatment. Inclusion and exclusion criteria were as follows:

Inclusion criteria –

1. Males and females 25 to 80 years of age

Exclusion criteria –

1. Patients with open fractures,
2. Fracture of bilateral distal radius.
3. Associated Fractures shaft of radius or ulna.

The patients who visited the hospital with extra and intra-articular distal radius fractures, who had been managed surgically and came for follow-up (at least six months) were taken up for study after taking consent from them for the study. Post-operative x rays of the wrist in antero-posterior and lateral views were taken.

Radial inclination, volar tilt, residual step, radial height and ulnar variance were analysed. Fracture classification was done based on AO classification. [2] Pain and function score were graded according to PRWE (Patient Rated Wrist Evaluation) [3] (which has 50 points each for pain and function score, being 0 denotes least pain and least difficulty in performing function) and overall results were recorded according to Demerit point system Score [4,5] as poor, fair, good and excellent. Functional grading was made depending on pain, mobility, work, grip strength. Radiological grading was made based on radial height, radial Inclination, volar tilt, ulnar variance and intra articular step.

## Results

We retrospectively studied 120 Patients, with intra-articular and extra articular distal radius fracture in which 30 each were managed by volar plating and JESS fixator,

30 by percutaneous pinning and 30 conservatively. Most-common-age group was between 40-60 yrs. which constituted 28.8% of cases. There were 73 males (65%) and 47 females (35%). RTA was the most common mode of injury in our study in young patients and trivial fall in geriatric patients followed by fall from height and assault. AO type C1(31.25%) was the most common fracture followed by, B1(20.8%), C2(20%), B3(12.5%), & B2(8%) and C3 5%

Mean pain score:

There were less pain scores among the patients who retained the radial inclination ( $P=0.01$ ), radial height ( $p<0.01$ ), in patients with no intraarticular step ( $P=0.053$ ), neutral ulnar variance.

Mean function score:

There were less function scores among the patients who retained the radial inclination ( $p<0.01$ ), radial length ( $p<0.01$ ), and in patients with no intraarticular step ( $P=0.003$ ). Among the patients who had intra articular step function scores were less with the patient who had less than 2 mm step( $P<.01$ ). Some patients had good function score in spite of radiological parameters being affected. Those were mainly patients with less physical demands. Excellent results were seen in 60% of cases, Good in 15%, fair in 15% and poor in 10% of cases. Affection of radiological parameters (radial inclination, radial length, Intra articular step and palmar tilt, ulnar variance) had effect on final outcome.

Excellent results (77% of excellent results were among less than 40 years age group) were more in younger age group ( $p<0.01$ ). Post-surgery good and excellent results were more among patient where radiological parameters were restored. Better outcome was seen in patients where post-surgery number of radiological parameters restored were more in number ( $p<0.01$ ).

## Discussion

Distal radius fractures are one of the most common fractures treated. Outcome mainly depends on factors like type of fracture and modality used. Treatment should aim to restore radiological parameters, reduction and functional status of patient. Studies have been done to study relationship between anatomical reconstruction and the functional outcome. [1,6]

Functional and radiological outcome, after management in our study depended on age, fracture type, modality of treatment. The time of union was less in younger patients.

Basset concluded that Range of motion was significantly higher in cases that underwent ORIF. Scores (general, work, appearance, final, and MHOC) were significantly higher in cases that underwent ORIF. In subjects who underwent ORIF, pain score was significantly lower. [7] similar observations were made in this study.

Jakim I in his prospective study of 132 patients with an average age of 35 years, with unstable intra-articular fractures of the distal radius treated by external fixator reported only 15 cases required limited open reduction. 83% of patients had good or excellent results. There was a statistically significant correlation between the severity of the fracture and the clinical outcome, irrespective of radiological restoration. [8] In this study mean pain score and mean function score were better in internal fixation group as compared to external fixation group (21.3 and 19.8 respectively as compared to 11.7 and 12.8 in ORIF group) Articular and soft-tissue damage following violent compressive forces may lead to a degree of functional impairment.

Porter in his study identified the factors affecting prognosis following distal radius

fracture. One hundred fifteen patients were assessed six months and two years following initial injury. On final assessment, subjectively, 56% had good, 39% had fair, and 5% had poor results. Median grip strength improved from 51% to 78%, range of movement from 87% to 94%, and wrist torque from 93% to 100%. Redisplacement occurred in 59%; only 33% clinically and 19% radiologically had perfect cosmetic results. Radial malunion was important functionally. Only when the dorsal angle exceeded 20 degrees or the radial angle fell below 10 degrees with a 30 degrees mean was there reduction in grip strength ( $p = 0.05$ ). Comminution and intraarticular involvement predisposed to a median loss of movement of 15% and 11%, respectively ( $p =$  less than 0.05). Patients requiring physiotherapy formed a poor prognostic group. [9] Similar results were reported in this study. A combination of factors is responsible for poor results. Attention should be directed toward early and adequate rehabilitation of the injured hand and wrist.

Karnezis IA in his study concluded that residual articular incongruity correlates with persisting loss of wrist dorsiflexion and wrist dysfunction contradicts the view that loss of articular congruity is associated with late development of articular degeneration but not with early wrist dysfunction. Additionally, this study failed to show any association between the fracture type and the functional outcome as rated by the patients. [10]

The radiological parameters which were considered in our study were loss of radial inclination and radial height, presence of intra-articular step, volar tilt and ulnar variance. The range of movements was directly related to the number of these parameters affected, in most of our patients.

Loss of volar tilt and radial height, presence of intra-articular step, ulnar variance in wrist and affection of radiological parameters have been reported to affect the functional outcome in many studies. [11]

### Conclusion

The radiological parameters have an effect on functional outcome in our study at final follow up especially in young active

individuals. The more the number of radiological parameters affected poorer is the functional outcome. Best results were obtained by volar plating followed by percutaneous pinning, jess fixator and conservative management.

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