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A FUNCTIONAL AND RADIOLOGICAL CORELATION OF TREATED INTRAARTICULAR DISTAL END RADIUS FRACTURES IN ADULTS

Orthopaedics

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ABSTRACT

Introduction: Fractures of distal end of radius are one of the most common skeletal injuries encountered in orthopaedics. Treatment of intraarticular distal radius fractures in adult patients is controversial. There is no consensus on treatment and on which outcome measures are the most suitable for research and clinical practice.The study had been taken up to assess the corelation between radiological parameters and functional outcome in treated patients posttreatment with intra-articular distal end radius fracture

Aims and objective :- To Study Functional And Radiological Corelation Of Treated Intra-articular Distal End Radius Fractures In Adults.

Material and method: The study involves 50 patients with intraarticular fracture of distal end radius ,treated either conservatively or operatively. The patients of age group 31 to 50 yrs, either sex with closed intraarticular distal end of radius fractures were included in study. All the 50 patients evaluated after treatment with the help of clinical, functional and radiological parameters for a period of 9 months.

Results: In our study, the mean values for Radiological Findings at 9 months were as follows: Radial length – 8.52 mm, Radial Inclination – 18.72 degrees, Dorsal tilt - 3.04 degrees. The total PRWE score changes from mean PRWE score 70 at 1½ months , to 29.96 at 4½ months, to mean PRWE Score 8.8 after 9 months . At 9 months Post treatment in 39 (78%) patients with Good radiological score, 37 (74%) were having minimal grade of PRWE score and 2 (4%) patients were having mild grade of PRWE score. Also in 11 (22%) patients with Fair radiological score, 8 (16%) were having minimal grade of PRWE score and 3 (6%) patients were having mild grade of PRWE score.

Conclusion: The majority of the patients had a good to excellent radiographic score but only radial length had strong positive corelation with the objective functional PRWE score statistically. So radial length was the most important radiographic parameter to be restored to obtain good and fair functional outcome in intraarticular distal radius fracture in young adults. . Small variations of other radiographic parameters donot affect the functional outcome at minimum 9 months follow-up.

KEYWORDS

Treated Intraarticular, Distal End Radius Fractures, PRWE score, Corelation, Adults

INTRODUCTION:

Fractures of the distal end of radius are one of the most common fractures encountered in Orthopaedic practice encompassing 16% of all fractures[11]. About 50% of fractures of the distal radius involve the articular surface. Intra-articular fractures of the distal radius represent a therapeutic challenge as compared with unstable extra-articular fractures for Orthopaedic surgeons. While achieving good fracture alignment may be significant, the actual functional importance of anatomical reduction is controversial. The assumption that functional outcome is better by restoration of anatomy is argued. Various clinical[1,3,5] and biomechanical studies[2,4] have shown the benefits of restoring anatomical reduction for better functional outcomes. However other studies[9,10] have demonstrated that restoring normal anatomy does not offer better functional outcomes. There is no consensus on treatment and on which outcome measures are the most suitable for research and clinical practice.The study had been taken up to assess the corelation between radiological parameters and functional outcome in treated patients with intra-articular distal end radius fracture . Moreover, we evaluated alignment of fracture and post-operative range of motion of wrist joint.

MATERIALS AND METHODS :

The study was conducted in the Department of Orthopaedics and Rehabilitation, RNT Medical College & Hospital, Udaipur, between Jan. 2016 to Dec. 2017. Total 50 patients of intraarticular fracture of distal end radius, were included in study for regular follow up.

INCLUSION CRITERIA

1. Patients age group 31 to 50 yrs.
2. Patients with closed fractures.
3. Patients with intra-articular fractures.
4. Patients who are fit for surgery.
5. Patients who had regular follow up at 1½, 3 months, 4½ month, 6 months and 9 month.
6. Patients who had supervised physiotherapy during immediate post op period.

EXCLUSION CRITERIA

1. Patients with open fractures.
2. Pre existing arthritis and any other disease of wrist joints.
3. Patient with pathological fracture. Patient with associated neurovascular injury.
4. Patients who did not follow up regularly.
5. Patient's whose follow up data was inadequate for the study.
6. Patients had skeletal injury other than fracture of lower end of radius and ulna.

All the 50 patients with intraarticular distal end radius fracture were evaluated after treatment with the help of given clinical, functional and radiological parameters. Clinical Parameters included range of motion i.e. active wrist flexion, active wrist extension, radial deviation and ulnar deviation. Radiological Parameters included radial length, radial inclination and ulnar variance in anteroposterior view of wrist and palmar/dorsal tilt in lateral view of wrist. This study is based on AO classification of distal radius fractures. Functional evaluation of wrist is done by PRWE (Patient Rated Wrist Evaluation) score. The PRWE has been shown to be reliable, valid and responsive in patients with distal radius fractures. The Patient-Rated Wrist Evaluation (PRWE) [6] are structured questionnaires that are widely used in patients with wrist diseases.

RESULTS:

There were 16 (32%) patients in the age group of 31-35 years, 13 (26 %) in the age group 36-40 years, 9 (18 %) in the age group 41-45 years, and 12 (24%) between 46-50 years. In our study, 28(56%) patients were injured due to Road Traffic Accidents, while 7 (15%) were injured due to fall from height and 15 (30%) were injured due to fall on ground. Out of 50 patients enrolled in the study, Distribution as per AO

Classification of fracture was 4 (8%) for B1, 7 (14%) for B2, 11 (22%) for B3, 16 (32%) for C1, 10 (20%) for C2, 2 (4%) for C3. Out of 50 patients, Close reduction & immobilization was used on 10 (20%) patients, Close reduction & internal fixation with k wire on 13 (26%) patients and Open reduction & internal fixation with volar plate on 27 (54%) patients.

Figure 1 :The total pain and disability reported in the PRWE questionnaire presented with the number of patients :

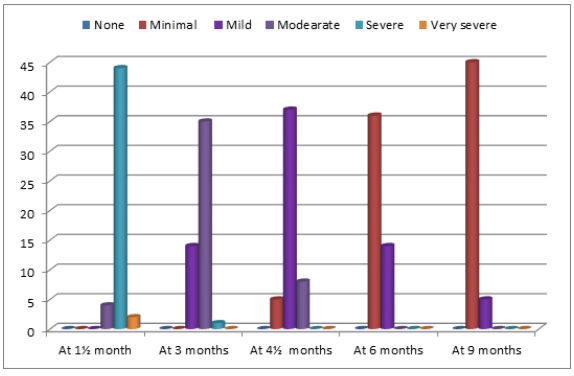


Table 1: Mean score of PRWE score

S.No.	PRWE score of	Mean score at				
		1½ month	3 month	4½ month	6 month	9 month
1	Pain (P)	30.4	18	11	6.1	2
2	Function (F)	39.6	28	19	12.2	6.86
3	Total (T)	70	45.9	29.96	18.3	8.8

Table 1 shows the mean scores for the three subscales and the total PRWE score. The total PRWE score changes from mean severe pain and disability at baseline (mean score 70), through mild 4½ months later (29.96), to minimal pain and disability after 9 months (8.8).

Table 2. Mean score of various radiological parameters

S. No.	Radiological parameters	Mean score at				
		1½ month	3 month	4½ month	6 month	9 month
1	Radial length (in mm)	8.74	8.58	8.56	8.56	8.52
2	Radial inclination (in degree)	18.36	18.16	18.26	18.32	18.72
3	Dorsal tilt (in degree)	3.06	3.16	3.04	3.04	3.04

Table 3. Correlation between radiological and functional outcome

Radiological parameters	Functional outcome	
	PRWE score of pain (P) at (1½ M-9 M)	PRWE score of Function (F) at (1½ M-9 M)
Mean Dorsal tilt (1½ M-9 M)	+ 0.783	+ 0.783
Mean Radial inclination (1½ M-9 M)	- 0.400	- 0.537
Mean Radial length (1½ M-9 M)	+ 0.975	+ 0.975

Correlation coefficient calculated using spearman correlation coefficient

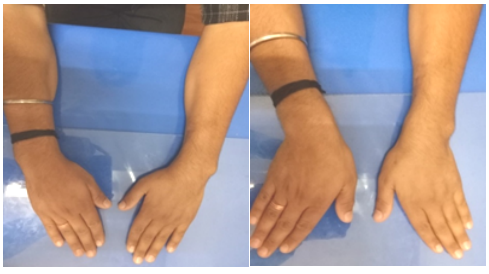
- If spearman corelation coefficient (rs) = +1 this indicates that there is a perfect positive association two variables.
- If rs = -1 this indicates that there is a perfect negative association between two variables.
- If rs < ± 0.50 this indicates that there is a positive or negative weak association between two variables.
- If 0.70 > rs > ± 0.50 this indicates that there is a moderate positive or negative association between two variables.
- If rs > ± 0.70 this indicates that there is a strong positive or negative association between two variables.

Case No. 1 : FRACTURE TYPE B3 (AO)

Preoperative X-ray (left side) | Postoperative X-ray at 3 month | Postoperative X-ray at 6 months

CLINICAL PICTURES AT 6 MONTHS

FLEXION | EXTENSION



RADIAL DEVIATION | ULNAR DEVIATION

CASE-2: FRACTURE TYPE C1 (AO)

Preoperative X-ray (Right side) | Postoperative X-ray at 3 months | Postoperative X-ray at 6 months

CLINICAL PICTURES AT 6 MONTHS

FLEXION | EXTENSION

RADIAL DEVIATION | ULNAR DEVIATION

Discussion:

In our study radiological parameters like mean radial length consistently showing improvement from 1½ months to 9 months Posttreatment but mean dorsal tilt and mean radial inclination showing variable results.Figure 1 shows at 1½ month Post-treatment, out of 50 (100%) patients 44 (88%) patients were having severe grade of pain and disability under PRWE grading while at 4½ month 37 (74%) patients came under mild grade of pain and disability under PRWE score and at 9 months Post-treatment out of 50, 45 (90%) patients were having minimal grade of pain and disability under PRWE score.

There is weak negative to strong positive corelation between the radiological parameter like mean radial inclination and mean dorsal tilt Post-treatment at 1½ ,3 ,4½, , 6 and 9 month and the patient's disability presented with the pain (PRWE Pain subscale), difficulties doing tasks (PRWE Specific activities subscale) and problems experienced while involved in life situations (PRWE Usual activities subscale) at respective time period statistically.

At 9 month Radial length was the only radiological parameter affected which was responsible for fair grade of radiological scoring in 11(22%) patients. While at the same time Radial length (41%) was maximally affected parameter followed by Dorsal tilt (31%) and Radial inclination (27%), responsible for Good grade of radiological scoring in 39 (78%) patients.

In our study It was found that, there was a strong positive corelation between radiographic outcome specially radial length and the objective functional outcome.

In a study by Batra et al.[8] radial length was the radiographic parameter most strongly correlated with final functional outcome; loss of normal VT and RI were also associated with functional outcome but to a lesser extent. A similar study published by MacDermid in 2002 evaluated the factors that are predictors for pain and disability six months after a distal radius fracture and concluded that the physical impairments (grip strength, ROM, dexterity) are not significant pain and disability predictors, but these three factors are: educational level, compensatory status and the initial radial shortening.[7]

Conclusion:

- In this study the statistically positive corelation between radiological and objective functional outcome in younger patients suggests that regular follow-up radiographs are required to assess that reduction of the fragments is maintained till fracture union is achieved.
- Radial length was the most important radiographic parameter to be restored to obtain good and fair functional outcome in distal radius fracture in adult patients. Small variations of other radiographic parameters donot affect the functional outcome at minimum 9 months follow-up
- Further prospective randomized studies with more number of patients with longer duration should be done aiming to compare radiological and functional outcomes of different treatment modalities in different fracture types to be able to come up with a local standard protocol for managing these fractures locally.

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