



## Comparison of Conservative Vs Operative Treatment of Intra-articular Distal End Radius Fracture (Study during COVID 19 pandemic)

Dr. Bhagya Shah<sup>1</sup>, Isha M. Shah<sup>2</sup>, Dr. Sarvang Desai<sup>3</sup>, Dr. Manish R. Shah<sup>4\*</sup>

<sup>1</sup>2<sup>nd</sup> year resident, <sup>2</sup>2<sup>nd</sup> year MBBS student, <sup>4</sup> MBBS, M.S. Associate Professor, <sup>3</sup>MBBS M.S.

Professor and Head of Department,

<sup>2</sup>GMERS Medical College, Gotri, Vadodara-390021, Gujarat, India

<sup>1,3,4</sup>Department of Orthopaedics, Dhiraj Hospital, Smt. B. K. Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth Deemed to be University, Waghodia, Vadodara-391760, Gujarat, India

**\*Corresponding Author:**

**Dr. Manish R. Shah**

MBBS M.S. (Orthopaedics), Associate Professor, Department of Orthopaedics, Dhiraj Hospital, Smt. B. K. Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth Deemed to be University, Waghodia, Vadodara-391760, Gujarat, India

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

### Abstract

**Background:** Distal radius fractures are one of the most common injuries encountered in orthopaedic practice. Though conservative treatment remains a reasonable option, the use of internal fixation for unstable distal radial fracture is increasingly becoming popular. Due to COVID 19, a pandemic higher number of patients were forced to get conservative management due to two reasons; one being fear of acquiring COVID infection while being admitted to hospital setup and, the second patients showing suspicious signs and symptoms of COVID and coming positive when tested with RTPCR pre-operatively. So keeping in mind conditions like COVID our concern was to assess that the functional and clinical outcomes of patients with intra-articular distal end radius fracture treated operatively are comparable with those treated conservatively.

**Material and methods:** We studied 50 patients of intra-articular distal end radius fracture for 10 months. Outcome of conservative and operative groups was assessed by Mayo wrist score.

**Results:** Radiological parameters improved better with operative intervention. Mayo wrist score was better in operative group than in conservative group.

**Conclusion:** Distal radius fracture is one of the most common fractures but in situations like COVID 19 pandemic, patients were forced to get managed conservatively which normally would have been operated and thus compromising the overall functional outcomes of the patient.

**Keywords:** distal radius fracture, COVID 19, Mayo wrist score, radius plating, percutaneous distal radius fixation, conservative treatment for distal radius fracture

### Introduction

Distal radius fractures are one of the most common injuries encountered in orthopaedic practice. They make up 8%–15% of all bony injuries in adults <sup>[1]</sup>. The fracture pattern most observed in the geriatric age group is extra-articular while the high-energy intra-articular type is most frequent in young adult patients <sup>[2]</sup>. Distal radius fractures have a bimodal

age distribution in the population, with a peak incidence seen in patients younger than 18 years and the second peak in patients 50 years or older.

Though conservative treatment remains a reasonable option <sup>[3]</sup>, the use of internal fixation for unstable distal radial fracture is increasingly becoming popular <sup>[4,5]</sup>.

Plating is now emerging as the gold standard for the management of distal radius fractures due to increased rate of complications such as mal-union, subluxation/dislocation of a distal radioulnar joint or late collapse of fracture by a conservative method.

Distal radial fracture characterization and treatment are mainly based on radiographic measurements. Unfortunately, evidence is lacking to correlate acceptable radiographic measurements to clinical outcomes [6]. However, there is evidence that poor radiological measurements can be associated with poor clinical results [7]. There is conflicting evidence in the current literature regarding the 'acceptable' radiological indices for the surgeon and the correlation with functional outcomes, in patients with a displaced distal radial fracture [7, 8]. This is due to the wide spectrum of injury patterns sustained, different methodologies used by the investigators, and the number of potential parameters studied. Treatment aims to be a pain-free, mobile wrist joint without functional limitations [8].

Due to COVID 19, a pandemic higher number of patients were forced to get conservative management due to two reasons; one being fear of acquiring COVID infection while being admitted to hospital setup and, the second patients showing suspicious signs and symptoms of COVID and coming positive when tested with RTPCR pre-operatively. Patients were also forced to get conservative treatment because of issues like non-availability of beds in hospitals, difficulty in procuring oxygen, comorbid conditions of patients, and difficulty in getting final fitness from the anaesthesia department due to the ongoing pandemic. So as a surgeon we are forced to do conservative management even if surgical intervention is indicated. So keeping in mind conditions like COVID our concern was to assess that the functional and clinical outcomes of patients with intraarticular distal end radius fracture treated operatively are comparable with those treated conservatively.

### **Aim & objectives:**

**Aim:** To compare functional and clinical outcomes of operative and conservatively treated patients of distal radius fractures in adults.

### **Objectives:**

**Primary:** To measure mayo wrist score at the end of 6 months in patients of intraarticular fracture managed conservatively or operatively.

**Secondary:** To analyze complications associated with conservative as well as operative modalities.

### **Material and Methods:**

Prospective observational study was conducted in tertiary care medical college set up. All cases of intra-articular distal end radius fracture patients with age more than 18 years were selected as per inclusion and exclusion criteria mentioned below.

Total 50 patients were registered for the study. They were divided in two groups- operative and conservative treatment groups (25 in each group). Purposive sampling was done.

### **Operative definitions:**

- 1) Conservative Management – Close Reduction and cast application for 5 to 6 weeks.
- 2) Operative Management – Fracture reduction and fixation with implants (plate, k wire).

### **Inclusion Criteria:**

1. All cases of distal end radius fracture >18years of age
2. Fresh fracture injury (Treated within 1 week)
3. Frynkman`s classification [III to VIII]
4. Closed injuries
5. Patients who want to participate in this program
6. Patients are willing to follow up for more than 2 months

### **Exclusion criteria:**

1. Open injuries
2. Frynkman`s classification {I-II}
3. Old fracture injury (more than 1 week)
4. Patients who don't want to participate in this program
5. Patients who do not have a minimum two-month follow-up

### **Methodology**

After getting approval from the ethical committee, according to defined inclusion and exclusion criteria patients of either gender with fractures of the distal end of the radius were included in our study. Patients were explained the reason for conservative management due to COVID.

All cases underwent a pre-operative X-ray of the affected wrist (AP, Lateral). Radial height, radial tilt, and radial angulation were measured. Patients who were fit for surgery were enrolled in the operative group and were given below elbow slab preoperatively. Routine pre-anesthetic check-ups and additional investigations were done whenever indicated. In this group, patients were treated with fracture reduction and fixation with implants. Post-operatively standard antibiotics and analgesics were given according to the protocol. If there were no postoperative complications, the patient was discharged after 48 hours of hospital stay.

Patients who were not fit for surgery (COVID 19 infection, financial restraints, old age, and/or comorbidities) and thus were forced to undergo conservative management were enrolled in the conservative group. Such patients underwent close reduction and below elbow plaster under sedation/anaesthesia and were observed for 24 hours for oedema and complications. In follow up on 1<sup>st</sup>

and 2<sup>nd</sup> week of procedure, plaster may have been changed if the displacement of reduction is seen in X-ray. All treated patients post-operatively / post-procedure underwent X-ray wrist (AP, Lateral) in which radial height, radial tilt, and radial angulation were re-evaluated. All treated patients were advised physiotherapy (active thumb and finger movements). Patients were asked to follow up at 1 week, 2 weeks, 6 weeks, 12 weeks, and 24 weeks. Routine follow-ups with radiographs were obtained at 6 weeks, 12 weeks, and 24 weeks.

Surgical and functional outcomes were assessed during the follow-up visits using the Mayo wrist score.

**Results:**

We studied 50 patients for 10 months. Age was ranging from 19 years to 80 years [mean-50.5 years]. In our study, 27 patients were males [54%] and 23 patients were females [46%] [Table 1].

SEX	No.	%
Male	27	54
Female	23	46

**Table 1 patient demographics**

Most of the male patients in our study were manual labourers and females being Housewives. Duration of hospital stay in patients managed conservatively was 1-3 days [average 2 days] whereas 7-10 days [average 8 days] in patients with operative intervention. In conservatively managed 25 patients [50 %] we had done close reduction with plaster under the guidance of IITV with sedation [Figure 1]. Whereas in another 25 patients [50%] were managed operatively [Figure 2, 3]. Out of 25 patients managed operatively, 10 [40%] were operated on with close reduction and percutaneous K wire fixation, and another 15 patients [60%] were managed with open reduction internal fixation with plating [Table 2].

	Conservative	Operative	
	Below elbow plaster	CR+ k wire	ORIF+Plating
Patients	25	10	15
Percentage	50	20	30

**Table 2 showing the percentage of patients managed with different modalities**



**Figure 1 Showing conservatively managed distal radius fracture**



**Figure 2 Distal end radius managed with close reduction and with percutaneous k wire fixation**



**Figure 3 Showing distal radius fracture managed with open reduction and plate fixation**



Patients managed conservatively, were immobilized for 5-7 weeks [mean 6 weeks] and in operative group for 3-5 weeks [Mean 4 weeks]. In conservative group, patients were given below elbow cast for immobilization whereas in operative group of patients, below elbow splintage was given. Union was assessed by primary callus formation in conservative group and operative group treated with percutaneous k wires. In patients with open reduction

internal fixation with plate no callus formation was seen (secondary intention healing) but no signs of non-union were present. At the end of follow up patients were assessed with radiographic measurements.

Radial height ranges from 2-18 mm [mean 10.24 mm], radial angulation ranging from 5-26 degrees [mean 13.32 degrees], dorsal tilt 5-33 degrees [mean 14.88][Table3].

Parameters	Radial Height	Radial angulation	Dorsal tilt
Normal Range	8-18 mm	13-30 degrees	0-28 degrees
Range in our study group	2-18	5-26	5-33
Mean	10.24	13.32	14.88

**Table 3 Radiographic Measurements**

Patients managed conservatively had a union of fractures at 4-6 weeks [mean 5 weeks] and in operatively managed patients at 3-5 weeks [mean 4 weeks].

In our study, we assessed the functional outcome of patients with help of a mayo wrist score [Figure 4].

Category	Score	Findings	
Pain (25 points)	25	No pain	
	20	Mild pain with vigorous activities	
	20	Pain only with weather changes	
	15	Moderate pain with vigorous activities	
	10	Mild pain with activities of daily living	
	5	Moderate pain with activities of daily living	
	0	Pain at rest	
Satisfaction (25 points)	25	Very satisfied	
	20	Moderately satisfied	
	10	No satisfied, but working	
	0	No satisfied, unable to work	
Range of motion (25 points)	25	100% percentage of normal	
	20	75~99% percentage of normal	
	10	50~74% percentage of normal	
	5	25~49% percentage of normal	
	0	0~24% percentage of normal	
Grip strength (25 points)	25	100% percentage of normal	
	15	75~99% percentage of normal	
	10	50~74% percentage of normal	
	5	25~49% percentage of normal	
	0	0~24% percentage of normal	

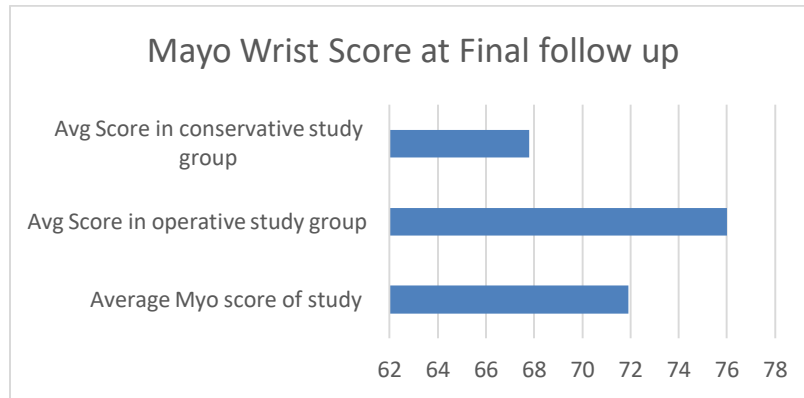
Final result (total points)	
90~100	Excellent
80~89	Good
65~79	Fair
<65	Poor

**Figure 4 Mayo Wrist Score**

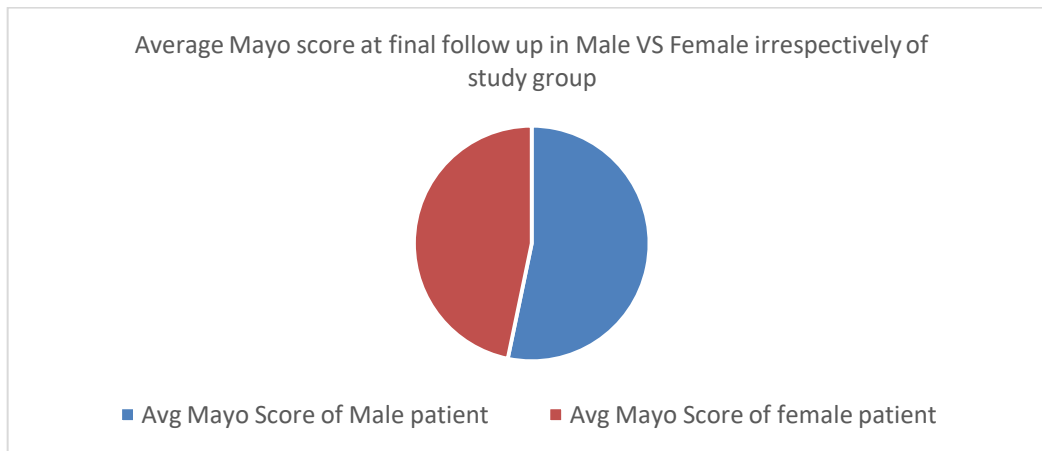
Our study showed that average Mayo Score at final follow up was 71.9 [Fair]

Average score of patients managed conservatively was 67.8 [Poor] whereas patients with operative intervention had Mayo score of 76 [Fair] [Chart 1].

In our study 27 patients were males and 23 patients were females, irrespective of study group males have shown better recovery than females with Average mayo score at final follow up to be 76.06 in males and 66.73 in female[ Chart 2].



**Chart 1 showing Mayo wrist score at final follow up**



**Chart 2 shows average mayo Score in male and female patients**

In our study, we faced complications in 4 patients of the operative management group. 3 patients out of 10 [30%] faced k wire back out and 1 patient out of 15 [6.67%] who were operated on for plating developed superficial infections managed conservatively by dressing and antibiotics. No other major complication was seen.

**Discussion**

Intraarticular distal end radius fractures are commonly encountered in orthopaedic practice which are usually fixed with operative intervention but because of COVID 19 pandemic, patients being

COVID 19 RTPCR positive preoperatively, non-availabilities of bed in hospitals, difficulty in procuring oxygen, comorbid condition of patients and difficulty in getting final fitness from anaesthesia department; were forced to get managed with close reduction and fixation with below elbow cast which would otherwise have been managed with operative intervention.

DJ pogue et al measured contact areas and pressures in the wrist and compared them between two groups of the wrist; one with a normal state and the other with varying degrees of simulated distal radius

fracture malunion and showed that load distribution in the lunate fossa was increased and was decreased in the scaphoid fossa on decreasing the radial inclination <sup>[1]</sup>. Sanjay Meena *et al* concluded that conservative management in case of low energy extraarticular fracture and ORIF in case of intraarticular fractures offered optimum outcomes <sup>[2]</sup>. In Avijit Barai *et al* study statistically significant difference was found between conservative and open reduction internal fixation management in distal end radius fracture with better functional outcomes and lower DASH scores in the conservative group <sup>[3]</sup>.

Markus Figi *et al* found that in the elderly fixed-angle plate allows good anatomical reduction and restoration of shape and function of the wrist with a lesser amount of complications and also showed a decreased rate of secondary reduction correction <sup>[4,5]</sup>. Janni Jensen *et al* studied radiological measurements with clinical outcomes in the case of distal end radius fracture and found no evidence to support the accuracy of the radiographic measurements commonly used to characterize a distal radius fracture <sup>[6]</sup>. C Y Ng *et al* studies concluded that patients with high functional demands should undergo articular reconstruction with less than 2 mm of step-off, the radius being restored within 2 mm of its normal length, and that carpal alignment should be restored <sup>[7,8]</sup>. Anzarut A *et al* study found that not much improvement of functional outcome was seen in patients with adequate radiographic reduction and thus suggests taking less aggressive approach for obtaining anatomic reduction <sup>[9]</sup>. The importance of soft tissue and muscle mass in the elderly was again proved by Breen L *et al* studies that age-related muscle wasting (sarcopenia) is accompanied by a loss of strength which can compromise the functional abilities of the elderly and thus even poorer outcomes with aggressive soft tissue dissection <sup>[10]</sup>. Another study, it showed that surgically treated patients tend to achieve greater motion and better grip strength early during recovery. However, there seemed to be no significant difference in motion and functional scores beyond six months, although several studies observed that grip strength was better in patients who underwent surgery. This study proves that the diminished grip strength in conservatively managed patients is multi-factorial and age-related anabolic changes impede their ability to regain muscle mass lost through prolonged immobilization. Based on

currently available evidence and institutional practice, cast immobilization should be the treatment option of choice for most distal radius fractures in the elderly, but special considerations for surgery should be given to active elderly patients who desire early motion and quicker return to function <sup>[11]</sup>. After 12 months of follow up, Arora R *et al* concluded that better grip strength was seen in the operative group throughout follow up time than in non-operative group but no difference was seen in a range of motion, level of pain, PRWE & DASH scores in both operative and non-operative groups <sup>[12]</sup>. A prospective study was carried out on 60 patients with fractures of the distal end radius. Fractures were classified according to the AO classification into type A (extra-articular), type B (partial articular), and type C (complete articular). After initial evaluation patients were taken up for either conservative or operative treatment and were followed up for two years. Anatomical results were evaluated according to Sarmiento's modification of Lindstrom criteria, which showed that excellent results were more frequent with open reduction and internal fixation using the plating technique. Clinical and functional results were evaluated according to the demerit point system of Gartland and Werley with Sarmiento modification, which was revealed to relate to the type of treatment techniques <sup>[13]</sup>.

Aparicio P *et al* showed in their study confirm the hypothesis that the conservative treatment of distal radius fracture produced an increase in the upper limb disability after 1 year of follow-up <sup>[14]</sup>. Ochen Y *et al* did a meta-analysis and showed that operative treatment of distal radius fractures improves the medium-term DASH score and grip strength compared with nonoperative treatment in adults, with no difference in overall complication rate and thus operative management might be more effective in younger and active adults <sup>[15]</sup>. Whereas Mishra P *et al* showed that surgically treated fractures in the elderly generally lead to good outcomes compared to conservatively managed elderly <sup>[16]</sup>.

Our results are comparable to other studies. Large number of patients treated by different authors can be considered strength of our study. However, long term multi centric study can by of more help to know long term results of such injury.

## Conclusion

Distal radius fracture is one of the most common fractures but in situations like COVID 19 pandemic, patients were forced to get managed conservatively which normally would have been operated and thus compromising the overall functional outcomes of the patient.

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