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Evaluating Functional Recovery in Distal Radius Fractures: Closed Reduction with Cast vs. Volar Plating

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Abstract

Background and Objectives: While many of the distal radius fractures fractures are relatively uncomplicated and can be effectively treated with closed reduction and casting, unstable intra-articular fractures can compromise joint integrity and lead to complications. This has led to a shift towards surgical management to address these issues. The aim of this study was to compare the functional outcomes of distal end radius fractures treated with closed reduction and cast application versus volar plating.

Material and Methods: This study involved a randomized prospective interventional approach in which all patients with distal radius fractures were included based on specific inclusion and exclusion criteria. A total of 70 patients were enrolled and followed for six months. They were evenly divided into two groups, with 35 patients receiving surgical treatment and the other 35 managed conservatively. Patients were scheduled for follow-up at 6 days, 6 weeks, 3 months, and 6 months, during which routine X-rays were taken, and the DASH scoring system was used to assess functional recovery.

Results: Patients who received operative management showed a significantly better "Good" DASH score for the affected hand at the 3-month mark. Fair scores were significantly higher

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among patients managed conservatively, and Excellent scores at 6 months were significantly higher in the operative management group.

Conclusion: This study suggests that surgical intervention for distal end radius fractures can reduce the risk of wrist joint stiffness and loss of reduction, resulting in good functional outcomes compared to conservative management.

Key Words: Radius Fractures, Wrist Joint, Intra-Articular Fractures, Humans

Introduction

Distal radius fractures are among the most common orthopedic injuries encountered in orthopedic departments. They account for a significant portion of all bone fractures and are more prevalent in young men and older females. These fractures often occur in young individuals during sports activities or accidents. In elderly individuals, the most common cause is a fall onto an outstretched hand. There are various specific variants of distal radius fractures, including Colles, Smith, Barton, and Chauffeur's fractures. Typically, the diagnosis is confirmed through X-rays, and it is usually based on clinical symptoms [1-4].

The anatomical alignment of the articular surface and the alignment of the distal section of the radius, both intra-articular and extra-articular, significantly impact the functional outcome in the treatment of distal radius fractures. The primary treatment goal is to use an immobilization method that maintains the reduction in the normal anatomical position with minimal surgical morbidity. However, comparing the outcomes of the available published data is challenging due to the diversity of fracture patterns, different treatment modalities, and conflicting results in various studies.

Material and Methods

In this study, a total of 70 patients were enrolled and followed for a period of 6 months. They were evenly divided into two groups, with 35 patients in each group. Group 1 received surgical

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 10, 2023

treatment, while Group 2 received conservative treatment. All the patients had similar characteristics, and there were no notable differences in demographic information between the groups.

- Group 1 patients underwent closed reduction and casting.

- Group 2 patients were managed surgically with volar plating. The patients were positioned supine on the operating table, and regional or general anesthesia was administered as appropriate.

Follow-up assessments were conducted at 6 days, 6 weeks, 3 months, and 6 months after the initial treatment, and the functional outcomes were assessed using the DASH (Disabilities of the Arm, Shoulder, and Hand) scoring system.

Inclusion criteria for the study were as follows:

1. Patients aged over 18 years.

2. Patients with distal radius fractures resulting from road traffic accidents, slips or falls on outstretched hands, or assaults.

3. Closed fractures.

Exclusion criteria included:

1. Patients who did not provide consent.

2. Pathological fractures.

3. Fractures involving vascular injury.

4. Fractures with neurological involvement.

5. Infection or poor skin conditions at the operative site.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 10, 2023

Radiographic evaluation was carried out using posteroanterior (PA) and lateral X-ray views of the affected wrist. Surgical interventions were performed as follows:

The outcomes of this study were assessed using the following parameters:

1. DASH (Disabilities of the Arm, Shoulder, and Hand) score.

2. Range of motion measurements for wrist joint flexion, extension, forearm supination, forearm pronation, ulnar deviation, and radial deviation.

Results

The majority of the study population fell into the 31-40 years age group, with a male-to-female ratio of 0.89:1. Most of the participants had injuries on their right wrists. According to Frykman's Classification, Type 3 fractures were the most common (Table 1).

Table 1: Clinico-demographic variables of study population

Variable	n	%
Age group (Years)		
21-30	21	30.00
31-40	23	32.86
41-50	9	12.86
51-60	5	7.14
>60	12	17.14
Gender		
Females	37	52.86
Males	33	47.14
Site of Fracture		
Left Wrist	30	42.86
Right Wrist	40	57.14
Frykmans Type		
1	9	12.86
2	9	12.86
3	23	32.86
4	7	10.00
5	7	10.00
6	5	7.14
7	2	2.86
8	7	10.00

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 10, 2023

When comparing operative and conservative management using a chi-square test, a significant difference was found in the Affected hand post-reduction DASH score at 6 days, with fair scores being significantly higher in the conservative management group. However, at 6 weeks, there was no significant difference in the DASH score between the operative and conservative management groups. Notably, at 3 months and 6 months, there was a significant improvement in the DASH score in the operative group (Table 2).

Table 2: Post reduction DASH scores in affected hand

DASH Score	Management Type		p Value
At 6 weeks	Operative (n=35)	Conservative (n=35)	
Good	5	2	0.81
Fair	25	28	
Poor	5	5	
At 3 months			
Excellent	2	0	<0.05
Good	19	9	
Fair	9	21	
Poor	5	5	
At 6 months			
Excellent	35	16	<0.05
Good	0	14	
Fair	0	5	

The comparison of the Affected limb pre-reduction DASH score at 6 days, 6 weeks, 3 months, and 6 months based on Frykman's Classification Type, using the chi-square test, did not reveal a significant association between the Affected limb pre-reduction DASH score and Frykman's Classification Type.

Discussion

Distal radius fractures are common and often mismanaged injuries [5]. Many studies have aimed to determine the most effective surgical treatment method for these fractures. Osada et al. [5] noted a growing preference for open reduction and internal fixation, particularly with

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the introduction of locked volar plates. Previous studies have frequently used subjective tools, such as the Gartland and Werley calculation and the DASH calculation, to assess quality of life, while others have emphasized radiographic parameters after surgical reduction [6-8].

In our study, the majority of the participants were in the 31-40 years age group. Similar to our findings, Kevin and Chung [9] reported an average patient age of 48.9 years, ranging from 18 to 83 years. Arora et al. [10] mentioned an average patient age of 57 years (ranging from 17 to 79 years), and Killic A et al. [11] reported an average age of 45 years (18-77 years). In our study, 47.14% were male, and 52.86% were female. This gender distribution is in line with Chavhan AN et al. [12], who found that 71.4% of their patients were female, and Hanae Minegishi et al. [13], who included 80% females and 20% males in their study. Fok WM et al. [14] reported a distribution of 57.7% males and 42.3% females, whereas Tank Gyaneshwar's study [15] had 65% females and 35% males.

In our study, a significant number of patients had injuries on the right wrist. Khan et al. [16] reported that 63% of cases involved the right wrist, while Testa et al. [17] found that, in their surgical group, type A fractures represented 20.5%, type B fractures 38.46%, and intra-articular fractures 41%. In the conservative group, they observed 36% type A fractures, 40% type B fractures, and 23% type C fractures.

The DASH questionnaire is a widely used tool to assess difficulties related to the arm, shoulder, and hand from the patient's perspective. It evaluates the extent of difficulty in performing physical activities, the severity of symptoms, and the impact of the health issue on the patient's daily functioning [6].

Furthermore, in our study, we observed that patients in the operative management group had significantly better DASH scores at 3 months, with a greater proportion achieving a "Good" score. Conversely, the "Fair" score was significantly more prevalent among patients in the

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conservative management group. By the 6-month follow-up, the "Excellent" score was notably higher in the operative management group. These findings are consistent with a study by Ochen et al. [8], which, while analyzing data from all age groups, also reported significantly better DASH scores in patients who underwent operative management for distal radius fractures compared to those who received non-operative treatment.

Conclusion

This study strongly suggests that open reduction and internal fixation (ORIF) with a plate and screws is the preferred treatment approach for distal radius fractures.

Conflict of interest: none

Source of funding: none

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