

**ORIGINAL RESEARCH**

# Assessment of complex regional pain syndrome in association with fracture distal radius reduction method: A tertiary care centre

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**ABSTRACT**

**Background:** One of the most prevalent fractures is the distal radius fracture (DRF), and its frequency is steadily rising. The present study was conducted to assess complex regional pain syndrome in association with fracture distal radius reduction method. **Materials & Methods:** 104 patients with distal radius fractures of both genders. All were informed regarding the study and their written consent was obtained. Data such as name, age, gender etc. was recorded. A thorough clinical and physical examination was carried out. Patients were divided into 2 groups based on incidence of complex regional pain syndrome (CRPS). Group I had CRPS and group II had not. Risk factors were recorded. **Results:** Reduction method used was open in 16 and 32 and closed in 18 and 38. Application of external fixator was done in 7 and 15, with ulnar fracture in 11 and 17 and with open fracture in 12 and 20 patients in group I and II respectively. The difference was significant ( $P < 0.05$ ). Risk factors for CRPS were mean age (years), seropositive RA, reduction method, with ulnar fracture and open fracture ( $P < 0.05$ ). **Conclusion:** The incidence of CRPS-I following DRF surgery was low. Patients with rheumatoid arthritis and difficult fractures who are susceptible to developing CRPS-I require close observation.

**Keywords:** distal radius, fracture, complex regional pain syndrome

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**INTRODUCTION**

One of the most prevalent fractures is the distal radius fracture (DRF), and its frequency is steadily rising. The most susceptible age groups for these fractures are youngsters under the age of eighteen and individuals over fifty.<sup>1</sup> Only hip fractures are more prevalent than distal radius fractures in adults over 65. The age group of 75–84 years old has the highest prevalence of DRF (351.5 per 100,000 yearly). Age affects the occurrence of distal radius fractures in specific sexes.<sup>2</sup> Men are more likely than women to sustain this fracture in groups of up to 50. This kind of fracture is more common in women over 50. The two biggest causes of fractures in this youthful age are automobile accidents and sports-related injuries. Low-energy trauma is the primary cause in the second group.<sup>3</sup>

Of the treatment modalities, we may distinguish non-operative techniques, which include closed reduction and the use of a plaster cast. On the other hand,

surgical procedures such as Kirschner wire stabilization, external fixation, and open reduction and internal fixation (ORIF) are available.<sup>4</sup> The main factor driving the rising use of surgical techniques is the frequency of complications that follow non-surgical therapies. Three types of problems can arise from the treatment of distal radius fractures. The first category of consequences consists of compartment syndrome, skin damage sustained during manipulation, and nerve injury.<sup>5</sup> Early problems (within six weeks) include tendon rupture, infection, and loss of reduction. These are included in the second group. The final category of complications consists of late problems, which happen beyond six weeks and include complex regional pain syndrome and arthrosis.<sup>6</sup> The present study was conducted to assess complex regional pain syndrome in association with fracture distal radius reduction method.

## MATERIALS & METHODS

The present study was conducted on 104 patients with distal radius fractures of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough clinical and physical examination was

carried out. Patients were divided into 2 groups based on incidence of complex regional pain syndrome (CRPS). Group I had CRPS and group II had not. Risk factors were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

Total- 104		
Gender	Males	Females
Number	68	36

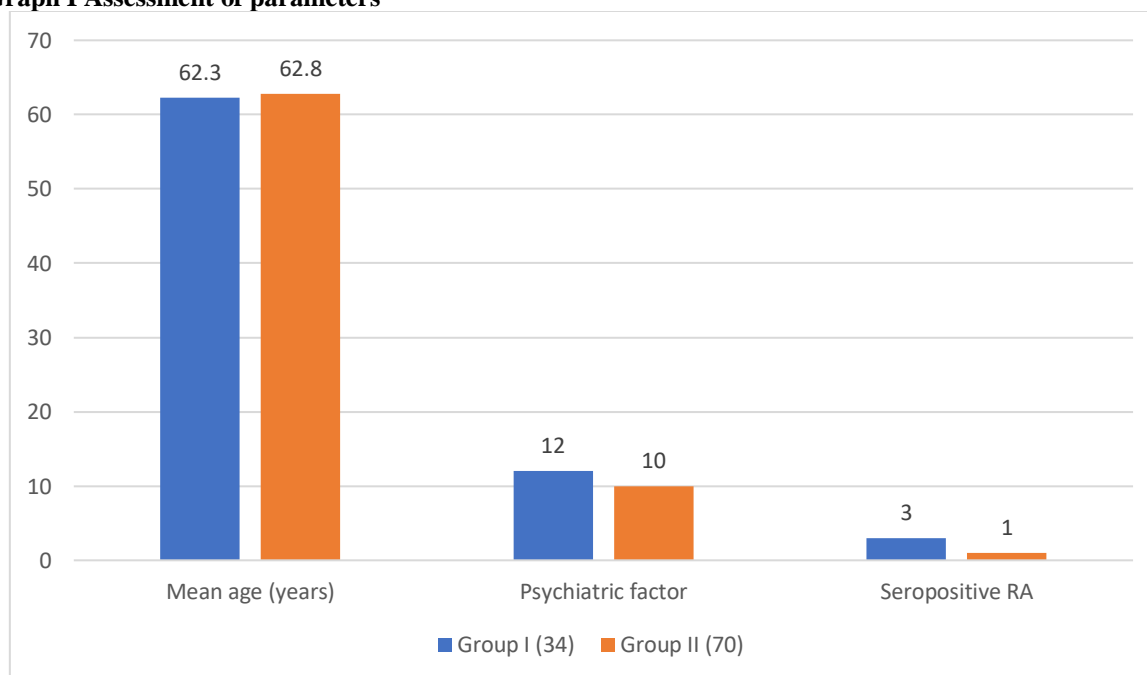
Table I shows that out of 104 patients, males were 68 and females were 36.

**Table II Assessment of parameters**

Parameters	Group I (34)	Group II (70)	P value
Mean age (years)	62.3	62.8	0.97
Psychiatric factor	12	10	0.82
Seropositive RA	3	1	0.05

Table II shows that mean age was 62.3 years in group I and 62.8 years in group II. Psychiatric factor was seen in 12 patients in group I and 10 patients in group II. Seropositive RA was seen in 3 patients in group I and 1 in group II. The difference was significant (P< 0.05).

**Graph I Assessment of parameters**



**Table III Comparison of treatment method**

Reduction method	Group I (34)	Group II (70)	P value
Open	16	32	0.01
Closed	18	38	0.05
Application of external fixator	7	15	0.01
With ulnar fracture	11	17	0.83
Open fracture	12	20	0.05

Table III shows that reduction method used was open in 16 and 32 and closed in 18 and 38. Application of external fixator was done in 7 and 15, with ulnar fracture in 11 and 17 and with open fracture in 12 and 20 patients in group I and II respectively. The difference was significant (P< 0.05).

**Table IV Multivariate logistic regression for predicting type 1 complex regional pain syndrome after distal radius fracture surgery**

Variables	aOR	95% CI	P value
Mean age (years)	1.6	1.7-2.5	0.01
Psychiatric factor	1.4	1.1-1.9	0.94
Seropositive RA	1.2	1.0-1.8	0.02
Reduction method	2.1	1.7-3.0	0.04
With ulnar fracture	1.6	1.2-2.3	0.01
Open fracture	1.9	1.4-2.7	0.05

Table IV shows that risk factors for CRPS was mean age (years), seropositive RA, reduction method, with ulnar fracture and open fracture ( $P < 0.05$ ).

## DISCUSSION

Persistent pain, mainly in the limbs, is the hallmark of complex regional pain syndrome (CRPS). There are two forms of the disorder: Type I appears as symptoms that follow a traumatic incident.<sup>7</sup> Distal radius fractures (DRFs), a prevalent cause of upper limb injuries resulting from fractures and surgical operations, are a typical cause of CRPS-1.<sup>8</sup> Conversely, type II is associated with damage to the nerves.<sup>9</sup> According to a different source on complex regional pain syndrome, trauma can cause either kind, with kind II being the only one where there is clear evidence of nerve damage. The differences in chronic pain types—CRPS I and II, which are mostly nociceptive and neuropathic, respectively—are caused by this distinction.<sup>10</sup> The present study was conducted to assess complex regional pain syndrome in association with fracture distal radius reduction method.

We found that out of 104 patients, males were 68 and females were 36. Jo et al<sup>11</sup> evaluated the incidence rates of and risk factors for complex regional pain syndrome type 1 (CRPS-1) after surgery for distal radius fractures (DRFs). 172,194 DRFs were treated surgically. Within 1 year postoperatively, 1,103 CRPS-1 cases were diagnosed, with an incidence of 0.64%. On univariate and multivariate analyses, the risk factors that significantly correlated with the incidence of CRPS-1 included female sex, rheumatoid arthritis, open reduction, open fracture, and accompanying ulnar fracture, whereas old age, psychiatric disease, and external fixation were not statistically significant. The incidence of CRPS-1 after surgery for DRF was very low (0.64%) in South Korea. Careful monitoring is necessary for patients with complex fractures and rheumatoid arthritis who are at increased risk of developing CRPS-1.

We observed that mean age was 62.3 years in group I and 62.8 years in group II. Psychiatric factor was seen in 12 patients in group I and 10 patients in group II. Seropositive RA was seen in 3 patients in group I and 1 in group II. Roh et al<sup>12</sup> evaluated factors associated with the occurrence of CRPS I after the surgical treatment of a distal radius fracture (DRF). A total of 477 patients with a DRF who had been treated surgically were enrolled in this prospective observational study. Patients were followed for 6 months after surgery, and CRPS I was diagnosed

using the Budapest diagnostic criteria for research. The factors assessed for the development of CRPS I were age, gender, the body mass index, the type of fracture, the energy of trauma, the number of trial reductions, the type of surgery, and the duration of immobilization. Among the 477 patients, 42 (8.8 %) satisfied the Budapest criteria for CRPS I within 6 months of surgery. Female patients developed CRPS I more frequently, and the patients who developed CRPS I were older and more likely to sustain a high energy injury or have a comminuted fracture. According to the multivariate analysis, female patients and those with a high energy trauma or severe fracture type were significantly more likely to develop CRPS I ( $p = 0.02, 0.01, \text{ and } 0.01$ , respectively).

We observed that reduction method used was open in 16 and 32 and closed in 18 and 38. Application of external fixator was done in 7 and 15, with ulnar fracture in 11 and 17 and with open fracture in 12 and 20 patients in group I and II respectively. The risk factors for CRPS was mean age (years), seropositive RA, reduction method, with ulnar fracture and open fracture ( $P < 0.05$ ). Ortiz- Romero et al<sup>13</sup> identified factors associated with developing complex regional pain syndrome (CRPS) after surgical treatment for distal radius fracture (DRF). In sample of 249 patients, 4% developed CRPS. Associated factors were economic compensation via work disability (odds ratio [OR] 14.3), age (OR 9.38), associated fracture (OR 12.94), and level of impact (OR 6.46), as well as psychiatric history (OR 7.21). Economically-productive aged patients with a history of high-impact trauma and patients with a history of psychiatric disorders have greater risk of developing CRPS after DRF.

The shortcoming of the study is small sample size.

## CONCLUSION

Authors found that the incidence of CRPS-1 following DRF surgery was low. Patients with rheumatoid arthritis and difficult fractures who are susceptible to developing CRPS-1 require close observation.

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