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## Incidence of complex regional pain syndrome (CRPS) following Distal Radius Fractures (DRS) managed by conservative method

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### Abstract

**Introduction:** Fractures of the distal radius represent the most common fracture in elderly patients. A variety of treatment options are available. The distal radius fractures can be managed by conservative as well as by surgical methods. The aim of this study was to analyze the incidence of CRPS after a fracture of the distal radius managed by closed reduction and plaster casting.

**Materials and Methods:** In this study a total of 120 patients were treated with closed reduction and cast immobilization for fracture of distal radius. At final follow-up of one year after fracturing the patients were examined if they had experienced any signs and symptoms of CRPS in the post-fracture period.

**Results:** CRPS occurred after closed reduction and cast immobilization for Distal Radius fractures in 2 cases; the incidence rate was 1.67%.

**Conclusion:** The incidence of CRPS after conservative management for DRF was very low (1.67%).

**Keywords:** CRPS, distal radius fracture, management, conservative method

### Introduction

The most frequent fracture seen in the emergency room is a distal radius fracture (DRF), which occurs more than 640,000 times a year on average [1]. Distal radius fractures had a bimodal distribution, with one peak mostly composed of young male patients who suffered high-energy fractures and another peak primarily composed of elderly female patients who experienced low-energy trivial fractures [2].

Distal radius fractures frequently result in arthrosis, malunion, nonunion, tendon rupture, and chronic regional pain syndrome (CRPS), and ulnar impaction, loss of rotation, finger stiffness, and compartment syndrome. Median nerve compression at the level of the wrist joint, often known as CTS, is another recognized side effect of distal radius fractures [3]. The likelihood of these problems relies on the patient's age, the mechanism of the injury, the kind of fracture, and the treatment method, the degree of reduction attained, the posture, and the length of immobilization [4, 5].

Distal radius fractures (DRFs) are one of the most common causes of CRPS. When CRPS occurs, the patient's quality of life and daily function are severely impaired due to the severe pain, making it difficult for them to return to the workplace [6]. Almost two thirds of these fractures are displaced and need to be reduced [7].

75-80% of radius distal end fractures are extra-articular stable fractures and can be treated conservatively in the Emergency Department [8]. However, approximately 20% of these fractures are unstable and surgical treatment is required and decision on conservative treatment or surgery still remains a debate for some particular types of fractures [8, 9]. In the choice of treatment methods, factors such as the type of fracture, the patient's age, lifestyle, accompanying health problems, compliancy to treatment, physical and mental capacity must be considered [10, 11]. Treatment by closed reduction and cast immobilization can be carried out on a large scale at low expense and without admission; however, this often has complications (CRPS) and leads to poor radiological results and re-displacement, which can be as high as 40%, according to Mulders, *et al.* [7].

The study was aimed to analyze the incidence of CRPS after management of distal radius fractures by conservative method.

### Materials and Methods

This prospective study was carried out from September 2020 to November 2022 at Postgraduate department of Orthopaedics, Govt. Medical College Srinagar. In this study a total of 120 patients were treated with closed reduction and cast immobilization for fracture of distal radius. Patients younger than 18 years, patients with a bilateral fracture of the distal radius and patients with multiple traumata were excluded from the study.

All fractures underwent an initial closed reduction and were immobilized with a long cast. Patients were radiologically examined after 1 week to verify the stability of the reduction and patients who showed a loss of reduction had a new reduction of the fracture and/or cast wedging. After 3 weeks, the arm portion of the cast was removed to allow pronation and supination movements, while the forearm part was kept for another 3 weeks. After 6 weeks, the cast was removed, and patients were advised for a functional recovery of the wrist articulation.

All patients were examined and the diagnosis of CRPS was made if the patient fulfilled the criteria of the IASP; continuing pain or allodynia or hyperalgesia, with which the intensity of the pain is disproportionate to the inciting event, evidence at some-time of edema or changes in skin blood flow, or abnormal sudomotor activity was present in the region of the pain (Bogduk, 1994) [16]. The diagnosis was excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction (Bogduk, 1994) [16]. At final follow-up of one year after fracturing the patients were examined if they had experienced any signs and symptoms of CRPS in the post-fracture period.

### Results

The mean age of the study population was 39.7 (range 19-72) years. There were 49(40.83%) males and 71(59.17%) were females. Majority of the patients were in the age group of 31-50 years. The main cause of the injury was road accidents in 67(55%) patients (Table 1).

In our study, the incidence of CRPS in distal radius fractures (DRF) managed with closed reduction and cast immobilization using a sample size of 120 and found to be 1.67%. The incidence was nil in patients under 30s age group. In this study patients with CRPS were significantly older than those in the non-CRPS patients and both patients with CRPS were women. The diagnosis of CRPS was made seven weeks after the accident, when severe swelling and discoloration was present and pain was still experienced, which could not be explained by the presence of another condition. Patients were treated with DMSO 50% in a fatty cream and were sent to a physical therapist.

### Discussion

According to the National Hospital Ambulatory Medical Care Survey (NHAMCS) database, hand and wrist fractures accounted for 1.5% of all visits to emergency rooms [12]. Conservative management by closed reduction and casting was and is the most common modality of treatment used for DRFs but with advancement in understanding the mechanisms involved and fixation techniques for DRFs surgical mode is being used in recent days. One of the most prevalent side effects of distal radius fractures is CRPS.

Distal end radius fractures (DRF), which account for 17.5% of all fractures, are the most frequent fracture seen in emergency rooms. When patients are treated with DRFs using different modalities, CRPS results in poor functional outcomes. Our study aims to identify the incidence of CRPS in DRF patients managed with conservative method.

In our study, 2(1.67%) of the 120 patients with DRFs had CRPS diagnosed. We discovered that the incidence of CRPS as a complication of DRFs depends on numerous fundamental parameters, some of which are avoidable and others which are not. The functional result is significantly influenced by the fracture pattern [13]. In our investigation, the mode of treatment also seems to play a significant role in the pathogenesis of CRPS. When we compared the outcomes with previous studies, we discovered that the incidence of CRPS was lowest in patients managed with conservative method. It is crucial to understand the pathophysiology generating CRPS as a complication in DRFs because all of these factors are avoidable [14]. According to a study by Cooney *et al.* [15], out of 565 fractures, 177(31%) had sequelae such as malposition-malunion, radiocarpal or radio-ulnar arthrosis, or persisting neuropathies of the median, ulnar, or radial nerves (45 instances, 30 cases).

A distal radius fracture can cause acute CRPS, which appears days or weeks later and is thought to be caused by various factors as, the hematoma formation, fracture displacement, wrist immobilization, and/or soft tissue swelling are likely secondary causes of the critically raised compartment pressure in the context of a DRF. Acute CRPS following DRF has been linked to high-energy trauma, repeated closed reduction attempts, fracture displacement, fracture comminution, poly-trauma, and women under the age of 48, as in our study all patients were between age group of 31-50 years and all were women.

The most significant factor affecting the functional outcome of distal radius fractures is carpal tunnel syndrome (CTS) and CRPS and these must be taken into account as one of the most crucial elements during therapy, and measures must be taken to avoid it. The incidence can be reduced by avoiding long-term casting, obtaining almost anatomical reduction, stable fixation, and little manipulation of fractures during reduction, caring for soft tissues during fixation and receiving the proper post-fixation physiotherapy.

**Table 1:** Demographic characters of patients (N=120, Mean age= 39.7 years)

Parameters	Number of patients	Percentage	
Gender	Male	49	40.83
	Female	71	59.17
Age group	18-30 years	43	35.83
	31-50 years	52	43.33
	51-70 years	22	18.33
	> 70 years	03	02.50
Mode of injury	Road accidents	67	55.83
	Fall	42	35.00
	Sports	11	09.16
AO Classification	A	32	26.67
	A1	09	07.50
	A2	05	04.17
	A3	07	05.83
	B	19	15.83
	B1	08	06.67
	B2	06	05.00
	B3	05	04.17
	C	14	11.67
	C1	07	05.83
	C2	06	05.00
	C3	02	01.67

The following are the study's limitations. This study is neither prospective and randomized, nor controlled. Different surgeons carried out the procedure and the postoperative evaluation, and the follow-up period was not standardized. The primary basis for outcome measurement is patient symptomatology and clinical tests. For improved statistical analysis, further prospective study on this topic is required.

### Conclusion

The incidence of CRPS after conservative management for DRF was very low 1.67%. Furthermore, careful monitoring is necessary for patients with complex fractures, who are at increased risk of developing CRPS. If CRPS is suspected during patient monitoring, early intervention with proactive anti-inflammatory therapy, such as steroids, may be helpful.

### Conflict of Interest

Not available

### Financial Support

Not available

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