Fracture of the Wrist and Incidence of the Complex Regional Pain Syndrome Type 1: A Case Series Study

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Abstract

Background: Complex regional pain syndrome (CRPS) is a painful syndrome with signs such as swelling, restriction of motion, and discoloration of the skin and bone. CRPS is divided into two types based on neurological injuries. Type 1 CRPS (CRPS-I), which is more common, has no nerve damage. In this study, we used the Budapest Criteria to investigate the incidence of CRPS. We also evaluated the risk factors for the incidence of CRPS.

Methods: A single-center case series study was performed at Shariati Hospital of Tehran University of Medical Sciences, Tehran, Iran, during 2018-2019. We evaluated CRPS-I, two and six weeks after treatment based on Budapest Criteria. The inclusion criteria included distal radius fracture confirmed by clinical and radiographic investigations. The exclusion criteria were patients with fractures in another part of the body, associated nerve damage, vascular injury, and an open fracture.

Results: Sixty-two patients with distal radius fracture who underwent casting or surgical treatment enrolled in the study. A total of 9 (14.5%) patients had CRPS-I after distal radius fracture. In 5 (8.1%) patients, CRPS-I occurred within two weeks after fracture. Also, 4 (6.5%) patients had CRPS-I after six weeks from fracture. There was no significant difference between the two sex groups in terms of CRPS-I (P = 0.345). This complication was significantly higher in the surgical group than in the casting group (P = 0.004).

Conclusions: Given the significant incidence of CRPS and its impact on patient’s quality of life, further studies are recommended to explore solutions to reduce this complication.

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We aimed to evaluate the incidence of this syndrome following distal radius fracture according to different gender and treatment groups.

Methods

This single-center case series study was performed at Shariati Hospital of Tehran University of Medical Sciences, Tehran, Iran, during 2018-2019. Patients with distal radius fracture confirmed by clinical and radiographic investigations, who underwent casting or surgery treatment, were included in this study. The exclusion criteria included patients with fractures in another part of the body, associated nerve damage, vascular injury, and open fracture. Budapest Criteria as valid criteria for diagnosis of CRPS-I were used to evaluate the patients two and six weeks after treatment (Table 1) [9]. This study was conducted by following the Declaration of Helsinki and was approved by the Ethics Committee of Tehran University of Medical Sciences. The ethical registration code of the study is IR.TUMS.MEDICINE.REC.1397.219.

Statistical analysis was performed using SPSS software (version 24, IBM Corporation, Armonk, NY, USA). Qualitative variables were shown by number and percentage and quantitative variables were demonstrated by mean and standard deviation (SD). Fisher’s exact test was used to compare the significant difference of CRPS-I between different gender and treatment groups.
Results

Sixty-two patients with distal radius fracture between August 2018 and August 2019, who underwent casting or surgical treatment, enrolled in the study. The mean and SD of the patient’s age was 44.08 ± 21.13 years. 34 (54.8%) patients were male and 28 (45.2%) were female. Non-invasive treatment (casting) was performed on 35 (56.5%) patients and surgical treatment was performed on 27 (43.5%) patients.

A total of 3 (14.5%) patients had CRPS-I after distal radius fracture. 5 (8.1%) patients experienced CRPS-I within two weeks after fracture. Also, 4 (6.5%) patients had CRPS-I after six weeks from fracture.

Of 34 male patients, 18 (52.9%) had a casting and 16 (47.1%) had surgical treatment. In the male population, 2 (5.9%) had CRPS-I within two weeks after fracture. Also, 4 (11.8%) had this complication in the sixth week after the fracture. Of 28 female patients, 17 (60.7%) had a casting and 11 (39.3%) had surgical treatment. In the female population, 3 (10.7%) experienced CRPS-I within two weeks. However, none of the patients had CRPS-I in the sixth week after the fracture. The mean age in the female group was 46.32 ± 21.79 years and in the male group was 42.24 ± 20.72 years. There was no significant difference between the two sex groups (P = 0.345) and treatment modalities (P = 0.111).

Table 2 shows the incidence of CRPS-I by gender groups.

| Incident of CRPS-I by gender groups | Male | Female | P-value |
|-------------------------------------|------|--------|---------|
| CRPS-I in two weeks after fracture  | 2    | 3      |         |
| CRPS-I in six weeks after fracture  | 4    | 0      |         |
| Total                              | 6    | 3      | 0.345   |

A total of 35 patients received non-invasive treatment (casting). None of these patients had complications within two weeks after fracture. However, in one case (2.9%), this complication was found within six weeks after fracture. 27 patients underwent surgical treatment. In the surgical treatment group, 5 patients (18.5%) developed CRPS-I in two weeks after fracture and 3 patients (11.1%) developed this complication in the sixth week.

The mean age in the casting group was 47.71 ± 23.21 and in the surgical group was 39.37 ± 17.39. There was no significant difference in age between the two groups (P = 0.043) and treatment modalities (P = 0.36).

Table 3 shows the incidence of CRPS-I by treatment groups.

| Incident of CRPS-I by treatment groups | Male | Female | P-value |
|----------------------------------------|------|--------|---------|
| CRPS-I in two weeks after fracture      | 0    | 5      |         |
| CRPS-I in six weeks after fracture      | 1    | 3      |         |
| Total                                  | 1    | 8      | 0.004   |

The incidence of CRPS-I was not significantly different between the two sex groups (P = 0.345). This complication was significantly higher in the surgical group than in the casting group (P = 0.004).

Discussion

Although several studies have evaluated the incidence of CRPS-I (10-12), a comprehensive study in Iran has not been conducted to determine the incidence of this complication. The incidence of CRPS-I in different studies has been in the range of 1% to 37% (13, 14). In our study, the incidence rate was 14.5%.

Most studies have reported a higher incidence of CRPS-I in the female population than in men (15-17). Our study showed that this value was not significantly different between the two sex groups (P = 0.345), which may be due to the greater use of the surgical approach in men and the use of different diagnostic criteria in this study.

In our study, the incidence of CRPS-I was significantly higher in patients who underwent surgery than in the casting group (P = 0.004). Given the greater use of the surgical technique in more severe injuries, it can be predicted that severe fractures and high-energy injuries increase the risk of this complication. The results of previous studies were similar in terms of differences in the incidence of CRPS-I in different treatment modalities (12, 18).

Budapest Criteria that have the highest specificity for CRPS-I diagnosis were used in our study (9).

Conclusion

Based on the high incidence rate of CRPS-I after fracture of the distal radius, multi-center studies with a larger sample size are recommended for investigating the exact incidence rates and risk factors.
Conflict of Interest

The authors declare no conflict of interest in this study.

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