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Post-operative complications in patients with distal radius fractures

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Abstract
Introduction: Fractures of the distal radius have complex morphology resulting in many complications, seriously affecting the normal hand function of patients.
Aim and Objective: To explore the post-operative complications of distal radius fractures.
Materials and Methods: This prospective study was conducted at the govt. Bone and Joint Hospital Barzulla, an associated Hospital of Govt. Medical College, Srinagar from January 2020 to December 2020. In this study a total of 30 patients with distal radius fractures were enrolled. The selected surgical methods were internal fixation in 17 cases and external fixation in 13 cases.
Results: In this study, 10 patients had post-operative complications with the overall complication rate of (33.33%). Among them, carpal tunnel syndrome and traumatic arthritis are the most common ones, each accounting for 6.67%.
Conclusion: The postoperative complication rate of distal radius fractures is relatively high. The prognosis is related to the patient's age, AO classification, surgical method and the time to start exercise after surgery.

Keywords: Distal radius fracture, management, internal fixation, external fixation, complications

Introduction
The fracture of the distal radius is the most common injury in adults, accounting for approximately 17.5% of fractures [1]. It refers to a fracture within 3 cm of the articular surface of the lower end of the radius, which is mostly caused by direct or indirect violence [2–4]. Fractures of the distal radius often occur in adolescents and elderly people.
Distal radius fractures have a bimodal age distribution in the population, with a peak incidence seen in patients younger than 18 years and a second peak in patients 50 years or older. Adolescents are prone to accidental collisions and fractures due to their frequent participation in strenuous exercise. Recent studies indicate the worldwide incidence of distal radius fractures is increasing each year owing to the overall potential to live longer with comorbidities such as osteoporosis [5]. Although the elderly population is at greatest risk, distal radius fractures still have a significant effect on the health and well-being of nonelderly adults. Reports have shown a significant increase of distal radius fractures in patients aged 17 to 64 years [5].
Fractures of the distal radius have complex morphology and are easily involved in their adjacent articular surfaces. Improper treatment can easily lead to carpal tunnel syndrome, dislocation of the radioulnar joint, traumatic arthritis, and other complications, resulting in chronic wrist pain, stiffness, weakness, deformity, and other symptoms, seriously affecting the normal hand function of patients [6-8].
The management of distal radius fractures consists of operative or non-operative treatment. However, no consensus has been reached regarding the optimal treatment method. Several meta analyses have been published on the comparison between operative and non-operative treatment [9-11].
At present, the main surgical methods for the treatment of distal radius fractures include closed reduction and external fixation and open reduction and internal fixation. However, the effect of surgery is affected by many factors, and there are many complications after surgery.

Therefore, analyzing the relevant factors that affect the postoperative recovery of patients with distal radius fractures can help improve the prognosis of surgical treatment and reduce the incidence of complications [12-14].

Overall, distal radius fracture complications have been found to occur in as little as 6% of patients and as many as 80% of patients, pending on the definition of complication [15]. Complications after distal radius fractures occur for many reasons, and often vary depending on the method of treatment [16]. When deciding on a treatment option, it is important that surgeons focus on recognition, management, and prevention of known associated complications in order to achieve a good outcome [17]. Patient factors must also be taken into account when considering treatment methods. Factors including patient lifestyle, age, mental attitude, social support, comorbid conditions, and compliance with treatment can influence the likelihood for complications [18]. The aims of the current study are to characterize complications experienced by WRIST participants through 12-month follow-up to determine whether complication frequency or type is associated with treatment modality, and to determine predictors of 12-month complications.

Materials and Methods

This prospective study was conducted at the govt. Bone and Joint Hospital Barzulla, an associated Hospital of Govt. Medical College, Srinagar from January 2020 to December 2020. In this study a total of 30 patients with distal radius fractures were enrolled. The selected surgical methods were internal fixation in 17 cases and external fixation in 13 cases (Table 1). The inclusion criteria were were fresh distal radius fractures within 2 weeks and closed fractures. Exclusion criteria were patients with old fractures, patients with severe medical diseases, patients with severe motor nerve dysfunction, patients with severe mental illness, and patients with follow-up loss.

Table 1: Patients demography

Parameters		No. of patients	Percentage
Gender	Male	18	60
	Female	12	40
Mechanism of injury	Road accidents	13	43.33
	Fall	11	26.67
	Other	6	20
Side	Right	22	73.33
	Left	8	26.67
AO Classification	A	12	40
	B	8	26.67
	C	10	33.33
Surgical method	Internal fixation	17	56.66
	External fixation	13	43.33

All patients were followed up for 6–12 months and their postoperative complications were recorded. During the follow-up, the Gartland and Werley wrist joint function scoring system was used to evaluate the prognosis of patients' joint function.

Table 2: Gartland and Werley wrist joint function scoring system

Points	Parameters
0	No pain
2	Occasional pain and wrist weakness
4	Occasional pain, wrist weakness and limited movement
6	Persistent pain, limited movement and wrist deformity

Results

In this study a total of 30 patients with distal radius fractures, who were managed with surgical approach using internal fixation in 17 cases and external fixation in 13 cases. The average age of the study population was 38.9 (19-68) years. There were 18 (60%) male patients and 12 (40%) female patients. In majority of the patients mechanism of injury was road traffic accidents. According to AO classification 12 (40%) patients had type A fracture, 8 (26.67%) patients had type B and 10 (33.33%) had type C (Table 1).

In this study, 10 patients had post-operative complications with the overall complication rate of (33.33%). Among them, carpal tunnel syndrome and traumatic arthritis are the most common ones, each accounting for 6.67%, as shown in Table 3.

Table 3: Post-operative complications

Complications	No. of patients	Percentage
Carpal tunnel syndrome 3 6.00	2	6.67
Traumatic arthritis 3 6.00	2	6.67
Wrist rotation dysfunction 2 4.00	1	3.33
Stiff wrist	1	3.33
Malunion	1	3.33
Changes in hand grip strength and flexion and extension dysfunction	1	3.33
Extensor tendon rupture	1	3.33
Dislocation of the wrist joint	1	3.33
Total	10	33.33

Discussion

Distal radius is located between the compact bone and the cancellous bone. Fractures in this part will cause the height of the radius and uneven articular surface, which directly affects the movement function of the wrist joint [19-21]. The wrist joint is one of the joints with the highest frequency and the widest range of human activities, and it undertakes a large number of human activities in daily life.

Improper treatment will seriously affect the quality of life of patients [22-24]. Therefore, it is extremely important to explore the relevant factors that affect the prognosis of patients with distal radius fractures and to better restore wrist joint function.

The results of this study showed that patients' age, injury causes, AO classification, surgical method, and postoperative exercise time were all related to the postoperative prognosis of distal radius fractures. Multivariate logistic analysis showed that age, AO classification, operation method, and postoperative exercise time were independent factors influencing the prognosis of distal radius fractures. The reason is that the older the patient, the more serious the calcium loss in the body, the osteoporosis, and the worse the body function and recovery function, and other complications often occur after treatment, which greatly increases the complexity, thus leading to a poor prognosis [25-27].

Patients with different AO classifications have different surgical difficulties. Because the more complex the AO classification, the more severe the bone damage, the greater the difficulty of the operation, and the wider the scope, which greatly increases the difficulty of reduction and the degree of functional recovery and affects the prognosis. We suggest that complex injuries especially those type C fractures and lunate bone depression collapse should be managed by a more experienced surgeon, so as to reduce the occurrence of complications.

In this study patients were managed with surgical approach using internal fixation in 17 cases and external fixation in 13

cases. Compared with external fixation, internal fixation can reduce the fracture site more accurately, better restore the structure and function of the wrist joint, and thus can improve the prognosis [28, 29]. For patients with other fractures on the same side, the stability of their bones needs to be considered during the treatment process. If the control is not strong enough, the degree of healing will be seriously affected. After postoperative fixation and stability, timely exercise can maintain the mobility of the wrist joint and help the recovery of wrist joint function [30, 31].

In this study, 10 patients showed post-operative complications with the overall complication rate of (33.33%). In previous studies, the incidence of postoperative overall complications of fixation of distal radius fractures varied widely, ranging from 4 to 36%, depending on the study design, the participants, sample size, and the follow-up period [32-34]. In a recent meta-analysis, Bentohami *et al*. [32] included 33 original studies and found that the overall complication rate was 16.5%, lower than ours.

In this study among the post-operative complications, carpal tunnel syndrome and traumatic arthritis are the most common ones, each accounting for 6.67%. The reason is that bleeding after a fracture and local injection of anesthetic drugs will cause the pressure in the carpal tunnel to increase and oppress the median nerve, leading to carpal tunnel syndrome. The bone mass and quality of the distal radius are low, so the fracture degree of fracture is relatively large, and the bone blood supply and repair ability are also poor, resulting in difficulty in reduction and traumatic arthritis [35-37].

Some of the limitations of this study were low number of patients, the retrospective design which compromised the accuracy of the data collection and we cannot quantify some variables. The future prospective studies are needed to validate our results and to continue the investigation of the subsequent effects of complications or revision procedure.

Conclusion

The postoperative complication rate of distal radius fractures is relatively high. The prognosis is related to the patient's age, AO classification, surgical method and the time to start exercise after surgery.

Therefore, choosing a suitable surgical method and starting exercise in time can effectively improve the patient's wrist function recovery and reduce the occurrence of complications.

Conflict of Interest

Not available

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Not available

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