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A comparative study of functional outcome of intraarticular distal radius fractures treated with K wire versus conservative management

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Abstract

Background: Intraarticular distal radius fractures are commonly seen fractures of the upper extremity showing bimodal distribution in pediatric and elderly adults. The age distribution of distal radius fracture is typically peaks in the 5-14 year age group and also peaks in elderly patients more than 60 years of age.

Aim: To compare the functional outcome of intraarticular distal radius fractures treated with k wire versus conservative management

Material and methodology: The study was conducted between July 2020 to December 2021 in the department of orthopaedics, RMMCH, 20 patients with intraarticular fractures of the distal radius were included in the study. 10 patients were treated with k wire/ligamentotaxis with k wire, 10 patients were treated with conservative methods. Follow up was done for a minimum period of 6 months, functional outcome was assessed using the Quick DASH Scoring system

Results: The functional outcome in the k wire group was 12.9, which was found to be better than the conservative group 17.49. No poor outcome was seen in the k wire group. 2 patients had a poor outcome in the conservative group. Malunion was found in 2 patients in the conservative group. No patients had malunion in k wire group. Superficial pin site infection was found in one patient. Stiffness was found in 1 patient in the k wire group and 3 patients in the conservative group

Conclusion: In our study, the functional outcome results were better in the patients managed with surgical intervention by percutaneous fixation using K wire/ligamentotaxis with k wire than in patients managed with the conservative method by closed reduction and cast immobilisation.

Keywords: Intraarticular distal radius fracture, K - wires, ligamentotaxis, conservative

Introduction

Intraarticular distal radius fractures are commonly seen as fractures of the upper extremity showing bimodal distribution in paediatric and elderly adults [1]. The age distribution of distal radius fracture is typically peaks in the 5-14 year age group and also peaks in elderly patients more than 60 years of age. The common mechanism of injury of Intraarticular distal radius fractures involves a fall on outstretched hand and high energy trauma in the form of a road traffic accident.

The optimal management of these fracture plays a vital role in the daily activity of the patients. Traditionally distal radius fractures were treated with conservative management with the POP application. There is an increase in the trend towards operative management [2]. The goals of treating intraarticular distal radius fractures are articular congruity, radial length and alignment, functional mobility [3].

In this study we have compared the functional outcome of intraarticular distal radius fractures

Classifications

1. Frykman classification
2. AO classification
3. Gartland and Werley
4. Melone
5. Fernandez

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Material and Methodology

The study was conducted between July 2020 to December 2021 in the department of orthopaedics, RMMCH, 20 patients with intraarticular fractures of the distal radius were included in the study. 10 patients were treated with k wire/ligamentotaxis with k wire, 10 patients were treated with conservative methods. Follow-up was done for a minimum period of 6 months, functional outcome was assessed using Quick DASH Scoring system.

Inclusion Criteria

- Age within 20 to 80 years
- All intraarticular distal radius fractures without any neurovascular deficits.
- Patients agreement to participate in the study and have signed the informed written consent form.

Exclusion Criteria

- Previous history of any distal radius fracture or surgery to the wrist.
- Associated fractures of the ipsilateral upper limb.
- Age less than 20 years, more than 80 years.
- Patients with any neurovascular deficit.
- Patients in whom the functional outcome was not been able to assess due to any cognitive impairment.
- Compound fractures.

Informed consent was obtained from all the patients undergoing the study. A through history was taken and a clinical evaluation was done. The neurovascular examination was done, temporary splinting was done and radiographs were taken.

Both Anteroposterior and Lateral views were taken and fracture was classified. Patients who were not willing for surgical intervention and who were anaesthetically not fit for surgical intervention were managed conservatively by closed reduction and POP immobilisation.

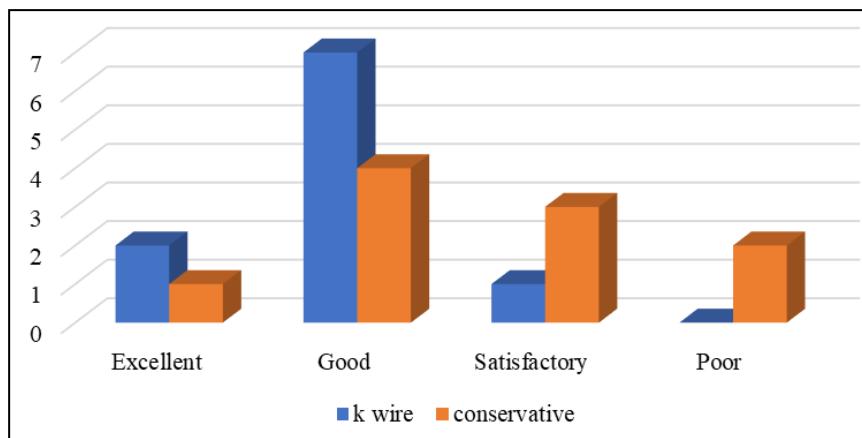
Blood investigations were taken and anaesthetic fitness was obtained for surgical intervention. Patients who had minimal or no comminution in the fracture site were fixed with percutaneous k wires. Patients who also had distal radioulnar joint disruption were treated with an additional radioulnar k wire. And patients with comminution in the fracture site were treated by ligamentotaxis with augmented k wire. The functional outcome analysis was done using Quick DASH scoring system.

Results

- The total study population was 20 patients.
- 10 patients were treated with percutaneous k wire fixation.
- 10 patients were treated with conservative management.
- In both the groups, male preponderance was found at 70% in k wire group and 60 % in the conservative group.
- Both groups were followed up for 1 year. The functional outcome in the k wire group was 12.9, which was found to be better than the conservative group 17.49.
- No poor outcome was seen in the k wire group. 2 patients had a poor outcome in the conservative group.
- Mal union was found in 2 patients in conservative group. No patients had malunion in k wire group.
- Superficial pin site infection was found in one patient.
- Stiffness was found in 1 patient in k wire group and 3 patients in conservative group.

Table 1: Results of K-wire vs conservative

Results		K wire		Conservative	
		Count	Percentage	Count	Percentage
Gender	Male	7	70%	6	60%
	Female	3	30%	4	40%
Side	Right	6	60%	3	30%
	Left	4	40%	7	70%
Mode of injury	RTA	1	10%	2	20%
	Self-Fall	9	90%	8	80%
Frykman classification	III	3	30%	4	40%
	IV	3	30%	3	30%
	VII	2	30%	2	20%
	VIII	2	30%	1	10%
Functional outcome	Mean Dash Score	12.9		17.49	
Grading	Excellent	2	20%	1	10%
	Good	7	70%	4	40%
	Satisfactory	1	10%	3	30%
	Poor	-	-	2	20%
Complications	Malunion	-	-	2	20%
	Stiffness	1	10%	3	30%
	Pin site infection	1	10%	-	-

**Graph 1:** Functional Outcome**Case Illustrations****Case 1 34/M**

Pre-op x-ray



Post reduction



Immediate Post-op x-ray



1 Month Follow Up



6 Months Follow Up



Functional Outcome

Case 2 (Conservative Management)



Functional Outcome

Discussion

Distal radius fracture in patients were traditionally treated with closed reduction and cast immobilisation. This avoided the need for surgical intervention and related complications. But cast immobilisation couldn't maintain the length and rotation of the distal fragment, especially in fractures that had comminution. Loss of reduction was usually noted around the second week of initial reduction^[4]. The articular incongruity and distal radioulnar joint instability resulted in poor functional outcomes in patients treated with conservative

management.

In patients with persistent dorsal tilt resulted in dorsal overload and which leads to secondary carpal bone disease.

J. song et al. have shown that 30% of patients treated with cast immobilisation showed unsatisfactory results^[5].

A. Daniel et.al 51.4% unsatisfactory results were seen with closed reduction and cast in the treatment of commented intraarticular fracture of distal radius^[6].

Although the final functional outcome in elderly patients were independent of the radiological outcome as per some authors

like *E. Spira et al.* [7].

Considering the benefits of closed reduction, which preserve the fracture haematoma and follows biological healing, percutaneous fixation with k wires has an advantage of utilising these principles and also can avoid complications like loss of reduction and can address distal radioulnar joint instability [4, 10].

In a study done in 2015 by *Lolade Giwa et al.* which compared closed reduction and casting, with percutaneous K-wire fixation of Distal radius fractures, and found that patients treated with K wire was associated with better grip strength and hand function at 6 months with reduced risk of displacement [8].

Abhishek K Das et. al. in his study of percutaneous pinning and cast immobilization of the fracture, found (81.25%) had excellent to good functional outcomes. The study also concluded that, percutaneous pinning of distal radius fractures combined with early physiotherapy with wrist mobilisation provided a good functional outcome and no loss of fracture alignment [9].

In our study, 90% of the patients in k wire group showed excellent to good functional outcomes 10% of patients showed satisfactory outcomes.

In Conservative management group 50% of patients had excellent to good outcome and 30% had satisfactory outcome and 20 % had poor outcome. Also the malunion and stiffness rates were higher in conservative group.

Conclusion

In our study the functional outcome results were better in the patients managed with surgical intervention by percutaneous fixation using K wire/ligamentotaxis with k wire than patients managed with conservative method by closed reduction and cast immobilisation. Since the sample size of the study being small larger study survey is needed to correlate the superiority of methods of fixation and fracture patterns affecting the functional outcome.

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