



ORIGINAL ARTICLE

COMPARATIVE STUDY OF FUNCTIONAL OUTCOME IN PATIENT WITH FRACTURE OF DISTAL END RADIUS TREATED EITHER CONSERVATIVE OR WITH-K WIRE FIXATION

ANIL BADUKE^{1*} | MOHAMMED NADEEM² | SANTOSH MISHRA³
| SOURABH ALAWA⁴ | AKHIL BANSAL⁵ | SANJIV GAUR⁶

¹Resident, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh

²Resident, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh

³Assistant Professor, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh.

⁴Senior Resident, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh.

⁵Associate Professor, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh.

⁶Professor and Head of Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh

Abstract

Background: One of the most common upper extremity fracture are the distal end radius fracture. A very complex injuries with a variable prognosis has seen in distal end radius fractures are well recognized. This type of fracture usually results from low Energy trauma in the elderly patients.

Method: In present study, 90 cases of both extra articular and intraarticular distal end radius fracture between age 20 to 65 years treated with closed reduction and cast and closed reduction with K wire fixation+ cast, it is a prospective study conducted at Gandhi medical college& associated Hamidia Hospital Bhopal between 2018 - 2020.

Results: The most common mode of injury was fall on outstretched hand (FOOSH)(65%), with male preponderance (60%) and right side more common in both the group. In both the group average age was 45.90 ±10.16 year. According to Frykman classification Frykman type 1 was more common in both the group. Higher complications seen in closed reduction with cast group. According to Quick DASH score results found in closed reduction with cast 7 patient had excellent , 20 patient had good , 13 patient had fair and 5 patient had poor results. In closed reduction with percutaneous K-Wire with cast 10 patient had excellent results , 24 patient had good , 9 patient had fair , 2 patient had poor results .

Conclusions: A minimally invasive technique Percutaneous K wire pinning, that provides an effective means of Maintaining the anatomical fracture reduction. Highly skilled personnel or sophisticated tools for Application usually doesn't required. It is a suitable method for fixation of displaced distal end radius fracture with minimal intra-articular Involvement. Therefore in group closed reduction with K-wire with cast had less complications and with better functionally as well as radiological outcome as a conclusion.

Keywords: Distal Radius fracture, Close reduction, Percutaneous Kirschner wire fixation, Plaster immobilization, Distal end extra and intra articular radius fracture, FOOSH

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1 | INTRODUCTION

Colle's fracture was first described by Abraham colle of Dublin in Ireland in 1814, after whom it was named. [1] Distal end radius fracture account for about 16-18% of all upper limb injuries. [2]. Most commonly seen in osteoporotic females, and commonly due to falling over the outstretched hand. In younger individual with good bone density Fracture of distal radius usually occur as a result of high energy trauma and are associated with substantial articular and periarticular tissue injury. [3] Besides this fracture are also reported in elderly osteoporotic patients. Angulation, shortening and articular incongruity occurred if these fractures are not assessed properly and not treated on time, which may lead to permanent deformity and loss of function. Over the last few years fracture management has undergone extraordinary evolution. [4] Various management for fracture distal end radius can be treated conservatively using a plaster cast or by other methods such as external Fixation, percutaneous fixation with k- wires or plates osteosynthesis or combinations all above. Comparing to the young and active patient, quality of bone are poor in elderly, in such patient percutaneous pinning adds the extra support needed to maintain the fracture in desired alignment and reduction following closed reduction and it goes for gradual collapse.

2 | MATERIAL AND METHODS

This study was conducted at department of Orthopaedics Gandhi medical college & associated Hamidia hospital Bhopal for treatment of fracture distal end radius. In this prospective study of 90 patient was taken according to inclusion and exclusion criteria after taken informed consent in a period of 20 months (September 2018 – may 2020). In this study functional outcome were assessed in patient with fracture distal end radius treated with closed reduction & cast application and K wire fixation & cast application. Frykman classification [5] was used to classified fracture distal end radius .

Inclusion criteria - Patients age between 20-65 year coming to orthopaedics department Bhopal with

fracture of distal end radius(both extra and intra articular) were treated by closed reduction +cast application / K wire fixation+ cast application.

Exclusion criteria - Pathological fracture, compound fracture, age below 20year and above 65 year, treated by external fixator and plating in distal end radius.

During pre operative evaluation after admission proper history was taken and clinical examination was done then patients were randomly allocated in either group. group A- closed reduction and cast application and group B- closed reduction with k wire and casting.

Closed reduction with cast application was done on radiolucent operating orthopaedics table under image intensifier and supraclavicular block/short general Anesthesia as per requirement. Longitudinal traction was applied to the forearm and disengage the fracture allow direct pressure to be applied to the distal radial fragments from volar to dorsal if volarly displaced and dorsal to volar if dorsally displaced. Flexion of the wrist may assist in producing some restoration of volar tilt. After reduction achieved above elbow plaster of Paris cast was applied in pronation, palmar flexion and ulnar deviation.

Closed reduction with k wire fixation with casting was done under all aseptic precaution under supraclavicular or occasionally short general anaesthesia. Under image intensifier the fracture was reduced with disengage then fixed with two cross kirschner wires were inserted in radius, first from radial styloid across the fracture site piercing the opposite cortex and another K wire inserted from the dorsal aspect of distal end radius just medial to the lister tubercle across the fracture site piercing the opposite cortex. In cases having distal radio ulnar joint injury a third transfixation wire was passed from ulna to the radius. The size of k wire used in our study is 1.8 mm or

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Corresponding Author: ANIL BADUKE
Resident, Department of Orthopaedics, Gandhi Medical College, Bhopal Madhya Pradesh

2 mm K wire bent and cut. After pin tract dressing below elbow plaster of paris cast applied in neutral position.

All the cases were follow up 2 week, 6 week ,3 month, 6 months and assessed for redisplacement radiologically, at six weeks, all fracture had radiological union and the cast in both the group and k wire were removed. Patients were encourage to resume wrist movements. Unlimited activity were allowed from the third months. Patient were seen at six months for the final clinical and functional assessment based on according to quick DASH score [13]. Radiological parameters was also measure at the 3 months and compared to be with both the group.

3 | OBSERVATIONS AND RESULTS

In present study, Injury is more common in males and involved in 60% of the patient, i.e. 26(57.8%) patients in closed reduction with cast group and 28 (62.2%) patient in CR with K wire + cast group.

The distribution of patients according to Frykman Type Classification [5] in both the groups.

In Closed Reduction with cast group, there were 28(62.2%) patients who had type I,7(15.6%) patients who had type II, 8(17.8%) patients who had type III and 2(4.4%) patients who had as type IV Frykman Type Classification.

In Closed Reduction with K wire + cast group there were 25(55.6%) patients who had type I,7(15.6%) patients who had type II, 10(22.2%) patients who had type III and 3(6.7%) patients who had type IV as Frykman Type Classification.

Complications in Closed Reduction with cast-group,4(4.44%) patients due to Stiffness of wrist. 5(5.55%) patient due to Stiffness of finger. 9(10.00%) patient due to residual pain, 5(5.55%) patient due to Malunion and 9(10.00) patient due to Reduced Grip Strength. In Closed Reduction with K wire + cast group,3(3.33) complication was due to superficial Pin tract infection which healed after removal of pins . 2(2.22%) patients due to residual pain, 1(1.11%) patient due to Malunion and 2(2.22) patient due to Reduced Grip Strength.

The distribution of patients according to functional assessment at 6 month the range of motion in mean value of affected limb such as Dorsiflexion, Palmer flexion, Supination, Pronation, Ulnar deviation and Radial Deviation in Closed Reduction with cast group, were 64.00 ± 2.02 , 66.55 ± 3.66 , 67.66 ± 4.95 , 60.88 ± 3.41 , 24.33 ± 3.12 , 15.22 ± 1.83 respectively and In Closed Reduction with K wire + cast group were 64.44 ± 1.58 , 68.77 ± 2.17 , 71.00 ± 3.12 , 63.15 ± 2.51 , 25.66 ± 3.30 and 19.11 ± 2.87 respectively. There was statistically significant difference in range of movements between both groups. Significant increase in Range of motion in patients treated with percutaneous K-Wire and casting group.

The distribution of patients according to Radiological Assessment at 3 month mean value of Radial Height, Radial inclination and Volar Height (AP and Lateral view) were 9.06 ± 1.26 , $20.08\pm .70$ and 16.88 ± 3.53 respectively in Closed Reduction with cast group, and 11.17 ± 1.23 , 23.53 ± 1.05 and 8.40 ± 0.96 respectively in Closed Reduction with K wire + cast group. There was significant difference in all the three parameters i.e. Radial Height, Radial inclination, Volar Height (AP and Lateral view between both groups at the end of 6 months. Closed reduction with K-Wire + cast group had shown not only better but also statistically significant anatomical reduction compared to other groups.

The above table shows the distribution of patients according to Functional Outcome according to quick DASH score in both the groups.

In Closed Reduction with cast group, there were 7(15.6%) patients functional outcome were Excellent, 20(44.4%) patients functional outcome were good, 13(28.9%) patients functional outcome were fair and 5(11.1%) patients functional outcome were poor.

In Closed Reduction with K wire + cast group, there were 10(22.2%) patients functional outcome were Excellent, 24(53.3%) patients functional outcome were fair, 9(20.0%) patients functional outcome were good and 2(4.4%) patients functional outcome were poor.

There was statistically significant association seen between the functional outcome in both the groups ($P<0.05$).

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TABLE 1: Comparison of Quick DASH score at 6 months [6] at 6 months(N=90) Unpaired 't' test applied. P value <0.05 was taken as statistically significant

Functional Outcome	Group				Total	
	losed Reduction with cast (n = 45)		Closed Reduction with K wire + cast (n = 45)			
	No.	%	No.	%	No.	%
Excellent	7	15.6%	10	22.2%	17	18.9%
Good	20	44.4%	24	53.3%	44	48.9%
Fair	13	28.9%	9	20.0%	22	24.4%
Poor	5	11.1%	2	4.4%	7	7.8%
Total	45	100.0%	45	100.0%	90	100.0%
Mean±SD	21.33±10.98		14.97±8.60		18.15±10.31	
't' Value	3.055, df=88					
P Value	.003, Significant					

4 | DISCUSSION

In our study fall on outstretched hand was the common mode of injury in both the group (65.6%) where RTA was the second common mode of injury in both the group(34.4%)which was similar to Mardanikivi et al.[10] (50.8+/-15) and UzzamanKS et al [11]

In our study 54 cases(60%) were male which 36 case (40%) were female. That shows that in our study there was male predominance which might be because of the typical Indian setup where the male population largely work outdoors, marking them more prone to fall on outstretched hand and road traffic accident . Our finding are similar to a study conducted by Mardanikivi et al.[10] consisted of 198 cases which had 111 male and 87 female .

In our study 35.5% complications found in closed reduction with cast group in which residual pain and reduced grip strength is most common (10%) . 8.8% complications was observed in closed reduction and K wire fixation with casting group in which superficial pin tract infection was more common (3.3%), pin tract infection was healed after removal of pin. Modi nikunj et al . [12]complications rate in closed reduction with cast group was 16.6% and closed reduction with K-wire and cast group was complications 10%.

In our study the functional assessment (mean range of motion) in both the group at 6 months follow were statically significant in the range of movement outcome between the two group. Range of motion was slightly more as compared to our study while comparing with the study by Bansal et al. [13] and khajotia et al.[14]

In our study, K wire with cast group shows superior radiological result in comparison to closed reduction and cast group which was to Begul et al [9]

In our study functional outcome was also assessed by Quick DASH score[6]. Compared to other study Mahato M.P. et al. [15]]mean (Quick DASH score +/- Standard deviation in closed reduction with cast group were 15.10+/-9.68 and closed reduction with k wire and cast group were 11.38 +/- 8.87 that similar to our study closed reduction and cast with k wire group. similar to our study Bartel et al [16] observed better functional outcome in closed reduction and k wire group .

5 | CONCLUSION

We concluded that the group with k wire with cast was less complications as compared to that of the closed reduction with cast group and had better func-



FIGURE 1: Case of fracture Distal end radius managed by closed reduction and cast application, Post Reduction (a), Follow-up After 3 months (b), ROM Supination (c) Dorsiflexion (d), Radial deviation(e), Pronation (f), Ulnar deviation(g),.Palmer flexion(h).

tionally as well as the anatomical and radiological outcome. Regardless of the cost ,we recommend closed Reduction with K wire fixation overcast application in the treatment of unstable distal end radius fracture.

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FIGURE 2: Case of fracture Distal end radius managed by closed reduction and k wire fixation with cast application, Pre Reduction(a), Post Reduction (b), Follow-upAfter 3 months (c), ROM Dorsiflexion (d), Palmer flexion(e), Supination (f), Pronation(g), Ulnar deviation (h), Radial deviation (i).

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