

## Comparative Study Between Closed Reduction and Cast Application with and Without Percutaneous K Wire Fixation for Extra Articular Fracture Distal and Radius

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### Abstract

*Background-It has been increased demand for impeccable reduction and reduced complications in the treatment of fracture midst the patients. There are various treatment modalities available for the treatment of a distal radius fracture; which includes closed reduction and casting, closed reduction and percutaneous spinning by different methods. External fixation by means of ligamentotaxis to realign displaced fracture in case of closed reduction and volar or dorsal approach and internal fixation by different implants such as screws, plates, or screws with locking plate for open reduction, are few other treatment modalities. Materials And Methods-50 cases of extraarticular fractures of lower end of radius were treated during the period of one year. These 50 cases were divided randomly in two groups consisting of 25 patients each. One group was managed with closed reduction and cast while the other group by percutaneous K wire fixation followed by below elbow cast in neutral position. RESULTS- Forty percent were male while 60% were females, 70% patients were present with the injury in right hand while 30% were having injury in left hand 12% patients were having ulnar styloid fracture while 14% had radioulnar joint instability. Mechanism of injury was fall on outstretched hands in 76% patients and RTA in 16%. Conclusion-Radiological outcome is better by K wire fixation than by closed reduction and cast in treatment of extra articular distal end radial fracture. Functional outcome remains the same whether they are treated by K wire fixation or by closed reduction and cast but the early rehabilitation in K wire group as compared to the cast alone can be outweighed with the complications associated with percutaneous pinning.*

**Keywords:** Ligamentotaxis, Distal Radius Fracture, Tenderness, Bony Irregularity, Crepitus

### Introduction:

Previously it was known that the fracture of distal radius is being common in geriatric age with less functional demand who sustained a low intensity trauma. As there is a surge in number of elderly population along with greater road traffic accidents in all age groups who end up sustaining this fracture, the incidence of this fracture has surged significantly.[1] It has increased the demand for perfect reduction and decreased complications in the treatment of fracture among the patients. There are various treatment modalities available for the treatment of a distal radius fracture; which includes closed reduction and casting, closed reduction and percutaneous spinning by different methods. External fixation by means of ligamentotaxis to realign fracture displacement in case of closed reduction and volar or dorsal approach and internal fixation by different implants such as screws, plates, or screws with locking plate for open reduction, are few other treatment modalities.[1-3] There are various factors such as patient's age, comorbidities, lifestyle, associated injuries, functional demands, dominance of hand, alignment of fracture,

type of fracture, condition of soft tissues, whether the fracture is open or closed and economic conditions of the patient should be considered while deciding the treatment modality and finalizing the most appropriate one for each patient. These factors play a paramount role in the final decision in the treatment plan of the distal radius fracture.[2,3] The quality of the bones are not good in geriatric patients in comparison to the young, active patients. It is not easy to maintain the distal radius fracture by simple external splintage without any supplementary support to avoid the collapse in aging patients. Percutaneous pinning delivers additional support which is obligatory to preserve the fracture in desired alignment and reduction [4,5] It is commended as a simple way of giving extra advantage and stability to immobilize in a cast in extra articular fracture of distal radius which may provide anatomical reduction.[5,6]

## Materials and Methods

This study was performed on patients admitted in orthopaedics department during the period of one year. Fifty cases of extraarticular fractures of lower end of radius were treated during the period of one year. These 50 cases were divided randomly in two groups consisting of 25 patients each. One group was treated with closed reduction and cast while the other group by percutaneous K wire fixation followed by below elbow cast in neutral position. Patients with closed extra articular fractures of lower end of radius, age >20 years, ulnar styloid fracture were included in the study while patients with open fracture-segmental fracture, associated with ulnar fracture, paediatric fracture <20 years were excluded from the study.

All the patients were methodically examined and general state, accompanying systemic illness and injuries were recorded. Vigilant examination of the swelling, deformity, and ecchymosis were carried out. Tenderness, crepitus, bony abnormality, and the relative position of radial and ulnar styloid process were elicited and movements of the forearm and wrist were also evaluated. Distal vascularity was assessed by radial artery pulsations, capillary filling, pallor and paraesthesia over finger tips. The involved forearm was immobilized in a below elbow POP slab and kept raised. All the cases were followed up after two weeks, four weeks and six weeks and were radiologically assessed for re-displacement. After six weeks K-wires and cast were detached and the patients were evaluated clinically for fracture union, movements and radiological factors, physiotherapy was recommended. After six weeks, consistent follow up was conducted at time interval of three months and 6 months respectively. Detailed consents were obtained from all the patients participated in the study.

## Results

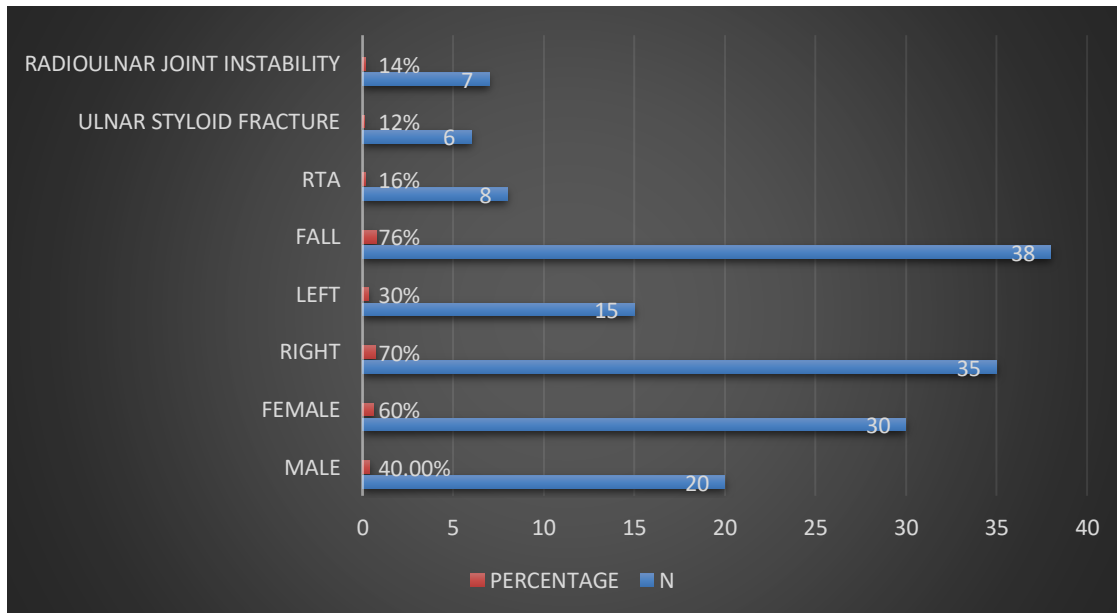
In our study we included 50 patients in which 40% were male while 60% were females, 70% patients were present with the injury in right hand while 30% were having injury in left hand 12% patients were having ulnar styloid fracture while 14% had radioulnar joint instability. Mechanism of injury was fall on outstretched hands in 76% patients and RTA in 16% (table-1, graph-1).

Out of both the groups were categorised in three category i.e good, fair and poor outcome. We found that 32% were falling in the category of good outcome while 46% and 25% patients had fair and poor outcome respectively when treated with closed reduction with cast. Patients treated with K wire with cast had better outcome as compared to the closed reduction with cast (table-2, graph-2, graph-3)

**Table 1: Number and percentage of gender, right or left hand, mechanism of fall and associated injury**

Parameters	N	Percentage
Male	20	40.0%
Female	30	60.0%
Right	35	70%
Left	15	30%
Fall	38	76%
Rta	8	16%
UlnarStyloidFracture	6	12.0%
Radioulnar joint instability	7	14.0%

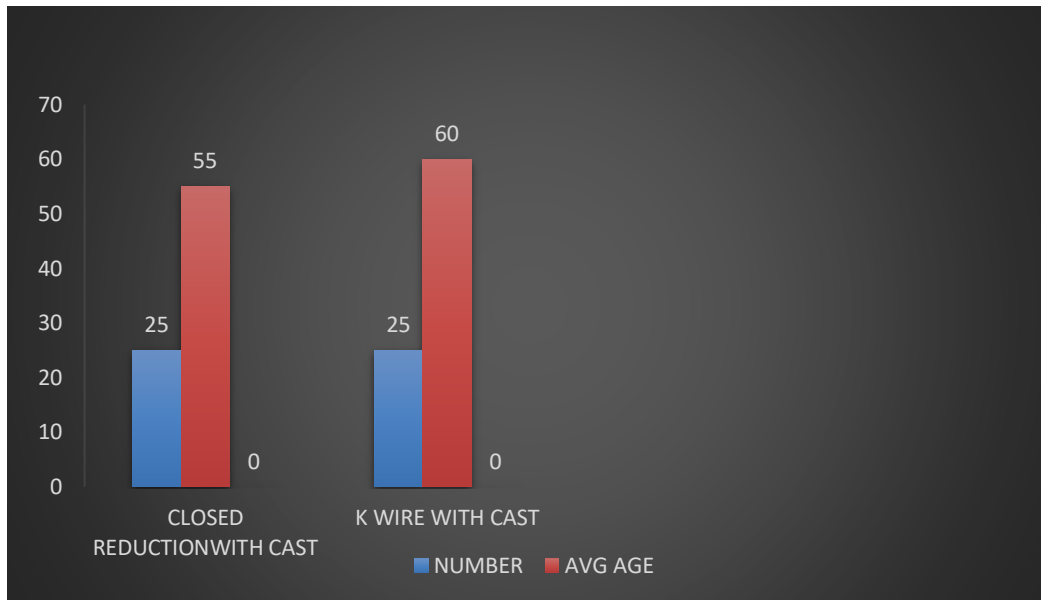
**Graph 1: Distribution of gender, associated injury and types of injury**



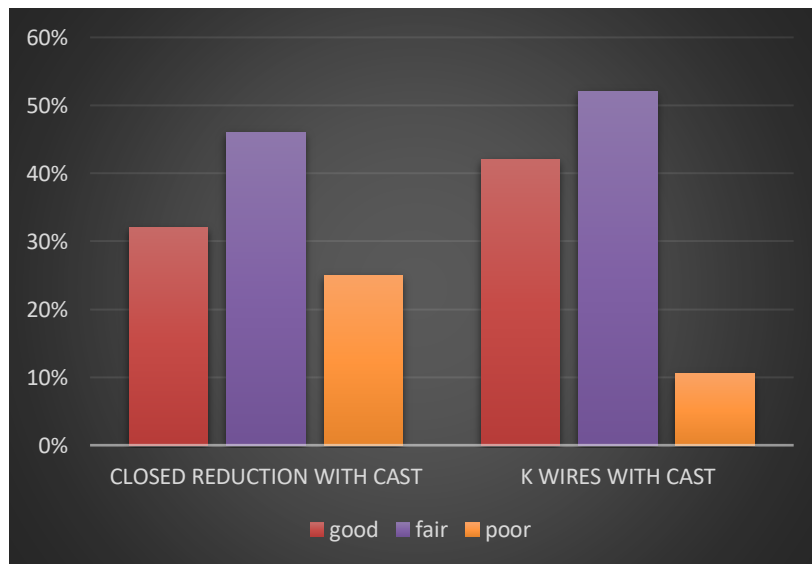
**Table2: Avg. age of mobilization and outcome at the end of 12 weeks in both groups**

	Number	Avg. Age	Mobilization	Outcome					
				Good		Fair		Poor	
Closed Reduction With Cast	25	55	6 weeks	7	32 %	10	46 %	6	25 %
K Wires With Cast	25	60	4 weeks	11	42 %	12	52%	3	10.5 %

**Graph2: Avg. age and number of subjects in both the groups**



**Graph3: Outcome of both the groups**



## Discussion

We treated and studied 50 patients, divided them into two groups. First group was managed with closed reduction and cast alone whereas in second group K wire fixation was done followed by cast. Maximum patients in our study were elderly female patients with a history of fall on outstretched hands. Low intensity trauma leading to fractures were correlates with the well formulated theory of postmenopausal osteoporotic women with fractures. In elder age groups, women had more fractures of the distal radius than men. These fractures resulted from low-energy falls. The inter-relationship between osteoporosis and distal radius fracture has previously been proposed.

In our study right side was involved in 70% patients and the left side was involved in 30% patients. Results were evaluated clinically and radiologically by the Sarmiento et al. modification of the demerit point system of Gartland and Werley.[7] Patients treated by closed reduction and cast application showed good outcome in 32%, fair outcome in 46% and poor outcome in 25%. Patients treated by percutaneous pinning followed by casts showed good outcome in 42% patients, 52% showed fair outcome while 10.5% showed poor outcome.

On comparison of both the groups, patients in K wire group showed early improvement in range of motion and grip strength because mobilization was started early in these patients. K wire group had statistically significant better radiological outcome and the anatomical reduction was maintained better except for ulnar variance.

Patients in cast group showed progressive dorsal angulation, loss of radial length and radial inclination but the final functional outcome was found to be similar in both groups. Our findings were in correlation with Azzopardi et al. who observed that the enhancement in functional outcomes for grip strength, pain and range of movement when patients were treated by supplementary wires was not significant, except in case of movement in deviation of ulna. They correlated these with the small differences in radiological factors which were consequently of no clinical significance and concluded that supplementary fixation by K-wire was only marginally superior to cast immobilisation alone to reduce the displacement of the fracture after closed manipulation. Supplementary K wires failed to provide good clinical outcomes in extra-articular, dorsally angulated, unstable fractures of the distal radius.[8] Raghu B.V. et al. in their study concluded that closed reduction with percutaneous K wiring and below elbow cast application is easy to perform and minimally invasive technique that gives additional stability and better outcome.[9]

Findings of our study were in contrast with Gupta et al. who performed a randomized study of 50 patients and he evaluated the efficacy of maintaining reduction and consequent results of two treatment methods in his study that is percutaneous crossed-pin fixation followed by conventional cast immobilization versus cast immobilization with the wrist in functional position. He mentioned that in his study 40% patients had good outcome and 20% of patients were in the category of fair outcomes while poor results were obtained in cases of plaster cast application, however patients with K-wire fixation: 18% showed good results and 4% shown fair to poor results. With the assistance of the observations he concluded that the anatomical and functional end results were significantly improved with percutaneous crossed-pin fixation at final followup.[10] Rodríguez-Merchán EC et al. also found that functional results in the pinning group were better than in the plaster group. Anatomic results also were improved in the pinning group and he concluded that the best functional results were received by percutaneous pinning. Nevertheless the cost of pins and plaster treatment is significantly greater than plaster treatment, and the author believed that the positive end result justifies the cost.[11]

## Conclusion

Patients with early physiotherapy developed early improvement in range of movements, possible with K wire fixation. Though radiological outcome is better by K wire fixation than by closed reduction and cast in treatment of extra articular distal end radial fracture. Functional outcome remains the same whether they are treated by K wire fixation or by closed reduction and cast but the early rehabilitation in K wire group as compared to the cast alone can be outweighed with the complications associated with percutaneous pinning.

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