

A Comparative Study Of Functional And Radiological Outcome Of Distal Radius Fractures Treated With Pop Cast Versus Percutaneous K Wire Fixation

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Abstract

Background: distal end radius fractures constitute 20% of fractures managed in emergency departments. the objective of our study is to compare functional and radiological outcome of pop cast compared percutaneous k wire fixation in distal radius fractures.

Materials and methods: this prospective study included 50 patients with distal radius fractures. 25 patients were treated with pop cast and 25 patients were treated with percutaneous k wire fixation. The functional outcome of wrist was assessed using sarmiento et al modification of gartland and werley score.

Results: among 50 patients, 24 are male and 26 are female with age ranging from 22-75 years of age with average age of 54.24 years in pop group and 58.32 years in percutaneous k wire fixation group. 13, 8, 4 patients in pop group shows excellent, good and poor outcome respectively. 19, 6 patients shows excellent and good outcome in percutaneous k wire group.

Conclusion: closed reduction and per cutaneous k wire fixation is a minimally invasive technique that provide added stability and functional outcome. the duration of fracture healing is less with percutaneous pinning with improved clinical and radiological outcomes with better functional rom.

Keywords: distal radius fractures, popcast, percutaneous k wire fixation, range of motion, increased stability

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I. Introduction

Twenty percent of fractures treated in emergency rooms are distal end radius fractures. Most patients, irrespective of the particular technique used to fix this fracture, have discomfort following therapy. There was a great deal of debate regarding these studies' use of many confounding variables when evaluating the final functional outcome¹.

In addition to closed reduction and percutaneous k wire fixation using methods like intrafocal Kapandij pinning, trans radial styloid pinning, insertion of k wire through Listers tubercle, or trans-ulnar pinning, orthopaedic surgeons have a variety of treatment options at their disposal. Other methods of treating fractures include open reduction using volar or dorsal approaches, fixing the fracture with screws, plates, or screws with locking plates, and closed reduction with external fixator application utilizing ligamentotaxis to realign misplaced fractures².

The patient's age, lifestyle, existence or absence of concomitant injuries, co-morbidities or not, functional demands, hand dominance, fracture type and alignment, soft tissues, closed or compound fracture, and the patient's socioeconomic status all play a role in determining the best course of treatment. Therefore, all the criteria would significantly influence the ultimate result of the treatment chosen for distal radius fracture².

The management of distal radius fractures with only external splints after closed reduction becomes more difficult as people age. It takes extra support to keep something from collapsing. Percutaneous K wire fixation was found to be advantageous for these patients after fracture reduction because it adds strength to ensure proper alignment of the fracture and reduction. This method worked well for immobilizing a plaster of Paris cast in an extra-articular fracture of the distal radius³.

II. Materials And Methods

This prospective interventional study was carried out on patients of Department of Orthopaedics at Maharajah's institute of medical sciences, Nellimarla, Vizianagaram from January 2023 to June 2024. A total of 50 subjects (both male and female) were for in this study.

Study design: prospective interventional study

Study location: maharajah’s institute of medical sciences,nellimarla,vizianagaram,andhra pradesh

Study duration: january 2023 to june 2024

Sample size:50 patients

Subjects and selection method: the study population was drawn from patients with distal radius fractures who presented to maharajah’s institute of medical sciences and treated with either pop cast or percutaneous k wire fixation from january 2023 to june 2024.patients were divided into two groups of 25 patients each based on their treatment modality received.

Inclusion criteria:

- 1) patients aged between 22-75 years of age
- 2)patients with clinical and radiological features of extra articular fractures of distal radius fractures
- 3) patients with fractures not more than 2 weeks
- 4) patients with medical fitness
- 5) patients with closed fractures

Exclusion criteria:

- 1) patients with intra articular fractures,
- 2) patients with compound fractures
- 3) patients with neurovascular deficit
- 4) patients who are unfit for general anaesthesia

Procedure methodology:

Diagnosis was made clinically and radiologically and treated with either pop cast or percutaneous k wire fixation.all patients were followed up for an average period of 1 year. During follow up,roentgenograms were taken and assessed. Anatomical evaluation was done using sarmiento modification of lindstorm criteria and functional evaluation was done using sarmiento et al modification of gartland and werley.

Statistical analysis:

The statistical analysis was performed using students ‘t’ test to compare variables in patients who were treated with pop cast or percutaneous k wire fixation..differences were considered statistically significant when $p < 0.001$.

III. Results

In the present study out of 50 patients,25 patients were treated with POP Cast and 25 patients were treated with Percutaneous K wire.

Table 1:Comparison of mode of injury between the groups

Mode of injury	Group A (Pop Cast)	GroupB (Percutaneous K Wire Fixation)
Low-velocity household self-fall	25	25
Total	25	25

Table 1 outlines a comparison of the mode of injury between Group A (Pop Cast) and Group B (Percutaneous K Wire Fixation) , both of which predominantly incurred low-velocity household self-falls, with 25 cases in each group.

Table 2: Comparison of fracture healing time between the groups

Fracture healing time	Group A (Pop Cast)	Group B (Percutaneous K Wire Fixation)
Mean	17.52	13.40
Standard deviation	2.47	2.12
p-value <0.001 (Statistically Significant)		

Table 2 reports a comparison of fracture healing time between Group A (Pop Cast) and Group B (Percutaneous K Wire Fixation) . Group A (Pop Cast) exhibits a mean healing time of 17.52 days with a standard deviation of 2.47 days, while Group B (Percutaneous K Wire Fixation) shows a mean healing time of 13.40 days with a standard deviation of 2.12 days. The χ^2 test yields a statistic of 148.13 with a p-value less than 0.001, indicating statistical indicating K wire fixation is better than Pop Casting.

Table 3: Comparison of functional range of movements between the groups

Range of movements	Group A (Pop Cast)	GroupB (PercutaneousK Wire Fixation)
Flexion	23	24
Extension	22	25
Radial Deviation	22	25
Ulnar Deviation	21	25
Supination	21	25
Pronation	22	25
p-value <0.001 (Statistically Significant)		

Table 4: Comparison of Radiological parameters between the groups

Radiological parameters	Group A (Pop Cast)	Group B (Percutaneous K Wire Fixation)	p-value
Residual Dorsal tilt 0° 1° to 10° 11° to 14° At least 15°	2 4 11 8	15 6 4 0	0.04 (Statistically Significant)
Radial Shortening < 3 mm 3 to 6 mm 7 to 11 mm At least 12 mm	4 5 10 6	16 8 1 0	0.001 (Statistically Significant)
Loss of Radial Inclination < 5° 5° to 9° 10° to 14° > 14°	7 8 9 1	13 12 0 0	0.02 (Statistically Significant)

**Illustrations:
Pop Group**



Pre Reduction

Post Reduction Pop Application

K Wire Fixation Group



Pre Op X Ray

Post Op X Ray

IV. Discussion

In osteoporotic patients, closed reduction of the fracture and cast immobilization are the standard methods for treating these fractures. This method avoids the need for surgery and the hazards that go along with it, but it can't fully maintain the length or rotational alignment of the fractured bone fragment, especially when the fracture is comminuted.

Reducing the fracture and immobilizing it with a cast is the non-operative strategy that has produced a high percentage of poor outcomes (up to 30% in large studies⁴).

According to a study, 51.4% of cases with comminuted intra articular distal end radius fractures treated with reduction and POP cast had a bad outcome⁵.

According to several authors, the radiological outcome has no bearing on the final functional outcome in elderly patients with distal radius fractures with unstable patterns (DRFs). They have also found that cautious methods produce positive results⁶.

Osteoporosis-related low-energy injuries are prevalent in older patients, and they typically have low prospects for recovery⁷.

To stabilize the unstable portions of this fracture, Walton et al. used the intramedullary k wire fixation and intra focal insertion techniques, more especially, intrafocal pinning, also known as kapandji pinning. They also used a modified version of the Lindstrom grading system to assess the final functional outcome⁸.

Kurup et al. used percutaneous insertion of k wire as a treatment option for these fractures in a related investigation. After the pins were taken out, the patients' fracture sites did not significantly shift, and this outcome held true for all patients—regardless of age, gender, or kind of fracture⁹.

A method for treating stable fractures of the distal end of the radius outside the joint as well as inside the joint was presented by Sato et al¹⁰. This method entails decreasing the fracture and fixing it antegradely with a K-wire. In rural locations, antegrade intramedullary K-wire fixation is a reasonably priced therapeutic option.

V. Conclusion

After evaluating the radiographic results, it is clear that, in the case of distal end radius fractures, surgical intervention is preferable to a conservative approach. Significant differences were observed in the frequency of complications and functional results.

Closed reduction combined with percutaneous K wire fixation is a minimally invasive procedure that yields improved function and stability. Percutaneous pinning results in shorter healing times for fractures and better radiological and clinical outcomes along with increased range of motion.

Our analysis's findings agreed with information already available on distal radius fractures that were managed with closed reduction and percutaneous pinning.