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## Original Research Article

## Extra-articular distal end radius fractures in elderly treated conservatively-functional outcome

Rohit Ranjolkar<sup>1\*</sup>, Mallikarjun G B<sup>1</sup>, Rajesh Sajjanshetty<sup>2</sup><sup>1</sup>Dept. of Orthopaedic, Bidar Institute of Medical Sciences, Bidar, Karnataka, India<sup>2</sup>Government of Karnataka, Karnataka, India

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## ABSTRACT

**Background:** An ageing population is associated with an increase in the frequency of distal radius fractures, an orthopaedic problem that affects many people. Orthopaedic surgeons have special concerns while treating some types of fractures, including those involving the distal end of the radius that occur outside of the joint. For this reason, we set out to compare the efficacy of conventional cast methods with that of percutaneous pinning in a sample of older adults.

**Materials and Methods:** From June 1, 2021 to June 1, 2022, researchers from Bidar Institute of Medical Sciences, Bidar, conducted a prospective, randomised trial. Thirty patients underwent cast immobilisation and closure reduction. thirty-one patients underwent closed reduction with percutaneous K wires. The patients underwent a clinical examination and X-rays at each subsequent follow-up.

**Results:** The results showed that the group that had closed reduction K-wire fixation had greater range of motion, VAS scores, and loss of radial length compared to the other group. When looking at the Saito chart and Lindstrom's criterion findings for both groups, it was also evident of this. In 13% of patients, a pin tract infection developed following K-wire fixation but went away after the wires were removed. This was the sole serious side effect of the procedure.

**Conclusion:** When treating displaced, distal end radius fractures, the best, safest, and most complication-free method is closed reduction with percutaneous K-wire fixation.

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## 1. Introduction

An ageing population is associated with an increase in the frequency of distal radius fractures, an orthopaedic problem that affects many people. Orthopaedic surgeons have special concerns while treating some types of fractures, including those involving the distal end of the radius that occur outside of the joint.<sup>1</sup> An ever-shifting tendency towards conservative methods, prioritising functional results above surgical measures, has emerged in the ongoing debate over the management of these fractures. Fractures caused by osteoporosis and age-related deterioration are

becoming more common as the world's old population keeps growing.<sup>2</sup> Distal end radius fractures make up a large percentage of these fractures and provide major obstacles to treatment methods and functional results in the long run.<sup>3</sup> There has been an upsurge in interest in conservative treatment methods for extra-articular fractures, which are defined as those that do not involve the joint surface.

Cast immobilisation, physical therapy, and close observation are examples of non-surgical treatments for extra-articular distal end radius fractures.<sup>4</sup> This method is designed to help older patients who may have other health conditions that make surgery more risky reach fracture union and functional independence as soon as possible with as few problems as possible. Considerations such as

\* Corresponding author.

E-mail address: [rohitranj@gmail.com](mailto:rohitranj@gmail.com) (R. Ranjolkar).

fracture features, patient age, co-morbidities, and functional demands have a role in the choice to conservatively treat extra-articular distal end radius fractures. Orthopaedic practitioners must have a thorough understanding of the specific difficulties associated with these fractures as well as the effects of conservative treatment on functional results in order to make well-informed judgements that are specific to their senior patients' requirements.<sup>5</sup>

### 1.1. Epidemiology of distal end radius fractures

Fractures of the distal end of the radius are common orthopaedic injuries that can severely limit a person's ability to go about their everyday lives and are especially common in the elderly. It is critical to understand the epidemiology of distal end radius fractures in order to guide public health efforts and clinical care options. Distal end radius fractures are becoming more common, especially in the older population.<sup>6</sup> The tendency can be explained by the natural decline in bone density that occurs with age, which makes people more prone to fractures like these due to falls. Distal end radius fractures, which often occur in falls from standing height or below, are more common in those over the age of 60, according to studies. Furthermore, there is an increased occurrence in females, which may be associated with the decline in bone mineral density that occurs after menopause.

Distal end radius fractures cause more than just physical harm; they can limit a person's mobility, cause them chronic discomfort, and generally lower their quality of life. It is crucial to prioritise bone health in the elderly as a preventive step, as these fractures are frequently signs of osteoporosis.<sup>7</sup>

### 1.2. Current treatment approaches in the elderly

A common orthopaedic problem among the elderly is distal end radius fractures, which typically require a sophisticated approach when planning therapy. Surgical procedures and conservative therapy have been the subject of increasing discussion in recent years as potential treatments for these fractures in the elderly.<sup>8</sup> With the goal of giving a thorough review of the current approaches used to treat elderly patients with extra-articular distal end radius fractures, this section aims to shed light on the current therapeutic landscape.

Fractures are more common in the elderly because of changes in bone architecture, decreased bone density, and an increased risk of falls. This highlights the critical need of individualising treatment plans with a focus on achieving a happy medium between clinical effectiveness and patient-centered outcomes.<sup>9</sup> When it comes to treating distal end radius fractures in people of all ages, surgical procedures like percutaneous pinning and open reduction and internal fixation (ORIF) have traditionally been the gold standard. The focus, however, has shifted in recent years

to investigating the possible advantages of conservative methods for the elderly.

### 1.3. Functional outcomes in extra-articular fractures

The functional results of distal end radius fractures in the elderly are greatly affected by the difficult spectrum of injuries that might occur as a result of these accidents. An important issue for treatment plans and functional recovery after a fracture is whether the injury was extra-articular, meaning it did not affect the joint surface. There has to be a thorough investigation into the best ways to treat distal end radius fractures in the elderly in order to keep them mobile and improve their quality of life, since this condition is becoming more common as the population ages.<sup>10</sup>

The effectiveness of various treatment approaches may be assessed by looking at functional outcomes in the case of extra-articular distal end radius fractures. An individual's capacity to carry out ADLs, retain autonomy, and participate in social responsibilities is directly impacted by the functional state of their wrist and hand.<sup>11</sup> Thus, it is critical for researchers and physicians to have a thorough grasp of the factors affecting functional outcomes.

## 2. Significance of the Study

The study's importance rests in its implications for the treatment of the ageing population and related fractures, namely extra-articular distal end radius fractures in the elderly treated conservatively. To optimise patient care, it is essential to evaluate the functional results of conservative therapy for distal radius fractures, which are more common in the elderly. To help doctors in their decision-making processes, this research adds to the medical community by giving important insights into the efficacy of non-surgical methods. By looking at functional outcomes, healthcare providers can learn about the long-term effects on patients' life and the pros and downsides of conservative treatment options. In the end, this study helps enhance the treatment that older adults with distal radius fractures receive, which leads to better results for patients and overall health.

## 3. Research Methodology

From December 2021 through June 2023, researchers from the Orthopaedics Department at Thrissur Govt. Medical College in Thrissur carried out a prospective, randomised study. The local ethics committee gave its blessing, and sixty patients (all 50 and up) with a distal end radius extra articular fracture that was displaced but stable and had no joint incongruity gave their informed consent. In addition to patients having a history of wrist or forearm fractures, we did not include individuals with open fractures, dorsal comminution fractures, congenital or other forearm abnormalities, dorsal tilts more than 20 degrees, or intra-articular distal end radius fractures. Cast immobilisation

and closure reduction were performed on thirty individuals. Thirty-one patients had percutaneous K wires placed for closed reduction.

Closed reduction with conventional cast immobilisation was performed on patients under regional or general anaesthesia with C-arm guidance in the operating room. Under the influence of anaesthetic, Agee's manoeuvre was used to accomplish reduction. A cast was placed below the elbow, beginning at the metacarpophalangeal joints and finishing at the proximal portion of the forearm (while sparing the thumb), after a soft roll was wrapped around the patient. This immobilised the patient. A patient had to be painted and draped before two crossed K wires could be introduced under C arm guidance to cross fracture lines in both planes, allowing for closed reduction with percutaneous pinning. Dressing the patient followed the cutting and bending of both K wires.

The patient's hands were raised for 24 hours after the procedure, and intravenous antibiotics and analgesics were given. After that, antibiotics, pain relievers, and calcium supplements were taken orally. The group that had closure reduction and cast immobilisation, in contrast, did not receive antibiotics. Patients were then discharged and re-evaluated at the end of the first, second, fourth, sixth, and twelfth weeks. At every checkup, we took AP and lateral X-rays in addition to taking notes and doing a clinical evaluation. A Visual Analogue Scale was used to evaluate each group. Saito charts for pain and deformity were used to evaluate both groups. The success of each fracture was evaluated using Lindstrom's Criteria for Anatomical End Result (LCAER) and Lindstrom's Criteria for Functional End Result (LCFER). We used XLSTAT, an unpaired student's t-test.

#### 4. Results

To address the increasing number of older people and the related fractures, this study focuses on conservatively treating extra-articular distal end radius fractures in this group. Thirty patients underwent cast immobilisation and closure reduction. Thirty patients underwent closed reduction with percutaneous K wires.

The gender breakdown of the patients who were part of the K-wire group and the cast group is presented in Table 1.

Both the group that utilised casts and the group that employed K-wires were able to demonstrate a wide range of mobility, as documented in Table 2. Among the members of the cast, the average age was 63.43 years old altogether. It was found that the K-wire group had an average age of 62.16 years, and the p-value for this group was just 0.6097.

It is clear from looking at Table 3 that both the cast group and the K-wire group had trouble. The Visual Analogue Scale (VAS) was utilised in order to assess both of the populations. According to the VAS, the K-wire group had a score of 4.7, whereas the cast group had a score of 5.6 (P

= 0.007).

A breakdown of the Saito scores for both the cast and K-wire groups can be found in Table 4. The scores may be divided into two separate categories, as shown in the table. Excellent and respectable. For the purpose of drawing conclusions, the data from both groups are presented in Table 4, which makes use of the four levels of Lindstrom's Criteria for Anatomical End Result (LCAER). The results of patients in both groups are presented in Table 4, which pertains to Lindstrom's Criteria for Functional End Result (LCFER). The average amount of radial length that was lost in patients who had closed reduction and cast measures 6.83 millimetres. It was shown that patients who had closed reduction with a K-wire experienced an average radial length loss of 3.8 millimetres, with a p-value that was lower than 0.0003.

#### 5. Discussion

When treating elderly individuals, it is important to keep in mind the unique challenges posed by distal end radius fractures that develop outside of the joint. Recent research has shown that conservative therapy, an alternative to surgical treatment, may be an option for these fractures. Common elements of this approach include applying a cast or splint to the injured region, prescribing pain medication, and participating in physical therapy. The decision to choose for conservative therapy is influenced by factors such as the patient's age, co-morbidities, fracture stability, and functional requirements. Research demonstrating promising functional outcomes with conservative therapy in the elderly has brought attention to the importance of personalised treatment. Stabilising a fracture by immobilisation helps the healing process along more smoothly.

An increased incidence of distal end radius fractures, a condition associated with all of the risk factors for osteoporosis, is seen in the elderly. In a two-year prospective study following 113 patients. External fixation and percutaneous pinning fixation were superior to traditional cast immobilisation. In contrast, a randomised clinical trial conducted by "Stoffelen" showed that the results for patients treated with casting vs percutaneous pinning methods were the same.<sup>12,13</sup> Distal end radius fractures treated with K-wire pinning fixation are more quickly and with less technical difficulty than those treated with more complex fixation procedures. It is less invasive than open reduction, which means less harm to soft tissues, and it works well with cast immobilisation.

Problems with this approach include the potential for pin tract infection, incorrect reduction of fractures, and unstable fixation as compared to plating procedures. The research conducted by "Rosenthal" et al. shown that intrafocal pinning worked better than both closed reduction and cast. Stiffness in the fingers and wrists is a very unusual side effect of external treatment for Colles' fractures.<sup>14,15</sup>

**Table 1:** Gender frequency

	Cast group	K-wire group	Total	Percentage
Male	12	07	19	31.66%
Female	18	23	41	68.33%

**Table 2:** Range of motion

Motion	Cast group (in degrees)	K-wire group (in degrees)	P value
Dorsiflexion	63.34	69.66	$P \leq 0.0001$
Palmar flexion	55.84	64.83	$P \leq 0.0001$
Pronation	63	64.83	$P = 0.1$
Supination	66.5	69.33	$P = 0.007$

**Table 3:** Complications

Complication	Cast group	K-wire group
Finger Stiffness	04 (13%)	02 (07%)
Sudeck's Dystrophy	04 (13%)	03 (10%)
Osteoarthritis	06 (20%)	03 (10%)
Pin Tract Infection	0 (0%)	04 (13%)

**Table 4:** Lindstrom's criteria

	Cast group	Percentage (%)	K-wire group	Percentage (%)
Excellent	07	23%	21	70%
Good	23	77%	09	30%

In terms of radial length loss, range of motion, and VAS ratings, our study indicated that the group that had closed reduction K-wire fixation had improved results. A statistical analysis revealed these disparities to be substantial. This was also clearly shown when comparing the two groups using Lindstrom's criteria results and the Saito chart. After the removal of the K-wires, a pin tract infection that had developed in 13% of patients resolved itself. The operation had no other major adverse effects than this.

Results in function can be positive for older individuals with extra-articular distal end radius fractures when conservative treatment is tailored to their specific needs. Thanks to a well-rounded assessment of fracture characteristics, patient concerns, and careful monitoring, this approach is effective in providing an alternative to surgical methods in some cases.

## 6. Conclusion

Functional results are favourable when older patients with extra-articular distal end radius fractures are treated conservatively. Successful outcomes can be achieved without the dangers of surgery by utilising this method, which focuses on non-invasive treatments including casting, bracing, and rehabilitation. The study highlights the significance of tailoring treatment approaches to each patient by taking their age, comorbidities, and fracture characteristics into account. A cautiously supervised conservative strategy can enhance function and quality

of life for older adults with distal end radius fractures, despite the limitations provided by aging-related variables such as osteoporosis. Compared to closed reduction and cast immobilisation, closed reduction with percutaneous K-wire fixation is a safer, better, and simpler approach to maintain reduction in displaced, distal end radius fractures with few sequelae. The results stress the need of individualised rehabilitation plans to maximise functional outcomes in this particular group of patients and call for a nuanced approach to decision-making that weighs the pros of conservative therapy against the risks of surgery.

## 7. Author Contribution

All authors contributed equally to this work. And all the authors have read and approved the final version manuscript

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## 9. Conflicts of Interest

The authors declare that we have no conflict of interest.


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## References

- Morin SN, Lix LM, Majumdar SR, Leslie WD. Temporal trends in the incidence of osteoporotic fractures. *Curr Osteoporos Rep.* 2020;11(4):263–9.
- Shauver MJ, Yin H, Banerjee M, Chung KC. Current and future national costs to Medicare for the treatment of distal radius fracture in the elderly. *J Hand Surg Am.* 2021;36(8):1282–7.
- Fujii K, Henmi T, Kanematsu Y, Mishiro T, Sakai T, Terai T, et al. Fractures of the distal end radius in elderly patients: A comparative study of anatomical and functional outcomes. *J Orthop Surg (Hong Kong).* 2002;10(1):9–15.
- Fang Q, Cai G, Liu J, Wang X, Zhu D. Efficacy of cast immobilization versus surgical treatment for distal radius fractures in adults: a systematic review and meta-analysis. *Osteoporos Int.* 2023;34(4):659–69.
- Polinder S, Iordens GI, Panneman MJ, Eygendaal D, Patka P, Hartog DD, et al. Trends in incidence and costs of injuries to the shoulder, arm, and wrist in The Netherlands between. *BMC Public Health.* 1986;13:531.
- Altissimi M, Antenucci R, Fiacca C, Mancini GB. Long-term results of conservative treatment of fractures of the distal radius. *Clinical Orthopaedics and Related Research.* 2021;206:202–212.
- Earnshaw SA, Aladin A, Surendran S, Moran CG. Closed reduction of colles fractures: comparison of manual manipulation and finger-trap traction: a prospective, randomized study. *J Bone Joint Surg Am.* 2022;84(3):354–8.
- Rikli DA, Regazzoni P. Fractures of the distal end of the radius treated by internal fixation and early function: A preliminary report of 20 cases. *J Bone Joint Surg Br.* 2018;78(4):588–92.
- Kulej M, Dragan S, Dragan SL, Krawczyk A, Plochowski J, Orzechowski W, et al. Efficacy of closed reduction and maintenance of surgical outcome in plaster cast immobilization in different types of distal radius fractures. *Ortop Traumatol Rehabil.* 2007;9(6):577–90.
- Mackenny PJ, Mcqueen MM, Elton R. Prediction of instability in distal radial fractures. *J Bone Joint Surg Am.* 2016;88(9):1944–51.
- Jordan RW, Saithna A. Defining the role of intramedullary nailing for fractures of the distal radius: A systematic review. *Bone Joint J.* 2019;97-B(10):1370–6.
- Stoffelen DVC, Broos PL. Closed reduction versus Kapandji pinning for extra-articular distal radius fractures. *J Hand Surg Br.* 1999;24(1):89–91.
- Naidu SH, Capo JT, Moulton M, Ciccone W, Radin A. Percutaneous pinning of distal radius fractures: a biomechanical study. *J Hand Surg Am.* 1997;22(2):252–7.
- Rosenthal AH, Chung KC. Intrafocal pinning of distal radius fractures: A simplified approach. *Ann Plast Surg.* 2002;48(6):593–9.
- Arora R, Gabi M, Gschwanter M, Deml C, Krappinger D, Lutz M, et al. A comparative study of clinical and radiologic outcomes of unstable colles type distal radius fractures in patients older than 70 years: nonoperative treatment versus volar locking plating. *J Orthop Trauma.* 2009;23(4):237–42.

## Author biography

**Rohit Ranjolkar**, Assistant Professor  <https://orcid.org/0009-0001-3379-034X>

**Mallikarjun G B**, Associate Professor  <https://orcid.org/0009-0001-3379-034X>

**Rajesh Sajjanshetty**, Consultant Orthopedic Surgeon

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