

Functional, Clinical and Radiological Outcome of Extra Articular Distal End Radius Fracture in Elderly Patients, Closed Reduction and Cross K-wiring Versus Conservative Management (Closed Reduction and Casting)

Hardik Kapopara¹, Vivek Dubey², Rajeev B. Reddy³, Surya Chandramurthy⁴, Sunil M. Shahane⁵, Ashwin Samant⁶

ABSTRACT

Introduction: Fractures of the distal radius constitute one of the common skeletal injuries. This type of fracture usually results from low energy trauma in the elderly with low functional demand. The optimal method of obtaining and maintaining an accurate reduction remains a topic of controversy. Study was done with the aim to evaluate and compare the clinical and radiological outcome in patients with extraarticular distal end radius fractures treated with i.e., closed reduction and cast or with closed reduction, K wires and cast.

Material and Methods: This was a prospective study consisting of sixty cases with distal end radius extra articular fracture with age greater than fifty years. The patients were randomly allocated to either closed reduction or closed reduction with percutaneous K-wire group equally. Clinical and radiological assessment was done in subsequent follow ups. Activities of daily life (ADL) were assessed using the demerit point system of Gartland and Wereley.

Results: The mean radiological parameters at three months in closed reduction and casting group were-radial length 8.93 mm, volar tilt 4.63 degrees and radial inclination was 19.47 degree. The mean radiological parameters at three months in closed reduction and K wiring group were-radial length 11.33 mm, volar tilt 7.67 degree and radial inclination was 22.87 degree.

Conclusion: From our study, we concluded that close reduction with percutaneous K-wire and casting has better functional, clinical and radiological outcome than closed reduction and casting alone.

Keywords: Distal Radius Fracture, Percutaneous Pinning, Casting, Kirschner Wire

controversy. Wide arrays of techniques, including closed reduction and cast immobilisation and close reduction and percutaneous pinning, external fixation, dorsal plating, volar locked plating, intra medullary nail fixation used as single or combined procedures, each have their own specific merits and demerits.^{4,5}

Traditionally fractures of distal radius in elderly have been treated by closed reduction and immobilization in a plaster cast. Maintenance of satisfactory alignment is difficult.^{6,7,8,9} Recent studies indicate high rate of re-displacement, re-angulation and remanipulation following closed reduction and cast immobilization.^{8,9} Supplementary percutaneous K-wire fixation resulted in a significantly better maintenance of the alignment of the completely displaced fractures of the distal radius.¹⁰⁻¹⁵

Complications are known to occur in both the groups^{13,14} (close reduction and cast immobilisation and close reduction and k-wiring). Hence, this prospective comparative study of closed reduction and cast immobilization versus closed reduction and K-wire fixation in distal radius extra articular fractures was conducted to identify the difference in functional, radiological and clinical outcome between the two groups.

¹Arthroplasty Fellow, Department of Orthopaedics, Laud Clinic, Mumbai, ²Registrar, Department of Orthopaedics, H.B.T. Medical College and Dr. R.N. Cooper Hospital, Mumbai, ³OrthoOncology Fellow, Hinduja Hospital, Mahim, Mumbai, ⁴Senior Resident, Department of Orthopaedics Government Area Hospital, Amalapuram, East Godavari District, Andhra Pradesh, ⁵Honorary Consultant, Department of Orthopaedics, H.B.T. Medical College and Dr. R.N. Cooper Hospital, Mumbai, ⁶Assistant Honorary, Department of Orthopaedics, H.B.T. Medical College and Dr. R.N. Cooper Hospital, Mumbai, Maharashtra, India

Corresponding author: Vivek Dubey, Room no. 305, RMO Quarters, Dr. R.N. Cooper Municipal General Hospital, N.S. Road No. 1, Vile Parle (W); Mumbai-400056

How to cite this article: Hardik Kapopara, Vivek Dubey, Rajeev B. Reddy, Surya Chandramurthy, Sunil M. Shahane, Ashwin Samant. Functional, clinical and radiological outcome of extra articular distal end radius fracture in elderly patients, closed reduction and cross K-wiring versus conservative management (closed reduction and casting). International Journal of Contemporary Medical Research 2018;5(6):F14-F16.

DOI: <http://dx.doi.org/10.21276/ijcmr.2018.5.6.24>

INTRODUCTION

Fractures of the distal radius constitute one of the common skeletal injuries. These injuries account for one sixth of all fractures evaluated in emergency room.^{1,2} This type of fracture usually results from low energy trauma in the elderly with low functional demand.³ Significance of this increased because of increasing elderly population, high energy vehicle accidents, and greater demand of perfection by patient and also due to potential early and late complications. Approximately 10% of 65 years old will sustain a distal radius fracture during the remainder of their lifetime. The optimal method of obtaining and maintaining an accurate restoration of distal radial anatomy remains a topic of considerable

Study was done with the aim to evaluate and compare the clinical and radiological outcome in patients with extraarticular distal end radius fractures treated with i.e., closed reduction and cast or with closed reduction, K wires and cast.

MATERIAL AND METHODS

Sixty adult patients with a distal end of radius extra articular fractures (Frykman's type 1 and 2), who were admitted to the Dr. R. N. Cooper Municipal General Hospital, Juhu, Mumbai-400056, fulfilling the inclusion criteria and willing to participate in this study were included. This was a prospective study consisting of sixty cases with distal end radius extra articular fracture with age greater than fifty years. The patients were randomly allocated to either closed reduction or closed reduction with percutaneous K-wire group equally. Thirty patients in closed reduction group were treated by closed reduction with cast application and another thirty patients in closed reduction with percutaneous K-wire group were treated by closed reduction with percutaneous K-wire and cast application. Patients with intra-articular fractures, open injury, and those with neurovascular compromise were excluded from this study.

Clinical and radiological assessment was done in subsequent follow ups. Activities of daily life (ADL) were assessed using the demerit point system of Gartland and Wereley based on objective and subjective criteria, residual deformity and complications.

STATISTICAL ANALYSIS

Statistical Package for Social Sciences (SPSS, Inc., Chicago, Illinois) version 18.0 was applied to confirm statistical significance of the data thus collected. Descriptive statistics was used to describe the sample in terms of socio-demographic and clinical characteristics. Parametric tests, non-parametric test (χ , ANOVA, Mann-Whitney U) was used to compare between groups. In this study, a level of significance (α) of < 0.05 (2-tailed) was taken to consider a result (group difference) statistically significant.

RESULTS

The mean age of patients treated by closed reduction with casting was (Mean +SD) 60.03+ 5.41 years while those treated by closed reduction with K-wire and casting was (Mean +SD) 58.9+ 5.08 years. (Range from 50 to 74 years). The most common mode of injury was fall on out stretched hand (85%). The complications were seen more in closed reduction with casting group when compared to closed reduction with K-Wire group. Patients treated with close reduction and percutaneous K-Wire and casting has significantly increased all range of movements compare to close reduction and casting. In closed reduction with casting group, 1 patient (3.33%) had excellent result, 9 patients (30%) had good results and 15 patients (50%) had fair results and 5 patients had (16.67%) had poor results. Patients with close reduction with K-wires and casting has statistically significant ($p < 0.01$) better outcome than close reduction

and casting group based on Gartland and Wereley scoring system. On evaluation of all three radiological parameters (Radial length, Radial inclination, and Radial tilt) over the period of time at 6 weeks and 3 months, they were statistically significant ($p < 0.001$) among close reduction and Kirschner wire group in comparison to close reduction and casting group.

So, patients with close reduction with k wire and casting group has better radiological outcome than close reduction and casting group.

Functional and clinical evaluation and range of motions over the long period of time at 3 months and 6 months, the close reduction with k wire and casting group has statistically significant ($p < 0.01$) better functional and clinical outcome than close reduction and casting group.

DISCUSSION

The fractures of distal end radius is one of the commonest fractures in Orthopaedic practice with increasing number of low energy fractures in elderly.¹⁶ While anatomical reduction can usually be achieved by closed manipulation, there is still no agreement as to the most appropriate way of maintaining this reduction.

In our study we found that most common mode of injury for extra articular distal end radius fracture was falling on the outstretched hand (FOOH) (85%). RTA/ high velocity trauma was mode of injury in 15% cases. As per literature supported by T. Azzopardi et al⁸, Jupiter JB¹⁶, etc. falls on the outstretched hand (trivial trauma) is the most common mode of injury.

Overall complications were seen more in closed reduction with casting group when compared to closed reduction with K-wire group. A high complication rate was observed in closed reduction and casting group because of insufficient reduction and inadequate methods of immobilization.^{4,17,18}

Radiological outcome was assessed by using standard AP and lateral radiograph at six weeks and three months, by measuring radial length (RL), radial inclination (RI) and volar tilt (VT) parameters. The mean radiological parameters at three months in closed reduction and casting group were Radial length 8.93mm, volar tilt 4.63 degree and Radial inclination was 19.47 degree. The mean radiological parameters at three months in closed reduction and K wiring group were Radial length 11.33 mm, volar tilt 7.67 degree and Radial inclination was 22.87 degree.

Our result of the improved radiological outcome in closed reduction and K-wire group is supported by a large number of previous studies.^{8,19,20}

Functional and clinical evaluation

In our study, we assessed the functional and clinical outcome by the Gartland and Wereley²⁰ De-merit scoring system at six weeks, three and six months. There was a significant difference in functional and clinical outcome between these two groups at every point of time in study. In closed reduction with K-wire group, 6 patients (20%) had excellent result, 15 patients (50%) had good results and 9 patients (30%) had fair results at six months. In closed reduction with casting

group, 1 patient (3.33%) had excellent result, 9 patients (30%) had good results and 15 patients (50%) had fair results and 5 patients had (16.67%) had poor results at six months. The closed reduction with K-wire and casting group had statistically significant ($p < 0.01$) improved functional and clinical outcome than closed reduction and casting group. Walton et al. in their study of 102 patients treated with K wires found that 92-95 percent of patients achieved good functional results.²⁰

CONCLUSION

From our study, we concluded that close reduction with percutaneous K-wire and casting has better functional, clinical and radiological outcome than close reduction and casting alone. closed reduction with percutaneous K-wire fixation under c-arm is a simple, minimally invasive technique which provides extra stability in the treatment of extra articular fractures of distal end of radius with good functional, clinical and radiologically outcome.

REFERENCES

1. Cui Z, Pan J, Yu B, Zhang K, Xiong X. Internal versus external fixation for unstable distal radius fractures: an up-to-date meta-analysis. *Int Orthop*. 2011;35:1333-41.
2. Bucholz RW, Heckman JD, Brown CM. *Rockwood and Green's Fractures in Adults: Vol. 1*. 6th ed. Philadelphia: Lippincott Williams and Wilkins; 2006. p. 910.
3. Young BT, Rayan GM. Outcome following nonoperative treatment of displaced distal radius fractures in low-demand patients older than 60 years. *J Hand Surg Am*. 2000;25:19-28.
4. Cooney WP 3rd, Dobyns JH, Linscheid RL. Complications of Colles' fractures. *J Bone Joint Surg Am*. 1980;62:613-9.
5. Krukhaug Y, Gjerdet NR, Lundberg OJ, Lilleng PK, Hove LM. Different osteosyntheses for Colles' fracture: a mechanical study in 42 cadaver bones. *Acta Orthop*. 2009;80:239-44.
6. Diaz-Garcia RJ, Oda T, Shauver MJ, Chung KC. A Systematic Review of Outcomes and Complications of Treating Unstable Distal Radius Fractures in the Elderly. *The Journal of hand surgery* 2011;36:824-835.e2.
7. Gofton W, Liew A. Distal radius fractures: Nonoperative and percutaneous pinning treatment options. *Orthop Clin North Am*. 2007;38:175-85.
8. Azzopardi T, Ehrendorfer S, Coulton T, Abela M. Unstable extra-articular fractures of the distal radius: a prospective, randomised study of immobilisation in a cast versus supplementary percutaneous pinning. *J Bone Joint Surg Br*. 2005;87:837-40.
9. Wong TC, Chiu Y, Tsang WL, Leung WY, Yam SK, Yeung SH. Casting versus percutaneous pinning for extra-articular fractures of the distal radius in an elderly Chinese population: a prospective randomised controlled trial. *J Hand Surg Eur Vol*. 2010;35:202-8.
10. Castaing J. Recent fractures of the lower extremity of the radius in adults. *Rev Chir Orthop Reparatrice Appar Mot*. 1964;50: 581-696.
11. Mah ET, Atkinson RN. Percutaneous Kirschner wire stabilization following close reduction of Colles' fracture. *J Hand Surg Br*. 1992;17:55-62.
12. DePalma A. Comminuted fractures of the distal end of the radius treated by ulnar pinning. *J Bone Joint Surg Am*. 1952;34:651-62.
13. Grewal R, MacDermid, JC. The Risk of Adverse Outcomes in Extra- Articular Distal Radius Fractures Is Increased With Malalignment in Patients of All Ages but Mitigated in Older Patients. *J Hand Surg* 2007;32A:962-970.
14. Turner RG, Faber KJ, Athwal GS. Complications of distal radius fractures. *Orthop Clin North Am*. 2007;38:217-28.
15. Simic PM, Weiland AJ. Fractures of the distal aspect of the radius: changes in treatment over the past two decades. *Instr Course Lect*. 2003;52:185-95.
16. Jupiter JB. Fractures of the distal end of the radius. *J Bone Joint Surg Am*. 1991;73:461-9.
17. Gartland JJ JR, Werley CW. Evaluation of healed Colles' fractures. *J Bone Joint Surg Am*. 1951;33-A(4):895-907.
18. Hutchinson F 3rd. Decision making in distal radius fractures. *J South Orthop Assoc*. 1995 Winter;4:290-306.
19. Naidu SH, Capo JT, Moulton M, Ciccone W 2nd, Radin A. Percutaneous pinning of distal radius fractures: a biomechanical study. *J Hand Surg Am*. 1997;22:252-7.
20. Walton NP, Brammar TJ, Hutchinson J, Raj D, Coleman NP. Treatment of unstable distal radial fractures by intrafocal, intramedullary K-wires. *Injury*. 2001;32:383-9.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 27-03-2018; **Accepted:** 25-06-2018; **Published:** 06-07-2018