

Original Research Article

The Functional Outcome Of Displaced Distal End Radius Fractures Treated With External Fixator Using Principle Of Ligamentotaxis

¹Dr. Nishant Singh, ²Dr. RB Uppin, ³Dr. SK Saidapur, ⁴Dr. Gangadhar Bhuti

¹Postgraduate, Department of Orthopaedics, Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research (KAHER), Belagavi, Karnataka, India

²Professor, Department of Orthopaedics, Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research (KAHER), Belagavi, Karnataka, India

³Associate Professor, Department of Orthopaedics, Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research (KAHER), Belagavi, Karnataka, India

⁴Assistant Professor, Department of Orthopaedics, Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research (KAHER), Belagavi, Karnataka, India

Corresponding Author:

Dr. Gangadhar Bhuti

ABSTRACT

Aims: To Assess the Functional Outcome of displaced distal end radius fractures treated with external fixator on the basis of Modified Gartland & Werley score.

Material and Methods: From January 2020 to December 2020, this study was conducted at a tertiary referral hospital after obtaining institutional ethical approval. During this period, adult patients with distal end radius fractures were classified on the basis of Frykman's classification, and 30 cases were selected based on inclusion and exclusion criteria and treated with external fixator. They were assessed using Modified Gartland & Werley score.

Results: Results with External fixator were found to be excellent with good union rates. The Modified Gartland & Werley Score were as follows: Excellent-12 cases (40%), Good-15 cases (50%), Fair-2 cases (6.6%), Poor-1 case (3.3%).

Conclusion: External fixator is a simple, effective, and relatively complication-free technique. The anatomical repair of the articular surface, along with the surrounding injury to soft tissue & articular cartilage determine the eventual functional outcome of distal end of radius fracture healing.

Keywords: External fixator, modified gartland & werley score, displaced distal end radius fractures, ligamentotaxis

INTRODUCTION

Distal radius fractures contribute approximately 16% of all fractures treated in the casualty [1]. Distal radial fractures were deemed innocuous thirty to forty years ago, and conservative treatment was the norm with complications like malunion [2, 3]. The distal radius fractures with intra-articular extension result in disruption of both the radiocarpal and radioulnar joints. To obtain good functional results, anatomical restoration is most important with early rehabilitation by physiotherapy. To treat displaced distal radial fractures, an external fixator is

a simple, effective and relatively complication-free technique [4, 5]. As a result, External fixator by principle of ligamentotaxis is one of the treatments for distal end of radius fracture. The ligamentotaxis helps in neutralizing compression forces to prevent displacement of unstable articular fracture components with gross radial shortening. External fixator helps in achieving radial length, volar tilt and radial angulation, allows for unrestricted wound management in open fractures without jeopardizing fracture reduction, maintains tension across the fracture site which promotes bone healing, provides for unrestricted elbow and hand motion. The main aim of this study was to evaluate the results obtained by treatment of displaced distal end radius fractures treated with external fixation.

Methodology

The study was conducted from January 2020 to December 2020 in a tertiary referral center after obtaining approval from institutional ethics committee. 30 cases of fractures of distal radial end were selected as per inclusion and exclusion criteria and treated using external fixator. Fractures were classified according to Frykman classification.

Surgical procedure: With appropriate preparation of the patient, fracture was reduced under the guidance of image intensifier and external fixator was applied to maintain the reduction in acceptable position by performing standard surgical procedure. K-wire augmentation was done in few cases to hold the multiple fracture fragments in position.

After surgery, follow up was done regularly at an interval of 1st week, 3rd week, 6th week and 3 months through clinical and radiological evaluation for functional outcome. Results were evaluated using criteria of Modified Gartland & Werley demerit score.

Selection Criteria: Adult patients aged 18 & above with a displaced distal end radius fractures were included in the study. Patients with a pathological fracture, any neurovascular injury and with ipsilateral 2nd and 3rd metacarpal and radius fracture were excluded from the study.

Data was collected from patients fulfilling the selection criteria who have been treated with external fixator as per study protocol. These patients were evaluated at regular follow ups for examining the patient's functional outcome as well as radiological evaluation.

Results

In our study, the distal end radius fracture patients were classified according to Frykman's classification as follows: Type 3-2 (6.6%) patients, Type 4-7 (23%) patients, Type 5-3

(10%) patients, Type 6-3 (10%) patients, Type 7-6 (20%) patients, Type 8-9 (30%) patients. The average age of patients was 45.8 years and 66% were male patients. The most common form of injury was falling on outstretched hands with right sided involvement more than left. In our study, 12 (40%) patients had excellent outcome, 15 (50%) patients had good outcome, 2 (6.6%) patients had fair outcome and 1 (3.3%) patient had poor outcome. By the end of 6-8 weeks, all of the fractures had healed, with a mean recovery time of 6.1 weeks. There were no instances of non-union.



Pre-op X-ray

Intra-op Picture



Immediate Post-op X-ray

Post-op X-ray after 3 months



Discussion

Distal end radius fracture is one of the most common fractures. It occurs in middle and elderly aged population ^[6]. Even though the distal radial end is not weight bearing joint, still it can be a cause of disability if the articular congruency is not restored. The distal radius metaphysis is surrounded by more important soft tissue, ligaments, retinaculum, tendons, and periosteum, which help to keep the fracture in place during ligamentotaxis. In distal radial end bone fractures, the aims of therapy are to provide early rehabilitation of the wrist, improve long-term wrist function, and minimize aesthetic deformity ^[7]. External fixation, which is based on the ligamentotaxis concept, is highly helpful in maintaining radial length and reduction ^[8]. In a study done by Maruti CV et al. on 30 cases that underwent surgical intervention with external fixator for distal end radius fractures, it was observed that 77% cases demonstrated an excellent/good outcome ^[9].

Out of 30 cases involved in our study, there were 20 men (67%) and 10 female (33%) patients. The rise in male patients is due to an increment in the frequency of RTA (road traffic accident), high energy trauma & falls that have been seen in young people. Our study shown that the greatest incidence occurred in the 41-50 years old age group, with an average age of 45.8 years. By the end of 6-8 weeks, all of the fractures had healed, with a mean recovery time of 6.1 weeks. There were no instances of non-union. In our study, 90% patients had excellent and good results.

Post-surgical complications: There was one case of malunion with a dorsal tilt and

restricted mobility & function. Finger stiffness was reported in one case. There was one case of RSD. There were five cases of residual pain and discomfort that went away after medication and one case of shoulder hand syndrome that required physiotherapy and range of motion exercises for the shoulder joint. There was no neurological damage as a result of a fracture or an external fixator.

Conclusion

Based on our study, we conclude that the distal end radius fracture is one of the most common fractures being treated by orthopaedic surgeons, affecting the middle and elderly persons. The closed reduction and external fixation with ligamentotaxis is a very safe, minimally invasive, cost effective and simple procedure for the treatment of distal end radius fractures with excellent functional outcome.

Limitations of the study: Sample size of our study was small. To confirm the findings of this study, a further study with larger pool of patients is needed.

Conflicts of interest: None.

References

1. Ark J, Jupiter JB. The rationale for precise management of distal radius fractures. *Orthop Clin North Am.* 1993 April;24(2):205-210.
2. Simi C PM, Wesland AJ. Fractures of the distal aspect of Radius; changes in treatment over the past two decades *J Bone Joint Surg (AM).* 2003;85-A:552-564.
3. Jupiter JB, Current concepts review-Fractures of the distal end of the radius. *J Bone Joint Surg (Am).* 1991;73-A:461-469.
4. Nagi ON, Dhillon MS, Aggarwal S, Deogaonkar KJ. External fixators for intra-articular distal radius fractures. *Indian Journal of Orthopaedics.* 2004;38:19-22.
5. Jenkins NH, Jones DG, Johnson SR, Mintowczyk WJ. Use of External fixation and K-wires in fractures of the distal radius in young adults. *Injury.* 1988;19:225-257.
6. Robert Cooney WP. Fractures of the distal Radius: A modern Treatment based Classification. *Orthop Clin North Am.* 1993 April;24(2):211-216.
7. Jupiter JB, Fernandez DL. Complications Following Distal Radial Fractures. *J Bone Joint Surg.* 2001;83-A:1244-1265.
8. Mudgal CV, Madhuchandra, Barker MI. A prospective study of clinical outcome after using ligamentotaxis in management of distal radius fractures. *J Evid based med healthc.* 2017;4(31):1831-5.
9. Maruthi CV, Shivanna, *et al.* Management of fracture of distal radius by external fixation using principle of Ligamentotaxis of prospective study. *IJO Surg.* 2015;2(1):19-26.