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Dr. Suman NV
Associate Professor, Dept. Of
Orthopaedics Navodaya Medical
College, Mantralayam Road,
Karnataka, India

Dr. Sanjeev Chincholi
Professor, Dept. Of
Orthopaedics, Mamata Medical
College, Khammam, Telangana,
India

Functional outcome in treatment of distal radius fractures using external fixator

Dr. Suman NV and Dr. Sanjeev Chincholi

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Abstract

Introduction and Background: Fractures involving the distal end of radius are one of the frequently encountered injuries in orthopaedics. Conventionally the fractures were treated with closed reduction and immobilization with casts. Even though union of these fractures occurs, it has very high incidence of going in for malunion and joint disability and instability especially those with comminution & intra articular extension. Moreover there is a changing trend in the age group, seen more commonly in the younger age group as a result of Road traffic accidents & trauma, leading to complicated fractures especially with intra articular extension & comminution. Over past few years, the importance of alignment correction, preservation of normal radial length and reconstruction of congruity of radiocarpal and radioulnar joints has been emphasized.

Anderson and O' Neil, were the first to introduce the use of external fixation in the treatment of these fractures. Since then there is a trend to use external fixators in management of these fractures as they give improved results both functionally as well as improved anatomic reconstruction. To be safe, effective and to give improved results the fixator chosen should be easy to use, allow re -reduction, low rate of complications and should be stiff enough to maintain the alignment. With better understanding of the principles of external fixation, this procedure has become an indispensable tool in the management of intra articular distal end of radius fractures.

Keywords: Distal radius, external fixator, road traffic accidents, ligamentotaxis

Introduction

Sample Size: 20 patients attending the out patient and in patient department of Orthopaedics with fractures of distal end radius fulfilling the inclusion and exclusion criteria during the study period of 2 years from June 2016-May 2018

Objectives

- Distal radius fractures is one of the commonest fractures and seen commonly in day to day life, especially in the elderly Indian adult population
- To study the fracture objectives.

Methodology

Twenty patients with intra-articular fractures of the distal end of radius were treated with external fixator at Navodaya Medical College Hospital and Research Centre, Raichur between June 2016 to May 2018 under Department of Orthopaedics, Navodaya Medical College Hospital and Research Centre, Raichur

Inclusion criteria

- a. Patients who have sustained fractures of the distal radius admitted in the department of orthopaedics at Navodaya Medical Hospital, Raichur will be studied.
- b. The inclusion criteria followed will be adults between age group of 18- 60 years both males and females with fracture lower end of radius, closed and open fractures, fractures less then 2 weeks old, comminuted fracture distal end radius and intra articular fracture of distal end radius, who will give written consent.
- c. Patients who will be medically fit for surgery

Corresponding Author:
Dr. Sanjeev Chincholi
Professor, Dept. Of
Orthopaedics, Mamata Medical
College, Khammam, Telangana,
India

Exclusion Criteria

- The patients with pathological fracture.
- Non union.
- Fracture with neurovascular complications. 56
- Fracture associated with other bone fracture in the wrist, hand or forearm.
- Patients 60 years.
- Patients medically unfit.
- Patients not willing for surgery.

Operative Technique

The patient was placed supine on the operation table. No Tourniquet was used. Intravenous antibiotics in the form of 1 gm of ceftriaxone was administered before the start of the procedure. The arm, Forearm, hand was scrubbed with Betadine scrub and was painted with betadine and spirit and then draped. The limb was placed on side board [Hard]. Under C arm one at the lateral aspect of the shaft of the 2nd metacarpal and another, one inch distal to the former. Through 50 each incision, one schanz pin was drilled passing through 4 cortices [i.e. 2nd & 3rd Metacarpal]. Another two stab incisions were made, the first approximately 8cms proximal to fracture site and another one inch proximal to the first incision. Taking care not to injure the tendons, nerves and vessels (bare area), one schanz pin

was passed through each incision and penetrating both cortex of the radius. The universal rod was then connected to all the 4 schanz pin by means of clamps. Under image intensifier guidance, further distraction if necessary was carried out by the fixator. At the end of the procedure sterile dressing was applied over the pins. No cast or splint was given

Post-Operative care and Rehabilitation. Immediate post-operative check x-rays were taken in both AP, PA and lateral views. Active exercises of all the fingers, Elbow and shoulder were carried out. The patient was discharged on the 2nd post-operative day after the first dressing change the patient was called for inspection and dressing change at the interval of one week for the next 6 weeks. The patient was assessed subjectively for pain at the fracture site; clinically for tenderness and loosening of the pins. 51 The external fixator was removed on the 6th week without any anaesthesia.

Check X-ray was taken in AP, PA and lateral view. The range of motion at the wrist was recorded and any deformity was assessed. Physiotherapy was carried out regularly for 2 weeks. All the cases were followed at an interval of 6 weeks, 3 months & 6 months. The follow up ranged from 1 month to 6 month with an average of 3 months. There was loosening of pins in only one case during the 4th week for which the fixator was removed on the 5th week. Following removal no displacement was noted.

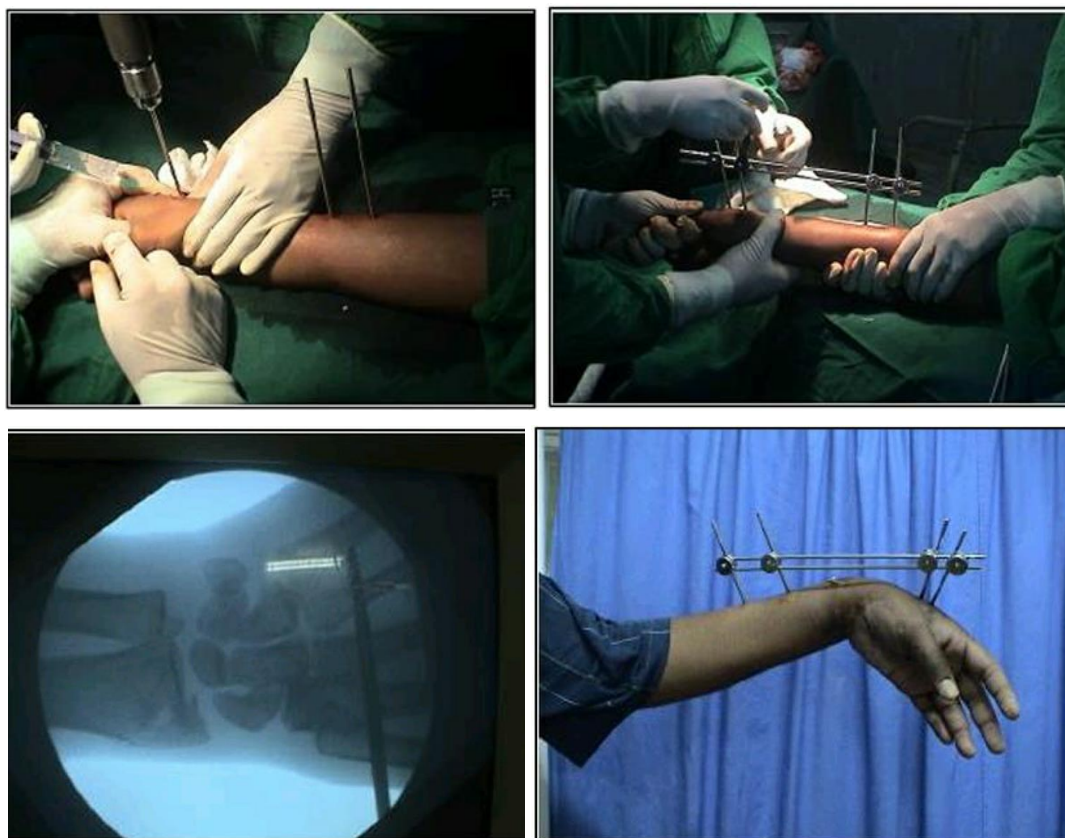


Fig 1: Radiographic Image and Clinical Picture

Discussion

Fractures of the distal end of radius continues to be one of the most common skeletal injuries of the upper limb. These fractures are frequently articular injuries resulting in disruption of both the radiocarpal and distal radio ulnar joints. In our series the majority of the cases of intra – articular fractures of distal end of radius were seen in the younger age group of patients with road traffic accidents [Fall from Motor bike] being the most common. Several authors have stressed

that a good functional outcome usually accompanies a good anatomical result. The application of cast in these patients would lead to loss of reduction and a poor functional outcome. In displaced intra articular fractures of distal radius, reduction is easy to achieve but difficult to maintain, due to intraosseous crushing, there is a void at the fracture site which can heal only after collapse, this collapse can be prevented by stabilizing either by packing cortico-cancellous bone graft in the void or by using metal to hold the fracture in place eg.

External fixator. External pins through metacarpals rigidly fixed by distractor to distal part of radius probably provides the best stabilization for lower end radius fracture. This produces traction effect on comminuted distal radius, this effect has been named ligamentotaxis. Fixed traction with ligamentotaxis minimizes the shortening that may result from resorption of bone at fracture site. The tensile distraction of radius 68 helps healing of comminuted dorsal fragment of radius to occur without displacement. External fixation also provides for retention of an anatomical reduction of the volar cortex obtained by traction with gentle manipulation. The distal fragments therefore are stabilized volarly, dorsal displacement is prevented and so is angulation. For an optional outcome selection of the patients is very important. Unreliable and poorly motivated patients are not the ideal candidates for external fixation. In our results, all the younger patients have had good & excellent results while the older patients (i.e. 50 – 60 years) have developed the complications. One patient (male) developed pin loosening on the 4th week. The fixator was removed on the 5th week. The pin loosening could be as a result of osteoporosis. Another elderly patient developed shoulder hand syndrome. Even the remaining elderly patients had only fair to poor results. Hence in our study the external fixators proved to be effective in younger patients but not very effective in elderly patients.

Most of the patients recovered significant movement of the wrist & forearm with 2 weeks of physiotherapy. In the literature the duration of fixation varies from 4 weeks to 10 weeks. In our series external fixation was maintained for 6 weeks. We had a high rate of excellent to good results and a low rate of complications.

Conclusion

In our series static external fixator was used to treat 20 patients with intra-articular distal end of radius fractures. Most of the cases in our series were of Frykman type III, type VIII & type VII. Mechanism of injury was road traffic accident in 15 cases (75%) and fall on outstretched hand in 5 (25%) cases.

Two patients had associated injuries [One Nasal bone fractures another with ipsilateral ulna fracture]. We inserted Schanz pins, 2 in the proximal radius & two in the metacarpal [2nd & 3rd] involving 4 cortices. Engaging 4 cortices enhances the rigidity of the fixation. External fixation was maintained for 6 weeks till the bony union is complete. For an optimal result, good anatomical reduction is necessary.

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