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Original Research PaperOrthopaedicsMANAGEMENT OF COMPOUND AND INTRA ARTICULAR FRACTURES OF DISTAL<br/>END OF RADIUS WITH EXTERNAL FIXATOR"OrthopaedicsDr S.M.HashimAssociate professor , Department of orthopedics, Rajarajeshwari medical college<br/>and hospital, Bengaluru.Assistant professor, Department of orthopedics ,Rajarajeshwari medical college<br/>and hospital, Bengaluru.Dr Avinash.C.K\*Assistant professor, Department of orthopedics ,Rajarajeshwari medical college<br/>and hospital, Bengaluru. \*Corresponding Author

ABSTRACT Comminuted fracture of distal end of radius is difficult to manage in view of its close proximity to joint with various ligaments attached. Open injuries and osteoporotic fracture further complicate its management because of damage to vascularity and poor purchase for internal fixation respectively. In this view we have chosen to manage open and comminuted fractures of distal end radius with External fixator using ligamentotaxis principle which is quick, safe and less morbid to injured limb. 21 patients with such fractures were selected of which 16 were males and 5 females. With mean follow up of 7.7 months good to excellent results were noted.

# **KEYWORDS**: Intra articular Distal end radius fractures, external fixator, ligamentotaxis, compound fractures

## **INTRODUCTION:**

The wrist is the foundation of hand function and unsatisfactory union of distal end radius can disable its basic function by causing finger stiffness and weakness of grip strength<sup>2, 3, 4, 11</sup>.

Fractures of distal end of radius often have been considered primarily extra articular injuries of elderly females; however there are increasing reports of distal radial fractures causing serious articular damage profoundly affecting the wrist of greater population<sup>6</sup>.

Better understanding of the spectrum of distal radial fractures is leading to changing concepts of managements. The articular injuries are more frequently comminuted, unstable and less suitable for traditional methods of closed manipulation and cast immobilization 1. It is increasingly clear that preservation of the distal radial articular surface is necessary for maximum recovery. Finally the more severe articular fractures are frequently associated with other serious injuries, particularly injuries of the median nerve, ulnar nerve and flexor tendons.

There is a current enthusiasm for the use of external fixator in the treatment of unstable fractures of the distal radius. This trend has been based on the positive experience of surgeons who have been able using external fixation to improve the anatomic as well as functional results in patients who have sustained severe injuries. To be safe and effective an applied fixator should have a low rate of serious complication, be non obstructive and be stiff enough to maintain alignment under adverse loading situations<sup>5,7</sup>.

Experience accumulated over the last decade has shown that these goals are best achieved by adhering to four basic principles, which demand that the applied frame optimally accommodate the vital limb anatomy. Injury access for debridement and secondary procedures, mechanical demands of patients and injury, and patients comfort.

With the improved components and better understanding of the principles that governs their safe and effective use, external fixates have become indispensable tool in the hands of experienced trauma surgeons.

## MATERIALS AND METHODS:

21 patients with compound and intra articular fractures of the distal end of radius were treated with external fixator at Rajarajeshwari medical college & hospital between 2014 to 2017 under the department of orthopedics. There were 16 males and 5 females between the age group of 16 to 60 years. Majority of injury occurred due to fall on outstretched hand. Preoperative evaluation consisted of careful inspection of the soft tissue, deformity of the wrist, swelling and ecchymosis. There will be tenderness of the wrist and relative position of radial and ulnar styloid is altered. Movements will be painful and limited. In our series of 21 cases there were no median nerve involvement or tendon injuries.

The routine AP and lateral view were taken and the fracture fragments analyzed and involvement of radio carpal and distal radio ulnar joints were assessed, and were classified according to frykmans classification. In our study we had majority of type 8 fracture and we had 9 patients with compound fracture. Majority of gustilo type 1 and the wound is mostly punctured. All these compound fracture were initially treated in the causality in the form of thorough wound washing with saline & betadine dressing was done. Patients were put on antibiotics and analgesic. After appropriate anesthesia in 18 cases and peripheral block in 3 cases.

### Surgical technique

The patient was placed supine on the operating table and under general anesthesia or brachial block, the part was painted and draped, the involved hand was placed in the side arm board, 2 stab incisions approximately 8cm proximal to the radial styloid lying over the dorsal aspect of radius and 2 more stab incisions were given over the dorsal aspect of the base of 2nd metacarpal. Taking care of both tendons and nerves , the drill sleeve was placed over the radius through the incision, the muscle and periosteum were displaced till the sleeve touches the bone and then the drill sleeve was fixed centrally, through drill sleeve the radius was drilled with 1.5mm drill bit, then it was removed and replaced with 2.5mm shanz screws. At the site of distal pin insertion at the base of 2nd metacarpal similarly it was drilled with 1.5mm drill bit and then replaced with 2.5 mm shanz screws. Then the fixator joints were applied and 4mm rod was inserted in the fixator joints. When it was still loosened longitudinal traction without severe hyper flexion or hyperextension with manual molding of the fracture fragments back into a more normal alignment was performed. Gentle flexion and ulnar deviation can be applied if the majority of the distal fragments are displaced dorsally. At this point the external fixation device is tightened and reduction carefully assessed. At the end of procedure sterile dressing was done and the pins were protected with dressing. No cast or split was given. The fingers were left free to go through motion.





Fig 1: Finger movements after external fixator showing effective "ligamnetotaxis

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Check x rays were taken in AP and lateral views. Tension across the wrist generated by external fixation device should provide enough ligament taxis. So that on AP radiograph the radio carpal articulation is seen to be 1mm wider than the mid carpal joint.

Passive and active range of motion exercises of fingers and thumb were commenced on the day of operation, on the 5th post op day the dressing was removed and care of the pin site was attended. The pins were cleaned with spirit on every alternate day for one week and then weekly till the fixator was removed. In infected cases daily dressing was done and with the help of antibiotics and analgesic which were continued till period of healing.

#### **RESULTS:**

In assessing the results of treatment of the injuries of this nature, there are many factors to be considered. The articular injuries are more frequently comminuted and unstable and it is increasingly clear that preservation of distal radial surface is necessary for maximum recovery. Cases here followed, were examined with respect to anatomy of fracture, wrist movements, strength, appearance, pain function and complication of the fracture.

Most of the fractures occurred due to fall on outstretched hand. 14 patients had Frykman's type VIII fracture and 7 patients had type VII fracture. 9 patients had compound fracture. Associated injuries were seen in 6 patients. Majority of the cases attended the hospital soon after the injury. The average stay in the hospital was 8 days. Complication such as pin tract infection and loosening was noted in 4 patients the patient was followed up at regular interval from the period of discharge. The average duration of follow up being 7.7 months.

Fig 3: Post op x-ray

Fig 5: 6month follow up

**Fig 7: Full Pronation** 

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#### **Case example**



Fig 2: Pre op x-ray



Fig 4: 1month follow up



**Fig 6: Full Supination** 





Fig 8, 9 & 10: full range of finger movements, full flexion and full extension respectively

#### **DISCUSSION:**

Fractures of the distal radius have been associated with significant history since their first description by Pouteau in 1783 and Colle's in 1814. Having been recognized for nearly two centuries, fractures of the distal radius recently have become the focus of an intense interest regarding optimal management. Fractures of the distal radius continuous to be one of the most common skeleton injuries treated by the orthopedic surgeon. These fractures are frequently articular injuries resulting in disruption of both the radio-carpal and the distal radio-ulnar joints.

Prominent among the concepts is that functional recovery closely parallels the accuracy of skeleton restoration. The most frequently occurring intra-articular fractures, on increasing consensus exists that preservation of the distal radius articular contour to prevent development of disabling arthritis. If these unstable factures are allowed to collapse, radial shortening, angulations and articular incongruity may cause permanent deformity and loss of function. If a satisfactory reduction is obtained by distraction and manipulation, but cummunition precludes maintenance of the reduction by the cast or percutaneous pinning, the external fixation is usually the treatment of choice <sup>12,13,14,15</sup>.

Since the introduction of pin and plasters by Bohler in 1929, followed by the development of the external fixator by Anderson and o'neil in 1944. Many different external fixation devices have become popular. However the rates of complication, including infection, loosening of the pin, loss of reduction of the fracture, permanent Stiffness and weakness, have been reported to range from 10 to 61 % 17. If an adequate closed reduction can be obtained, the external fixation device maintains the reduction with constant distraction, until solid union occurs.

The high prevalence of loosening the pins is a problem that has been cited Cooney et al-11%. Szabo and Weber-30% and Schuind et al-20%. To diminish the prevalence of loosening of pins, some authors have recommended use of larger diameter pins, or avoidance of external fixations in elderly patients because of osteoporotic bone. Cooney and Clyburn discouraged use of external fixation in patients older than 65 years, Jenkins et al and Howard et al used age limits of 60 and 75 years. Jacob and Fernandez recommended 65 years as maximum age for use of A.O. Fixator.

In our study of 21 cases we had 4 cases of pin tract infection (with loosening in 2 cases). In 2 cases proper antibiotics were given and after removal of pins after 5 weeks, the infection was controlled and the wound healed up.

In one case there was loosening of the pin with infection in the distal (metacarpal) one. This patient had a compound fracture. The fixation device was removed after 6 weeks and antibiotics were continued for 2 weeks, pin tract infection was controlled and the wound healed up.

In one patient there was an ipslisteral fracture of both the bones of the forearm, and an intra-articular fracture of the distal end of the radius, with degloving injury of the medical aspect of the arm. Initially the patient was treated with antibiotics after 2 weeks, at the same sitting the forearm bones were initially fixed, radius was fixed with plate and then external fixator was applied, ulna was fixed by intra medullary nailing. At a later date skin grafting was done for the arm. The fixator was removed after and weeks.

In one patient there was compound comminuted fracture of distal end of radius with comminuted fracture of distal ulna. Punctured wound was present over the volar aspect of the left wrist. The patient was treated with antibiotics then the patient was taken to operation theatre and under general anesthesia external fixator was applied to the radius and 2nd metacarpal after reduction. The wrist was quite stable but after 3 days instability was noticed and another fixation was applied and fixed over ulna and 4th metacarpal. Then the fixator was removed after 6 weeks.

The use of A.O. fixator and Asculup joint fixator in our study, we had high rate of excellent result and a low rate of complications. The basic treatment principle is to obtain accurate fracture reduction and to maintain while protecting the wrist in a physiologic position so that the hand can be rehabilitated.

#### **CONCLUSION:**

EXTERNAL FIXATION is the effective method in treating the unstable intra-articular fractures of the distal end of the radius. It is important to have a tight purchase of the pin in the bone with minimal damage to the bone and its surrounding soft tissues at the time of the operation. The patients should be educated, to maintain the fixator clean and to do active exercises of the fingers, elbow and shoulder, to minimize the complication and to get good results. Finally we would recommend the use of External Fixator in Frykman's type VII and VIII fracture, because of severe amount of communication found in these patients, indicating instability.

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