Surgical Management of Distal end Radius Fractures by Various Methods: A Prospective Study

Venkateshwara Jhatosh¹, Venkateshwar Rao T², Ram Kumar Reddy³, Chandra Krishna Ch⁴, Hanmandlu⁵

ABSTRACT

Aim: The optimal management of fractures of distal end radius has changed dramatically over the previous two decades from almost universal use of cast immobilization to a variety of highly sophisticated operative interventions. To assess the functional outcome of the distal end radius fractures we did a prospective study on 30 patients for a follow up of 20 months duration.

Materials and Methods: All the patients with fracture distal end radius are classified according to the Universal classification after radiographic evaluation. There were 20 males and 10 females between the age group of 20 – 60 years. Injury occurred due to road traffic accident in 50% of cases. The dominant wrist (right) was affected in 60% of cases. Five patients had associated long bone fractures. The results of this study is evaluated by clinician based functional outcomes of Gartland and Werley demerit scoring system and Stewart II scoring system.

Results: Most of the extra-articular displaced fractures were treated with closed reduction under image intensifier control and fixed with percutaneous K-wire. Most of the Intraarticular fractures are treated by internal fixation with plating techniques. Bridging external fixator was the mode of management for 53% of cases of this study which were grossly comminuted fractures. Excellent to good outcomes are seen in 90% of the cases treated by various surgical methods.

Conclusion: Unstable extra-articular and intra-articular fracture were reduced anatomically, and fixed with k-wires. Intra-articular displaced volar barton’s fracture were treated by open reduction and internal fixation with Ellis “T” buttress plate or locking compression plate. Grossly comminuted fractures of distal end radius and compound fractures were stabilized with external fixator.

Keywords: Distal end radius, elli’s plate, external fixator

INTRODUCTION

Fractures of the distal radius are the most common fractures of the upper extremity and account for 17%(one-sixth)¹ of all fractures treated in the emergency room. Initially thought to be simple fractures, they are now recognized as complex injuries with a high percentage of long term complications.

Fractures of the distal radius are extremely common and majorities are well treated non operatively. However, recent detailed evaluation of fracture patterns and results of treatment have demonstrated the need for surgical intervention.

In current opinion in orthopaedics, a study concludes that external fixation appears to have benefits that outweigh associated complications and as such, make it an attractive treatment option for fractures of the distal radius that require surgical treatment. Both its ease of use and successful track record make it an extremely versatile tool for the treatment of these injuries.²

A study conducted in Hongkong concludes that application of a locking compression plate for displaced distal radial fracture is a safe alternative. It provides stable fixation with excellent functional results and minimal complications.³
Figure 1: Pre-operative X-ray

Figure 2: Post-operative X-ray after 3-months

Figure 3: 6-months follow up x-rays

Figure 4: Operation Scar

Figure 5: Follow up at 6 months
Surgical Management of Distal end Radius Fractures

 MATERIALS AND METHODS

This study was conducted in a single institution from February 2011 to October 2012. Out of 150 cases of distal end radius fractures attended to our institution 30 were treated with internal or external fixation. After thorough clinical examination all the patients were evaluated with x-rays in two standard views Anteroposterior and lateral views.

The “Universal Classification” modified from the classifications of Gartland (1951) and Sarmiento (1975) was used in the study.

Universal Classification for fractures of distal end Radius:

Extra-articular fractures: Type - I, non-displaced and stable,
Type – II, displaced and unstable.

Intra-articular fractures: Type – III, non-displaced; Type – IV, displaced.

These patients were followed up at 3 weeks, 6 weeks, 3 months and 6 months. A complete clinico-radiological assessment was performed at each visit.

Inclusion criteria: Patients with fused epiphysis, sustaining distal radius fracture were included in the study.

Exclusion criteria: Patients with Compound fractures of Grade II and Grade III of Gustilo and Anderson, associated neuro-vascular deficit and with bilateral Colles’ fractures, undisplaced fractures, were excluded from the study. Patients medically unfit for anaesthesia were excluded from the study.

There were 20 males and 10 females between the age group of 20 – 60 years. Injury occurred due to Road traffic accident in 50% of cases, fall on outstretched hand in 37% of cases and fall from height 10% of cases and a case reported due to Electric shock injury. The Dominant wrist (Right) was affected in 60% of cases and 40% of patients had injury to left wrist. Five patients had associated long bone fractures.

Ten percent of the cases are compound Grade I Fractures. Routine blood investigations were done. Consent for surgery was taken. The results of this study is evaluated by Clinician based Functional outcomes:

Gartland and Werley demerit scoring system[4] and Stewart II scoring system which is as follows:

Clinical Radiological

Excellent No pain or tenderness
Dorsal angulation 0°
Full range of movement
Shortening < 3mm

Good
No pain or tenderness
Dorsal angulation 1-10°
Minimal restriction of ROM
Shortening of 3-6mm
Minimal deformity

Fair
Pain on extremes of movement
Dorsal angulation 11-14°
Limited dorsiflexion
Shortening of 7-11mm
Moderate deformity

Poor
Gross restriction of movement
Dorsal angulation >15°
with pain and deformity
Radial shortening >12mm

RESULTS

This study has included total of 30 cases of distal end radius fractures fixation by various methods. Most of the patients belong to the Age group of 21-50 yrs. Male patients being 66% of the cases with the Dominant right hand involved in 60% of the cases.

Only 10% of the cases are Compound Grade I(Gustilo Anderson). Road traffic accidents (RTA) are being the most common mechanism of injury constituting 50% of cases followed by fall on outstretched hand.

Extraarticular unstable (II) and Intraarticular stable (III) fractures of Universal Classification constituting 83% of cases. 17 cases were treated with bridging external fixator and 13 cases were treated with Internal Fixation. 50% of the cases achieved excellent results and 40% of the cases achieved good outcomes by various methods of surgical management. One case which was treated with external fixator landed in nonunion. It was treated later by bone grafting and internal fixation.

DISCUSSION

Fractures of distal end of radius are extremely common injuries and tend to occur in a bimodal age distribution. They are seen most frequently in young patients due to RTA and in old osteopenic patients due to accidental fall on outstretched hand.

The present study was undertaken with 30 cases to know the functional outcomes of the surgically managed distal end radius fractures.

Demographic profile

1. Most of the cases are seen in the age group of 21 to 30 years followed by 41 to 50 years which showing Bimodal age distribution.

2. There is male predominance in this study as the mode of injury is Road traffic accidents in majority of cases.

3. The nature of the violence in this study was Road traffic accidents followed by fall on outstretched hand.

4. Dominant right hand is involved in majority of the cases of this study.

Stable fractures of the distal end of radius treated by conservative means and Compound grade II & III fractures were not included in this study. Average age is 36.65 years. Maximum number of cases belonged to 21-30 years age group.

The high-energy fractures frequently have articular comminution and displacement that require open means to reduce. A percentage of some of the comminuted, osteoporotic low-energy fractures may be unstable injuries that require operative stabilization. The average time interval between injury and surgery was 3 days.

All the patients were explained the post-operative regimen to be followed after reduction of the fracture and the need for physiotherapy.

Majority of cases in the study were treated with External fixation, which gives a rigid fixation and allowing early mobilization. 5 cases of this study were treated by closed reduction and percutaneous K-wire fixation under image intensifier control. POP bandaging is applied for 4-6weeks. K-wires are removed after 4-6weeks followed by physiotherapy. All the cases have shown excellent to good results.

The follow-up period ranges from 6months to 2years. Results are assessed based on functional and radiological criteria of Stewart II.

Excellent results are seen in 15(50%) cases. Good results are seen in 12(40%) cases and Two cases of fair result and One case landed in Nonunion though rare.⑤

When analyzed by mechanism, patients who sustained a high-energy injury were more likely to require supplemental fixation (percutaneous pins). External fixation is used to maintain axial length while reduction is attained by manipulation of fracture fragments with supplemental Kirschner wires and ligamentotaxis in intra-articular and extra-articular fracture patterns.⑥⑦

However, external fixation alone is limited by the inability to directly reduce intra-articular fracture fragments in complex unstable fracture patterns. The advantages of open reduction and internal fixation include direct visualization and manipulation of the fracture fragments.⑧
Volar plating of dorsally angulated distal radius fractures, has become an increasingly common treatment option in more recent years.[9-14]

Wright et al [12] compared a volar locking plate to an external fixator in treating unstable distal radius fractures. They concluded that the use of a volar fixed-angle implant resulted in stable fixation of the distal articular fragments, allowing early postsurgical wrist motion. The PRWE and DASH scores in the volar plating group were better than those seen in the external fixator group. Egol et al.[15] compared external fixation and locked volar plates in a prospective randomized manner and found an improved range of movement and radiological outcome at three and six months after locked plating.

Pin tract infection is seen with 3 cases of external fixation which subsided with organism specific intra-venous antibiotics. Malunion is seen with 2 cases with no major functional impairment.

**Tables and graphs:**

<table>
<thead>
<tr>
<th>Type</th>
<th>No of Cases</th>
<th>% of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>Type III</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Type IV</td>
<td>5</td>
<td>17</td>
</tr>
</tbody>
</table>

Majority of the cases belong to type II and type III of Universal classification.

<table>
<thead>
<tr>
<th>Method</th>
<th>No of Cases</th>
<th>% of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. Fix</td>
<td>16</td>
<td>53</td>
</tr>
<tr>
<td>Plating</td>
<td>8</td>
<td>26</td>
</tr>
<tr>
<td>K Wires</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Combined</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

53% of the cases are managed with External fixator and 26% of the cases are managed with Plating technique.

<table>
<thead>
<tr>
<th>Result</th>
<th>No of Cases</th>
<th>% of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Good</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
CONCLUSION

Unstable extra-articular and intra-articular fracture were reduced anatomically, and fixed with k-wires. Intra-articular displaced volar barton’s fracture were treated by open reduction and internal fixation with Ellis ‘T’ buttress plate or locking compression plate. Grossly comminuted fractures of distal end radius and compound fractures were stabilized with external fixator with excellent results.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

FUNDING: None

REFERENCES