



## Study of results of volar plating in distal end radius fractures in adults

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### ABSTRACT

**Aims:** To study the results of distal radius fractures treated by volar plating with respect to clinical and radiological fracture union, functional outcome and complications in adults

**Introduction:** Distal end radius being more common fracture of upper limb in adults associated with both fine work and weight lifting, restoration of radial length, radial tilt and congruity of articular surfaces is important for good functional results. Volar plate has emerged out to be good treatment option for management of distal radius fractures.

**Materials and Method:** We have done prospective study of 24 patients with distal radius fracture operated by open reduction and internal fixation with volar plate with follow up of 6 to 30 months. Final outcomes were assessed by Gartland & Werley SCORE and PRWE SCORE.

**Results:** 88% had excellent to good Gartland & Werley SCORE and 92% had excellent to good PRWE SCORE.

**Conclusion:** Treatment of distal end radius fractures (especially type A2 and above) by volar plating technique gives gratifying results with good patients' compliance, satisfaction and low complications rate.

**KEYWORDS :** Distal Radius, Volar plate, MIPO, PRWE score, Gartland & Werley score

### INTRODUCTION

Fractures of distal end radius account for 17.5% of all fractures and is the most common fracture of upper extremity with average age of presentation in females around 60 years and for male 40 years. The incidence is higher in female. Low energy injury is the cause in 66 to 77% cases while in young patients high energy trauma such as road traffic accidents is major cause. Closed reduction and cast immobilization has been the mainstay of treatment, but the results are often unsatisfactory with swelling, loss of reduction, restricted function & disabilities with poor cosmetic results. A palmar locking plate has superior biomechanics compared with traditional dorsal locking plates.

### AIMS AND OBJECTIVES:

To study the results of management of distal radius fractures treated by volar plating with respect to clinical and radiological fracture union, functional outcome and complications in adults.

### APPLIED SURGICAL ANATOMY:

The radio carpal joint is an ellipsoid joint composed of radio carpal, intercarpal and inferior radio ulnar joint. Most of the muscles which act at the wrist joint are situated within the forearm, with only the tendons crossing the joint and inserting on the hand. The triangular fibro cartilage complex (TFCC) is a ligamentous and cartilaginous structure which suspends the distal radius and ulnar carpus from the distal ulna. The line marking the most volar margin of radius distal to Pronator Quadratus is known as watershed line. Any hardware placed distal to this may cause tendon rupture. Vascular supply of the wrist joint is through radial and ulnar arteries. Anterior and posterior interosseous nerves provide the nerve supply.

### CLASSIFICATION

Varying classification systems have been proposed for fractures of the distal radius:

1. NISSEN classification
2. OLDER classification
3. GARTLAND AND WERLEY classification
4. SARMIENTO & LATTAS classification
5. LIDSTORM CLASSIFICATION
6. MELONE'S CLASSIFICATION
7. FERNANDEZ CLASSIFICATION: Based on mechanism of injury
8. FRYKMAN CLASSIFICATION (1967): Most frequently used classification

### 9. AO/OTA CLASSIFICATION

### METHODS AND MATERIALS

In this prospective study of 24 patients of fracture of distal end of radius treated by volar plate through open reduction and internal fixation meeting the inclusion and the exclusion criteria as given below were followed up every 6 weeks for period of 6 months to 30 months radiologically and clinically GARTLAND & WERLEY SCORE and PATIENT RATED WRIST EVALUATION SCORE (PRWE).

#### Inclusion criteria:

- Patients with age more than 18 years.
- Closed fractures.
- AO type A2, A3, B3 & C1, C2, C3 fractures.
- History of trauma less than 2 weeks
- Patients with 6 months follow up.

#### Exclusion criteria:

- Patients with age less than 18 years
- Open fractures.
- Pathological fractures.
- Patient lost to follow-up

### SAMPLE SIZE: 24

All the routine investigations were done and radiographic evaluation of fracture was done with AP VIEW and LATERAL VIEW and with CT SCAN for intra-articular comminuted fractures.

### SURGICAL APPROACH:

With patient supine & the affected extremity extended over a radiolucent table, with forearm in supination an average of 30 to 40 mm incision vertically was kept on volar aspect of wrist extending proximal flexor crease centring the FCR tendon. Plane was created between radial artery laterally & FCR, FPL & Median nerve medially. This exposes the entire Pronator Quadratus (PQ) muscle & the volar radial surface.

In MIPO technique whenever used, we applied transverse incision around 30mm to proximal flexor wrist crease centring FCR tendon. And isolated small incisions were put for proximal screws.

### OBSERVATION AND DISCUSSION:

We have studied 24 patients prospectively with following

## observations:

- Incidence of distal end radius fracture was more common in 40-60 years of age group with mean age of 45.6 years and 58% of patients were male with occurrence of fracture on right side in 58% of patients.
- 37.5% of cases were due to high velocity road traffic accidents and 62.5 % due to trivial fall on outstretched hands with RTA being more common in the younger age group whereas fall on outstretched hand more common in the elders with osteoporotic bones..
- 71% of patients had AO type A2 and A3 and 88% of the patients were operated within 3 days of injury with remaining 12% patients operated late because of late OPD presentation or medical fitness.
- Starting from skin incision to skin closure, 88% of surgeries were completed within 75 minutes.
- 87% patients had excellent to good palmar flexion, 96% had excellent to good dorsiflexion, 83% had excellent to good radial deviation, 96% had excellent to good ulnar deviation, 74% had excellent to good supination, 92% had excellent to good pronation of wrist and 92% had grip strength of 5 at follow up.
- 92% patients had excellent to good radial inclination, all the patients had <6 mm radial shortening, 92% had excellent to good palmar tilt, 96% had pronator power  $\geq 4$ , 88% had excellent to good Gartland & Werley SCORE and 92% had excellent to good PRWE SCORE.
- Total 12% patients had complications; 4% having screw irritation in joint had weak grip strength, residual dorsal tilt and prominent ulnar styloid and radial deviation of hand; 4% having inadequate reduction and weak grip strength, residual dorsal tilt and radial deviation; 4% having palpable hardware on volar aspect had residual dorsal tilt, radial deviation of hand and prominent ulnar styloid.
- There was no infection and neurovascular injury probably due to proper hemostasis and careful dissection.

## CONCLUSION

From our study, we conclude that

- Non-surgical treatment frequently delays the patients' return to their routine activities.
- Unlike the dorsal approach, by using the volar approach, large volar fragments from the lunate fossa can be reduced by direct manipulation and stabilized with the plate's buttressing surface. The dorsal hardware also increases the chances of irritating tendons.
- It is very important to select the proper plate width to provide satisfactory subchondral support across the entire articular surface as well as to capture all the volar fragments.
- The commonest complication we encountered in our study was fracture collapse in 2(8%) patients leading to radial deviation of hand and causing ulnar styloid prominence which lead to a decrease in radial deviation and palmar flexion post operatively. The cause of which may be poor bone quality and poor hold of the distal screw allowing fracture to collapse. Both these patients were more than 60 years of age. Thus anatomical reduction of the joint surface with rigid fixation is the main goal in treating such fractures.
- Thus treatment of distal end radius fractures (especially type A2 and above) by volar plating technique has become a reliable procedure with encouraging results. It gives gratifying results with good patients' compliance, satisfactions and low complications rate.

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