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Short term clinical and radiological results of volar locking plating in volar barton fractures

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Abstract

Introduction: Volar Barton's fracture is fracture-dislocation of radiocarpal joint with the intra-articular fracture involving the volar lip. Open reduction and internal fixation is the preferred method as this allows reduction under direct vision, stable internal fixation, shorter period of immobilization, and fast return of function.

Materials and Methods: The study consisted a total of 20 patients who were operated in the Department of Orthopaedics, Government Medical College Srinagar during the period of 2019-2021. All the patients were managed by volar locking plating. Inclusion criteria were: age 18-60 years, both sexes, patient consenting for surgery and patients fit for anaesthesia. Exclusion Criteria were: associated fractures of ipsilateral limb, delayed presentation more than 2 weeks, pathological fractures and open fractures.

Results: Mean age of our patients was 27.3 years. The average palmar flexion was 72.5 degrees and the average dorsiflexion was 80.4 degrees. The mean supination was 82 degree and mean pronation at final follow up was 78 degrees. In the present study, the average radial inclination at final follow up was 17 degrees. All the 20 patients in this study had less than 5 mm radial shortening. Average palmar tilt at final follow up was around 7.5 degrees. 75% of the patient had excellent outcome based on Gartland and Werley score.

Conclusion: Anatomical reduction of volar barton fractures is important to achieve good procedural outcomes. Volar locking plates have shown promising results in volar barton fractures.

Keywords: clinical, radiological results, volar locking plating, volar barton fractures

Introduction

Distal end radius fractures are commonly encountered fractures in OPD practice. Volar Barton's fracture is fracture-dislocation of radiocarpal joint with the intra-articular fracture involving the volar lip. They may be due to high or low energy injuries, with a bimodal distribution. In older persons, it is seen as an osteoporotic fracture with low energy trauma, and in young persons, it is usually caused by a high energy trauma^[1, 2]. Volar barton fractures are considered as unstable and there are various treatment modalities available in literature including closed reduction with casting, k-wire fixation and cast, external fixation and plating^[3, 4]. Open reduction and internal fixation is the preferred method as this allows reduction under direct vision, stable internal fixation, shorter period of immobilization, and fast return of function^[5].

Open reduction with volar buttress plating have achieved most desired outcome functionally and radiologically^[6-7].

Aims and Objectives

The aim of the present study was to evaluate the functional outcome in volar Barton's fracture managed by open reduction and internal fixation with volar locking plate.

Materials and Methods

The study consisted a total of 20 patients who were operated in the Department of Orthopaedics, Government Medical College Srinagar during the period of 2019-2021. All the patients were managed by volar plating. Inclusion criteria were: age 18-60 years, both sexes, patient consenting for surgery and patients fit for anaesthesia. Exclusion Criteria were: associated fractures of ipsilateral limb, delayed presentation more than 2 weeks, pathological

fractures and open fractures.

Initial assessment of all the patients was done according to the ATLS protocol. Radiographic evaluation of fractures was done by obtaining anteroposterior and lateral radiographs of the part. Preoperative CT scan was done in all patients.

Ethical clearance was taken from the institutional ethical clearance committee. Informed written consent was taken from each patient. Operations were done under regional or general anaesthesia using tourniquet.

Surgical procedure- About 10cm skin incision at volar aspect of wrist between radial artery & flexor carpi radialis tendon was given. Fracture site was exposed after incising the FCR tendon sheath. Flexor pollicis longus was retracted to the ulnar side and pronator quadratus was incised in L shaped manner & then retracting it. Fracture was disimpacted and reduction was achieved by manual traction under c-arm guidance. Appropriate size plate was applied over volar surface of radius below the watershed line and temporarily fixed with cortical screw in oblong hole of locking plate. Reduction was checked under and image intensifier and cortical screw in oblong hole of locking plate was tightened and after application of screws in distal fragment. After confirming the desired reduction remaining screws were applied. Wound closure was done in layers.

Short arm splint was kept for 2 weeks & active ROM exercises of wrist elbow & shoulder were started. Heavy weight lifting and strenuous work was not allowed until signs of fractures healing were radiographically confirmed.

The follow up protocol was 2 weeks, 6 weeks, 3 months and final follow-up was done at 6 months. Clinical and radiographic assessments were done at every visit. Radiological parameters included were measurement of palmar tilt, radial shortening and radial inclination. Wrist range of motion was measured in flexion, extension, pronation and supination. The overall function of the upper limb was assessed using the Gartland & Werley Score.



Fig 1: Preoperative (left) and postoperative (right) radiographs of one of the cases.

Results

Mean age of our patients was 27.3 years. Most of the patients were males consisting of 80% patients. There were 13 patients who had injury to right side. Road traffic accident was mode of trauma in 65% patients and rest of the patients had fall as mode of trauma.

The average palmar flexion was 72.5 degrees and the average dorsiflexion was 80.4 degrees. The mean supination was 82 degree and mean pronation at final follow up was 78 degrees.

In the present study, the average radial inclination at final follow

up was 17 degrees. All the 20 patients in this study had less than 5 mm radial shortening. Average palmar tilt at final follow up was around 7.5 degrees.

75% of the patient had excellent outcome and 25% had good to fair outcome based on Gartland and Werley score.

Two of the patients had wound infection which responded well to antibiotics according to culture report and 1 patient developed reflex sympathetic dystrophy in 1 patient.

Table 1: Demographic profile of patients

Age	Mean age= 27.3 years Age group =19-40
Sex	Males 16(80%) Females 4(20%)
Side	Right 12(60%) Left 8(40%)
Mode of trauma	RTA 13(65%) Fall 7(35%)

Table 2: Gartland and Werley score

G and W Score	Frequency	Percentage
Excellent	15	75%
Good	3	15%
Fair	2	10%
Poor	0	0%
Total	20	100%

Table 3: Radiological parameters

Parameter	Shortening	Palmar tilt	Radial inclination
Mean	2.8mm	7.5 degrees	17 degrees

Discussion

The present series consisted of 20 patients among them 16 were male & 4 were females with an average of 27.3 years having volar barton fractures of radius treated with volar locking plate. Most recent literature have advocated the use of variable angle locking plates to address the fracture comminution and instability [8].

In the present study we observed an average of 82 degree supination and 78 degrees of pronation. In a study conducted by Keny and Kwan *et al.* mean supination & pronation were 82 and 80 degrees respectively [9].

The main aim in treatment of articular fractures of distal radius is to achieve anatomical reduction. Volar plating is observed to achieve superior results in clinical and radiological outcomes.

Kareem Sobky *et al.* biomechanical study indicates volar fixation of unstable distal radius fractures with a fixed angle device is a reliable means of stabilization [10].

We do observe some patients with complications, one patient developed RSD and two patient had wound infection.

We achieved Gartland & Werley score excellent result in 75% and good to fair result in 15% of patients. Denju osada *et al.* and kenya kwan *et al.* demonstrated 96% and 91% excellent results respectively [9, 11].

This study is not without limitations. The small sample size of the patients and the short term results were the main drawbacks of our study.

Conclusion

Anatomical reduction of volar barton fractures is important to achieve good procedural outcomes. Volar locking plates have shown promising results in volar barton fractures. Screws penetration in dorsal cortex should be avoided to prevent tendon irritation.

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