

ORIGINAL RESEARCH

Radiological and Clinical Outcome of Volar Barton Fractures Treated by Volar T- Plate Fixation

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ABSTRACT

Aims: To evaluate the functional and radiological result of volar barton fracture treated with T-plate.

Methods: In this prospective study forty patients of volar barton fractures treated with volar T- plate were evaluated. In all patient's volar approach was used for plate fixation. Fractures were reduced in direct vision. Plate applied and initially 3.5 mm cortical screw fixed in oval hole of t-plate then into other holes. Radiological outcome was assessed according to Lidstrom criteria and clinical outcome was assessed using Mayo score.

Results: Out of forty patients, thirty patients were caused by road traffic accidents and remaining ten patients caused by slip on the floor. Majority of patients (90%) operated within 5 days of injury. Duration of hospital stay was 3 to 6 days. Mean time of radiological union was 8 weeks (6 to 12 weeks). Thirty patients had excellent to good functional outcomes at the 8 months. No case of nonunion was reported. Thirty-four patients (85%) had volar tilt in the range of 5 to 10 degree. Radiologically 95% patients had excellent to good results.

Conclusion: Volar barton fractures are best treated with osteosynthesis using volar t - plate.

Keywords: Volar Barton Fracture, Open Reduction Internal Fixation, T-Plate.

INTRODUCTION

Barton fracture is defined as fracture of distal end of radius that involve volar or dorsal rim and extend in the articular surface and is usually accompanied by subluxation or dislocation of radio-carpal joint, such intra-articular fracture is uncommon, and they are usually associated with high energy trauma. Different treatment modalities for treating these fractures are close reduction and cast¹, close reduction and percutaneous k-wire fixation, external fixation, open reduction and k-wire fixation, open reduction and T-plate or oblique T-plate fixation and variable angle volar locking plate fixation.²⁻⁴ Close reduction is usually easy to achieve but difficult to maintain.⁵ The main aim of this study was to assess the radiological and functional outcome of volar barton fracture using T-plate fixation.

MATERIALS & METHODS

This prospective study was conducted in the department of orthopedics, SK Govt medical college Sikar, from Jan 2013 to March 2021. Total 40 patients of volar barton fractures treated with open reduction and internal fixation with volar T-plate were evaluated in this study. Surgery was performed in regional or general anesthesia under tourniquet control to provide bloodless field during surgery. Volar approaches of Henry were used in all cases. Incision was over the tendon of flexor carpi radialis tendon, subcutaneous dissection done, retract the flexor carpi muscle medially and expose the pronator quadratus muscle. Subperiosteal dissection done. Fracture is reduced under direct visualization. T-plate fixed initially with 3.5mm cortical screw into oval hole of plate, cancellous screw fixed in distal holes. All patients were evaluated with X-rays of wrist with forearm anteroposterior and lateral views. Patient followup for at least 5 months. Evaluation of radiological outcome was performed using Lidstrom criteria and clinical outcome by Mayo score.

RESULTS

Total 40 patients included in this study, out of which 30 patients were caused by roadside accident and remaining 10 patients caused by fall on ground. There were 28 male (70%) and 12 female (30%). Age range from 20 to 60 yrs. Right side involve in 24 patients and left side in 16 cases. Majority of patient operated within 5 days of injury. Mean time was 3 days. Mean operative time was 40 min (30 to 50 min). Meantime of radiological union was 10 wks (8 to 12 wks), mean follow up period was 6 months. There was infection reported in one patient they resolve after taking antibiotics for 2 wks. No breakage of plate was reported. Clinically patient evaluated using Mayo score. Majority of patient had full range of motion at wrist and assume job at end of 6 months. Out of 40 patients 34 had excellent grip strength. 36 patients had excellent to good functional outcome at the end of 6 months. Radiologically 95% patients had excellent to good result.

Table 1: Functional Evaluation

Pain intensity	Functional status	Range of motion	Grip strength
No pain 32 patient	Regular job - 40 patients	100%- 12 patients	90 to 100 % - 35 patients
Mild pain 6 patient	Restricted employment- 0	75 to 99 %- 28 patients	75 to 89 % - 3 patients
Moderate pain 2 patient	Able to work but unemployed- 0	50 to 74 % - 0 patient	50 to 74 % - 2 patients
Severe pain 0	Unable to work- 0	25 to 49 % - 0 patient	25 to 49 % - 0

Table 2: Functional result

Functional score	Frequency	Percentage
Excellent	24	60%
Good	12	30%

Satisfactory	4	10%
total	40	100%

Table 3: Radiological evaluation

Radiological score	Frequency	Percentage
Excellent	26	65%
Good	12	30%
Satisfactory	02	05%
Total	40	100%

DISCUSSION

The mainstay of treatment of volar barton fracture is to achieve proper anatomy of distal radius and wrist for proper functioning of wrist without any complication. Result of our study is comparable to other studies that support the effectiveness of our fixation method. For volar barton fracture T-plate provide stable fixation that allow early mobilization of wrist which prevent complication that occur due to prolonged immobilization.⁶⁻⁷ The average age of patient in our study is 38 yrs (range from 20 to 60 yrs). In our study 70% of patients were male and 30 % patient were female. The study done by Hanaeninegishi et al included most female (80%) and 20% male. In Margaret Fok et al. study there were 58% male and 42% female.

The volar tilt, radial length, articular margin, joint space was improved after surgery. Conservative treatment may lead to more complications as compared to plate fixation e.g. stiffness, deformity, subluxation and instability of wrist.⁸

The indication of surgical treatment -displaced volar barton fracture with unsuccessful close reduction.⁹⁻¹¹ Persistent step off of 2 mm or more after close reduction is also indication of surgery.¹²⁻¹³

Post operative median nerve injury not found in any case. This is comparable to other studies like Zoubos et al. in 1977, this suggests that release of the median nerve is not necessary in open reduction internal fixation of such fractures.

Volar T- plate fixation of unstable distal radius fracture has been described in literature. Adequate image intensifier control is necessary for proper position of distal screw(subchondral position).

In our study, union was achieved in all cases and postoperative complication were not significant. Smith et al. reported 100% union rate with 71% excellent, 18% good and 11% fair results after fixation of such fractures.^{14,15}

CONCLUSION

For volar barton fractures, volar T- plate fixation provide stable, rigid fixation with good functional outcome. By using T-plate joint movements & daily activities is recovered in short span of time.

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