Original Research Paper

Volume - 11 | Issue - 01 | January - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

FUNCTIONAL OUTCOME OF DISTAL HUMERUS EXTRA ARTICULAR FRACTURE TREATED WITH LATERAL COLUMN PLATE IN ADULTS

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ABSTRACT

Introduction: Distal humerus fractures comprise approximately 2% of all fractures[1]. Extra-articular fractures of the distal humeral shaft are relatively rare injuries and have been in the limelight owing to a higher incidence of radial nerve injuries, as well as the dilemmas surrounding their management[1,2,3]. Purpose of this study is to determine functional outcome following distal humerus extra articular fracture treated with extra articular lateral column plate in adults and to study the range of motion and activities of daily living after fixation with extra articular lateral column plate.

Materials and methods: We have conducted a retrospective study of 20 patients who were operated for extra-articular distal humerus fracture with open reduction and internal fixation using lateral column plate at our institute during the year of 2015 to 2018. All patients were operated in lateral position with triceps splitting approach[4].

Results: 20 patients were studied out of which 15(75%) patients were male and 5(25%) were females. Patients were assessed by Mayo's elbow performance score[5] at the end of 6-8 months of follow up. Average time of radiological union was 3.5 months. 2(10%) patients had non-union. The mean flexion achieved by the patients post-operatively was 130.5^0 and mean extension is 7.25^0. Excellent anatomical results were seen in 17 patients, good results were seen in 1 patient fair result was seen in 1 patient and poor result was seen in 1 patient.

Conclusion: Extra-articuar fracture of distal end of humerus at the diaphysio-metaphyseal junction treated by a lateral column plate provides stable fixation with a low complication rate and excellent functional results.

KEYWORDS : Distal humerus; extra articular fracture; lateral column plate; Radial nerve palsy.

INTRODUCTION

Distal humerus fracture, comprise approximately 2% of all fractures in body[1]. Because of its distal extent its reduction and stability is difficult to maintain with conservative management with bracing or casting. Restoration of alignment and stable fixation is necessary to allow early rehabilitation and a good functional outcome. The goal of operative treatment of extra articular distal humerus fracture is to reestablish the length, rotational stability with stable fixation that allows early active pain free mobilization of the fracture extremity[6]. The goal can be achieved with distal humerus extra articular lateral column plate. This plate is anatomically pre-contoured, to be placed along the central humeral diaphysis proximally and to the lateral supracondylar ridge distally for stable fixation system for distal humerus fracture.

MATERIALS AND METHODS

A retrospective study of 20 patients who were operated for extra-articular distal humerus fracture at the distal diaphysio-metphyseal junction with open reduction and internal fixation using lateral column plate at our institute between 2015 to 2018 was conducted. They were followed up at regular interval with a minimum follow up of six months. All the surgeries were performed by the principle author and assisted by co-authors.

INCLUSION CRITERIA:

- Patients with more than 18 years of age.
- Fractures of humerus at distal diaphysio-metaphyseal junction.
- Closed fractures and open fractures according to Gustilo Anderson type I and II[7],
- Patients who were presented within 2 weeks of the injury
- Patients present without any vascular deficit.

After stabilization of patient's general condition, standard antero-posterior (AP) and lateral radiograph (Figure-1) was done. Fracture were classified according to Muller's AO classification[8] for distal humerus fracture.

(Figure-1) Pre-op radiograph

All patients were operated on simple table and lateral position after general or regional anaesthesia as per decided by anaesthetist. Open reduction and internal fixation were done by posterior midline incision and posterior triceps splitting approach[4]. Inter-fragment screws or encircle with SS wire was used when there was a spiral oblique fracture during which lateral column plate was used in neutralizing mode. (Figure-2)

(Figure –2) Immediate post-op radiograph

Post-operatively the elbow movement was started as soon as patient became tolerant to the surgical pain while shoulder and wrist mobilization was allowed from the second day of the operation. Sutures were removed on 13 to 15th post-operative day. Clinical and radiological assessment was done at 1, 3 and 6 months post-operatively according to Mayo's elbow performance score[5]. Any complications that happened during this period were also taken into consideration.

Figure-3 Final radiological and clinical outcome

RESULTS

All the 20 patients in this study were between 20 to 63 years of age with mean age of 44.35 years. 15 (75%) patients were male and 5 (25%) patients were female. 14 (70%) patients had fractures following road traffic accidents and 6 (30%) patients had domestic fall. Involvement of right or left extremity is a matter of chance as 11 (55%) patients had injury of right arm and 9 (45%) patients had injury of their left arm. 2 (10%) patients presented with radial nerve palsy following injury. In this study, 4 patients had spiral fracture, 4 patients had transverse fracture, 1 patient had oblique fracture, 10 patients had comminuted fracture and 1 patient had segmental fracture. (Table-1)

Fracture configuration:

Table -1 Fracture configuration

Type	Number	Percentage
Spiral	4	20%
Transverse	4	20%
Oblique	1	5%
Comminuted	10	50%
Segmental	1	5%

We observed that 10(50%) patients had radiological union at 3 months, 7(35%) patients had union at 4 months and 1(5%) patient had union at 5 months post-operatively thus average time of radiological union was 3.5 months.

The mean flexion achieved by the patients post-operatively was 130.5^0 and 13(65%) patients achieved full extension i.e. 0^0, 3(15%) patients had extension of 10^0 and 2(10%) patients had extension of 5^0. Mean extension is 7.25^0. 85% of patients had functional range of motion, while remaining 15% patients had less than functional range of motion. Thus 85% patients could carry out their activity of daily living without any difficulty.

2(10%) patients had non-union and no patient had local site infection, malunion or post-operative radial nerve palsy. Even the patients, who had radial nerve palsy pre-operatively, had complete recovery at 6 months.

Excellent anatomical results according to Mayo's Elbow Performance Score (MEPS)[5] were seen in 17 patients, good results were seen in 1 patient, fair result was seen in 1 patient and poor result was seen in 1 patient. (Table-2)

Table-2 MEPS

Mayo's Elbow Performance Score (MEPS)[5]:

MEPS	cases	Percentage
Excellent	17	85%
Good	1	5%
Fair	1	5%
Poor	1	5%

DISCUSSION

Management of distal humerus extra-articular fracture continues to pose vexing problem for Orthopaedic surgeons even in 20th century. Fracture of distal humerus is at an increase in the present due to high chances of road traffic accidents. Internal fixation of distal humerus fracture has gained wide spread acceptance due to failure of conservative management in past as well as high chances of complications.

The average time of radiological union was 3.5 months in our study which is comparable to the series by Trikha et al[9] which was 3 months and by Jain et al[10] which was 5.7 months.

Functional range of motion of the elbow is 75^0 to 120^0 [11]. In our study, the mean flexion achieved by the patients post-operatively was 130.5^0. 17(85%) of the patients achieved functional range of motion. (Table-3)

Table-3 Range Of Movement (ROM)

Series	Trikha[9]	Jain[10]	Current
Flexion	$122.9^0 \pm 23^0$	141.2^0	130.5^0
Extension	$4.03^0 (\pm 6.5)$	1.5^0	7.25^0

In the present study, 2 (10%) patients had nonunion. In the series by Scolaro[12] there was 5% nonunion rate and in the series by Trikha[9] there was 5.5% nonunion rate. Out of 2(10%) patients who had nonunion in the present study 1 patient was 58 years old with poor bone quality and that could be the reason of implant loosening and failure. Other patient with nonunion was treated by a revision surgery with dual plating.

In our series no patient had local infection, malunion or post-operative radial nerve palsy. Even the patients who had radial nerve palsy pre-operatively, had complete recovery at 6 months. In the series by Trikha et al[9] 1 (2.7%) patient developed radial nerve palsy post-operatively which recovered completely.

In our study 17(85%) patients had excellent result, 1(5%) patient had good result, 1(5%) patient had fair outcome and 1(5%) patient had poor outcome. (Table-2)

The average MEPS was 94.5 which is comparable with the series conducted by Trikha et al[9] 90.8+9.9 and Jain et al[10] 96.1.

A comparison study was made by Meloy et al[13] for extra articular distal humerus fracture treated by single column plating and double plating and he concluded that the single column plating with a pre-contoured posterolateral locking plate has significantly fewer complications, which is also seen in our series.

CONCLUSION

Extra-articuar fracture of distal end of humerus at the diaphysio-metaphyseal junction treated by a single lateral column plate provides stable fixation with a low complication rate and excellent functional results.

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