



FUNCTIONAL OUTCOME OF PROXIMAL HUMERUS FRACTURE TREATED WITH PROXIMAL HUMERUS LOCKING PLATES

Orthopedics

Venkat Reddy
Almareddi

Professor, Department of Orthopedics, Prathima Institute of Medical Sciences, Nagunoor,
Karimnagar, Telangana, India

Anudeep Batchu

ABSTRACT

Introduction: Proximal humerus fractures are one of the common fractures encountered by orthopedic surgeons today. Management of articular fractures is more controversial because of complications like nonunion, shoulder stiffness and avascular necrosis. Open reduction and internal fixation allows early mobilization and functional recovery. Aim of this study is to evaluate the functional outcome of proximal humerus fractures treated with proximal humerus locking plates.

Methods: This study was conducted at Prathima Institute of Medical Sciences, Karimnagar from July 2015 to June 2017. 36 patients with displaced proximal humerus fractures were included in this study. All patients underwent open reduction and internal fixation with proximal humerus locking plate. Neer's scoring system which is based on 100 points is used to assess the results of internal fixation.

Results: Out of 36 patients, 12(34%) had excellent results (Neer's score >89), 21(58%) cases had satisfactory results (Neer's score between 80-88) and unsatisfactory result in 3(8%) cases (Neer's score between 70-79). We had zero failure in our study. 3 patients had superficial infection, 3 patients had shoulder stiffness and 30 patients had no complications.

Conclusion: We recommend open reduction and internal fixation of all displaced proximal humerus fractures with proximal humerus locking plate. Early mobilization, better fracture union rate and less disability make proximal humerus plating treatment of choice for all displaced proximal humerus fractures.

KEYWORDS

Proximal Humerus Fracture, Proximal Humerus Locking Plate, Philos Plate

INTRODUCTION

Proximal humerus fractures are one of the common fractures encountered by orthopedic surgeon in day to day practice. They account for approximately 4 – 5% of the all fractures.

Incidence of proximal humerus fracture is high in the elderly because of decreased bone density. But it can also occur in younger age group following high velocity trauma¹. Increasing incidence of complicated proximal humerus fractures is due to rise in the high velocity trauma. It is a challenge for the orthopedic surgeon to deal with these complicated fractures because of numerous muscles attachments and paucity of space for fixing implant.

Treatment of articular fractures is more controversial because of high nonunion rate and avascular necrosis of humeral head. In Neer's classification, there are two part, three-part and four-part fractures and those with dislocation of head of humerus. A review of published result suggests that there is no universally accepted method of treatment. Conservative management may be associated with nonunion, malunion resulting in painful dysfunction².

The surgery should be carried out as soon as the patient's general condition permits. A delay of several days makes reduction more difficult and a significant delay results in absorption of bone, making secure internal fixation difficult.

The objective of the osteosynthesis is to correct the displacement (usually rotation) of each fragment and hold it in place with an implant. Thus, the greater tuberosity fragment which is usually displaced proximally and rotated upward by rotator cuff muscles inserted into it, is fixed to the major humeral head fragment and lesser tuberosity fragment similarly displaced by subscapularis is fixed. Three & four part fractures represent 13 to 16 % of proximal humeral fractures. Treatment options for these displaced fractures include open reduction and fixation. Neer recommended open reduction and internal fixation for displaced two and three parts fractures³. Poor results of open reduction and internal fixation of three part fractures is often due to imperfect technique. In a three or four-part fracture dislocations when the head of the humerus is entirely devoid of any blood supply it can be replaced by a humeral prosthesis.

However, the goal of Proximal Humerus fracture fixation should be stable reduction to allow early mobilization.

Aim of this study is to evaluate the functional outcome of proximal humerus fractures treated with proximal humerus locking plates

MATERIAL AND METHODS

This study was conducted at Prathima Institute of Medical Sciences,

Karimnagar from July 2015 to June 2017. 36 patients with displaced proximal humerus fractures were included in this study.

All patients underwent open reduction and internal fixation with proximal humerus locking plate under general anesthesia. Deltopectoral approach in supine position was used in all cases. All the patients were examined clinically and radiologically. Routine preoperative work up was performed for all cases. Only two part, three part and four part acute humerus fractures in patients aged above 18 years were included in this study. Exclusion criteria: open fractures, pathological fractures, old fractures, associated humerus shaft fracture, associated neurovascular injury, age below 18 years. Arm sling pouch was used during postoperative period.

Pendulum exercises are begun immediately depending on pain tolerance. Passive range of motion started at 1st week. The active range of motion was started at 2-4 weeks postoperatively, depending on stability of osteosynthesis and bone quality. Immobilization discontinued from 4th to 6th week. Active assisted movements started up to 90° abduction with no forced external rotation. Full range of movements with active exercises started from 6th to 8th week.

At each follow up, patients were examined clinically and radiologically, assessed for range of motion and bony union and any complications. Further follow ups were done at 6 weeks, 12 weeks and 24 weeks. Patients with shoulder stiffness were given physiotherapy for 7 to 15 days on outpatient basis. Final evaluation was done at the end of 9 months by using the Neer's scoring system.

Neer's scoring system is based on 100 points. Pain is the most important consideration and is assigned 35 points. The result in any patient with significant pain is graded as failure.

Table 1S

1.Pain	35 points
2.Functions	30 points
3.Anatomy	10 points
4.Range of movements	25 points
TOTAL	100 points
1.Pain (35 points)	
A. None/ignores	35
B. Slight, occasional, no compromise in activity.	30
C. Mild, no effect on ordinary activity	25
D. Moderate, tolerable, makes concessions, uses aspirin.	15
E. Marked, serious limitations	5
F. Totally disabled	0

2.Function (30 points)	Score
A. Strength	
Normal	10
Good	8
Fair	6
Poor	4
Trace	2
Zero	0
B. Reaching	10
Top of head	2
Mouth	2
Belt buckle	2
Opposite axilla	2
Brassier hook	2
C. Stability	10
Lifting	2
Throwing	2
Pounding	2
Pushing	2
Hold over head	2
3. Anatomy (10 points) rotation, angulation, joint incongruity, retracted tuberosities, implant failure, myositis, non-union, avascular necrosis	Score
None	10
Mild	8
Moderate	4
Marked	0-2
4.Range of motions (25 points)	Scoring
Flexion	
180 (degrees)	6
170	5
130	4
100	2
80	1
Less	0
Extension	
45	3
30	2
15	1
Less	0
Abduction	
180	6
170	5
140	4
100	2
80	1
Less	0
External rotation from anatomical position with elbow bent	Scoring
60 (degrees)	5
30	3
10	1
Less	0
Internal rotation (from anatomical position with elbow bent)	
90 (T-6)	5
70(T-12)	4
50(L-5)	3
30(Gluteal)	2
Less	0

GRADING OF RESULTS

- Total points 100
- Excellent >89 points
- Satisfactory 80-88 point
- Unsatisfactory 70- 79 points
- Failure <69 points

RESULTS

36 patients with closed displaced proximal humerus fractures were treated by open reduction and internal fixation with locking compression plate. All 36 patients in the study presented for clinical and radiological examination at regular intervals. Out of 36 patients, 21 were male and 15 female. Nine patients (25%) were in age group

21-30yrs, 15(41%) in age group 31-40yrs, 6(17%) in age group 41-50yrs and 6(17%) in age group 51-60yrs. High incidence of proximal humerus fractures (41%) was observed in the 31 – 40yrs age group in this study. Right side was involved in most of cases (58.3%). Mechanism of injury was due to RTA in 24(67%) cases and fall in 12(33%) cases. Dominance of right side, young male due to RTA observed in this study is due to daily commute of working men on two wheelers from work place. In our study out of 36 patients, 24(67%) had 2-part fractures, 9(25%) had 3-part fractures and 3(8%) had 4-part fractures.

At 9 months follow up after surgery, 21(59%) had no pain, 12(33%) had slight pain and 3(8%) had mild pain. 27(75%) had functional score between 25-30 and 9(25%) had score between 20-25 at the end of 9 months follow up. 30 patients (83%) have no anatomical distribution and 3 patients have mild anatomical distribution and three patients have moderate involvement at the end of 9 months. 21 (58%) patients had flexion between 150 to 180 degree, 12(34%) patients had flexion between 120 to 150 degree and 3(8%) patients had flexion between 90 degrees to 120 degree, 21 (58%) patients had extension between 35 to 45 degrees, 15(42%) patients had extension between 25 to 34 degrees at the end of 9 months. 21 (58%) patients had abduction between 150 degrees and 180 degree, 15(42%) patients had abduction between 120 degrees and 150 degree, 6(17%) patients had an external rotation between 60 degree and 90 degree, 27(75%) patients had an external rotation between 30 degrees and 60 degree, 3(8%) patients had an external rotation less than between 30 degree at the end of 9 months. 9(25 %) patients had an internal rotation between 60 degree and 90 degree ,27(57.3%) patients had an internal rotation between 30 degree and 60 degree, none of the patients had an internal rotation less than 30 degree at the end of 6 months.

In our study at the end of 9 months follow up, 12(34%) cases had excellent results (Neer's score >89), 21(58%) cases had satisfactory results (Neer's score between 80-88) and unsatisfactory result in 3(8%) cases (Neer's score between 70-79). We had zero failure in our study. 3 patients had superficial infection, 3 patients had shoulder stiffness and 30 patients had no complications.

DISCUSSION

Incidence of proximal humerus fractures has increased in last few years due to increase in road traffic accidents. Management of these fractures is still uncertain. Although un displaced fractures can be treated conservatively, treatment of displaced fractures is still not clear after extensive analysis of literature. Most of the studies revealed that the displaced proximal humerus fractures have a poor functional prognosis when left untreated because of displaced fragments. However, with the aim of getting anatomically accurate reductions, rapid healing and early restoration of function, which is a demand of today's life, open reduction and internal fixation, is the preferred modality of treatment. Overall, open reduction and internal fixation have yielded satisfactory results in case of displaced fractures. The best results were obtained if the fracture was well reduced and strict post-operative rehabilitation program followed.

The present study was conducted to assess the results of two part, three part and four part proximal humeral fractures treated by open reduction internal fixation with locking compression plate.

Proximal humerus fractures occur more commonly in elderly age group. Mean age reported was 58.1 years in Sameer et al¹¹ study and 56 years in Fazal et al¹⁸ study. Average age in our study is 39.9 years slightly lower than Gerber et al⁶ study in which mean age is 44.9 years. Lower mean age in our group is due to high incidence of two-wheeler accidents in working age group.

Male dominance was reported by Gerber et al⁶(male female ratio:1.35/1) and Sameer et al¹¹(male female ratio:1.7/1). Fazal et al¹⁸ reported female dominance with 1: 3.5 male female ratio. Our study showed a higher incidence of fractures in men than in women. The male to female ratio was 1.4: 1. Higher ratio can be explained by a higher involvement of male in day to day activities in comparison to female.

Cause of fracture in our study was road traffic accidents in 24 (66.4%) cases and fall from standing height due to slip in 12(33.6) cases. Fazal et al¹⁸ in their study had reported 21(77.8%) due to fall and 6(22.2%) cases due to RTA. Sameer et al¹¹ in their study of 47 patients of

proximal humerus fractures, fall accounted for 55% of fractures, road side accident 42.5% and 1(2.5%) fracture was caused by seizure.

In our study, right side was involved in 21(58.33%) cases and left side in 15(41.66%) cases. Gerber et al¹ reported 18(53%) cases on right side and 16(47%) on left side out of 34 cases.

Ramchander Siwach et al¹² reported 12 two part and 13 three part fractures treated with Philos plate. In 157 case series of Felix Brunner et al¹⁰, 49 two part fractures, 70 three part fractures and 38 four part fractures were included. All cases were treated with Philos plate. MA Fazal et al¹⁸ treated 27 cases (13 two part, 12 three part) using Philos plate. When compared with other studies, two part fractures were more in our series (66.66%) and were treated with Philos plate. As the number of cases in this study are small, no conclusion can be drawn.

When compared with other studies present study shows less complications. Three patients had stiffness and three patients had superficial infection. However, Felix Brunner et al¹⁰ showed 13.9% of his cases had screw penetration as a complication.

Ramachander Siwach et al¹² reported excellent results in 28% cases, satisfactory result in 64% cases and unsatisfactory result in 8% cases. Sameer Aggarwal et al¹¹ reported 17% excellent results, 39% satisfactory results and 34% unsatisfactory results. The results in our study were graded according to Neer scoring criteria. We had satisfactory to excellent results in 33(91.7%) patients treated in our institution. All patients with excellent results and satisfactory results had normal muscle function and functional range of motion according to Neer's Criteria. We had unsatisfactory results in 3 (8.3%) patients. These three patients had stiffness with restriction of movements and with persistent mild to moderate pain which is considered as unsatisfactory. These patients had poor follow up and compliance to physiotherapy was poor. Ramachander Siwach et al¹² reported similar outcome with 92% of their cases having excellent to satisfactory results (28% excellent, 64% satisfactory).

CONCLUSION

The present study was done to evaluate functional outcome and complications following surgical management of proximal humerus fractures treated with proximal humerus locking compression plate (Philos). Locking compression plate is mechanically and biologically an advantageous implant for proximal humeral fractures particularly comminuted and osteoporotic fractures. Philos plating allows early mobilization and fracture union. Based our results, we recommend routine surgical stabilization of all displaced proximal humerus fractures with proximal humerus locking plate (Philos).

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