



COMPARISON BETWEEN OUTCOME OF RECONSTRUCTION PLATING AND PRECONTOURED PLATING IN SUPRACONDYLAR FRACTURE HUMERUS IN ADULTS

Orthopedics

Dr. Maninder Singh

Assistant Professor, Department of Orthopaedics, Government Medical College, Amritsar, Punjab, India-143001.

Dr. Partap Singh Verka*

Professor, Department of Orthopaedics, Government Medical College, Amritsar, Punjab, India-143001. *Corresponding Author

Dr. Kashish Talwar

Junior Resident, Department of Orthopaedics, Government Medical College, Amritsar, Punjab, India-143001.

Dr. Parminderjeet Singh Bhullar

Junior Resident, Department of Orthopaedics, Government Medical College, Amritsar, Punjab, India-143001.

ABSTRACT

Background: Fractures of the distal humerus account for 0.5% to 7% of all fractures, and 30% of elbow fractures.

Methods: The present study consisted of 26 cases of either sex with fracture of distal end of humerus. In half of the patients the fixation was done with reconstruction plates and in another half the fixation was done with pre contoured locking plates after reduction. All patients were examined clinically and radiologically at three weeks interval till the union occurred. Each patient completed a comprehensive written questionnaire regarding functional capabilities, residual symptoms and existing disabilities.

Results: Anatomically Precontoured locking plate system is useful in providing stable fixation and better outcome for distal end humerus fractures and facilitating early postoperative rehabilitation.

KEYWORDS

Reconstruction Plates, Precontoured Locking Plates

INTRODUCTION

Distal humerus fractures are difficult to manage because of anatomic complexity, articular and metaphyseal comminution and osteoporotic bone. These fractures occur most commonly in a bimodal distribution: in younger people in their second decade as the result of high-energy trauma, and in elderly women as the result of relatively low-energy injury (i.e., fall) in the setting of osteoporosis. The basic principle for treatment of distal humerus fractures is similar to that for other intra-articular fractures: stable anatomic reconstruction of the joint to allow early mobilization. Treatment options include bracing, open reduction and internal fixation (ORIF), total elbow arthroplasty (TEA), and distal humerus replacement.^{1,2,3} The common signs and symptoms of distal humerus fractures are pain, swelling, deformity, and sometimes instability of the elbow after a fall.

A.O. Classification⁴

A) Extra-articular fractures:

A1 Extra-articular fracture, apophyseal avulsion

A2 Extra-articular fracture, metaphyseal simple

A3 Extra-articular fracture, metaphyseal multifragmentary

B) Partial articular fractures:

B1 Partial articular fracture, lateral sagittal

B2 Partial articular fracture, medial sagittal

B3 Partial articular fracture, frontal

C) Complete articular fracture:

C1 Complete articular fracture, articular simple, metaphyseal simple.

C2 Complete articular fracture, articular, simple, metaphyseal multifragmentary

C3 Complete articular fracture, multifragmentary

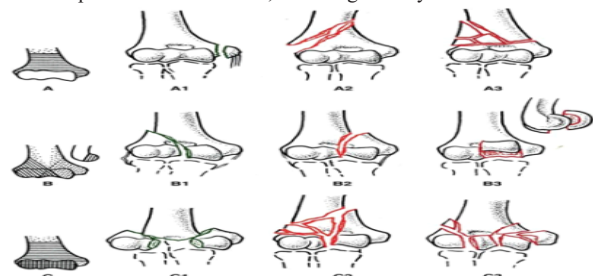


Figure 1: AO Classification

AIM

To compare the outcome of reconstruction plating and precontoured plating in supracondylar fracture humerus in adults.

MATERIAL AND METHODS

The present study consisted of 26 cases of either sex with fracture of distal end of humerus admitted in the Orthopaedic Ward of Guru Nanak Dev Hospital/ Government Medical College, Amritsar. Radiological examination of arm including elbow in antero-posterior and lateral planes was done, to assess the type of fracture and fracture geometry. Trans olecranon approach was used. In half of the patients the fixation was done with reconstruction plates and in another half the fixation was done with pre contoured locking plates after reduction. Depending on the medial and lateral column comminution, medial and postero lateral surface plating was done accordingly. Movements of elbow were checked. The physiotherapy was started on very next day. All patients were examined clinically and radiologically at three weeks interval till the union occurred. Each patient completed a comprehensive written questionnaire regarding functional capabilities, residual symptoms and existing disabilities. The range of motion and strength of the elbow was noted. All the findings were entered into the proforma. Radiographs were obtained in antero- posterior and lateral projection on each follow up visit till bony union. The duration of follow up was for a minimum period of 6 months. Results were assessed according to Mayo elbow performance index.

Table1: Assessment system (according to Mayo elbow performance index)

FUNCTION	POINTS
Pain	
None	45
Mild	30
Moderate	15
Severe	0
Movement ARC (Degrees)	
>100	20
50-100	15
<50	5
Stability	
Stable	10
Moderate instability	5
Gross instability	0
Function	

Combinghair	5
Feedingoneself	5
Hygiene	5
Puttingonshirt	5
Puttingonshoe	5
Total	100

Evaluation Of Results

•Excellent	90 or more
•Good	75 – 89
•Fair	60-74
•Poor	<60

Inclusion Criteria :

- Age > 18 years
- Open fracture with Gustilo Anderson type I or less than I
- Closed/Open displaced/undisplaced fractures
- Patients who were willing to undergo study with signed consent
- Controlled diabetic and hypertensive patients

Exclusion Criteria

- Age < 18 years.
- Gustilo Anderson type II or more.
- Patients who were not willing to undergo study with signed consent

Data Analysis:

All the results were summarized in microsfot excel sheet and were analysed by SPSS software. Chi- square test and student t test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

Table 2: Distribution Of Patients According To Ao Classification

AO Classification	Precontoured plating		Reconstruction plating	
	Number of patients	Percentage	Number of patients	Percentage
A2	1	7.69	0	0
A3	0	0	2	15.38
B2	1	7.69	1	7.69
C1	4	30.77	5	38.46
C2	5	38.46	4	30.77
C3	2	15.38	1	7.69
Total	13	100	13	100

84.62 percent of the patients (11 patients) of Precontoured plating group and 76.92 percent of the patients (10 patients) of reconstruction plating group belonged to Type C of AO classification.

Table 3: Mayo Elbow Performance Score

Parameter	Precontoured plating	Reconstruction plating	p- value
Mean Mayo elbow performance score	90.38	82.69	0.041
SD	9.45	11.99	

Mean mayo elbow performance score among the patients of the Precontoured plating group and reconstruction plating group was 83.37 and 78.15 respectively. Significant results were obtained while comparing the mean Mayo elbow performance score among the patients of the two study groups.

Table 4 : Mayo Elbow Performance Score Grading

Mayo elbow performance score grading	Precontoured plating		Reconstruction plating	
	Number of patients	Percentage	Number of patients	Percentage
Excellent	9	69.23	7	53.85
Good	3	23.08	3	23.08
Fair	1	7.69	2	15.38
Poor	0	0	1	7.69
Total	13	100	13	100

Excellent results were obtained in 69.23 percent of the patients (9 patients) of the Precontoured plating group and 53.85 percent of the patients (7 patients) of the reconstruction plating group.

Table 5: Postoperative Complications

Postoperative complications	Precontoured plating		Reconstruction plating	
	Number of patients	Percentage	Number of patients	Percentage
Superficial infection	1	7.69	2	15.38
Skin necrosis	1	7.69	0	0
Delayed union	1	7.69	1	7.69

Superficial infection was seen in 7.69 percent of the patients (1 patient) of the Precontoured plating group while it was seen in 15.38 percent of the patients (2 patients) of the reconstruction plating group.



Figure-1



Figure-2

Figure 1 and Figure 2 : Preoperative x-rays AP and Lateral view.



Figure -3



Figure -4

Figure 3 and Figure 4 : Postoperative x-rays AP and Lateral view.



Figure-5



Figure-6

Figure 5 and Figure 6: Preoperative x-rays showing AP and Lateral views

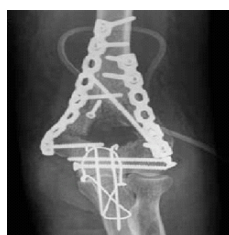


Figure-7



Figure-8

Figure 7 and Figure 8 : Postoperative x-rays AP and Lateral view

DISCUSSION

Distal humerus fractures are often multi-fragmented and have complex anatomy with limited options for internal fixation.⁵⁻⁸ Historically, distal humeral fractures have earned a reputation for having a propensity for poor clinical outcome after treatment. Prolonged immobilisation of the elbow while waiting for union predisposes to joint stiffness, muscle atrophy, and permanent functional impairment. Therefore the consensus has shifted towards treating these fractures with open reduction and stable internal fixation so as to restore painless and satisfactory elbow function by early mobilization.⁹⁻¹² 7.69 percent of the patients (1 patient) of the Precontoured plating group and 15.38 percent of the patients (2 patients) of the reconstruction plating group belonged to Type A of

AO classification. 84.62 percent of the patients (11 patients) of Precontoured plating group and 76.92 percent of the patients (10 patients) of reconstruction plating group belonged to Type C of AO classification. In the study conducted by Jain P et al, maximum number of patients had 13C2 type of fracture of the distal humerus (53.57%) followed by 13C3 type which constituted 35.71% of all the fractures.¹³ 13C1 type constituted only 10.71% of all the fractures. Mean mayo elbow performance score among the patients of the Precontoured plating group and reconstruction plating group was 90.38 and 82.69 respectively. Significant results were obtained while comparing the mean Mayo elbow performance score among the patients of the two study groups. Excellent results were obtained in 69.23 percent of the patients (9 patients) of the Precontoured plating group and 53.85 percent of the patients (7 patients) of the reconstruction plating group. Good results were obtained in 23.08 percent of the patients (3 patients) each of the Precontoured plating group and reconstruction plating group respectively. Fair results were obtained in 7.69 percent of the patients (1 patient) of the Precontoured plating group and 15.38 percent of the patients (2 patients) of the reconstruction plating group. Poor results were seen only in 1 patient (7.69 percent) of the reconstruction plating group. Hence; clinical outcome was significantly better in patients of the Precontoured plating group in comparison to the patients of the reconstruction plating group. In a previous study conducted by Gupta RK et al, authors reported that using the Mayo elbow performance score, excellent or good results were seen in 33 patients (82.5%) undergoing treatment by reconstruction plates.¹⁴ In a study conducted by Jain P et al, authors reported that using the Mayo elbow performance score, excellent or good results were seen in 24 patients (85.71%) undergoing treatment by Precontoured plates.¹⁵ Superficial infection was seen in 7.69 percent of the patients (1 patient) of the Precontoured plating group while it was seen in 15.38 percent of the patients (2 patients) of the reconstruction plating group. Skin necrosis was seen in 7.69 percent of the patients (1 patient) of the Precontoured plating group. Delayed union was present in 7.69 percent of the patients (1 patient) each of the Precontoured plating group and reconstruction plating group. In terms of postoperative complications, results obtained in both the study groups were comparable.

CONCLUSION

Anatomically Precontoured locking plate system is useful in providing stable fixation and better outcome for distal end humerus fractures and facilitating early postoperative rehabilitation. The higher clinical success of the Precontoured plates in the present study indicates that the technique is promising and warrants further investigation.

REFERENCES

1. Default PJ. A treatise on fractures, luxations and other affections of the bones, Bichat X, ed. Caldwell C, trans. Philadelphia: fry and kammerrer; 1805;8:413
2. Helfet DL, Kloen P, Anand N, Rosen HS. ORIF of delayed unions and nonunions of distal humeral fractures. Surgical technique. J Bone Joint Surg Am. 2004 ; 86-A Suppl 1:18-29.
3. Galano GJ, Ahmad CS, Levine WN. Current treatment strategies of bicolunar distal humerus fractures J AM Acad Orthop Surg.2010;18:20-30
4. Rüedi TP, Buckley RE, Moran CG: AO Principles of Fracture Management, ed 2. New York, NY, Thieme, 2007;9-31
5. Ali N, Ahmad Mir N, Ahmad Dar T, Rather MN, Mir WA, Shah S et al. Outcome of Extra-Articular Distal Humerus Fractures Fixed by Single Column Extra-Articular Distal Humerus Locking Compression Plate Using Triceps Sparing Postero-Lateral Approach. Bull Emerg Trauma. 2018;6(4):306–12
6. Bhayana H, Pandey R, Dhammi IK, Baumann F, Bhatia U. Comparative Study for Assessment of Functional Outcome of Intraarticular AO Type C Distal Humerus Fractures Treated by Parallel Plating. Indian J Orthop. 2019;53(1):190–95.
7. Ambulgekar RK, Saoji KR. Functional outcome of distal humerus fractures treated with an extensor mechanism sparing Paratricipital approach. Medpulse-International Medical Journal. 2019; 9(2): 56- 60.
8. O'Driscoll SW. Optimizing stability in distal humeral fracture fixation. J Shoulder Elbow Surg 2005; 14: 186S-194S.
9. Self J, Viegas SF, Buford WL, Patterson RM. A comparison of double-plate fixation methods for complex distal humerus fractures. J Shoulder Elbow Surg 1995; 4: 10–16.
10. O'Driscoll SW, Sanchez-Sotelo J, Tor-Chia ME. Management of the smashed distal humerus. Orthop Clin N Amer. 2002; 33: 19–33.
11. McKee MD, Mehne DK, Jupiter JB. Fractures of the distal humerus. In: Browner BD, Levine AM, Jupiter JB, Trafton PG, eds., Skeletal Trauma. Philadelphia, Saunders 1998, 1483–22.
12. Cohen MS, Bruno RJ. The collateral ligaments of the elbow: Anatomy and clinical correlation. Clin Orthop 2001; 383: 123–30.
13. Jain P, Gupta A, Thakur R, Sharma S. Stabilization of Distal Humerus fractures by precontoured bi-condylar plating in a 90-90 pattern. Int J Orthop Traumatol Surgi Sci. 2017; 3(2): 186-90
14. Gupta RK, Gupta V, Marak DR. Locking plates in distal humerus fractures: study of 43 patients. Chin J Traumatol. 2013;16(4):207-11.