

MANAGEMENT OF PROXIMAL HUMERUS FRACTURE WITH LOCKING COMPRESSION PLATEShivananda S¹, Radhakrishna A. M², Kumar M³**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Proximal humeral fractures, particularly in osteoporotic patients, remain an unsolved problem. The objective of the study is to test the efficacy and functional outcome of locking compression plate in proximal humerus fractures and to evaluate the incidence of complication that may occur with locking compression plate in proximal humerus fractures. **METHODS:** Prospective study involving Adults with proximal humerus fractures admitted from November 2010 to November 2012. In this study period 30 cases of fractures of proximal humerus were treated by open reduction and internal fixation with Locking Compression Plate was evaluated. Clinical outcome was measured using neer's score. **RESULTS:** In our study proximal humerus fracture was common in age group of 41 to 60 years (63%) and the commonest mode of injury was Road traffic accident (53.3%). Mean follow up time was 12 month. Radiological union was achieved within 8 to 12 weeks in all cases. Most of these fractures were two part (n-21) followed by three part (n-6) and four part (n-3). We had 4 excellent (13.3%) and 19 satisfactory (63.4%) results and 7 had unsatisfactory (13.3%) according to Neer's criteria. Out of 30 patients, 7(23.4%) had complication. 3 patients had plate impingement, 2 patients had varus malunion, 2 patients had stiffness of shoulder with pain and functional restriction of movement. **CONCLUSIONS:** In conclusion locking compression plate is mechanically and biologically an advantageous implant in proximal humeral fractures particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization.

KEYWORDS: Proximal humerus fracture, locking compression plate, angular stability Level of evidence: Prognostic Studies, level IV -8(case series).

INTRODUCTION: Fractures of the proximal humerus represent 4-5% of all fractures seen in trauma patients¹. The majority (80%) of these fractures are not displaced and are therefore treated conservatively². In displaced fractures and in multiple fragmented fractures, open reduction and internal fixation are indicated.

Traditional treatment techniques include open reduction and internal fixation with proximal humeral plates, hemiarthroplasty and percutaneous or minimally invasive techniques such as pinning, screw osteosynthesis and the use of intramedullary nails³⁻⁶. All these techniques have been associated with various complications including implant failure, loss of reduction, nonunion or malunion of the fracture, impingement syndrome, and osteonecrosis of the humeral head⁴⁻⁹. Comminuted fractures and older patients presenting with weakened bone from osteoporosis present additional challenge to treatment¹⁰.

As proximal fragment is too small to accommodate minimum of three screws, loosening of screws and loss of reduction may occur with conventional implants. Poor rotational and angular stability can lead to a partial loss of reduction into varus or retro flexion, resulting in an

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unsatisfactory functional outcome¹¹. Its theoretical advantage is better anchorage of screws in osteoporotic bone. Because of the good fixation, there is potential of enhanced stability that could allow early mobilization.¹²

METHODS: All patients fulfilling the inclusion criteria admitted during the study period from November 2010 to November 2012 and were operated with proximal humerus locking compression plate. 30 cases were studied without any sampling procedure.

INCLUSION CRITERIA: Closed displaced two part, three part, four part proximal humeral fractures.

Acute fracture.

Age above 18.

Patient fit for surgery.

EXCLUSION CRITERIA:

Associated humerus shaft fracture.

Associated neurovascular injury.

Acute infection.

Pathological fractures.

Old fractures.

Compound fracture.

The patients were then assessed clinically to evaluate their general condition and the local injury. Methodical examination was done to rule out fractures at other sides. The local examination of injured shoulder was done for swelling, deformity loss of function and altered attitude. Any nerve injury was also looked for and noted. Anteroposterior, lateral and axillary radiographs were taken preoperatively and were classified according to Neer's classification¹³. The patient was taken for surgery after routine investigation and after obtaining physician fitness towards surgery and written consent is taken from patients. Under general anesthesia, deltopectoral approach was used and fracture is reduced and fixation done with locking compression plate. All patients are immobilized in shoulder immobilizer.

Appropriate antibiotics and analgesics were used. Post-operative radiographs were taken to determine the bone alignment and maintenance of reduction. Sutures removed by 12th day. Pendulum exercises are begun immediately depending on pain. Passive range of motion started at 1st week. The active range of motion was started at 2-4 weeks post-operatively depending on stability of osteosynthesis and bone quality. 4th to 6th week-immobilization discontinued. Active assisted movements started up to 90° abduction with no forced external rotation. 6th to 8th week-full range of movements with active exercises started. The patients were examined clinically and radiological bony union and complication. Further follow ups were done at 6 weeks and 12 weeks and 24 weeks. The final results were evaluated using Neer score.

RESULTS: In our study proximal humerus fracture was common in age group of 41 to 60 years (63%). The commonest mode of injury was road traffic accident (53.3%). 17 out 30(56.6%) patients

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were male. Most of these fractures were two part (n-21) followed by three part (n-6) and four part (n-3).

All fracture had radiological union within 8 to 12 weeks. In our study we had 4 excellent and 19 satisfactory (63.4%) and 7 had unsatisfactory (13.3%) results according to Neer's criteria. Out of 30 patients, 7 (23.4%) had complication. 3 patients (10%) had plate impingement, 2 patients had varus malunion, 2 patients had stiffness of shoulder with pain and functional restriction of movement.

Complications	Number of patients (n=30)	percentage
Nil	23	76.6
Present	7	23.4
• Plate impingement	3	10.0
• Varus malunion	2	6.7
• Stiffness	2	6.7

Table 1: Distribution of Complications of patients studied

DISCUSSION: There is no consensus on the optimal treatment of complex fractures of the proximal humerus^{2, 19, 20}. The fracture can be defined by a variety of classification systems including an assessment of bone quality and metaphyseal comminution, all of which are prone to error. None of these systems gives a clear prognosis and direction for treatment. The difficulty in accurately classifying the fracture also creates problems in reporting outcome. Overall, open reduction and internal fixation have yielded satisfactory results²¹⁻²⁴.

The best results are obtained if the fractures are well reduced and maintained reduced until healing has occurred. This is dependent on various factors such as the type of fracture, the quality of the bone, the technique of reduction and fixation and the experience and skill of the surgeon.

In present study proximal humerus locking compression plate as has shown encouraging results in displaced proximal humeral fractures. Sound union was achieved in all patients. No revision surgery was performed in our study due to implant failure. Locking compression plate offers the advantage of locking head screws, which enter the humeral head at various angles in order to maximise purchase.

We had unsatisfactory results in 7(23.3%) patients. Out of which 3 patients had plate impingement with restriction of abduction beyond 90°. Proximal positioning of plate lead to impingement of plate to acromion leading to limitation of abduction beyond 90°. 2 Cases developed varus malunion.

Decreasing neck shaft angle <120°. It was probably due to comminution of underlying osteoporotic bone which may go impaction at the fracture site after reduction leading to varus malunion. 2 patients had stiffness with restriction of movements and with persistent mild to moderate pain which considered as unsatisfactory.

These patients had poor regular follow up and compliance was poor. There was no case of failure in our study. In comparison to other study on surgical management of proximal humerus we had similar results^{14, 15, 25, 26}.

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In conclusion locking compression plate is mechanically and biologically an advantageous implant in proximal humeral fractures particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization.

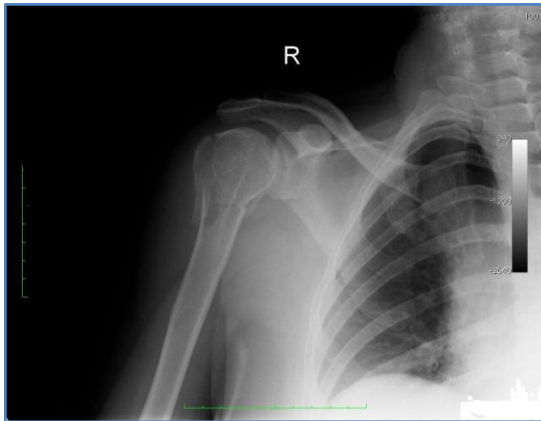


Fig. 1: Pre-operative x-ray of three part fracture - ap view



Fig. 2: Pre-operative x-ray of three part fracture - y scapular



Fig. 3: Immediate post op x-ray of three part fracture treated with locking plate



Fig. 4: Three month follow up x-ray of three part fracture showing good union



Fig. 5: Pre-operative x-ray of two part fracture – ap view



Fig. 6: Pre-operative x-ray of two part fracture – y scapular view



Fig. 7: Immediate post op x-ray of two part fracture treated with locking plate



Fig. 8: Three month follow up x-ray of two part fracture showing good union

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