

# Surgical Management Of Proximal Humerus Fractures By Philos Locking Plate

## Orthopaedics

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### Abstract:

**Background and Objective:** Proximal humerus fractures accounts for about 4 to 5% of all fractures. They are the third most common fractures in elderly population after hip and distal radius fractures. Regarding treatment of proximal humerus fractures, controversies still exists whether to do conservative or operative management. Various operative procedures are carried out, recent trend in internal fixation has moved on to locking plates. The present study is undertaken to evaluate the functional outcome and and complication of proximal humerus fractures treated by philos locking plate.

**Material and methods:** Prospective study involving Adults (>18yrs) with proximal humerus fractures admitted to October 2010 to September 2012 S N Medical college and research Institute, Bagalkot. In this study period 20 cases of fractures of proximal humerus were treated by open reduction and internal fixation using PHILOS Locking Plate were evaluated.

**Result:** In our series, majority of the patients were males, elderly aged, with road fall being the commonest mode of injury, involving 2 part, 3 part and 4part fractures of proximal humerus. The fractures united in all 20 patients. Excellent and satisfactory results were found in 80% of patients with unsatisfactory results in 20 % according to Neer's criteria.

**Conclusion:** In conclusion Philos locking plate is an advantageous implant in proximal humeral fractures due to angular stability, particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization.

**Keywords:** Proximal humerus fractures, Philos locking plate , Open reduction and internal fixation.

### Introduction:

Fractures of proximal humerus are still unsolved fractures in many ways. Disagreement exists regarding reliability of classification system. The indication for surgical management continue to be modified.<sup>1</sup> Fixation technique are myriad and none is ideal for all cases.<sup>2-5</sup>

Fractures of proximal humerus are not uncommon especially in older age group.

They have been reported to account 4% - 5% of all fractures.<sup>2,6</sup> About 85% of these fractures are minimally displaced or non -displaced and are effectively treated symptomatically with immobilization followed by early motion. The remaining 15% of fractures are displaced unstable and may have disruption of the blood supply. The treatment of these fractures is therapeutic challenge.<sup>1,3,7</sup> Displaced and unstable extra-articular fractures are most commonly treated by operative reduction

and fixation using various technique.<sup>1</sup>

The treatment is more controversial for articular fractures which carry a high risk of the humeral head necrosis.<sup>8-10</sup> In Neer's classification,<sup>11,12</sup> these are two part anatomical neck, three-part and four-part fracture and those with dislocation of head of humerus. A review of published result suggests that there is no universally accepted form of treatment.<sup>10,13-17</sup> Conservative management may be associated with non union, malunion, and avascular necrosis resulting in painful dysfunction.<sup>18-19</sup>

Proximal humeral fracture, whether caused by trauma (or) related to osteoporosis, requires carefully planned, individual treatment.

A wide variety of treatment options have been described beginning with percutaneous fixation, non-absorbable rotator cuff-incorporating sutures and the use of tension band devices, intramedullary nails.<sup>4,20,21</sup>

The use of methods of open reduction and internal fixation with the more contemporary use of locking plates advocated recently.<sup>21-26</sup> The role of hemiarthroplasty in the treatment of these fractures has also been advocated in both the acute setting and as a delayed procedure<sup>27</sup>

Current therapeutic options for proximal humerus fractures are humerus nails, plates, tension band wiring, and percutaneous (or) minimally invasive technique such as pinning, intramedullary flexible nails, screw osteosynthesis and hemiarthroplasties.<sup>1,18</sup>

The Choice of technique and devices depends on quality of bone, soft tissue, age and reliability of patients.<sup>1</sup>

However the goal of Proximal Humerus fracture fixation should be stable reduction allowing early motion of fracture.<sup>1,28-30</sup>

This study conducted to analyze fractures of the proximal humerus that were treated with the proximal humeral internal locking system (PHILOS) locking plate and documents their clinical and functional outcome .

## **Methodology:**

### **Source of the data:**

Adults (>18yrs) with proximal humerus fractures admitted to October 2010 to September 2012 S N Medical college and research institute, Bagalkot

### **Method of collection of data:**

The study purpose to include patients with proximal humerus fractures admitted and examined according to protocol, associated injuries noted. Clinical and Radiological evaluation done. Fractures classified using Neer's classification.<sup>11,12</sup> Routine investigation carried out to get fitness for surgery

Patients will undergo Open reduction internal fixation with PHILOS locking plating for the sustained fracture under general anaesthesia

Post operative physiotherapy followed according to protocol, to evaluate the functional outcome. Patients will be followed up at 6 weekly intervals until fracture union and at once at 1yr after the surgery

A minimum of 20 cases will be studied without any sampling procedure.

**SURGICAL APPROACHES:<sup>31</sup>**

The surgical approaches used were Deltopectoral approach.

**NEER'S CRITERIA**  
**Criteria for evaluation of results:**

1. Pain (35 units)		4) Range of motion (25 units) Flexion (sagittal plane)	
a) None/ignores	35	180	6
b) Slight, occasional, no compromise in activity	30	170	5
c) Mid, no effect on ordinary activity	25	130	4
d) Moderate, tolerable, makes concessions, uses aspirin	15	100	2
e) Marked, serious limitations	5	80	1
f) Totally disabled	0	Less	0
2) Function (30 units)		Extension	
a) Strength		45	3
Normal	10	30	
Good	8	15	2
Fair	6	less	1
Poor	4	Abduction (coronal plane)	0
Trace	2	180	6
Zero	0	170	5
b) Reaching		140	
Top of head	2	100	4
Mouth	2	80	2
Belt buckle	2	Less	1
Opposite axilla	2	External rotation (from anatomical position with elbow bent)	0
Brassiere hook	2	60	
c) Stability		30	5
Lifting	2	10	3
Throwing	2	less	1
Pounding	2	Internal rotation (from anatomical position with elbow bent)	0
Pushing	2	90 (T-6)	5
Hold overhead	2		
3) Anatomy (10 units) rotation, angulation, joint incongruity, retracted tuberosities, failure metal, myositis, non-union, avascular necrosis)		70(T-12)	4
		50(L-5)	3
		30 (gluteal)	2
None	10	less	0
Mild	8		
Moderate	4		
Marked	0-2		
		Total points	100

Excellent, > 89 points;  
satisfactory 80-89 points;  
unsatisfactory, 70-79 points;  
failure < 70 points

**Results:**

Twenty patients with closed displaced proximal humerus fracture were treated by Open Reduction with Locking compression plate. The following observations were made from the data collected during this study.

Majority of the patients i.e. 12 (60%) were from age group of 58-77 years followed by 6 patients (30%) in 38-57 age group. The average age of patient was 53.7 years. Majority of the patient in our group are elderly in our study.

Majority of the patients were males i.e. 60% and 40% were females. Male: Female sex ratio is 3:2.

In majority (70%) cases the mode of injury was fall. This included fall from Steps or from the bicycle on outstretched hand. The injury from RTA (30% of cases) was high energy trauma directly or indirectly to shoulder.

The fracture occurred right in 13 patients (65%) and left side in 7 patients (35%)

In our study we had 9 cases (45%) with 2 part fracture surgical neck humerus and 7 (35%) cases with 3 part (greater tuberosity and surgical neck) fractures. 1(5%) case with 3 part (lesser tuberosity and surgical neck). 3(15%) cases with 4 part fractures .

**Method of treatment:**

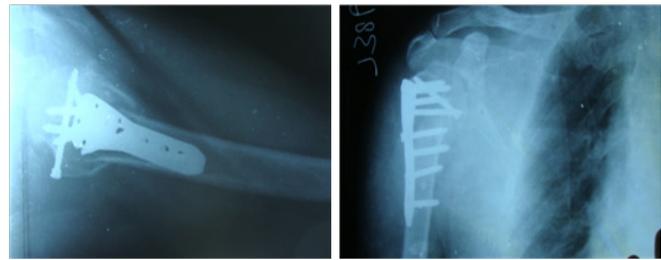
All patients underwent open reduction and internal fixation with philos locking plate



**Preoperative X Ray**



**Postoperative X Ray**



**Axial view**

**Check 3 Months**



**Check X Ray Six Months**

**Check X Ray One Year**

**Functional Results:**

All fracture united by 6-8 weeks interval. The final results were evaluated by Neer scoring criteria.

In our study 4 (20%) case had excellent results and 12 (60%) had satisfactory result. 4 (20%) had unsatisfactory result and there was no case of failure.

**Discussion:**

The operative treatment of proximal humeral fractures provides orthopaedic surgeon with a therapeutic challenge. Even if the injury is thoroughly analyzed and the literature is understood, treatment of displaced fracture or fracture dislocation is difficult.

The result is related to restoration of anatomical alignment and if fracture is treated only with rest followed by early motion, a functional deficit will certainly develop and may be associated with pain. The external support is difficult to apply effectively because fracture site is adjacent to trunk.

Many studies have shown that the displaced fracture of the proximal humerus have a poor functional prognosis when left untreated because of severe displacement of fragments.<sup>1,2,6,18,19</sup>

Numerous investigators have described the various surgical treatment for displaced proximal humerus fracture. There is no consensus on optimal treatment of displaced proximal

humeral fractures which account for about 20% of fractures.

Overall, open reduction and internal fixation, although not in all institution, have yielded satisfactory results. The best results are obtained if the fracture is well reduced and planned rehabilitation program followed. This is dependent on various factors such as type of fracture, the quality of the bone and the technique of reduction and fixation.

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

### **Age Incidence:**

In our study majority of the patients i.e. 12 (60%) were from age group of 58-77 years followed by 6 patients (30%) in 38-57 age group. The average age of patient was 53.7 years. Majority of the patient in our group are elderly in our study

Neer original studies of 300 patients average age was 55.6 years. The average age incidence in Felix Brunner et al study was 65 years<sup>10</sup>. The average age in K.N. Sharafeldin et al study was 61.5 years<sup>21</sup>. The average age in Ramchander Siwach et al study was 65 years.<sup>33</sup>

### **Sex Incidence:**

In present study 60% were males and 40% patients were female at a male to female ratio of 3:2. K.N. Sharafeldin et al<sup>21</sup> reported 9 male and 18 female in the ratio of 1:2. Ramchander Siwach et al<sup>33</sup>, reported in his series 12 were male and 13 were females at ratio of 1:1.2. Hong-fei Shi et al<sup>34</sup>, reported in their series 28 were males, 48 patients were females at a ratio of 2.5:3 for male to female<sup>35</sup>.

### **Mode of injury:**

Major cause of fracture in our study was fall in 12 cases (60%), and in 8 cases (40%) the mode of injury was road traffic accident. Rose SH et al, in their study of proximal humerus fracture, epidemiological study have reported 80% of cases the mode of injury was minor fall in a patients aged above 40 years and especially in osteoporotic females.<sup>18</sup> Herbert Resch et al in their study of 27 patients

with 3 part and four part fracture, 24 patients had history of high energy trauma.<sup>36</sup>

### **Side affected:**

In our present study fracture occurred on right side in 13 patients and on left side in 7 patients. C. Gerber reported, in their series of 34 fractures 16 were on left side and 18 were on right side.<sup>3</sup>

### **Complications:**

There were 2 cases of secondary displacement and malunion and 3 case of Plate impingement.

The incidence of avascular necrosis ranges from 8% to 35% in different studies. We had no case of avascular necrosis. Comparatively we also had less chance of stiffness because of extensive and planned physiotherapy with stable fixation but four cases went on to have limitation of range of shoulder movements with mild to moderate pain.

### **Results:**

The final results are graded according to Neer scoring criteria. We had good to excellent results in 16 (80%) of 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 4 (20%) patients. The unsatisfactory cases, out of 3 plate impingement cases, 1 case had good function range of movement with minimal pain which was considered as satisfactory. Other 2 impingement cases had restriction of abduction < 90° which was considered as unsatisfactory. 2 more Cases developed Varus malunion with restriction of movements and with persistent mild to moderate pain which considered as unsatisfactory.

4 patients with unsatisfactory result had fair to good muscle function limitation of movements with mild moderate pain with these functions they were considered unsatisfactory according to Neer's criteria.

All fracture united by 3 months on an average of 10 weeks (8 to 12 weeks). There were no cases of failure in our study. In comparison to other study on surgical management of proximal humerus we had similar results.

Our studies comparison with studies conducted by Hong-fei Shi et al and Ramchander Siwach et al which are similar to our study group. All three study group came up with similar results Although avascular necrosis, screw penetration and loosening of implant were not seen in our group.

### Conclusion:

The present study was done to evaluate functional outcome and complication following surgical management of proximal humerus fracture by PHILOS locking plate.

Proximal humerus fracture is common in elderly aged patients in our study. The commonest mode of injury is fall. Road traffic accident is next common mode of injury.

Proximal Humeral Internal Locking system (PHILOS). In this system, locking of the threaded heads of the screws in the plate itself provides for a construct with angular and axial stability, eliminating the possibility of screw toggling (windscreen wiper effect), or sliding of the screws in the plate holes.

Coupled with a divergent or convergent screw orientation, this makes for much improved resistance to pull out and failure of fixation. Also, whereas conventional plating systems depend on compression between the plate undersurface and bone for stability, this is not the case for the PHILOS. This lessens the chance of stripping the thread in osteoporotic bone, as the plate/bone interface is not loaded along the screw axis. This also allows for a more biological fixation as the underlying periosteum and blood supply to the fractured regions are much less compressed.

The most common complication in open reduction and plate fixation is plate impingement, leading to limitation of abduction.

In conclusion Philos locking plate is an advantageous implant in proximal humeral fractures due to angular stability, particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization..

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