



## To assess the functional outcome of proximal Humerus Fractures treated with Proximal Humerus Internal Locking System (PHILOS) plating In Elderly age Group Population

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### Abstract

**Background:** Proximal humeral fractures are the second most common fractures of the upper extremity accounting for 4% to 5% of all fractures. These type of fractures are better treated surgically using Proximal Humerus Internal Locking System (PHILOS) plating to achieve pain free shoulder and good functional outcome.

**Aim:** The Aim of this study is to assess the functional outcome of proximal Humerus Fractures treated with Proximal Humerus Internal Locking System (PHILOS) plating In Elderly age Group Population.

**Type of Study:** This is a Prospective type of Study.

**Materials and Method:** 20 cases of Proximal Humerus Fractures were treated by using Proximal Humerus Internal Locking System (PHILOS) plating in Elderly age group and studied from September 2020 to April 2021 in Department of Orthopaedics, Sri Aurobindo Medical College and Post graduate Institute, Indore.

**Results:** Total 20 patients were evaluated post operatively for 6 months and functional outcome was evaluated using UCLA Shoulder Score which shows 75% of patients had fair to good outcome.

**Conclusion:** Our data have shown that Proximal Humerus Fractures in Elderly Treated with PHILOS Plating Is a good treatment option and a reliable procedure which provides Satisfactory Results specially in elderly osteoporotic age group population.

### Introduction

Proximal humeral fractures are the second most common fractures of the upper extremity

accounting for 4% to 5% of all fractures<sup>[1]</sup>. They account for approximately 4 – 5% of the all fractures<sup>[2]</sup>. Incidence of fractures is more

common in the elderly because of decreased bone density and in younger age group following high velocity trauma<sup>(2)</sup>. It has always been an challenging task for the management of such fractures because of numerous muscles attachment. Majority of undisplaced proximal humeral fractures can be treated with a sling immobilization and physical therapy<sup>[3]</sup>. However, approximately 20% of displaced proximal humeral fractures require surgery<sup>[4]</sup>. Conservative treatment is usually associated with nonunion, malunion and avascular necrosis resulting in a painful dysfunction<sup>[5,6]</sup>. The surgery should be done as soon as the patient's general condition permit. A delay of several days makes reduction a more difficult task and a significant delay results in absorption of bone, making secure internal fixation very tough. Neer recommended open reduction and internal fixation for displaced two and three parts fractures<sup>[7]</sup>. The PHILOS plate (Synthes Stratec Medical Ltd., Philadelphia, USA) is a part of the latest generation of locking compression plates that is designed especially for fractures of the proximal humerus. The PHILOS plate has locking screws that provide angular stability and better hold even in the osteoporotic bone. The screws are placed in converging and diverging directions to provide a stable fixation. This secure reduction allows early postoperative mobilization. Multiple holes in the proximal part of the plate are also available for suture anchors to the rotator cuff to help the soft tissue repair. The PHILOS plate can therefore provide an excellent stable construct in multi fragmented osteoporotic proximal humerus fractures.<sup>[8]</sup>

### **Aim**

To assess the functional outcome of proximal Humerus Fractures treated with Proximal Humerus Internal Locking System (PHILOS) plating In Elderly age Group Population Using Modified UCLA Shoulder Score.

### **Materials and Method**

A prospective study was conducted on 20 patients with displaced/angulated/rotated two, three and four part fractures cum dislocation of Proximal humerus treated with open reduction internal fixation using PHILOS plating. All the patients presenting to the emergency/outpatient department between September 2020 and April 2021 were enrolled in the study.

### **Inclusion Criteria**

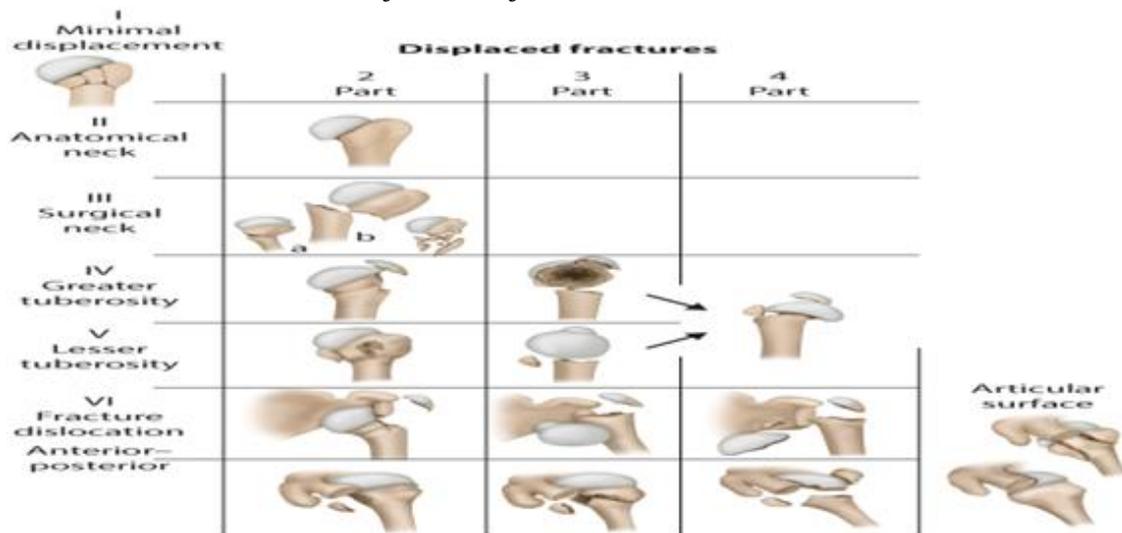
- 1) Patients with proximal humerus fracture with a displacement of > 1 cm and a varus angulation of >45 Degree.
- 2) Patients with Age > 60 Years.
- 3) Closed Fractures.

### **Exclusion Criteria**

- 1) Compound Fractures
- 2) Patients With Age < 60 Years.
- 3) Patients with Neurovascular Injury
- 4) Pathological Fractures
- 5) Patients with other fractures in ipsilateral limb.

Anteroposterior radiographs were taken preoperatively. These are classified according to Neers Classification of proximal humerus fractures. . In selected cases CT scan was done in order to know the extent of articular surface involved. Blood investigations were carried out to get fitness for surgery. Consent of the patient and fitness for surgery along with ethical committee clearance was taken. Patients underwent Open reduction internal fixation with PHILOS plate for the fracture under general anaesthesia / block. The functional outcome of these patients were assessed by using the Modified UCLA Shoulder Score. Post operative radiographs were reviewed for evidence of bony union or complications (non-union, avascular necrosis, implant failure, etc.).

*Neer's Classification of Proximal Humerus Fracture*



Patient satisfaction

- 0 Patient feels procedure was not successful
- 5 Patient feels procedure was a success

Active forward flexion range of motion

- 0 Less than 30°
- 1 30°-45°
- 2 45°-90°
- 3 90°-120°
- 4 120°-150°
- 5 Greater than 150°

Strength of forward flexion

- 0 No active contraction
- 1 Evidence of slight muscle contraction, no active elevation
- 2 Complete active forward flexion with gravity eliminated
- 3 Complete active forward flexion against gravity
- 4 Complete active forward flexion against gravity with some resistance
- 5 Complete active forward flexion against gravity with full resistance

Pain

- 1 Present always and unbearable, strong medication frequently
- 2 Present always but bearable, strong medication occasionally
- 4 None or little at rest, present during light activities; salicylates frequently
- 6 Present during heavy or particular activities only, salicylates occasionally
- 8 Occasional and slight
- 10 None

Function

- 1 Unable to use limb
- 2 Only light activities possible
- 3 Able to do light housework or most activities of daily living
- 6 Most housework, shopping, and driving possible; able to do hair and to dress and undress, including fastening brassiere
- 8 Slight restriction only, able to work above shoulder level
- 10 Normal activities

Total

- Excellent: 34-35
- Good: 28-33
- Fair: 21-27
- Poor: 0-20

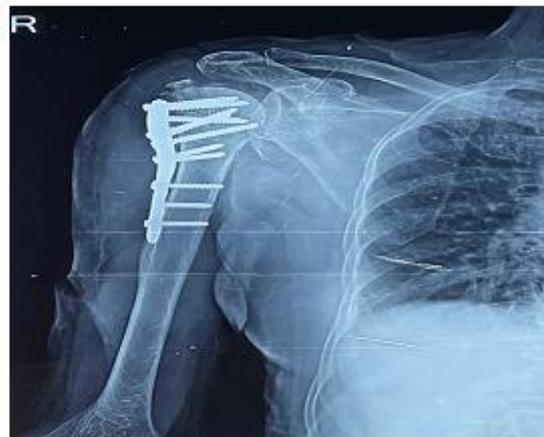
**Surgical Technique**

General anaesthesia combined with a regional block was used and a beach chair position was given to all the patients. Preoperative dose of Antibiotic (Cephalosporin) given. Delto-Pectoral or deltoid splitting approach is used according to the surgeons choice and all the necessary steps followed. In Deltopectoral approach, an 7-9 cm incision starting from coracoid process was taken along the line of deltopectoral groove towards the deltoid insertion. The internervous plane between deltoid and the pectoralis major muscle was identified. The cephalic vein was retracted laterally or medially depending upon the exposure , and the conjoint tendon was retracted medially. The fracture fragments were identified and the haematoma was cleared. The fragments were reduced and temporarily fixed with the help of K-wires under image intensifier control. Preliminary

reduction was done with the help of K wires and checked in both the views. PHILOS plate was applied about 6-8 mm distal to the greater tuberosity and around 2-4 mm posterior to the bicipital groove. The plate was then placed lateral to the long head of the biceps without compromising its function. The plate was first fixed to the distal fragment and then the proximal fragment. The final position of the implant was checked under the C-Arm. Closure was done layer by layer using Vicryl and Nylon sutures. A shoulder immobilizer was given post-op. All patients started early passive and active assisted mobilisation within the first 24 hours under close supervision. All the patients were assessed at a regular interval of 1 month, 3 months, 6 months interval. Antero-posterior Xray views taken. Functional Outcome measured using Modified UCLA Score.



**Pre-Op X-Ray**



**Post-Op X-Ray**



**1 Month Follow-up**



**2 Month Follow-up**



6 Months Follow-Up



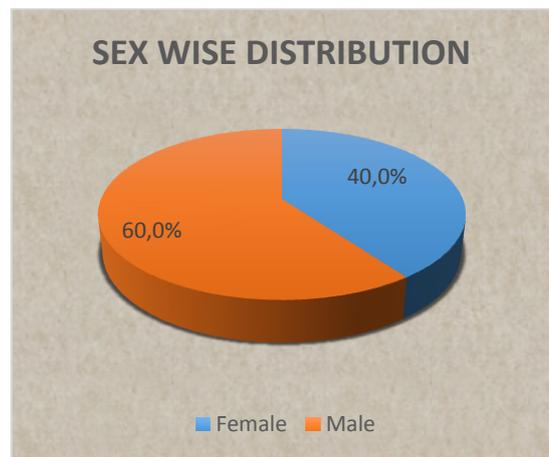
6 Months Follow-Up Clinical Images

**Observations and Results**

**Table No.1.** Distribution according to sex

Sex	Number	Percentage
Female	8	40.0
Male	12	60.0
Total	20	100.0

There were 8 (40%) females and 12 (60%) males in our study, showing a male predominance. The male : female ratio was : 1.5 : 1.



**Graph:** Pie diagram showing sex wise distribution

**Table No. 2** Distribution according to side involvement

Side Involvement	Number	Percentage
Left side	8	40.0
Right side	12	60.0
Total	20	100.0

In 8 (40%) patients left side was involved and in 12 (60%) patients right side was involved. Right sided involvement was more predominant.

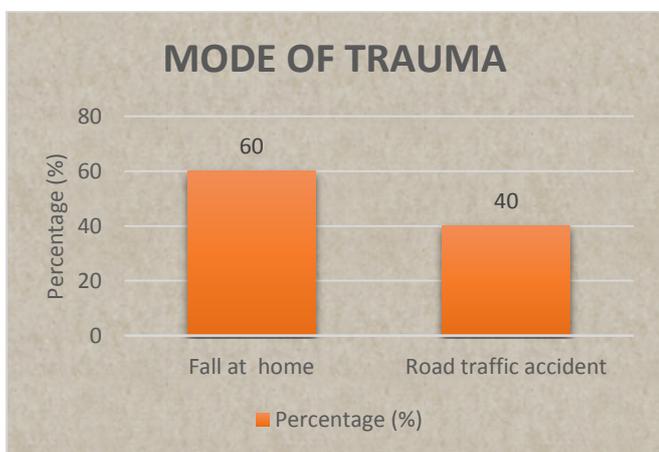


**Graph:** Pie diagram showing side involvement

**Table No. 3** Distribution according to mode of trauma

Mode of Trauma	Number	Percentage
Fall at home	12	60.0
Road traffic accident	8	40.0
Total	20	100.0

12 (60%) patient sustained injury due to fall at home and rest 8 (40%) patients had road traffic accident. Majority of the patients had sustained injury due to fall at home.

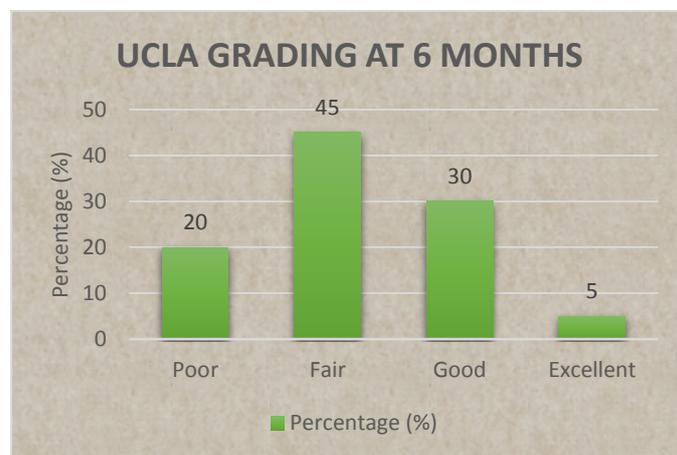


**Graph:** Bar diagram showing mode of trauma

**Table No.4** Distribution according to ULCA grading at 6 months

UCLA Grading at 6 months	Number	Percentage
Poor	4	20.0
Fair	9	45.0
Good	6	30.0
Excellent	1	5.0
<b>Total</b>	<b>20</b>	<b>100.0</b>

At 6 months the functional outcome in these patients was assessed using UCLA Shoulder rating scale. 4 (20%) patients had poor outcome, 9 (45%) patients had fair outcome, 6 (30%) patients had good outcome and 1 (5%) patient had excellent functional outcome.



**Graph:** Bar diagram showing UCLA grading at 6 months

**Discussion**

Management of Proximal humerus fractures in elderly patients are quiet challenging task. Several techniques have been discussed for the fixation of displaced proximal humerus fractures. All these techniques have been associated with a varying rate of complications such as cutout or back-out of the screws and plates, nonunion, AVN, and fracture distal to the plate. In order to obtain better and reproducible results, the AO/ASIF has developed a special locking compression plate (PHILOS)<sup>(9)</sup>. Locking plate fixation offers more advantages compared to many implants and have been shown to be superior to non-locking plates. In our study of Proximal humerus fractures in Elderly, the patients age was in the range of 60 to

82 years, with mean being 66.8 years. This mean age in the present study is comparable with Kilic B et al.<sup>(10)</sup>(2008). The mean age in our study was probably due to higher incidence of this fracture in osteoporotic bone. In the present study 60% of proximal humerus fractures were due to low energy trauma like fall at home (i.e. 12 out of 20 cases); whereas in 8 (40%) patients, mode of trauma was road traffic accident. The results are comparable to the study of Geiger EV<sup>(11)</sup> (2010) in which out of a total of 30 patients, the injury was due an accident 7 patients (33%) and fall from height in 21 patient. In out of 20 cases in our study there were 6 cases of type 2 fracture, 10 cases were of type 3 fracture and 4 cases were type four fracture. In the study of Geiger EV et al<sup>(12)</sup> out of 28 cases there were 8 cases of type 2 fracture, 12 cases of type 3 fracture and 8 cases of type 4 fracture. In the study of David S et al. (2009)<sup>(13)</sup> out of 30 cases there were 6 cases of type 2 fracture, 14 cases of type 3 fracture and 10 cases of type 4 fracture. In this study, the signs of radiological union was seen between 10 to 22 weeks with most of the cases occurring between 12-14 weeks. In the study of Moonat P et al.<sup>(14)</sup> Mean duration for union was 10 weeks with range of 8 to 24 weeks. In our Study 75% patients had fair to good outcome according to Modified UCLA scoring system. In the study by Petros RSB et al.<sup>(15)</sup> 78% good and excellent results according to the UCLA score. The Poor functional results of 20% patients of this study was probably due to patients not doing proper physiotherapy as advised.

### Conclusion

Treatment of Displaced proximal Humerus fractures are quite challenging specially in older osteoporotic age group patients. Philos Plating provides stable fixation, early mobilization with excellent radiographic and functional results with minimal complications as compared to other treatment options.

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