

# “Functional and Radiological Outcome of Displaced Proximal Humerus Fractures Managed Surgically With Philos Plating”

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## Abstract

**Background: Material and Methods:** The present retrospective study was conducted in the Tertiary teaching hospital and included 20 cases. Age is more than 18 year, skeletally mature satisfying Neer's criteria of 2, 3 and 4 part fracture for operative displacement, who were operated for proximal humerus fractures over last 3 years with plating by anterolateral approach. **Results:** In 60% patients there is Neer's 2part fracture as the most common type with Greater Tuberosity fractures were the predominant type. In only 5% of patients 4 part fractures involved. The active elevation was 126.25 degrees (average range), active external rotation was 47 degrees (average range), abduction was 123.25 degrees (average range). Early complications like skin necrosis, wound gaping, and deltoid atony were encountered. Late complications like joint stiffness and malunion of greater Tuberosity were encountered. The average constant score in our study with 20 patients was 82.4 by using Constant and Murley's score (to assess the functional outcome of our patients). **Conclusion:** Displaced proximal humeral fractures when treated surgically produce less pain, greater range of movements (ROM), and less stiffness. Functional outcome of 3 part and 4part fractures is less than in 2part fractures. In 2 and 3part fractures Radiological outcome assessed by means of quality of reduction and union of fracture is better than in 4part fractures.

**Keywords:** PHILOS plates, Proximal humeral fractures, Constant score, Neer's classification.

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## I. Introduction

Proximal humeral fractures account for about 4 to 5%. Of all humeral fractures it accounts for up to 45%. After hip fracture and Colle's fracture, it is the 3rd most common fracture in elderly patients. Non operative treatment can be acceptable for 2, 3 and 4 part fractures of proximal humerus as suggested by Numerous authors in elderly patients but stiffness, pain, loss of function and muscle power have been described in majority of patients using this conservative approach. Diagnosis obtained by using of 3-right angled trauma series, X-rays supplemented with MRI or CT. Protocol for management and comparison of long term outcome of similar injuries has been made possible with use of Neer's 4- part Classification system for fracture and fracture dislocation. There have been improvements in understanding of the role of prosthetic replacement and fixation techniques to maximize anatomic restoration and minimizing immobilization time, during which period stiffness develops. 20 surgically treated proximal humerus fracture patients using PHILOS plate (proximal humerus internal locking osteosynthesis system) have been analyzed for functional and radiological outcome in this study.

**Materials and Methods:** Reduction, Fixation is done using 4.5 mm narrow Limited Contact Plate (LCP). A posterior above elbow slab was applied at the time of Dynamic Compression Plate LCDCP/ 4.5 mm Locking Compression surgery (Fig 1,2 and 3).



**Fig 1: Showing preoperative and Postoperative X-ray of PHILOS plating**



**Fig 2: Showing preoperative CT SCAN      Fig 3: Showing Postoperative X-ray**

This is a prospective study which give analysis of functional and radiological outcome of 20 cases of surgically managed fractures of proximal humerus using PHILOS undertaken at Department of Orthopaedics, Tertiary teaching hospital from July 2020 to July 2022. Of the 20 patients, 12(60%) are females & 8(40%) are males.

**METHODOLOGY (MATERIALS & METHODS) Study topic:** Functional & Radiological outcome of displaced proximal Humerus fractures managed surgically with PHILOS plating.

**Study Design:** Prospective Study.

**Study Venue:** Department of Orthopaedics, Tertiary teaching hospital.

**Sample Size:** Twenty (20).

**Study Period:** July 2020 to July 2022.

**Data Collection:** Collection of data as per proforma with consent from the patients admitted in Orthopaedic ward, Tertiary teaching hospital.

**Inclusion Criteria:** Patients with proximal humerus fractures who, are skeletally mature & age more than 18years & Satisfy Neer’s criteria for operative displacement-type2,3&4part fractures.

**Exclusion Criteria:** Patients with Open fractures, Pathological fracture, Associated neurovascular injury and head injury.

**Results Table 1:Showing demographic profile and results**

Parameter	Number
Mean Age	42.65±12.42
Sex	M=12 F=8
Side	R=15 L=5
Mode of Injury	RTA-4 Fall- 15 Epilepsy- 1
Type of fracture	Closed:20 Open :0
Mean Range of Motion (degrees)	120±15.46

No case of deep infection was noted in our study. One case of malunion with implant failure was noted in this study which was further managed by replating. No case of neurovascular injury post injury was reported in the present study (Table 2).

**Table 2: Complications**

COMPLICATIONS	No of patients
3 part fracture went for malunion	1
Deep infection	-
Non union	1
Elbow stiffness	-
Radial Nerve Palsy	-

The mean age was  $42.65 \pm 12.42$  with a range of 20-70 years. There were 12 males (80%) and 8 females (20%). Right side was involved in 15 patients (75%) while left side was involved in 5 patients (25%). 15 patients (75%) had fall as mode of trauma for their fracture, 4 patients (20%) had Road side accident (RSA) as the mechanism of injury for their fracture and 1 patient epilepsy (5%) as the mode of injury. The choice of implants was based on surgeons' preference and financial constraints of the patient. Range of motion at elbow at final follow up was  $120 \pm 15.46$  degrees (Table 1). Final overall results showed excellent outcome in 7 patients (35%), good results in 10 patients (50%), fair result in 2 patients (10%) and poor result in 1 patient (5%).

## II. Discussion

This is a prospective study which give analysis of functional and radiological outcome of 20 cases of surgically managed fractures of proximal humerus using PHILOS undertaken at Department of Orthopaedics at Tertiary teaching hospital, from July 2020 to July 2022. Of the 20 patients, 12(60%) are females & 8(40%) are males. Collection of data as per proforma with consent from the patients admitted in Orthopaedic ward, Tertiary teaching hospital. Neer's Classification is the most widely used classification for Proximal Humeral Fractures. It has gained universal clinical acceptance by orthopaedic surgeons & radiologists and is considered to have significant implication for both treatment options & outcomes. In study conducted by us, we also have followed the Neer's 4part classification but many authors have reported lower level of interobserver reliability. Sidor et al reported a 0.48 as reliability co-efficient of for 1 viewing, 0.52 for 11 viewing & a reliability co efficient of 0.66. Precise radiographic evaluation is of paramount importance, In order to properly employ this classification; we have found the Neer's 3 view trauma series has being the greatest value in evaluating these fractures. Richard J, Hawkins S and R.L. Angel showed the importance of these series. In 40% of the patients associated dislocations were present. ORIF was done, In the reducing the glenohumeral dislocation if tuberosity fragment remained displaced  $>1$  cm or angulated more than  $45^\circ$ .

Repair in such patients, the dynamic stability is restored by reattachment of the muscles of the rotator cuff. Flatow et al in a study of 12 patients reported 50% excellent results & 50% good results in patients managed by ORIF with Locking Compression Plates (LCP) for 2part greater tuberosity fracture. In 3part fracture, closed treatment of is often associated with poor range of motion, moderate pain and disability. Good to excellent results was associated with Open Reduction and Internal Fixation (ORIF) in more than 80% of patients in a report by Hawkins et al & recommended surgical treatment for healthy active individuals who have 3part fractures of the Proximal Humerus. Good results with screw tension band technique for 3part fractures reported by Cornell and Levine. Several authors used Prosthetic replacement for 3part fracture. In the treatment of 4part fracture & fracture dislocations, open reduction & internal fixation gave less than 10% good or excellent results. Following open reduction and internal fixation by some isolated reports showing revascularization of head of humerus indicate satisfactory healing. Unfortunately, many of the cases which are referred in the literature often have not been true 4part fractures with isolation of articular fragment & follow-up is not sufficient to rule out long term osteonecrosis. Hugg & Lundberg noted 74% AVN when ORIF was done for these fractures. AVN is being reported to be as be as high as 90% in 4part fractures & 3-25% in 3part fracture. All authors agree on that pain relief has been seen greater than 90% with prosthetic replacement, but there has been varying results in regard to motion, function and strength. Neer & McIlveen have reported as nearly as 90% excellent results with an improved technique using long deltopectoral approach & better rehabilitation. From the data present in our study, we have demonstrated that majority of the patients had no pain at all or has only mild pain (85%) which are comparable to the study by Hawkins et al<sup>56,102</sup> & Flatow et al. In the study conducted by us, the average active elevation in 2 part fractures was  $126.25^\circ$  & average external rotation was  $47^\circ$  which is comparable to the study conducted by Flatow et al in 12 patients of 2 part fractures

treated surgically. In our study, the average elevation with 3part fracture was 124.25° & external rotation was 45.5° which is also comparable to the study conducted by Hawkins et al 56 in 15 cases of 3part Proximal Humerus fractures which are treated surgically. Of the 8 patients with 3 & 4part fractures 40% patients regained at least 90° abduction & elevation. Full muscle strength is seen in about 85% of the patients, which is also comparable to the study by Hawkins et al & Flatow et al. In our study we have seen few complications. All fractures united & the average time taken for union was approximately 10 weeks. 1 patient with 3 part fracture went for malunion. No cases of screw penetration, implant deviation, screw back out, impingement & failure was encountered. Due to malunion of greater tuberosity fragment in a patient with 2part fracture treated surgically with PHILOS plate resulted in restriction of abduction & impingement. In this patient due to poor radiological outcome which lead to poor functional outcome as well. Despite having malunion in some patients, they may have a good functional capacity reflecting the fact that the radiological outcome may not imply functional outcome. Heterotopic ossification occurred in 1 patient with 3part fracture, probably because of the patient had taken native treatment in the form of massage, many attempted reduction, and splinting. Incidence of up to 10% (as reported by many authors) of heterotopic ossification which are seen in proximal humeral fractures. There were no cases of non-union & radiographic evidence of avascular necrosis or deep infection in our study. Finally, to obtain the best functional results, a prolonged closely monitored & well defined program of rehabilitation was necessary. We have followed the 3-phase rehabilitation protocol of Hughes & Neer in all our patients & this has given good results.

**PHILOS PLATE results:** In our study with 20 patients, the average constant score was 81.7 which are slightly better than the study conducted by Koukakis et al. In summary, fractures of Proximal Humerus may be one of the extremely demanding ones. There may be many pitfalls for the unwary patient & surgeon to avoid during the course of treatment. Emphasis is based on complete & accurate diagnosis & formulation of safe & simple techniques for fracture union, restoration of anatomical stability, range of motion, cuff integrity and adequate muscle strength.

### III. Conclusion

Surgically treated displaced proximal humeral fractures produce greater range of movements (ROM), less stiffness and less pain. Earlier the surgery when done better is the results. Functional outcome is seen better with isolated fractures than with fracture dislocations. When operative methods resulting in stable fixation that allows early passive mobilization, results are best. Functional outcome of 2part fractures is better when compared to the 3part & four part fractures. Radiological outcome which is assessed by means of quality of union and reduction of fracture in 2 & 3part fractures is better than in 4part fractures.

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