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## **EVALUATION OF OUTCOME OF PROXIMAL HUMERUS FRACTURES MANAGED WITH PHILOS PLATE**

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### **ABSTRACT**

**INTRODUCTION:** Proximal humeral fractures account for 4 to 5 percentage of all fractures. minimally displaced can be managed non-operatively in adults. Displaced and unstable fractures should be treated surgically to achieve painless shoulder and good range of movement.

**AIM AND OBJECTIVES:** Our study Is to evaluate the clinical, functional and radiological result of operative proximal humerus fractures managed PHILOS Plating.

**MATERIAL AND METHODS:** 26 patients with displaced proximal humeral fractures that were treated by PHILOS plating between June 2018 to December 2019 were included in this study. The Constant-Murley score (CMS) was used to evaluate the outcome.

**RESULT:** Out of 26 patients 9 were male and 17 were female. The mean age was 52 years. The mean surgical time was 88 min. The mean fracture union time was 11.5 weeks. Outcome was excellent in 17 cases, Good in 6 and Fair in 3 cases.

**CONCLUSION:** Fixation with PHILOS is associated with good to excellent outcomes. It gives high rate of union, good range of movement and has minimal complications.

**KEY WORDS:** Proximal humerus fracture; PHILOS plating; Constant-Murley score

### **INTRODUCTION**

Fractures occurring at or proximal to surgical neck of humerus are described as proximal humerus fractures. It forms 4% of all fractures and 26% of humerus fractures<sup>1</sup>. It is third common fracture in elderly, with female : male ratio of 2:1. The main mechanism in elderly is low energy fall and high energy trauma in young patients. Techniques available for humerus fixation are bone sutures, K-wires, tension band wires, intramedullary devices, external fixator, prosthetic replacements & PHILOS PLATE.<sup>2-3</sup> The PHILOS designed specifically for fractures of the proximal humerus. The screws are placed in converging and diverging directions to provide stable fixation. Multiple holes in the proximal part of the plate are also

available for suture anchors to the rotator cuff. The PHILOS therefore provide an excellent stable construct even in multi-fragmented osteoporotic proximal humerus fracture.



Figure 1 PHILOS (Proximal Humerus Internal Locking System)

**NEER CLASSIFICATION**

It is based on the number of fracture parts and their displacement from each other.

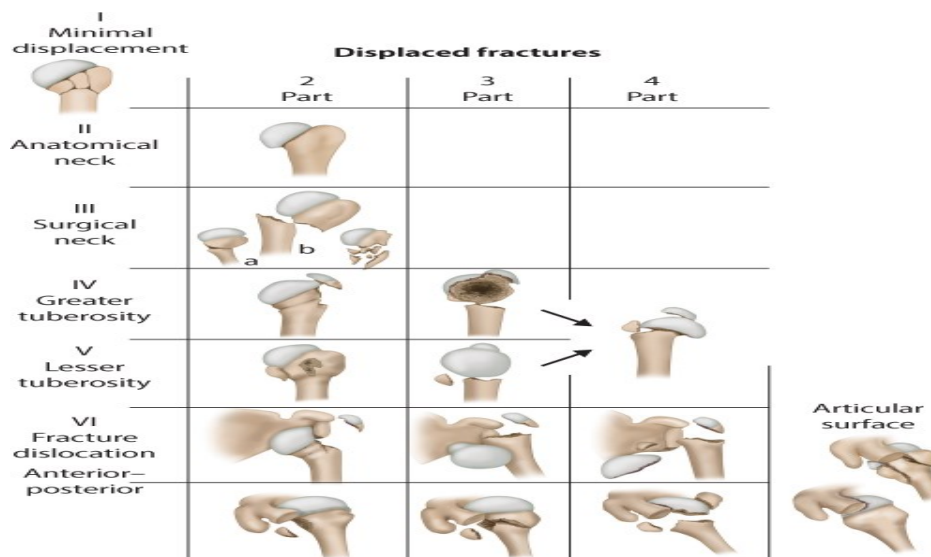


Figure 2 Neer’s Classification

**AIMS AND OBJECTIVES**

To study the functional outcome of PHILOS plating for proximal humeral fractures by examining pain, activities of daily living, range of motion & muscle power (Constant –Murley score).

## **MATERIALS AND METHODS**

26 patients with displaced proximal humeral fractures that were treated by PHILOS plating between June 2018 to November 2019 were included in this study.

The Constant-Murley score (CMS) was used to evaluate the outcome of this procedure.

### **Inclusion Criteria**

- Age >18 YEARS
- Closed injury
- Fracture with normal neurovascular status
- Neer's 2 part,3 part,4 part fracture and fracture dislocation.

### **Exclusion Criteria**

- Age <20 years
- Open wound/ injury
- Fracture with distal neurovascular status defect
- Fracture Extension to Shaft humerus
- Medically compromised patients

AO principles for internal fixation were strictly adhered to:

1. Anatomical reduction
2. Stable fixation
3. Preservation of blood supply
4. Early mobilization

## **SURGICAL TECHNIQUE**

All patients were operated under supine position under General anesthesia. The delto-pectoral approach was preferred in case of fracture with dislocation of humeral head. Deltoid split approach was preferred for fractures without dislocation.

### **OPERATIVE STEPS**

The skin incision in the direction of the muscle fibres along the proximal part of deltoid at the junction of anterior and middle raphe. The deltoid is split along its fibres from the acromion downwards, with care to not to injure the axillary nerve. The humeral head reduced if dislocation present and fracture is anatomically reduced and provisionally fixed with k-wires. The Tuberosities are tied to the plate by non-absorbable sutures. After tagging tuberosities, definite fixation was done using PHILOS plate.

- 1) Plate should be placed at least 0.5-1 cm distal to the upper end of greater tuberosity
- 2) Plate placement should be in line with the shaft of humerus.
- 3) Plate should be at least 2 mm posterior to the bicipital groove thus sparing the long head of biceps.

Proximally 4 mm locking cancellous multidirectional screws are applied, and distally in shaft simple or locking cortical screws are applied. At least 3 bicortical screws are applied distally. Reduction is checked and confirmed under IITV. Closure of the wound was done in layers over drain as and when needed.

Injectable antibiotics were given for 3-5 days post operatively. Post operatively shoulder immobilizer was given to all patients for 2-3 weeks. Early mobilization was started in patients with minimally displaced, stable 2 part and 3-part fractures while displaced, 4 part fracture & fracture dislocation required immobilization for longer period.

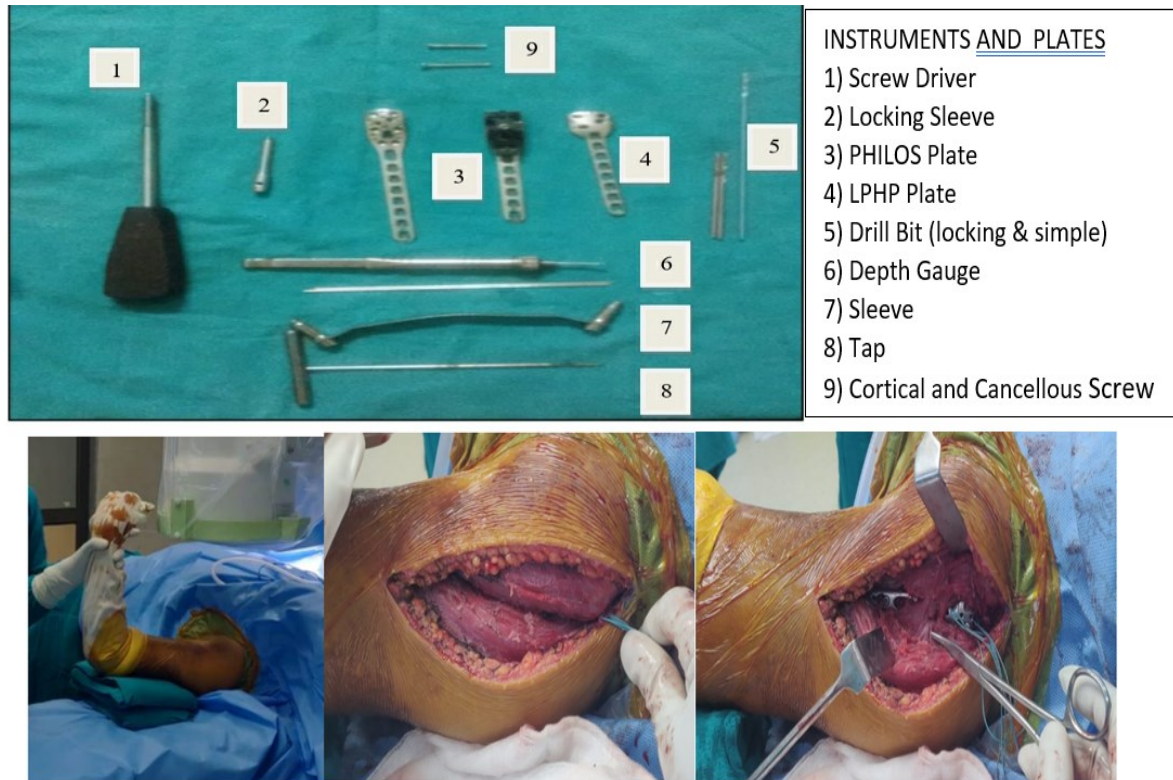
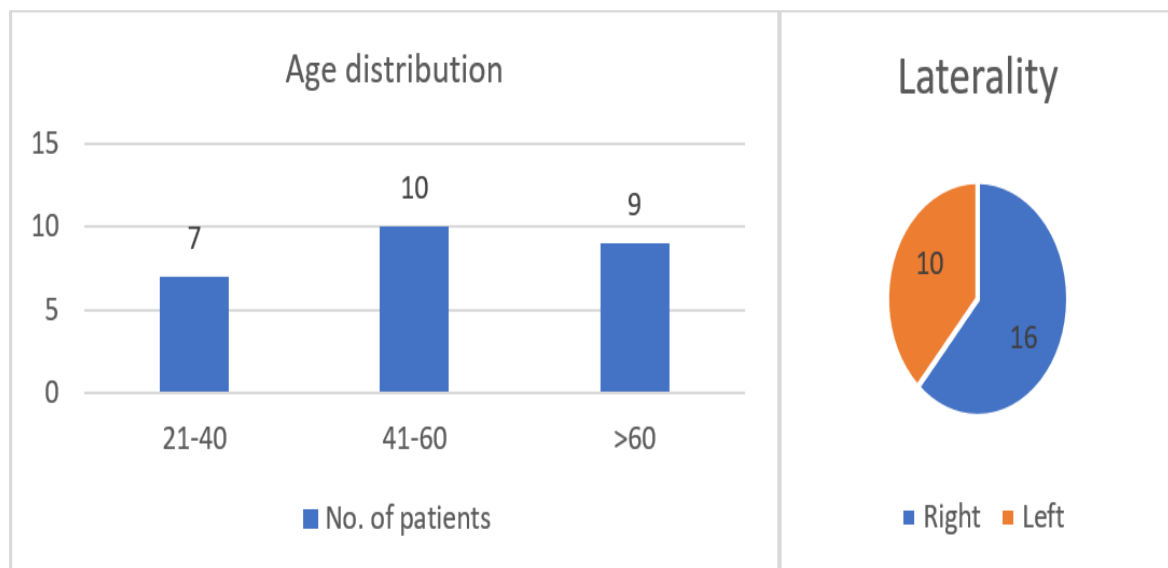


Figure 3 Intra-op preparation with deltoid split Approach and Application of plate and sutures

**RESULTS**

Total of 26 patients, 9 males and 17 females were operated from June 2018 to February 2020. The average age was 52 years (range 29-73 years). Maximum of the patients i.e. ten patients belonged to age group of 41-60 years. 16 out of 26 patients had right sided fractures and 10 patients had left sided fractures.



Graph 1 Age distribution

The mean surgical duration was 88 min (range 68-140min). The mean fracture union time observed was 11.5 weeks (range 10 - 18 weeks). All patients had good bone union along with favourable range of movement and no malunion was observed. One patient had screw cutout and chronic pain while one patient had superficial SSI which was managed conservatively. surgical outcome was excellent in 17 cases (65.38%), Good in 6 (23.07 %), Fair in 3 (11.53%), Poor in 0 (0%) cases.

## DISCUSSION

The present study aimed at evaluating clinical outcome after PHILOS plate fixation. It has been shown in various studies that osteoporosis adversely affects the anchorage of internal fixation and leads to increased failure rates.<sup>4-5</sup>

There are different fracture fixation methods:

Percutaneous fixation with metallic wires offers a less invasive fixation, yet the fixation is not rigid, requiring absolute immobilization until fracture consolidation that leads to residual joint stiffness.

The tension band wiring are used if there is a fracture of the greater tubercle.

External fixator can produce better healing of soft parts in cases of exposed fractures, but environmental contact predisposes to infections & there is a risk of neurological injury from the pins.

Fixed-angle plates are restricted to simple fractures, without impairment of the greater tubercle, which is the blade insertion site.

Non-locking plates like T-plates and cloverleaf plates have high failure rate in weak osteoporotic bones and complication rates of upto 40% which includes impingement, loosening of implants and avascular necrosis.

Load sharing devices like intramedullary nails have reduced lever arm but due to insufficient purchase of proximal screws, were associated with high complication rates (31%)<sup>6</sup>.

Arthroplasty is the method of last resort and is generally employed in elderly patients with four-part fractures where there is fixation difficulty due to osteoporosis.

Proximal locking plates allow proper rigid fixation and can be used in more severe fractures. They allow the association of loops with non-absorbable sutures, permitting fixation of the tubercles and a more anatomical reduction of fragments. In PHILOS plate, all forces are transmitted from the bone to the locking head screws to the plate, and vice versa. Hence, the principle of fixed angle plates enables a gain in torsional stiffness and stability, and may therefore promote a superior outcome<sup>7</sup>. Passive mobility exercises for gain of movement can be started earlier.

The Constant-Murley Score (CMS) was presented as to evaluate overall shoulder function, irrespective of diagnosis. It was approved by the committee of the European Society for Surgery of the Shoulder and Elbow and has been used as an assessment method ever since. The CMS assesses 4 aspects related to shoulder pathology; subjective are: pain and activities of daily living (ADL) and objectives are: range of motion (ROM) and strength. Subjective components has point up to 35 and the objective 65, resulting in a possible maximum total score of 100 points (best function). Subjective points are answered by the patient; ROM and strength require evaluation and answered by the orthopaedic.

In this study, mean constant score at the final follow-up was 72.35. The average time to union was 12.3 weeks (10 – 20 weeks). Average time to union in 2 part fractures was 11.2 weeks, in

3 part it was 12.5 weeks and in 4 part 14.6 weeks. Complications (screw cut out, superficial surgical site infection) occurred in total 2 cases (7.7%).

**Case:**

53 years old male patient with history of Convulsion with proximal humerus fracture dislocation treated by PHILOS plate and osteosynthesis with non-absorbable suturing. CMS score was 100, after 6 months follow-up.



Figure 4 Pre-op X-ray and CT scan

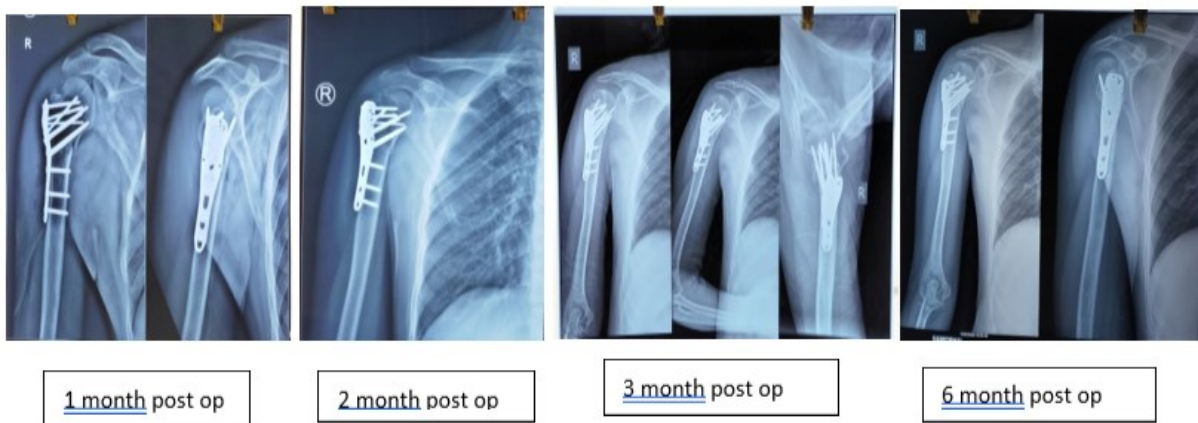


Figure 5 Post Op Series of X-ray



Clinical photos show healthy suture site and excellent range of movement

## **CONCLUSION**

Fixation of proximal humerus fractures with PHILOS is associated with good to excellent functional outcomes. Benefits of high rate of union, good shoulder range of movement and has minimal complications.

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