

## FUNCTIONAL OUTCOME OF PHILOS PLATE FIXATION FOR PROXIMAL HUMERUS FRACTURES

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### ABSTRACT

#### INTRODUCTION

Treating a proximal humerus fracture remained a challenging problem until proximal humeral internal locking system has been developed. Our study aims at evaluating the functional outcome of 30 consecutive patients with proximal humeral fracture treated by Philos plate fixation; 30 patients with proximal humeral fractures who attended our hospital between December 2013 and December 2015 were included in the study; 18 women and 12 men with a mean age of 47.5 years (30-60 years) are included. Data was collected prospectively and outcomes were assessed using constant shoulder score. The mean follow-up period was 12 months (6-18 months). Mean union time of all the fractures was 11.4 weeks (8-20 weeks). The mean constant shoulder score at final review was 70.5 (52-92). Philos plate provides stable fracture fixation for proximal humerus fracture in both young and elderly patients, which enables for early mobilisation and achieves acceptable functional results.

#### KEYWORDS

Proximal humerus fracture, Philos plate, stable fixation, Constant shoulder score.

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**INTRODUCTION:** Proximal humerus fractures account for 4-5% of all fractures.<sup>1</sup> They occur mostly in elderly where as in younger patients high energy trauma is the cause. Most of these fractures are stable and minimally displaced and they can be treated conservatively with good results.<sup>2</sup> But displaced and unstable fractures are difficult to treat and they have high morbidity especially in elderly. The treatment aim is to achieve painless shoulder with full range of movements of shoulder joint. The decision that operative treatment is appropriate is complicated by the numerous and varied techniques described for fixation of proximal humeral fractures.<sup>3</sup> Various treatment modalities are available for the treatment of these fractures, they include K wire fixation, suture fixation, external fixation, tension band fixation, intramedullary nails and plating.<sup>4,5</sup> Philos plate has been developed to improve screw fixation in osteoporotic bone and to minimise soft tissue dissection.<sup>6</sup> This is a pre-contoured locking compression plate for the proximal humerus. This plate provides both angular and axial stability, so it reduces the risk of loss of reduction. Our study aims at evaluating the functional outcome of Philos plate fixation for proximal humerus fractures in 30 patients.

**MATERIALS AND METHODS:** Thirty patients who attended our hospital between December 2013 and

December 2015 are included in the study. Patients older than 20 years, closed proximal humerus fractures, failed non-operative treatment are included in the study. Open fractures, patients older than 60 years, patients with high risk for surgery and those not willing for surgery are excluded from the study. Of these 18 were women and 12 were men. All of them underwent Philos plate fixation for displaced proximal humerus fractures. The mean age was 47.5 years. The cause of injury was road traffic accident in 17 and fall in 13 patients. All the fractures were close fractures. One patient had associated distal radius fracture of opposite side, which was treated with plate and screws fixation. One was a case of non-union surgical neck of humerus. All the fractures were classified according to Neer's classification. There were 2 part fractures in 11 patients, 3 part fractures in 14 patients and 4 part fractures in 5 patients. All the patients were evaluated clinically and posted for surgery under general anaesthesia. The surgery in all cases was performed by same consultant surgeon. The patient is positioned in beach chair position. A standard deltopectoral approach was used with minimal soft tissue dissection. Fracture was initially reduced and held temporarily with K wires and sutures. In case of comminuted fractures, major fragments are reduced by joystick maneuver and minor fragments are brought in to alignment by traction and counter traction. Reduction was confirmed under image intensifier, as close anatomical reduction as possible and Philos plate was applied. For the case of non-union in addition iliac crest bone grafting was done wound was closed over suction drain, which was removed on second post-operative day. Postoperatively, arm was supported in arm sling pouch. Passive assisted movements were started on day one followed by active assisted

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exercises for 3 weeks and active exercises after 3 weeks. Patients were followed up at 3 weeks, 6 weeks and 3 months interval until union was achieved. Patients were evaluated clinically and radiologically for the signs of union. Assessment of shoulder function was by constant shoulder score.<sup>7</sup> The mean follow-up of the patients was 12 months.

**RESULTS:** All patients were followed up for mean of 12 months (6-18 months). All the fractures united. The mean time of union was 11.4 weeks (8-20 weeks). The patients were evaluated by constant shoulder score. The mean constant shoulder score at final review was 70.5 (52-92). Out of the 30 cases 82% cases had excellent results, 11% had good results, 7% had fair results. There was no case of wound infection and implant failure.



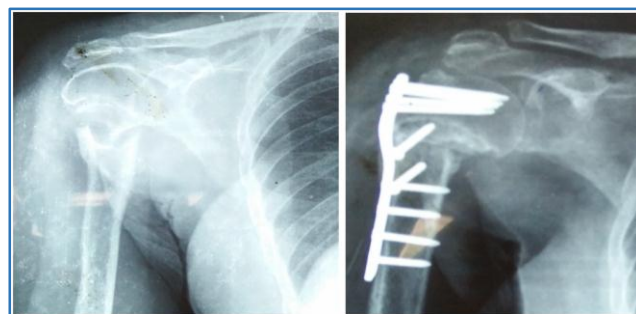
**Fig. 1: Preop radiograph of 2 part proximal humeral fracture and postop radiograph**



**Fig. 2: Preop radiograph of 3 part proximal humeral fracture and postop radiograph**



**Fig. 3: Preop radiograph of 3 part proximal humeral fracture and postop radiograph**



**Fig. 4: Preop radiograph of non-union proximal humerus, postop radiograph**

**DISCUSSION:** Various treatment modalities have been described for the treatment of proximal humerus fractures. They include K wire fixation, suture fixation, external fixation, tension band fixation, intramedullary nails and plating.<sup>4,5</sup> The complication rate for different modalities is as high as 50% or even higher.<sup>8,9</sup> Various complications that has been reported are cut-out or back out of the screws and plates, non-union, avascular necrosis, nail migration, rotator cuff impairment and impingement syndrome.<sup>10,11</sup> There is a strong correlation between holding capacity of screws and regional bone morphology.<sup>12</sup> In order to decrease the incidence of complications, particularly fixation failure and loss of stability and to improve stability and enable early postoperative mobilization, new plating techniques such as the Proximal Humeral Internal Locking System (PHILOS, Synthes, Solothurn, Switzerland) have been developed.<sup>13</sup> Surgical treatment of proximal humerus fracture with PHILOS plating gives satisfactory outcome, especially in patients with displaced fractures. The fixation with PHILOS plate is stable allowing early mobilization. In an internal locking system like the PHILOS plate, all forces are transmitted from the bone via the locking head screws to the blade 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>14</sup> The PHILOS plate gives very rigid construct if locking screws are used both proximally and distally. In our study all the fractures united well; we had no cases of non-union, avascular necrosis or implant failure. The mean constant shoulder score was 70.5. Although small our study shows that with good technique and proper application, PHILOS plate can give good results in displaced proximal humerus fractures. It is even more advantageous in patients with poor bone stock. Various techniques have been described for fixation of comminuted and displaced proximal humeral fractures. All these techniques have been associated with varying complication rates such as cut out or back out of screws and plates, non-union, avascular necrosis, fracture distal to the plate. Functional outcome depends not only on the quality of bones stock but also on the stability provided by the implant. PHILOS plate gives stable fixation and better torsional stiffness and stability and gives superior outcome.

**CONCLUSION:** Philos plate provides stable fracture fixation for proximal humerus fractures in both young and elderly patients. The fixation is stable enough to enable early mobilisation and achieves acceptable functional results. Moreover it is minimally invasive with less chances of implant failure.

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