

ORIGINAL RESEARCH

Treatment of proximal humerus fractures using philos plate

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ABSTRACT

Background: The proximal humerus fractures are not easy to handle and are the second most common fractures of the upper extremity. The aim of the study is to analyze the treatment outcome of proximal humerus fractures using Philos Plate.

Methods: The present study included 40 patients from May 2019 to May 2021 who underwent PHILOS plate fixation for displaced proximal humeral fractures using the PHILOS plating system in the department of Orthopaedics, IGIMS, Patna.

Results: Patients were followed up for 6 to 18 months. The mean Constant shoulder score was 75 (range 28–88). 14 patients had a score exceeding 75, 11 were scored between 50 and 75, and 10 were below 50. Constant scores in 2-, 3- and 4-part fractures were compared.

Conclusion: In the present study, PHILOS plate fixation provided stable fixation with minimal metal work problems and enabled early range-of-motion exercises to achieve acceptable functional results. However, the choice of treatment should be based on patient age, functional requirements, bone quality and fracture pattern.

Keywords: Proximal humerus fracture, PHILOS, bone plates

INTRODUCTION

Proximal humeral fractures are the second most common fractures of the upper extremity accounting for 4% to 5% of all fractures.¹ Majority of undisplaced proximal humeral fractures can be treated with a sling immobilization and physical therapy.² High energy trauma is the cause in younger patients and it usually results in fracture dislocations, whereas trivial trauma can be the cause in older individuals because of osteoporosis. Most of these fractures are stable and minimally displaced and can be treated conservatively.³ Many different techniques have been described for the treatment of proximal humerus fractures, including closed reduction and percutaneous K-wire fixation, open reduction followed by fixation with bone sutures, tension band, circulating wire, T plate, intramedullary nails, or locking plates and prosthetic replacement.⁴⁻⁷

Several complications have been reported, such as cut-out or back-out of the screws and plates, nonunion, avascular necrosis (AVN), nail migration, and rotator cuff impingement syndrome.^{8,9} Proximal humeral internal locking system (PHILOS) has been developed to solve these complications, especially to improve fracture fixation in elderly osteoporotic bones. It minimizes soft tissue dissection and gives both axial and angular stability, hence, reducing the risk of fracture displacement. Philos plates are pre-shaped and pre-contoured locking compression plates, with an aiming device for insertion of the locking screws and positioning of the plate to prevent impingement.

The aim of the study is to analyze the treatment outcome of proximal humerus fractures using philos plate.

MATERIALS AND METHODS

The present study included 40 patients from May 2019 to May 2021 who underwent Philos plate fixation for displaced proximal humeral Fractures using the PHILOS plating system in the department of Orthopaedics, IGIMS, Patna.

Inclusion criteria were as follows: 1) closed proximal humerus fractures (2-, 3-, 4-part according to Neer classification system; 2) patients older than 18 years of age.

Exclusion criteria included: 1) open fractures; 2) pathological fractures.

There were 40 patients who were included in the study out of which 15 were females and 25 were males. All the necessary haematological and radiological examinations were done for these patients.

All the fractures were closed with no associated injuries and classified as 2-part, 3-part and 4-part according to the Neer classification.¹⁰ The surgery of patients was done in a beach-chair position under general anaesthesia. A delto-pectoral incision was made. Reduction was confirmed and the PHILOS plate was applied, and the correct position was confirmed with the image intensifier. A Philos plate was applied with at least 4 locking proximal screws and 4 non-locking distal screws. Postoperatively the arm was placed in a sling. Passive assisted movements were started on day 1, followed by active-assisted exercises after 3 weeks. Patients were assessed radiologically and functionally using the Constant shoulder score.¹¹

STATISTICAL ANALYSIS

The qualitative variables were expressed in proportion and quantitative variables were summarized by mean and standard deviation. All the data was analysed using Epi-Info software (Version 3.5.4) and Microsoft Excel 2013 (Microsoft Office v15.0).

RESULTS

Table 1: Demographic characteristics of patients

Gender	n	%
Male	25	62.5
Female	15	37.5
Mean age	55.7±7.5	

There were 15 females and 25 males out of 40 patients who were included in the study (table 1, graph 1).

Graph 1: Demographic characteristics of patients

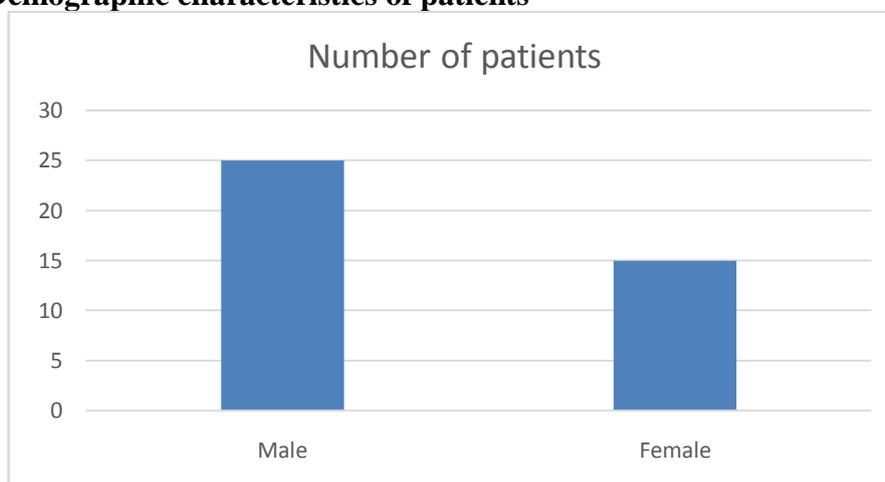


Table 2: Comparison of Constant scores

Constant scores	2 part (n=20)	3 part (n=13)	4 part (n=7)
Mean (range)	75 (48–88)	65 (26–88)	50 (48–68)
>75	12	5	2
50-75	5	3	3
<50	3	5	2

Patients were followed up for 6 to 18 months. The mean Constant shoulder score was 75 (range, 48–88). 19 patients had a score exceeding 75, 11 were scored between 50 and 75, and 10 were below 50. Constant scores in 2-, 3-, and 4-part fractures were compared (table 2, graph 2).

Series 1- 2 part, Series 2- 3 part, Series 3- 4 part

Graph 2: Comparison of Constant scores

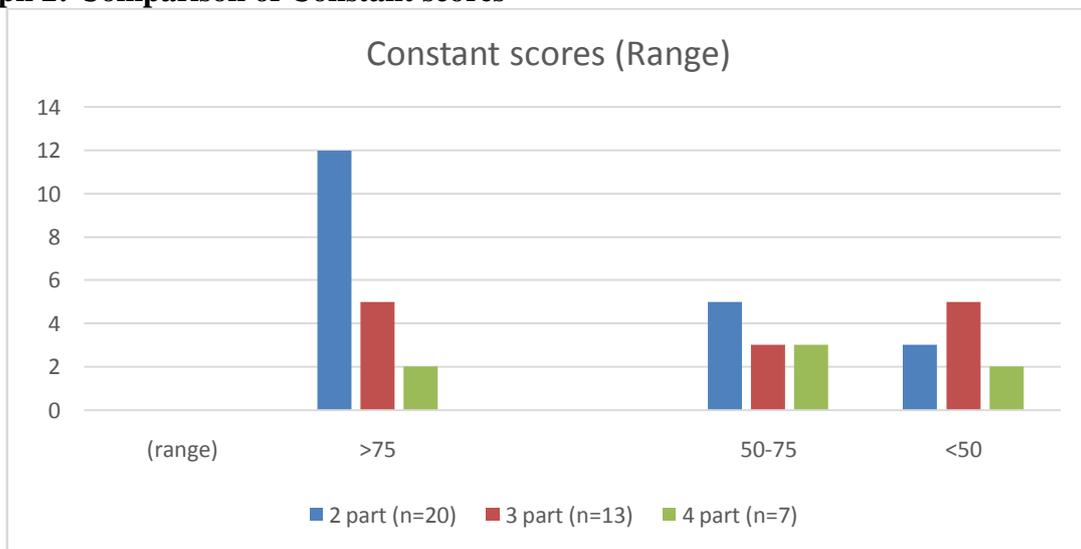
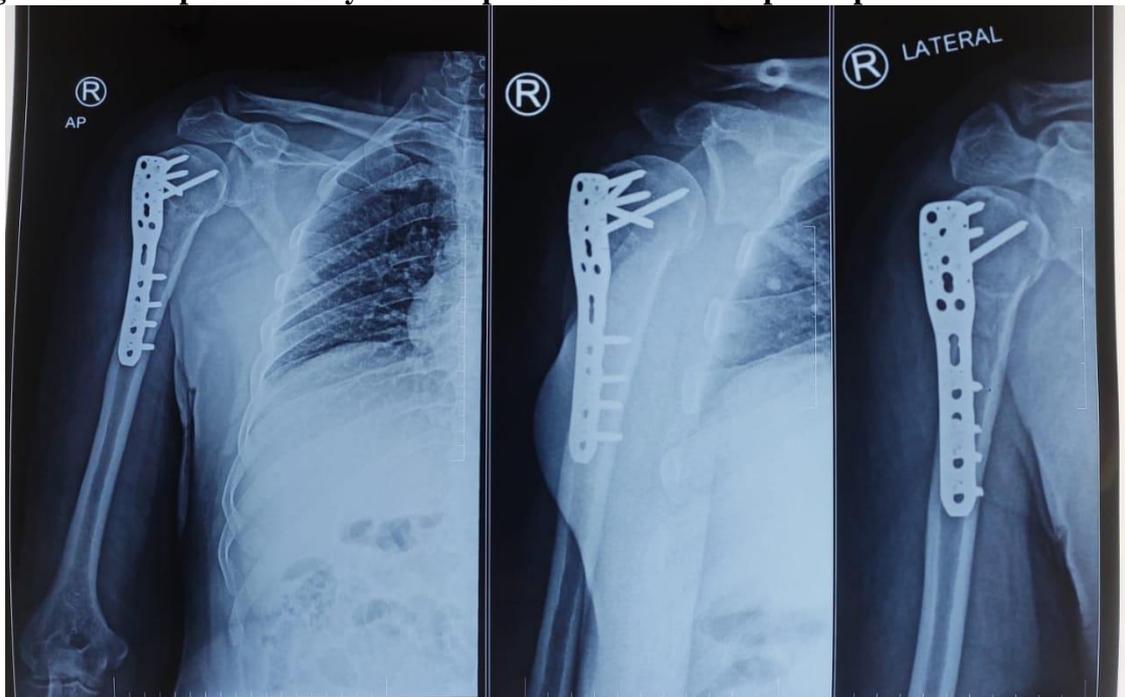


Figure 1: 3 part fracture of proximal humerus right side of 45 yrs male patient



Figure 2: Post operative xray of same patient treated with philos plate

DISCUSSION

Fractures of the proximal humerus constitute 5% of all fractures. They often are considerably displaced and comminuted and may be accompanied by other injuries. Proximal humerus fractures usually show a bimodal age distribution with high energy velocity injuries in younger population to trivial trauma in older age groups. Although, undisplaced fractures can be treated non-operatively with favourable outcome, fractures with intra-articular extension and severe comminution necessitate surgical fixation.^{12,13} The PHILOS plate is part of the latest generation of locking compression plates.¹⁴ The screws in the humeral head are locked into the plate and cannot back out or toggle, which is a particular advantage in osteoporotic bone.¹⁵ The screws alternately diverge and converge, improving the purchase in the humeral head. The plate has a low profile, which minimizes the risk of impingement syndrome. The aim of the study is to analyze the treatment outcome of proximal humerus fractures using philos plate.

Locking periarticular plate fixation offers more advantages compared to many implants and have been shown to be superior to non-locking plates.^{16,17} Meticulous care must be taken to preserve the overlying soft tissues during open reduction and internal fixation since damage to these soft tissues may disturb the vascularity of fracture fragments.¹⁸⁻²⁰

Siffri PC et al.,²¹ in their cadaveric study suggested that locking plates have better torsional stability when compared to non-locking plates. Similarly, in the present study, patients with PHILOS of humerus fractures showed better results. The locking plates advocates the use of anterolateral deltoid split approach to preserve the blood supply of the humeral head, use of rotator cuff sutures, medial column stabilization and use of endosteal supports.²¹ Similarly, all the surgeries executed in the present study were done using the delto-pectoral approach.

Out of the 40 patients in the present study who had PHILOS plate fixation, no failures of the locking humeral head screws were noticed. The plate should be placed lateral to the bicipital groove to prevent damage to the biceps tendon and the anterolateral branch of the anterior humeral circumflex artery. Damage to this artery can lead to iatrogenic osteonecrosis.²²

Proper placement of the plate is equally important for a superior outcome in these fractures. These plates, unlike non-locking plates, are anatomically pre-contoured and thus even a slight displacement can result in shoulder impingement.

CONCLUSION

In the present study, PHILOS plate fixation provided stable fixation with minimal metal work problems and enabled early range-of-motion exercises to achieve acceptable functional results. However, the choice of treatment should be based on patient age, functional requirements, bone quality and fracture pattern. There are certain limitations with respect to the present study such as less sample size and short duration of follow-up.

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