



EVALUATION OF RESULTS OF PROXIMAL HUMERUS FRACTURE TREATED BY PHILOS PLATTING

Orthopaedic

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ABSTRACT

Purpose: To assess the functional outcome of proximal humerus fracture treated with Proximal Humerus Internal Locking osteosynthesis (PHILOS) plating.

Methods: Functional outcomes of 30 patients aged 30 to 75 (mean 57) years who underwent Philos plate fixation for proximal humeral fractures were evaluated after taking informed consent about the study. Indications for surgery were 2-part, 3-part or 4-part closed proximal humeral fractures with angulation of more than 45 degrees or displacement of more than 1 cm. All patients satisfying the inclusion criteria were operated and followed up for 6 months. Functional outcomes and shoulder range of movement were assessed based on the Constant scoring system and was done at 6 months postoperatively.

Result: Patients were followed up for 6 months. All fractures healed satisfactorily. No wound infections, vascular injuries, avascular necrosis, or loss of fixation ensued. One patients with axillary nerve palsy recovered spontaneously within 3 months. Functional outcome was excellent in 11 patients, good in 15, and moderate in 4. The mean Constant score was 83(range 40–100).

Conclusion: Proximal humerus fractures treated by Open Reduction and Internal Fixation by Philos plate have good functional results with low complication rates.

KEYWORDS

Philos plate; Fracture fixation, Proximal humeral fractures, Constant score

INTRODUCTION:

Techniques for treating complex proximal humeral fractures vary and include fixations using tension bands, percutaneous pins, bone suture, T-plates, intramedullary nails, double tubular plates, hemiarthroplasty and blade plates. Complications of these techniques include cutout or backout of the screws and plates, avascular necrosis, nonunion, malunion, nail migration, rotator cuff impairment, and impingement syndromes. Insufficient anchorage from conventional implants may lead to early loosening and failure, especially in osteoporotic bones.

The locking compression plate (Philos plate) fixation provides greater angular stability than do conventional implants. It works as a locked internal fixator and provides better anchorage of screws in osteoporotic bone⁽¹⁴⁾ with good functional outcomes⁽¹⁵⁾. Complications associated with the Philos plate fixation include screw perforations into the glenohumeral joint or femoral head, screw loosening and backing out, secondary implant dislocations from the humeral head, avascular necrosis of the humeral head, pseudoarthrosis with a broken plate, subacromial impingement requiring plate removal, nonunion, malunion due to loss of purchase in the humeral head, broken distal screws with separation of the plate from the bone, and transient axillary nerve palsies⁽¹⁵⁾. We evaluated the functional results of 30 patients who underwent Philos plate fixation for proximal humeral fractures.

MATERIALS AND METHODS:

This prospective study had been conducted in the Department of Orthopedics, GCS Medical College and Research Hospital, Ahmedabad. Between July 2019 and June 2020, 16 men and 14 women aged 30 to 75(mean 57) years with proximal humeral fractures underwent Philos plate fixation. Indications for surgery were 2-part, 3-part or 4-part closed proximal humeral fractures with angulation of more than 45 degrees or displacement of more than 1 cm. Patients with fractures that were open or older than 3 weeks, or with a history of primary or metastatic tumours were excluded.

Patients were placed in a beach-chair position for surgery through a Deltopectoral approach or a Deltoid split approach according to fracture pattern. Fragments were indirectly reduced with traction sutures placed in the insertion of the rotator cuff tendons. Fracture was provisionally fixed with k wires. The Philos plate was applied at least 1 cm distal to the upper end of the greater tubercle and fixed to the humeral head with proximal locking screws before the distal screws were inserted into the humeral diaphysis. After wound closure, the arm was placed in a sling.

Passive elevation and rotation exercises were started on day 3. Active range-of-movement exercises were started at week 6. Resistive strengthening was started when union was ensured. Patients were followed up for at least 6 months. Shoulder range of movement was graded as excellent when the loss of movement was <10°, moderate when between 10° and 30°, and poor when >30°. Functional outcomes were assessed according to the Constant scoring system, with 15 points for pain, 20 points for activities of daily living, 40 points for range of movement, and 35 points for strength. The Constant scores of 0 to 55 were graded as poor, 56 to 70 as moderate, 71 to 85 as good, an 86 to 100 as excellent.



Figure1: Pre and Postoperative radiographs of Philos plating in Proximal Humerus Fracture

RESULTS:

Patients were followed up for minimum 6 months. All fractures healed in satisfactory position. No wound infections, vascular injuries, avascular necrosis, or loss of fixation were noted. One patients with axillary nerve palsy recovered spontaneously within 3 months. According to the Constant score, functional outcomes were excellent in 11(36.67%) patients, good in 15(50%) patients, moderate in 4(13.33%) patients. The mean Constant score was 83 (range, 40–100). The shoulder range of movement was excellent in 11(36.67%), moderate in 19(63.33%) patients. Three patients complained of impingement symptoms on abduction. 26(86.67%) patients were able to return to their pre-injury activity level.

Table 1: Results of PHILOS plating in Proximal Humerus Fracture

RESULTS	NO. OF PATIENTS
CONSTANT SCORES	
Excellent	11
Good	15
Moderate	4

Poor	0
SHOULDER RANGE OF MOTION	
Excellent	11
Moderate	19
Poor	0
COMPLICATIONS	
Axillary Nerve Palsy	1
Impingement	3
RETURN TO PRE-INJURY ACTIVITY LEVEL	26



Figure 2: Clinical results of Philos plating in Right proximal humerus fracture

DISCUSSION:

Comminuted fractures of the proximal humerus are at risk of fixation failure, screw loosening, and fracture displacement⁽²⁾. Open reduction and internal fixation with AO T-plate and plate and screws has been associated with a high rate of complications, namely: avascular necrosis, subacromial impingement, or screw loosening in osteoporotic bone⁽³⁾. The technique requires extensive soft tissue stripping, compromising the vascular supply to the humeral head. Minimally invasive methods of plate osteosynthesis may increase the risk of neurovascular structural damage⁽⁴⁾. Percutaneous pinning requires advanced skills, good bone quality, minimal fracture comminution, and a cooperative patient⁽⁵⁾. Every fourth patient fixed with a blade plate is at risk of blade perforation into the humeral joint⁽⁶⁾. In an *in vitro* model of a reconstructed 3-part proximal humeral fracture, the locking plate provided better torsional fatigue resistance and stiffness than did the blade plate⁽⁷⁾. The bulky PlantTan plate requires wide surgical exposure and has high rates of infection and fixation failure in patients with osteoporosis⁽⁸⁾. Intramedullary nails are biomechanically stronger than plates⁽⁹⁾. 80% of patients treated with Polarus nails reported satisfactory results; most of them had 2-part fractures⁽¹⁰⁾. However, a failure rate of 45% was also reported⁽¹¹⁾. With antegrade nailing, shoulder function can be impaired because of subacromial impingement or rotator cuff injury at the nail entry point⁽¹²⁾.

In our study, the Philos plate fixation was suitable for 2-, 3- and 4-part proximal humeral fractures. Its complication rate was low, probably because our patients were relatively young, and both the bone quality and the surgical technique were good. During dissection and head penetration with proximal interlocking screws, care should be taken to avoid damage of the anterior humeral circumflex artery and the axillary nerve. The screw position must be checked intra-operatively with image intensification. In elderly patients with poor bone stock, the humeral head and shaft should be packed with bone grafts or substitutes to prevent fixation failure of the screws⁽¹³⁾.

CONCLUSION:

Proximal humerus fractures treated by Open Reduction and Internal Fixation by Philos plate have good functional results with low complication rates.

COMPLIANCE WITH ETHICAL STANDARDS:

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee.

All patients gave an informed consent for participating in this study

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