



FUNCTIONAL OUTCOME OF LOCKING PROXIMAL HUMERUS PLATE IN DISPLACED PROXIMAL HUMERUS FRACTURES – A PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

Background Proximal humerus fractures accounts for about 4 to 5% of all fractures. They are the third most common fractures in elderly population after hip and distal radius fractures. The choice of procedure in the operative management of proximal humerus fractures are often controversial, since there are still no evidence based schemes or guidelines for the treatment of these fractures. **Method** 20 patients with displaced proximal humerus fractures, surgically treated with proximal humerus locking system (PHILOS) plate, between December 2021 and December 2022, followed up for 6 months at 1 month interval and short-term functional results analyzed by Constant Murley Score. **Results** 25% of patients had excellent results, 60% had good results, 10% had fair results and 5% had poor results. **Conclusion** Proximal humerus locking system plate was found to be an advantageous implant in proximal humerus fractures due to angular stability, particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization.

KEYWORDS

Proximal humerus fractures, Proximal humerus locking system (PHILOS) plate, Constant Murley Score

INTRODUCTION

Fractures of proximal humerus is still unsolved fractures in many ways. Disagreement exists regarding reliability of classification system. The indication for surgical management continue to be modified. Fixation techniques are myriad and none is ideal for all cases¹. Fractures of proximal humerus have been reported to account 4% - 5% of all fractures.^{1,2}

About 85% of these fractures are minimally displaced or non-displaced and are effectively treated symptomatically with immobilization followed by early motion. The remaining 15% of fractures are displaced, unstable and may have disruption of the blood supply. Displaced and unstable extra-articular fractures are most commonly treated by operative reduction and fixation using various technique³. The treatment is more controversial for articular fractures which carry a high risk of the humeral head necrosis. In Neer's classification, these are two part anatomical neck, three-part and four-part fracture and those with dislocation of head of humerus. Conservative management may be associated with non union, malunion, and avascular necrosis resulting in painful dysfunction.^{4,5} Proximal humeral fracture, whether caused by trauma or related to osteoporosis, requires carefully planned, individual treatment. A wide variety of treatment options have been described beginning with percutaneous fixation, non-absorbable rotator cuff-incorporating sutures and the use of tension band devices, intramedullary nails. The use of methods of open reduction and internal fixation with the more contemporary use of locking plates advocated recently. The role of hemiarthroplasty in the treatment of these fractures has also been advocated in both the acute setting and as a delayed procedure.⁶ Current therapeutic options for proximal humerus fracture are humerus nails, plates, tension band wiring, and percutaneous (or) minimally invasive technique such as pinning, intramedullary flexible nails, screw osteosynthesis and hemiarthroplasties.^{3,4} The Choice of technique and devices depends on quality of bone, soft tissue, age and reliability of patients. However the goal of Proximal Humerus fracture fixation should be stable reduction allowing early motion of fracture. This study was conducted to analyse fractures of the proximal humerus that were treated with the proximal humeral internal locking system (PHILOS) locking plate and to document their clinical and functional outcome.

METHODS

This prospective study was performed in 20 patients with displaced proximal humerus fractures, surgically treated with proximal humerus locking system (PHILOS) plate, between December 2021 and December 2022, followed up for 6 months at 1 month interval and short-term functional results analyzed by Constant Murley Score.

a. Inclusion criteria

- Age: >18 years
- Gender: male and female patients
- displaced proximal humerus fractures according to NEER two, three and four part fracture

b. Exclusion criteria

- Children and adolescent patients <18yrs
- Compound fracture
- Fracture associated with dislocation
- Fracture associated with neurovascular deficits
- Pathological fracture
- Polytrauma

Sampling technique-Convenience sampling. Patients attending trauma casualty and orthopaedics OPD at St Joseph's hospital Karuvanchal and Co operative Hospital Taliparamba, satisfying the inclusion criteria during the study period were included.

Period of follow up-The patients were followed up for a minimum period of 6 months at 1, 2, 3 and 6 months.

Tool of measurement-The clinical data collected and evaluated with pre surgery activity and present functional levels with "Constant Murley score" (CMS)

Pre operative assessment

Once the patient was admitted thorough clinical examination was carried out and patients were evaluated for pre existing medical conditions and treated accordingly. Clinical assessment was followed by radiological investigations-Plain Xray-Shoulder Antero Posterior view, Axillary view.

Computed Tomography scan was performed when the proximal humerus and the shoulder joint were not presented with sufficient Xray quality as to establish a treatment plan-irrespective of number of fracture parts.

Surgical procedure

The patient was taken for surgery after routine investigations and after obtaining physician fitness towards surgery. The consent for surgery was also taken from the patient and attendants after explaining the procedure and possible complications. Limb was shaved from shoulder to hand including axilla just before the surgery.

General anesthesia, supra clavicular block or interscalene block were administered as per anaesthetist's discretion.

Patients were placed in supine position on operating table with wedge a sandbag under the spine and medial border of scapula to push the affected side forward while allowing the arm to fall backward.

All patients received 1. 5g IV Cefuroxime prophylactically. The procedure was performed in a supine position with general anesthesia. Deltpectoral approach initiated just above the coracoid process, extending distally to the acromioclavicular joint with an 8-10cm incision. The intermuscular plane between deltoid and pectoralis major muscles was utilized. Pectoralis major retracte medially, deltoid laterally. Cephalic vein managed accordingly. Short head of

biceps and coracobrachialis displaced medially. Subscapularis muscle exposed, stretched, and divided from its insertion onto the humerus. Capsule incised longitudinally for joint access. Anatomical reduction of humeral head and greater tuberosity achieved with K wires. Shaft fragment reduced as needed. Locking plate applied laterally to the bicipital groove, sparing the long head of the biceps tendon. Proximal locking screws placed to hold the humeral head, ensuring adequate distance from the articular surface. Distal shaft screws inserted bicortically. Intraoperative fluoroscopy used for confirmation. In cases of severe comminution or instability, rotator cuff, greater tuberosity, and lesser tuberosity secured to the plate using non-absorbable sutures. (Fig 1)



Fig 1: Fracture reduction, plate positioning

Range of motion of shoulder was checked on the table for impingement. Wound was closed with negative suction, which was removed after 48 hours.

Postoperative management: All patients were immobilized in arm pouch. Immediate post operative radiographs (Fig 2) were taken to determine the bone alignment and maintenance of reduction and passive range of motion and pendulum exercises are begun immediately depending on pain.



Fig 2 : Post op Xray

Follow up^{1,4,7,8}: All patients were followed up at 1, 2, 3 and 6 months. The active range of motion was started at 1-2 weeks, postoperatively, depending on stability of osteosynthesis and bone quality. The sling is discontinued by 4-6 weeks depending upon fracture stability. The patients were examined clinically and radiologically, assessed for range of motion and bony union and complication. The patient with shoulder stiffness given physiotherapy for 1 week to 15 days on outpatient basis. The final result were evaluated using Constant Murley Score.^{7,9}

RESULTS

Twenty patients with closed displaced proximal humerus fracture were treated by Open Reduction with PHILOS plate. The following observations were made from the data collected during this study. Majority of the patients i.e. 11 (55%) were from age group of 47-66 years followed by 8 patients (40%) in 67-86 age group. The average age of patient was 62.9 years. Majority of patients in our study were elderly. Majority of the patients were females i.e. 55% and 45% were males. In majority of cases (70%), the mode of injury was fall on outstretched hand. The injury from RTA (30% of cases) was high energy trauma, directly or indirectly to shoulder. The fracture occurred

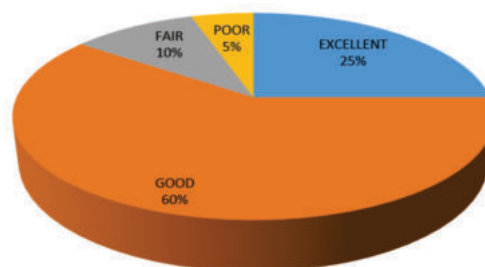
right in 9 patients (45%) and left side in 11 patients (55%). In our study we had 13 cases (65%) with 2 part fracture neck humerus, 7 (35%) cases with 3 part fractures and no cases with 4 part fractures.

All patients underwent open reduction and internal fixation with PHILOS locking plate. The average interval between fracture and surgery was 3.5 days and the average hospital stay in our study was 14.2 days. The final results were evaluated by Constant Murley Score. (Table 1)

Table 1: Result according to constant Murley score

GRADE	NO. OF PATIENTS	PERCENTAGE
Excellent	5	25
Good	12	60
Fair	2	10
Poor	1	5

In our study, 5 cases (25%) had excellent results, 12 cases (60%) had good results, 2 cases (10%) had fair results and 1 case (5%) had poor results. (Graph 1)



Graph 1 : Result according to constant Murley score

The only complication encountered in the study was stiffness in 3 patients (15%)

DISCUSSION

The operative treatment of proximal humeral fractures provides orthopaedician with a therapeutic challenge. Most of the proximal humerus fracture which are un-displaced can be treated conservatively. Even if the injury is thoroughly analyzed and the literature is understood, treatment of displaced fracture or fracture dislocation is difficult. Overall, open reduction and internal fixation, although not in all institution, have yielded satisfactory results. The best results are obtained if the fracture is well reduced and planned rehabilitation program followed. It must be the goal to select fractures for open reduction and internal fixation which can be anatomically reduced. This is dependent on various factors such as type of fracture, the quality of the bone and the technique of reduction and fixation. The present study was conducted to assess the results of displaced proximal humeral fractures treated by open reduction internal fixation by PHILOS locking plate and it was then compared with results from different study groups. (Table 2)

Table 2 : Comparison with different study groups

Author	No. of Cases	%	Excellent %	Good %	Fair %	Poor %
Hawakins ¹⁰	15	Tension band wire	40	40	20	
Moda SK ¹¹	25	T-plate, Blade plate	84		16	
Flatow ¹²	12	Suture	50	50		
Dardar and Dardar ¹³	33	Intramedullary K-wire & TBW		64	30	6
Jaberg ¹⁴	29	CR+percutaneous pins		62	27	1
Esser RD ¹⁵	31	Clover leaf plate AO T plate	74	7	19	
Hong-fei Shi ¹⁶	76	OR +IF philos locking plate	20	75	5	
Ramchander Siwach ¹⁷	25	OR +IF philos locking plate	28	64	8	
Our study.	20	OR +IF philos locking plate	25	60	10	5

CR : Closed reduction
 IF : Internal fixation
 AO : Arbeitsgemeinschaft für Osteosynthesefragen
 OR : Open reduction
 TBW : Tension band wire

CONCLUSION

In conclusion PHILOS plate is an advantageous implant in proximal humeral fractures due to angular stability, particularly in comminuted fractures and in osteoporotic bones in elderly patients, thus allowing early mobilization.

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