Original Research Article

Comparative Study of Open Reduction and Internal Fixation with PHILOS Plate versus Closed Reduction and Fixation with Percutaneous K Wiring in Proximal Humerus Fractures

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Abstract

Background: Proximal humerus fractures constitute about 4-5% of all fractures. The present study was conducted to assess functional outcome and compare results of k wire fixation and PHILOS plating in proximal humerus fracture. **Methods:** The present study was follow-up in nature conducted upon patients with proximal humerus fracture. Patients were divided into two groups. Group 1 included 20 patients who were treated with closed reduction and percutaneous K-wire fixation. Group 2 included another 20 patients who were treated with ORIF with PHILOS plate. All these 40 patients were followed up for mean duration of twelve months. **Results:** Mean age was 36.4 ± 4.3 years. 65% of them were males. Mean Constant-Murley score was 79.5 points in Group 1 and 77.3 pointsin Group 2 at 12 months follow up. Least scores were seen in 4 part fractures. **Conclusions:** Proximal humerus interlocking system (PHILOS) gives better results than K-wires fixation for proximal humerus fractures type III and type IV (Neer's).

Keywords: K - Wiring, PHILOS plate, Proximal humerus fracture

Introduction

Proximal humerus fractures are one of the most common fractures in upper limb. They constitute about 4-5% of all fractures and represent the most common humerus fracture (45%) [1]. Higher incidence is found in elderly with osteoporosis following low energy trauma. Though most of the proximal humerus fracture are non displaced, however Displaed fractures require anatomical reduction with internal fixation. The choice of treatment is guided by multiple factors such as age of patient, physical activity, fracture pattern. The complex periarticular anatomy, cancellous nature of proximal humerus, deforming. Forces of attached muscles make reduction and fixation of fracture quite difficult.

The desired result of fixation, among various treatment options can be achieved either by closed reduction and percutaneous k-wire fixation or open reduction internal fixation with PHILOS plating [2]. Closed reduction with k wire fixation is advantageous in respect with less blood loss, lower risk of neurovascular complication [3], but prolonged immobilisation leading to stiffness of shoulder joint is encountered. Pre contoured Philos plate working on principle of angular stability, 3 dimensional distribution in humeral head has advantages of early mobilisation and less chance of malreduction but extensive surgical exposure and risk of neuromuscular damage and avascular necrosis of humeral head may however be associated. The aim of this study is to evaluate functional outcome and compare results of k wire fixation and PhiLOS plating in proximal humerus fracture.

Aims & objectives

The present study was conducted to assess functional outcome and compare results of k wire fixation and PHILOS plating in proximal humerus fracture.

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Materials and methods

The present study was follow-up in nature conducted upon patients with proximal humerus fracture reporting to Department of Orthopedics of this hospital. Patients were divided into two groups. Group 1 included 20 patients who were treated with closed reduction and percutaneous k wire fixation. Group 2 included another 20 patients who were treated with ORIF with PHILOS plate. All these 40 patients were followed up for mean duration of twelve months.

Inclusion Criteria

1. Displaced proximal humerus fracture with > 1cm of separation and >45% angulation
2. Age >20 years and
3. Patient operated within 7 day of injury

Exclusion Criteria

1. Age < 20 years
2. Patients with open or pathological fractures

Pre-operative AP and lateral X-rays were reviewed to define fracture type. CT scan was done in some of the cases. Fracture of proximal humerus were classified according to NEER classification [4].

Details of surgical procedure are as follows-

Group 1- Surgery was performed under general anaesthesia with the patient in beach chair position. Near anatomical reduction was achieved by manual traction and arm mobilization. Three to four threaded 2.5 mm K-wires under image intensifier were inserted depending on the number of fracture fragments. Care was taken on the pin placement to avoid injury to the axillary nerve, the radial nerve and the anterior circumflex humeral vessels lying medially. K-wires were left out of skin and bent at the extremity to control migration. Patients were encouraged to start active mobilisation of wrist and elbow on the second postoperative day. Dressing of the pin tracts were done [5,6].

Group 2- Patients with proximal humerus fractures were treated with open reduction and internal fixation (ORIF) with PHILOS plate. Surgery was performed under general anaesthesia, patient in supine position with a small sand bag under the shoulder. All patients

received prophylactic dose of intravenous antibiotic preoperatively. The fracture was exposed through a deltoid pectoral approach [7,8] and fracture fragments were reduced. The reduced fracture fragments were held in position with K-wires under guidance of image intensifier. Definitive fixation with PHILOS plate was done with the plate positioned lateral to the bicipital groove, sparing the tendon of long head of biceps. The required lengths of the locking screws were determined and at least six locking screws were inserted in the humeral head Range of motion of shoulder and impingement were checked on the table. Wound was closed in layers with suction drain. Passive range of motion (ROM) exercises were initiated on the second postoperative day. Sutures were removed after 12-15 days. Active shoulder mobilization exercises were started 4 to 6 weeks postoperatively depending on the patient's co-operation. Follow up was at one week, then every month for 6 months, and then at 12 months for final evaluation. Standard anteroposterior, axillary and lateral radiographs were obtained and evaluated for fracture healing, non-union, malunion, loosening of implant, loss of reduction and avascular necrosis of head of humerus. Clinical examination included range of motion - and strength evaluation, pain assessment according to NEER score. The criteria for radiographic healing was when all fragments showed substantial cortical continuity.

Results

A total of 40 patients were included in the study. Mean age was 36.4 ± 4.3 years. 65% of them were males. Most common mode of injury was RTA (77.5%) followed by history of fall (12.5%). 2-part fracture was seen in 52.5% cases followed by 3-part in 40% as per Neer classification.

Mean operation time was 117 minutes (range- 85-135 minutes) in group 1 and 78 minutes in group 2 (60-105 minutes). The difference was significant statistically ($p<0.05$). No major intraoperative complication was seen in any group. The post-operative complications are listed in table-1.

Mean Constant-Murley score was 79.5 points in Group 1 and 77.3 pointsin Group 2 at 12 months follow up. Least scores were seen in 4 part fractures. Mean VAS Score was 2.7 in Group 1 and 3.9 in Group 2.

Table 1:showing post-operative sequelae

	Non-union	Infection	Malunion	Avascular necrosis	Average CMS score at 12 months	Mean VAS score
Group 1	1	1	0	1	79.5	2.7
Group 2	1	3	1	0	77.3	3.9

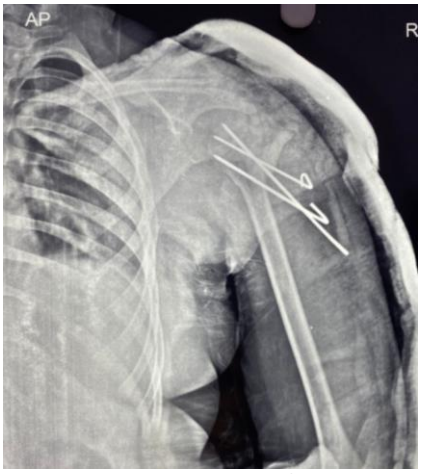
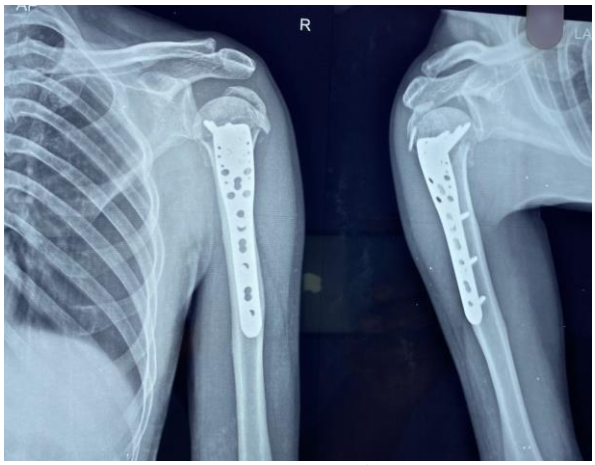


Fig 1: Radiograph showing placement of percutaneous k-wires

Fig 2: Intraoperative radiograph showing PHILOS plate



Post-operative radiograph of PHILOS plate

Discussion

Mean age was 37.4 years. 65% of them were males. Most common mode of injury was RTA (77.5%) followed by history of fall (12.5%). 2-part fracture was seen in 52.5% cases followed by 3-part in 40% as per Neer classification. No major intraoperative complication was seen in any group. Mean Constant-Murley score was 79.5 points in

Group 1 and 77.3 points in Group 2 at 12 months follow up. Least scores were seen in 4 part fractures. Mean VAS Score was 2.7 in Group 1 and 3.9 in Group 2.

Gangaiah et al [9] wanted to assess the clinical, functional, and radiological outcomes of two surgical treatment methods (K-wire application and PHILOS plate fixation) for proximal humerus fractures. The CMS of the Kirschner wire (K - wire) and plate groups did not differ significantly (p = 0.82671). The mean CMS values were 58.5 ± 15.04 for the PHILOS group and 59.4 ± 12.04 for the K - wire group. All fractures united 100 %. One case had stiffness and the other one had impingement in the PHILOS group. In the K wire group, one case had infection. They concluded that the clinical and radiological results of the PHILOS plate and K-wire groups were similar. Percutaneous fixation has the advantage of minimal invasiveness, which lowers the rate of complications. But PHILOS plate has the advantage of stable fixation and early mobilization.

Singh et al [10] conducted study to see outcome of proximal humeral fracture fixation with K wires vs PHILOS plating. They found that mean Neer score at final follow up was 80 in group 1 patients while it was 90 in group 2 patients As per the Neers scoring system ; 7 patients (28%) in group 1 had excellent results ,12 patients(48%)had satisfactory Results,2 patients(8%) had unsatisfactory results while 4 patients (16%) had poor outcome For Group 2, as per Neers scoring system 12 patients (48%) had excellent results,9 patients (36%) had satisfactory results, 2 patients (8%) had unsatisfactory results while 2 patients (8%) had poor outcome.

Jaura et al [11] reported on the long term results of PHILOS plating and percutaneous K-wire fixation in a prospective series of proximal humerus fractures in elderly patients. They reviewed a total of 60 patients with proximal humerus fractures in 30 patients (Group 1), who were treated by open reduction and internal fixation with Proximal Humeral Internal Locking System (PHILOS) plate and 30 patients (Group 2) who were treated with percutaneous K-wire fixation. Functional outcome was assessed using Visual Analogue Scale(VAS) and Constant-Murley Score. Mean Constant-Murley score was 84.6 points (range: 61- 100) in Group 1 and - 76.4 points(range:56-100) in Group 2 at final follow up. Values varied depending upon the fracture type with worst in 4-part fractures. Mean VAS Score was 2.6(range:0-10) in Group 1 and 3.8(range:0-10) in Group 2. They obtained satisfactory results in both the groups, with each procedure having its advantages and shortcomings. They found that PHILOS plate fixation provided stable fixation with minimal implant problems and enabled early range of motion exercises to achieve acceptable functional results. Fixation with percutaneous K-wires presented an efficient treatment option with the advantages of minimal invasiveness and soft tissue dissection.

Anshuman et al [12] found that in elderly population, comminuted proximal humerus fracture can be successfully treated with percutaneous k wire fixation as well as open reduction and internal fixation with Philos with equal success. Although the radiological results were slightly better with the PHILOS than percutaneous k-wire fixation, there was no difference in functional outcome.

Conclusion

It is concluded that for proximal humerus fractures type III and type IV (Neer's), proximal humerus interlocking system (PHILOS) gives better results than K-wires fixation.

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