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*Corresponding author.

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Outcome of proximal humeral fracture fixation with K wires Vs Philos plating

Chander Mohan Singh^{1*}, Devinder Singh², Baljit Singh³, Manpreet Singh⁴, Shaleen Sreen⁵

¹ Assistant professor, Department of Orthopedics, Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar, Punjab, India

² Junior resident, Department of Orthopedics, Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar, Punjab, India

³ Professor, Department of Orthopedics, Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar, Punjab, India

⁴ Senior resident, Department of Orthopedics, Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar, Punjab, India

⁵ Associate professor, Department of Orthopedics, Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar, Punjab, India

Abstract

Introduction- Proximal humerus fractures represent one of the most common fracture type in upper extremity. **Aim-** this study aimed to see outcome of proximal humeral fracture fixation with K wires vs PHILOS plating. **Material and Method-** A prospective study was conducted over three years of a total of 50 patients with proximal humerus fracture. Patients were divided into two groups by randomized controlled trial. Group 1 included 25 patients who were treated with closed reduction and percutaneous k wire fixation. Group 2 included 25 patients who were treated with ORIF with PHILOS plate. All these 50 patients were followed up for mean duration of 12 months. **Results-** 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. **Conclusion-** In conclusion it was found that K-wires fixation for proximal humerus fractures type III and type IV (Neer's) gives inferior results than proximal humerus interlocking system (PHILOS).

Keywords: K-wire; proximal humerus interlocking system Neer's Score

1 Introduction

Proximal humerus fractures represent one of the most common fracture type in upper extremity. 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 Displaced 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 mal-reduction 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.

2 Materials and methods

A prospective study was conducted in our institution over three years of a total of 50 patients with proximal humerus fracture. Patients were divided into two groups by randomized controlled trial. Group 1 included 25 patients who were treated with closed reduction and percutaneous k wire fixation. Group 2 included 25 patients who were treated with ORIF with PHILOS plate. All these 50 patients were followed up for mean duration of months.

Inclusion Criteria

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

Exclusion Criteria

1. Skeletally immature patients
2. Patients with open fractures
3. Pathological fracture
4. Patient with any serious medical comorbidity

Pre-operative AP, 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⁾.

Operative technique for each group was 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.

We use millet et al.⁽⁵⁾ and Rowles⁽⁶⁾ for deciding the safe starting point for the proximal lateral pins and the point for greater tuberosity pins.

Three to four threaded 2.5 mm K-wires under image intensifier were inserted depending on the number of fracture fragments. In the case of difficult reduction one K wire of 3.5

was used as a joystick. 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 on



Pre-Operative

Post-Operative



Pre-Operative

Post-Operative

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 assesment according to NEER score. The criteria for radiographic healing was when all fragments showed substantial cortical continuity.



Pre-Operative

Post-Operative

3 Results

Mean operation time was 50 minutes in group 1 (range 35-70Minutes) and 100 minutes in group 2 (80 -120 minutes).In group 1,the average blood loss during surgery was 100 ml(range 80-140 ml), whereas in group 2 it was 600 ml (range 400- 800ml). Both groups received broad spectrum antibiotics.

The average age of the patient was 48+/-6 in both the groups.

Group 1 had 14 males (56%) and 11 females (44%) whereas Group 2 had 13 males (52%) and 12 females (48%).Overall 30 patients (60%) had history of road side accident while 20patients had history of fall, following which were diagnosed by fracture proximal humerus. All fractures were classified as per the Neer classification which came out with overall 12 cases of 2-part(24%), 22 cases of 3 -part (44%) and 16 cases 4 -partfracture. Postoperatively

.No major complication was encountered intraoperatively. One female patient had tachycardia due to excessive blood loss, which was managed with blood transfusion. Post op complications were noted in 13 patients in group 1 and 6 patients in group 2.In group 1, 3 patients had pin tract infection,4 patients had nonunion (3 patients were with 3 part frac-

ture); 4 patients had malunion (2 patients with 2 part fracture and 2 patients with 3 part fracture),k wire loosening was seen in 2 patients Patients with pin tract infection were treated with dailydressing and antibiotics .K wire removal was done in onepatient.Those with nonunion were treated with ORIF and bonegrafting .The range of movements was acceptable in patients in whom malunion had occurred, so no further intervention was done. The patient with k wire loosening had their k wireremoved and new wires inserted. In group 2, 2 patients (with 3 part fracture) had nonunion .4patients had infection and 2 patients had avascular necrosis ofhumeral head .For patients with nonunion, bone grafting was done. Patients with infection were treated with antibiotics after obtaining culture sensitivity report. Implant removal was donein 2 patients Mean time for radiology union in group 1 was 16 weeks while it was 14 weeks in group 2 patients.Mean neer score at final follow up was 80 in group 1 patientswhile it was 90 in group 2 patients. As per the Neers scoring system; 7 patients (28%) in group1 had excellent results, 12 patients(48%) had satisfactory Results,2 patients(8%) had unsatisfactory results while 4patients (16%) had poor outcomeFor 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.

4 Discussion

Proximal humerus fractures when undisplaced can be treated conservatively but when they are displaced fractures, require surgical treatment for better outcomes as they are one of the most difficult fractures to treat. These are common both with high energy trauma aswell as simple fall in elderly patients with osteoporosis making these fractures difficult to manage conservatively because of their anatomical location. Although fracture union has never been a problem in proximal humeral fracture as had been mentioned in many studies⁽⁹⁻¹¹⁾ due to cancellous nature of bone unless anatomical neck or articular of humerus is involved, compromising bone of its blood supply.

Surgical procedures like percutaneous K wires has the advantage of less soft tissue damage, less blood loss but do not ensure anatomical reduction and has limitations such as delayed mobilization and longer period of recovery whereas pre contoured PHILOS plate has revolutionized the treatment of proximal humerus fracture with better results in respect with higher rate of union, especially in osteoporotic bone, more stable anatomical reduction which is of great importance in any surgery, with ease of reconstruction of comminuted irreducible fractures. It has disadvantage of excessive soft tissue dissection and blood loss ,risk of injury to neurovascular structure and increased risk of avascular necrosis of humeral head. However long term results of proximal humerus fractures managed by PHILOS plate are good. higher Neer's score with better ROM was observed

in patients of Group B as compared to Group A several other authors^(12,13) have also obtained similar results. Dolfi et al.⁽¹⁰⁾ operated type II, type III and type IV fractures of proximal humerus using distally pins, 2 mm K-wires, etc. they found all patients with Neer's type for fractures did not respond to fixation by pins or K-wires.

Fixation with percutaneous k wire may present an effective treatment for 2 or 3 part fracture s with advantage of minimal invasiveness. So in our study overall results of K-wires more unfavorable than studies by Smejkalet al.⁽¹⁴⁾ and jaberg et al.⁽¹⁵⁾ Better functional results were seen in patients treated with PHILOS plate than those treated with percutaneous k-wire fixation.

In a study conducted by fazal et al. it was seen that PHILOS plate fixation provided stable fixation with minimal implant problems and enabled early range of motion exercises to achieve acceptable functional results.⁽¹⁶⁾

Mean Neer's score for ROM was significantly more in patients treated with PHILOS Akshatvijay, et al.⁽¹⁷⁾

In the present study it was concluded that PHILOS plate provide stable fixation even in comminuted multi-fragmented osteoporotic proximal humerus fracture with advantage of anatomical reduction and early rehabilitation.

5 Conclusion

In conclusion it was found that K-wires fixation for proximal humerus fractures type III and type IV (Neer's) gives inferior results than proximal humerus interlocking system (PHILOS)

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