ORIGINAL RESEARCH

Assessment of the functional outcome of three or four part fracture treated surgically with proximal humerus internal locking system (PHILOS)

Dr. Vinod Kumar Arya
Assistant Professor, Department of Orthopedics, Rajarshi Dashrath, Autonomous State Medical College Ayodhya

Corresponding author
Dr. Vinod Kumar Arya
Assistant Professor, Department of Orthopedics, Rajarshi Dashrath, Autonomous State Medical College Ayodhya, Email: vinod12.arya@ gmail.com

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ABSTRACT

Background: To assess the functional outcome of three or four part fracture treated surgically with proximal humerus internal locking system (PHILOS).

Materials & methods: 20 Patients diagnosed of three and four part proximal humerus fracture were admitted and fitness for anesthesia was done. Preoperative True Anteroposterior, lateral radiographs(Y view) in scapular plane along with CT scan was done as per the standard protocol of care. After complete informed consent and ethics committee approval study was started. Functional Outcome was assessed with by Disability of Arm, Shoulder and hand Score (DASH score). DASH score is measured from 0 (no disability) to 100 (most severe diability) Patient was not called especially for evaluating scores and radiographs, all the procedure were done during routine check-ups.

Results: Mean DASH score at 3 months and 6 months was 39.1 and 23.5 respectively. Significant results were obtained while comparing the mean DASH at different follow-up time intervals. According to DASH score, "No problem", "Problem, but working" and "Unable to work" was observed in 60 percent, 25 percent and 15 percent of the patients respectively. Implant failure, infection and malunion were seen in 5 percent of the patients.

Conclusion: Fractures of the proximal humerus especially three and four part fractures have been a difficult group to treat. Good functional outcome was achieved in this group of patients using PHILOS.

Key words: Proximal humerus internal locking system (PHILOS), Fracture, Proximal Humerus

Introduction

Proximal humerus fractures account for 6% of all fractures in the Western world. Following the distal radius and vertebra, it is the third most common osteoporotic fracture. Around 85% occur in people older than 50, and the incidence peaks in the 60- to 90-year-old age-group with a female to male ratio of 70:30. A 2006 Finnish study estimated the incidence of fall-related proximal humerus fractures has tripled since 1970.[1- 3]

The initial evaluation of a patient suspected of having sustained a proximal humerus fracture should begin with a proper history and physical examination. Proximal humerus fractures are usually seen in association with falls in the elderly, and evaluation of these patients carries with it age-specific issues.[4]

The indications to treat a proximal humerus fracture nonoperatively, with surgical fixation, or with arthroplasty, are still evolving. In the past, much of the treatment algorithm was based on radiographs and fracture classification systems. But due to the poor intra-observer reliability of classification systems, as well as the poor correlation with outcome, there has been less emphasis placed upon them.[5- 7]

Options for operative management consist of closed reduction and percutaneous fixation; suture fixation; plates and screws or cables; or intramedullary fixation. Augmentation can include an intramedullary structural allograft, bone grafting, or the addition of osteobiologics. Operative intervention allows for improvement of the displacement and alignment, and provides stability to allow the fracture to heal in a

more anatomical position. This can help to maximize the function of the shoulder. Operative intervention can also result in improved range of motion over conservative management.[6- 8]

Locked fixed-angle screw plates are newly designed angular stable implants designed for fractures of the humeral head (eg, PHILOS Synthes, STRATEC Medical, Oberdorf, Switzerland). This design allows the screws to be inserted into the humeral head by diverging or converging.[8- 10] Hence; under the light of above mentioned data, the present study was undertaken for assessing the functional outcome of surgically treated three and four part Proximal humerus fracture.

Materials & methods

The present study was undertaken for assessing the functional outcome of surgically treated three and four part Proximal humerus fracture.Patients diagnosed of three and four part proximal humerus fracture were admitted and fitness for anesthesia was done. Preoperative True Anteroposterior, lateral radiographs(Y view) in scapular plane along with CT scan was done as per the standard protocol of care.After complete informed consent and ethics committee approval study was started. Functional Outcome was assessed with by Disability of Arm, Shoulder and hand Score (DASH score).DASH score is measured from 0 (no disability) to 100 (most severe diability) Patient was not called especially for evaluating scores and radiographs, all the procedure were done during routine check-ups. The ability to do daily activities, range of motion and severity of symptoms all are included in the scores mentioned above. Radiographs taken at 3 and 6 months as part of standard care protocol was used for assessing union and/or any complication like non-union, malunion, loss of reduction and implant failure which may have an impact on the functional outcome of the patient. The data was collected, compiled, and analyzed using SPSS software.

Results

Mean age of the patients was 51.33 years. 60 percent of the patients were males while the remaining 40 percent were females. In 60 percent of the patients, dominant side was involved while in the remaining 40 percent, non-dominant side involvement occurred. In 80 percent of the patients, mode of injury was fall while in the remaining 20 percent; mode of injury was road traffic accident. Mean fracture union was found to be 12.2 weeks. Mean DASH score at 3 months and 6 months was 39.1 and 23.5 respectively. Significant results were obtained while comparing the mean DASH at different follow-up time intervals. According to DASH score, “No problem”, “Problem, but working” and “Unable to work” was observed in 60 percent, 25 percent and 15 percent of the patients respectively. Implant failure, infection and malunion were seen in 5 percent of the patients.

Table 1: Fracture union time

Fracture union time (weeks)	Number
Mean	12.2
SD	2.45

Table 2: Comparison of mean DASH score at different follow-up

Time interval (follow-up)	Mean DASH score	SD
3 months	39.1	4.52
6 months	23.5	5.13
p- value	0.000 (Significant)	

Table 3: Functional Outcome on the basis of DASH score at final follow-up

Outcome	Number of patients	Percentage
No problem	12	60
Problem, but working	5	25
Unable to work	3	15
Total	20	100

Table 4: Complications

Complications	Number of patients	Percentage
Implant failure	1	5
Infection	1	5
Malunion	1	5

Discussion

Fractures of the proximal humerus account for 4% to 5% of all fractures. In patients over 65 years of age, they are the second most common upper-extremity fracture and the third most common fracture after hip fractures and distal radial fractures. Although most such fractures can be managed non-operatively, operative intervention is generally recommended when any of the major fracture fragments is displaced more than one centimeter or angulated more than 45°.In recent years, the proximal humeral internal locking system (PHILOS) has proved efficient for proximal humerus fractures. The PHILOS is an interlocking anatomically precontoured plate that is broader at its proximal than its distal end. Good functional outcomes have been reported after fixation with the PHILOS plate. However, some postoperative complications have been reported, including poor shoulder joint function, reduction loss, failure of the internal fixation, impingement syndrome, malunion or nonunion of the fracture, and humeral head osteonecrosis.[11- 13]

Mean age of the patients was 51.33 years. 60 percent of the patients were males while the remaining 40 percent were females. In 60 percent of the patients, dominant side was involved while in the remaining 40 percent, non-dominant side involvement occurred. In 80 percent of the patients, mode of injury was fall while in the remaining 20 percent; mode of injury was road traffic accident. Mean fracture union was found to be 12.2 weeks. Mean DASH score at 3 months and 6 months was 39.1 and 23.5 respectively. Significant results were obtained while comparing the mean DASH at different follow-up time intervals.Soler-Peiro M et alreviewed to assess criteria for indications, treatment protocols, and outcomes obtained with the conservative treatment of 3-part and 4-part PHF. The search yielded 26,660 records. They reviewed 44 of them in full, and finally 6 studies were included. They obtained a population of 133 patients (79% women), with a mean age of 74.3 years (range 25 to 98) and mean follow-up of 32 months (range 12 to 68.8). According to the Neer classification system, there were 41% (55) three-part fractures and 59% (78) four-part fractures; 5.81% of the patients were lost to follow-up. The mean Constant score was 64.5 for three-part fractures and 54.9 patients with four-part fractures. Consolidation was achieved in 95% of the three-part fractures and 91% of the four-part fractures. Loss of mobility varied according to the type of fracture. Regarding complications, the most frequent was malunion (21%), followed by avascular necrosis (9%). Their data showed that most three-part PHFs treated conservatively achieve fracture consolidation even noting a negligible rate of malunion got fair–good functional results with few complications, while the orthopedic four-part PHF treatment presents high rate of consolidation with less rate of malunion than the three-part PHF but achieve poor functional results with few complications.[50]

In the present study, according to DASH score, “No problem”, “Problem, but working” and “Unable to work” was observed in 60 percent, 25 percent and 15 percent of the patients respectively. Implant failure, infection and malunion were seen in 5 percent of the patients. Yadav U et al determined the rate of union, complications, operative risks and comparing the clinical functional outcome following ORIF (PHILOS plating) with CRIF (percutaneous K-wire fixation) for 3 and 4-part proximal humerus fracture patients. Total 44 patients with 3 and 4-part proximal humerus fracture (ORIF (PHILOS): 21; CRIF (K-wire) :23), Neer’s classification of proximal humerus was used to classify fracture, minimum 6 months follow-up, Functional outcome was assessed using Constant-Murley shoulder score. Results: Of the 21 patients (ORIF with PHILOS), all fractures united radiologically and clinically and average constant score at final follow-up was 85.29. Of the 23 patients (CRIF with K-wire), average constant score at final follow-up was 79.48. The study demonstrated that locking plate fixation gives good functional outcomes in treatment of proximal humerus fractures. The results are comparable to various studies conducted by other authors which states that locking plates(PHILOS) provide better functional and radiological outcomes as compared to other fixation methods like percutaneous K-wire fixation, nonlocking plates, intramedullary nails, Tension band wiring.[51]

Conclusion

Fractures of the proximal humerus especially three and four part fractures have been a difficult group to treat. Good functional outcome was achieved in this group of patients using PHILOS.

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