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Short and medium term functional outcome of hemi-replacement in complex proximal humerus fracture

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ABSTRACT

Background: Complex proximal humerus fractures are common injuries are common just because of high incidence of road traffic accidents and old age population. The aim of this study was to evaluate the functional outcome in hemi-replacement in complex 3and 4 part of proximal humerus fracture.
Methods: This prospective study was conducted in the Department of Orthopaedics, Sir. T. Hospital, Bhavnagar from August 2010 to April 2014. Out of 30 patients 27 turned up for follow up 3 was lost. Functional and clinical assessments using the age and gender specific Constant-Murley score.
Results: Excellent to good outcome as per Constant-Murley score was seen in 16 patients, moderate outcome in 8 patients and poor outcome in 3 patients.
Conclusions: To spare proximal humerus in younger patients there should be do osteosynthesis procedure with every effort. In the elderly, especially with more complex four-part fractures and fracture dislocations, hemiarthroplasty and reverse total shoulder arthroplasty are specified to decrease complication rates and improve functional outcomes.

Keywords: Proximal humerus fracture, Complex fractures, Hemi replacement arthroplasty, Functional outcome

INTRODUCTION

Proximal humerus fracture comprises (4-5%) of all fractures.[1] The management of the fractures varies from conservative to surgical procedures. Till now exact treatment of displaced humerus fracture is provocative. The main aim of the management includes anatomical reduction of fracture, preservation of vascularity to humerus head and good functional outcome.[2] Many types of surgical treatment are available that includes close reduction, internal fixation with locking compression humerus plate and hemiarthroplasty.[3]

Surgical management of proximal humerus fracture is indicated if fractures are displaced or angulated. Only 20% of fractures requires surgery.[4] The indication for fixing such fracture depend on pattern of fracture, quality of bone, activity of patient and importantly age of the patient.[5]

The successful outcome of the procedure depends on the original underlying diagnosis and tuberosity healing.[6] The present study was done the aim to evaluate the functional outcome in hemiarthroplasty in complex proximal humerus fracture.

METHODS

This prospective study was done on patients 30 patients with proximal humerus fractures attending the Department of Orthopedics, Sir. T. Hospital, Bhavnagar during the period from August 2010 to April 2014. Out of 30 patients, 3 patients were lost to follow-up, hence the sample size of the study was taken as 27 patients.

Patients greater than 70 years of age with poor neuromuscular control and osteoporotic bone leading to poor fixation, patients who are medically stable in order to

tolerate extensive surgery and be able to actively participate in rehabilitation after surgery, patients with fractures that include head-splitting patterns, fracture dislocations, and displaced three and four part fractures were included in the study.

Surgical technique

Patient were placed on beach chair position under general anaesthesia. Delto-pectoral approach was commonly used. The deltoid and pectoral muscles were retracted, and the clavipectoral fascia was incised up to the level of the coro-acromial ligament. Sometimes the fascia has been disrupted by the fracture fragment. A retractor was then placed under the deltoid, superficial to the cuff muscles, and the fractures are palpated. The biceps tendon is a very useful landmark, because it usually remains intact and is a guide to the interval between subscapularis and supraspinatus, that is, a delineation of the greater and lesser tuberosities. Tuberosity segments may well be comminuted and retracted but must be localized and secured with stay sutures. Loose fragments are removed from the joint once the tuberosities have been retracted.

The humeral head was retained as a possible source of bone graft. Once the humeral head has been removed, the shaft segment is presented into the wound by extension of the arm over the edge of the short arm board on the side of the operating table. The humeral shaft was then prepared using the graduated T-handle reamers. The stem size was then selected, being the largest that the humeral shaft will accommodate. Assessment of head size will be made using the retrieved fractured humeral head as a template. A trial reduction was then made, and the tuberosities with their stay sutures are brought round the neck of the prosthesis to assess ease of reduction and tension of the rotator cuff. These are temporarily fixed with the towel clip around the fin of the implant. The prosthesis is inserted in the shaft, and with the elbow flexed to a right angle, the forearm is used as a goniometer. The angle of retroversion was then checked by looking down the humeral shaft from above. Then a trial reduction was made, to assess the range of movements. The prosthesis was fixed at the correct level in the shaft by using cement as tightest press fit. The humeral shaft was prepared in the usual way with pulsed lavage, the shaft is dried, and at least two proximal drill holes are made with sutures passed through ready to attach to the tuberosities. The sutures are left in place while the cement is inserted down the shaft. The prosthesis is then inserted, and the angle of retroversion is checked. The tuberosities are tightly pulled round the humeral neck and placed in the anatomic position so that the height of the prosthesis can be judged correctly when the tuberosities fit like a jigsaw puzzle with no bone loss, the tension in the biceps tendon is adequate, and the tension in the rotator cuff anatomic and if the arm is pulled distally, the humeral head should not be able to be subluxed more than one third in relation to the glenoid. If all these are correct, then the cement is allowed to set.

Postoperatively, shoulder immobilizer was given to all the patients. From the 1st postoperative day pendulum shoulder exercises were started. After one-week, passive anterior elevation and passive abduction was started gradually and the number of times was increased. After 6 weeks, active shoulder movements were started when radiological evidence of consolidation of the tuberosities was seen. Functional outcome was assessed using Constant-Murley score.[7]

The collected data was analysed using microsoft excel and presented in number and percentages.

RESULTS

Of the 30 patients who underwent surgery with proximal humerus fracture, data of 27 patients were considered as 3 were lost to follow up. Table 1, shows the characteristics of the patients. Majority of the study participants belongs to age group (65-75) years. Females (55.6%) are more affected than males (44.4%). About 77% of the patients had 4 parts fractures. Table 2, presents the functional outcome assessment in all patients using Constant-Murley score. Excellent to good score was observed in 16 patients. Moderate outcome was observed in 8 patients. 3 patients showed poor outcome with osteonecrosis and with decreased range of motion.

Table 1: Socio-demographic characteristics of the patients (n=27).

Variable	N (%)
Age (in years)	
46-55	01 (3.7)
56-65	09 (33.33)
65-75	17 (62.97)
Sex	
Male	12 (44.44)
Female	15 (55.56)
Type of fractures	
3 parts fracture	06 (22.22)
4 parts fracture	21 (77.78)

Table 2: Functional outcome by Constant-Murley score (n=27).

Constant-Murley score	N (%)
Excellent	05 (18.5)
Good	11 (40.7)
Moderate	08 (29.6)
Poor	03 (11.1)

Complications

In our study, 3 patients showed poor outcome with decreased range of motion. Of them, 2 patients had developed superficial delayed infection required debridement and antibiotic, 1 patient developed osteonecrosis required reverse total shoulder arthroplasty.

DISCUSSION

The purpose of this study was to evaluate functional outcome after primary hemiarthroplasty in proximal humerus fractures. Primary hemi arthroplasty in complex fractures was initially proposed by Neer and found to have good functional outcome compared to conservative treatment.[8] Hemiarthroplasty is indicated in elderly patients with fracture dislocations or displaced 3 or 4 parts fractures. In younger patients it is the primary management for better outcome. We used Constant-Murley score for functional evaluation which is accepted and validated universally.[9]

The major objectives of hemiarthroplasty in proximal fractures are pain relief, good shoulder function and strength and patient satisfaction. Skilled surgical technique and anatomical tuberosity fixation are directly associated with the outcome. Primary factors that affect union of tuberosity are positioning of prosthesis, stable fixation of tuberosity and quality of the bone (rate of union is higher in younger patients compared to elders). Higher placement of prosthesis is associated with higher risk of tuberosity non-union. Hence, stem height assessment is very important at the time of implantation. And other important factor is leaving a gap of at least 1 cm or one finger width between the acromion and implant in neutral position.[9]

In our study, elder patients are more affected with 4 parts fractures compared to younger patients. Similar observation was done in the study of Thyagarajan et al.[4] They noted that in elderly patients, osteopenic bone in combination with thin or ruptured rotator cuff leads to unpredictable clinical results. Recently, Koukakis et al published a study that includes a series of 20 patients with two, three or four parts fractures and have shown no significant difference in functional outcome in younger and older patients.[10]

From the results of functional outcome, it is clear that this procedure gives an excellent to good outcome in majority of the patients (n=16). Similar observations were noted in the study done by Thyagarajan et al, in their study, the Constant-Murley score was good in younger patients.[4] In the current series, complication was noted in 3 patients. Of them, 2 patients had developed superficial delayed infection and 1 patient developed osteonecrosis. The development of malunion and osteonecrosis after internal fixation might be due to split humeral head fractures and complex three and four parts fractures.[11] In such cases reverse total shoulder arthroplasty are indicated. Similar observation was done in the study of Spross et al.[12]

Limitations

Firstly, the number of patients in the study was small. This study is only single institutional study done to evaluate the functional outcome of hemiarthroplasty in complex humerus fractures.

CONCLUSION

In our study, we achieved excellent to good fracture fixations even in complex fractures with osteopenic bones. We recommend hemi replacement arthroplasty as surgical option in the management of complex proximal humeral fractures.

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REFERENCES

1. Green A, Norris T. Part II: Proximal humeral fractures and fracture dislocations. In: Browner BD, Jupiter JB, Levine AM, Trafton PG, eds. Skeletal Trauma: Basic Science, Management, and Reconstruction. 2nd ed. Philadelphia, PA: Saunders; 2002.
2. Agarwal A, Rana A, Sharma RK. Functional outcome after primary hemiarthroplasty in three or four parts proximal humerus fracture: A short term follow up. Indian J Orthop. 2016;50(6):590-4.
3. Lanting B, Dermid MJ, Drosdowech D, Faber KJ. Proximal humeral fractures: A systematic review of treatment modalities. J Shoulder Elbow Surg. 2008;17:42-54.
4. Thyagarajan DS, Haridas SJ, Jones D, Dent C, Evans R, Williams R. Functional outcome following proximal humeral interlocking system plating for displaced proximal humeral fractures. Int J Shoulder Surg. 2009;3(3):57-62.
5. Iannotti JP, Ramsey ML, Williams GR, Warner JJ. Non-prosthetic management of proximal humeral fractures. Instr Course Lect. 2004;53:403-16.
6. Chambers L, Dines JS, Lorich DG, Dines DM. Hemiarthroplasty for proximal humerus fractures. Curr Rev Musculoskelet Med. 2013;6(1):57-62.
7. Constant CR. Cork: MCH Thesis, University College; 1986. Age related recovery of shoulder function after injury.
8. Neer CS. Displaced proximal humeral fractures II. Treatment of three parts and four parts displacement. J Bone Joint Surg Am. 1970;52:1090-103.
9. Cadet ER, Ahmad CS. Hemiarthroplasty for three- and four-part proximal humerus fractures. J Am Acad Orthop Surg. 2012;20:17-27.
10. Koukakis A, Apostolou CD, Taneja T, Korres DS, Amini A. Fixation of proximal humeral fractures using the PHILOS plate: Early Experience. Clin Orthop Relat Res. 2006;442:115-20.
11. Gerber C, Werner CM, Vienne P. Internal fixation of complex fractures of the proximal humerus. J Bone Joint Surg Br. 2004;86(6):848-55.
12. Spross C, Platz A, Rufibach K, Lattmann T, Forberger J, Dietrich M. The PHILOS plate for proximal humeral fractures - risk factors for complications at one year. J Trauma Acute Care Surg. 2012;72(3):783-92.

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