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A CASE SERIES OF SHOULDER HEMIARTHROPLASTY IN FRACTURES OF THE PROXIMAL HUMERUS

Orthopaedics

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ABSTRACT

PURPOSE: To assess the functional and radiological outcome of proximal humerus fracture treated with Shoulder hemiarthroplasty.
METHODS: Functional outcomes of 5 patients aged 36 to 80 (mean 60) years who underwent shoulder hemiarthroplasty for proximal humeral fractures were evaluated after taking informed consent about the study. Indications for surgery were 3-part or 4-part closed proximal humeral fractures. All patients satisfying the inclusion criteria were operated and followed up for 6 months. Functional outcomes were assessed based on the Constant scoring system and radiological outcome assessed. Assessment was done at 6 months postoperatively.
RESULT: Patients were followed up for 6 months. Functional outcome was good in 1, and moderate in 3 and poor in 1 patient. The mean Constant score was 60(range 38–76).
CONCLUSION: Proximal humerus fractures treated by hemiarthroplasty have good pain relief and moderate functional results with low complication rates.

KEYWORDS

Hemiarthroplasty, Proximal humeral Fracture, Shoulder fractures

INTRODUCTION

Proximal humeral fractures are the third most frequent limb fracture type in elderly patients. In a Swedish study of 2,125 fractures, Bengner et al. [1] found a significant, gradual increase in their incidence. According to Lind et al. [2], a major contributing factor is the rising proportion of elderly people in the population. They are largely due to osteoporosis of the humerus. Three- and four-part fractures account for 13–16% of the fractures of the proximal humeral epiphysis [3]. The surgical approach to three- and four-part fractures is debated. Options include closed reduction and percutaneous pinning with or without isolated screws, open reduction and internal fixation with sutures, alone or combined with hardware, and plating. Fixed-angle plates have been introduced to provide a durable reduction, especially when there is concern over the quality of the bone [4].

The aim of any operative intervention is to preserve the vascularity of the humeral head, avoiding avascular necrosis [5]. Most of the humeral head is supplied by the anterolateral branch of the anterior humeral circumflex artery, which is commonly affected in four-fragment fractures. Although not all cases of avascular necrosis progress to collapse of the humeral head, the condition is associated with a significantly worse outcome.

Shoulder hemiarthroplasty is indicated in patients with displaced and comminute fractures, where avascular necrosis of the humeral head seems inevitable. According to Hertel et al. [6], the predictors of humeral head ischemia are integrity of the medial hinge, length of the dorsomedial metaphyseal extension of the head fracture (calcar length) and fracture type. In the elderly, most displaced three- and four-part fractures, fracture-dislocations and fractures with a split or impacted humeral head with loss of greater than 40% of the articular surface can be managed by hemiarthroplasty [7]. In younger individuals, if osteosynthesis cannot provide a stable anatomically reduced proximal humerus, replacement with a prosthetic head may be considered. However, the ability of Hemiarthroplasty to restore normal shoulder kinematics and function remains a matter of controversy [8]. Neer's very good results have not been replicated by all surgeons, thus contributing to the debate between advocates and opponents of shoulder Hemiarthroplasty for the treatment of these fractures. We describe the 6 month results of primary Hemiarthroplasty performed to manage three- and four-part fractures of the proximal humerus.

MATERIALS AND METHODS

Between August 2019 and January 2020, 5 fractures of the proximal humeral epiphysis, average age of patients were 60 years were managed with hemiarthroplasty at GCS Hospital, Ahmedabad (Gujarat). Inclusion criteria were Displaced three- and four-part fractures (according to Neer's classification), fracture-dislocations, head-splitting fractures not amenable to open reduction and internal fixation, as well as severely osteoporotic bone, open reduction and internal fixation and bone necrosis.Exclusion criteria were patients who cannot undergo surgery because they are medically unstable, in young, active patients, and in those with infection or axillary nerve palsy and open fracture.

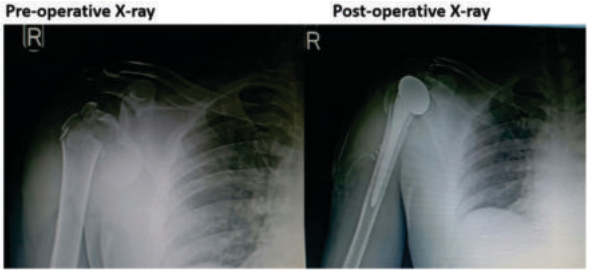
Fractures were classified according to Neer [9] based on preoperative X-rays and intra-operative results, to minimize intra- and interobserver variability. Cemented prosthetic stem were used. All fractures were operated on within 7 days. The mechanism of injury was a fall at home in 4 patients, and a road traffic accident in 1 patient.

The operation was performed under general anesthesia. The patient was placed in the beach-chair position on the edge of the table, with the arm being operated on hanging over the edge. This allowed full mobility of the limb. A deltopectoral approach was adopted in all patients, without detaching the anterior deltoid and the upper third of the pectoralis major. The long head of the biceps was used as a landmark to localize the tuberosities. The humeral head was removed and its diameter measured. After isolation of the tuberosities, non-absorbable sutures were placed at the bone-tendon junction. The humeral canal was then reamed, and a trial stem was inserted to determine height and version (retroversion about 20^0). The tuberosities were reduced, and the position and height of the implant checked by fluoroscopy. Stems were cemented, sparing the epiphysis to avoid affecting bone repair. A bone graft from the humeral head was placed between the tuberosities to restore humeral offset. The tuberosities were then sutured to one another and to the humeral shaft with non-absorbable horizontal and vertical sutures.

In the postoperative period, the arm was placed in an immobilizer in for 4 weeks. Passive mobilization and pendulum exercises were allowed after 4 weeks. Active mobilization was begun on the 6th week and strengthening at 8 weeks, initially only with isometric exercises.

Clinical and radiographic follow-up data were available for all 5 patients. Follow-up duration was 6 months. Outcomes were assessed using the Constant-Murley score, which attributes 20 points for function (ADL), 15 for pain (subjective components), 40 for range of motion and 25 for strength (objective components); the highest total score is 100, indicating a healthy, asymptomatic joint; and the lowest is 0[10].

The X-ray examination included true AP views. At each follow-up visit, all previous radiograms were examined for periprosthetic changes. The acromio-humeral distance (AHD), the position and state of the tuberosities were carefully examined. The greater tuberosity was considered to be properly positioned when its top stood 5–10 mm below the top of the head component. Tuberosity restoration was graded as anatomical reconstruction, malunion ([0.5 cm from the head component) and resorption/non-union. Any heterotopic ossifications and the state of cement were recorded.



RESULTS

The mean Constant score was 60. (Table 1); Pain is the main factor in patient satisfaction. The mean pain score was 14/15. The mean motion score was 26/40. The mean ADL score was 16. This is an excellent outcome given the low functional demands of these patients, who are typically quite elderly. The most frequent impairments involved lifting weights, raising the arm above the shoulder, combing one's hair and sleeping on the affected side. The strength score was only 4/25. On radiological evaluation shows tuberosity position anatomical in 4 patients and malunited in 1 patient.

Table 1 Mean Constant scores of 5 patients at 6-month follow-up

Constant scores	
ADL	16
Pain	26
ROM	14
Strength	4
Total	60

There were no neurological complications, wound infections or cases of implant instability.

DISCUSSION

Hemiarthroplasty is indicated in patients who are medically stable, can tolerate extensive surgery, and can participate in postoperative rehabilitation. In young subjects with displaced proximal humeral fracture and in some patients with impacted four-part valgus fractures, open reduction and internal fixation may avoid prosthetic replacement and its potential complications [11]. In such cases, even if bone necrosis or non-union does occur the tuberosities may be better positioned for conversion to a prosthesis [12]. Indications for HA include displaced three- and four-part fractures (according to Neer's classification), fracture-dislocations, head-splitting fractures not amenable to open reduction and internal fixation, as well as severely osteoporotic bone, open reduction and internal fixation failure and bone necrosis. In addition, it is crucial to take into account the predictors of humeral head ischemia. Krishnan et al. [13] described four factors guiding in the choice of the treatment approach: age, bone quality, fracture pattern and timing of surgery. Although patients older than 70 years are candidates for arthroplasty [14], chronological age is not an indication in itself, since patient activity level, the presence of osteoporosis and the fracture pattern are more important. HA is contraindicated in patients who cannot undergo surgery because they are medically unstable, in young, active patients, and in those with infection or axillary nerve palsy.

Kontakis et al. reviewed 16 studies describing 810 Hemiarthroplasty procedures for acute proximal humeral fractures (nearly all four-part fractures and fracture-dislocations) with a mean follow-up duration of 3.7 years in 808 patients aged 67.7 years (range 22–91). Mean Constant score was 56.63 (11–98). There were 11.15% complications related to fixation and healing of the tuberosities. Although most patients reported no or mild pain at the final follow-up, functional impairment was still considerable [8]. In our study mean constant score was 60, pain relief is satisfactory and moderate function outcome.

The optimal management of complex proximal humeral fractures is controversial. The main goals of treatment in these patients are a good functional result and pain relief. Neer was the first to recommended total arthroplasty for four-part fractures, patients. Kralinger et al.[15] described an Austrian multicentre study of 167 Hemiarthroplasty patients. At 1 year follow-up, healing of the tuberosities in anatomical position correlated with a better clinical outcome, 41.9% of patients being capable of active flexion upto 90^0. The older patients were at increased risk of pseudoarthrosis or malunion of the tuberosities. Outcomes appeared to be related to the experience of the individual centre. Kontakis et al. [16] reported the results of 28 procedures, where24 patients being very satisfied or satisfied with the outcome and 18 achieving an active anterior elevation upto 150 degree. At a mean follow-up of 39.3 months, the mean Constant score was 68.2. In our study tuberosity position anatomical 4 patient and malunited in 1 patient those who has anatomical positioning of tuberosity have function outcome and malunited tuberosity patient had poor functional outcome.

Tuberosity healing was the factor affecting outcome most significantly in our study; the Constant score was excellent in case of anatomical healing and poor in patients with malunion or resorption resulting in impaired range of motion due to impingement. Primary fixation of the tuberosities in a displaced position is associated with consistently poor results, emphasizing the value of using an image intensifier during the procedure, as also demonstrated in our study. A French multicentre study [17] of 406 patients showed that height of implantation, retroversion, tuberosity position, use of a fracture jig, rehabilitation and immobilization all have prognostic value.

Accurate patient selection, careful surgical technique, and patient compliance with the rehabilitation programme seem to be critical factors in achieving good results. A mean Constant score of 60 reflects good joint, and ADL function with scarce or no pain in most patients.

Rehabilitation after prosthetic replacement for proximal humeral fractures remains contentious. Neer initially advocated early passive movement as the optimal postoperative protocol; Naranja and Iannotti [18] suggest aggressive rehabilitation, while Boileau et al. [19] recommend a more conservative protocol to avoid affecting tuberosity fixation. In a randomized controlled trial, Agorastides et al. [20] conclude that late mobilization after Hemiarthroplasty for proximal humeral fracture is as safe as early mobilization. Rehabilitation in our patients was influenced by socioeconomic status, since those who consistently followed their programme achieved better results, further confirming the central role of postoperative rehabilitation following shoulder surgery.

In our study small sample size and shorter duration of follow up is major drawback of our study, which can be improvised by increasing sample size and longer duration of follow up.

CONCLUSION:

According to our study shoulder hemi arthroplasty gives moderate functional outcome, pain relief is major factor of satisfaction. On radiological evaluation, anatomical position of tuberosity gives good results. Post-operative rehabilitation is indicated in all patients and it plays major role in shoulder range of motion.

Compliance With Ethical Standards:
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee.

All patients gave an informed consent for participating in this study
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REFERENCES

1. Bengner U, Johnell O, Redlund-Johnell I (1988) Changes in the incidence of fractures of the upper end of the humerus during a 30 years study period: a study of 2,125 fractures. Clin Orthop 231:179–182
2. Lind T, Kroner TK, Jensen J (1989) The epidemiology of fractures of the proximal humerus. Arch Orthop Trauma Surg 108:285–287
3. Rose SH, Melton LJ III, Morrey BF, Ilstrup DM, Riggs BL (1982) Epidemiologic features of humeral fractures. Clin Orthop Relat Res 168:24–30
4. Moonot P, Ashwood N, Hamlet M (2007) Early results for treatment of three- and four-part fractures of the proximal humerus using the PHILOS plate system. J Bone Jt Surg [Br] 89:1206–1209
5. Gerber C, Werner CM, Vienne P (2004) Internal fixation of complex fractures of the proximal humerus. J Bone Jt Surg [Br] 86:848–855
6. Hertel R, Hempfing A, Stiehler M, Leunig M (2004) Predictors of humeral head ischemia after intracapsular fracture of the proximal humerus. J Should Elbow Surg 13:427–433

7. Phipatanakul WP, Norris TR (2005) Indications for prosthetic replacement in proximal humeral fractures. Instr Course Lect 54:357–362
8. Kontakis G, Koutras C, Tosounidis T, Giannoudis P (2008) Early management of proximal humeral fractures with hemiarthroplasty: a systematic review. J Bone Jt Surg [Br] 90-B:1407–1413
9. Neer CS II (1970) Displaced proximal humeral fractures. II. Treatment of three- and four-part displacement. J Bone Jt Surg [Am] 52:1090–1103
10. Constant CR, Murley AH (1987) A clinical method of functional assessment of the shoulder. Clin Orthop Relat Res 214:160–164
11. Nho SJ, Brophy RH, Barker JU, Cornell CN, MacGillivray JD (2007) Innovations in the management of displaced proximal humerus fractures. J Am Acad Orthop Surg 15:12–26
12. Dines DM, Warren RF (2008) Arthroplasty for proximal humerus fractures. In: Dines DM, Lorich DG, Helfet DL (eds) Solutions for complex upper extremity trauma. Thieme, NY, pp 79–87
13. Krishnan SG, Bennion PW, Reineck JR, Burkhead WZ (2008) Hemiarthroplasty for proximal humeral fracture: restoration of the Gothic arch. Orthop Clin North Am 39:441–450
14. Hertel R (2005) Fractures of the proximal humerus in osteoporotic bone. Osteoporos Int 16(Suppl 2):S65–S72
15. Kralinger F, Schwaiger R, Wambacher M, Farrell E, MenthChiari W, Lajtai G, Hu¨bner C, Resch H (2004) Outcome after primary hemiarthroplasty for fracture of the head of the humerus. A retrospective multicentre study of 167 patients. J Bone Jt Surg [Br] 86:217–219
16. Kontakis GM, Tosounidis TI, Christoforakis Z, Hadjipavlou AG (2009) Early management of complex proximal humeral fractures using the Aequalis fracture prosthesis: a 2–5 years follow-up report. J Bone Jt Surg [Br] 91(10):1335–1340
17. Boileau P, Coste JS, Ahrens PM, Staccini P (2002) Prosthetic shoulder replacement for fracture: results of the multicenter study. In: Walch G, Boileau P, Mole D (eds) 2000 Shoulder prostheses: 2–10 years follow-up. Sauramps Medical, Montpellier, pp 561–573
18. Naranja RJ Jr, Iannotti JP (2000) Displaced three- and four-part proximal humerus fractures: evaluation and management. J Am Acad Orthop Surg 8:373–382
19. Boileau PCJ, Coste J-S, Ahrens PM, Staccini P (2001) Prosthetic shoulder replacement for fracture: results of the multicentre study. In: Walch G, Boileau P, Mole D (eds) 2000 Shoulder prostheses: 2–10 years follow up. Sauramps Medical, Montpellier, pp 561–578
20. Agorastides I, Sinopidis C, El Meligy M et al (2007) Early versus late mobilization after hemiarthroplasty for proximal humeral fractures. J Should Elbow Surg 16(3 Suppl):S33–S38