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Functional outcome following surgical management of proximal humerus fracture in elderly

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Abstract

Proximal humerus fracture accounts to about 4-5% of all the fractures and is the third most common fracture in the elderly population. Though several modalities of treatment exist there are no clear guidelines or consensus to the optimal method of treatment of these fractures especially in the elderly population. This study was based in a tertiary hospital with the objectives to assess the functional outcome of surgical treatment of proximal humerus fractures in the elderly population. Patients with proximal humerus fracture aged above 51 years and fulfilling the inclusion criteria were included in the study. The fractures were classified using Neer's classification of proximal humerus fracture. Patients were treated surgically by [ORIF] and post-operatively limb is immobilized in arm pouch; mobilization was started at the second week as per patient's tolerance. Patients were then followed up at 3 months, 6 months and 12 months. They were assessed for functional outcome using Constant scoring system [Pain, activities of daily living and range of motion]. A total of 37 patients were included in the study. The mean age of the patients was 65.2 years. The study included 18 2-part fracture, 11 3-part fractures and 8 4-part fracture. The mean Constant score at 12-month follow-up in 2-part fracture was 66.2, in 3-part fracture was 59 and in 4-part fracture was 51.4. The overall mean Constant score was 60.2. In conclusion we are of opinion that treatment of proximal humerus fractures in the elderly population is a challenge and one should not deny them a good functional outcome. Patients with 2-part fracture fared better and has a satisfactorily good functional outcome. Whereas in 3-part and 4-part fractures the outcomes do not vary significantly and patients with 4-part fracture had higher incidence of surgery related complication.

Keywords: Functional outcome, surgical management, humerus fracture, elderly

1. Introduction

Proximal humerus fracture is the third most common fractures due to osteoporosis ^[1, 2]. It accounts to about 4-5% of all fracture ^[3, 4]. Studies show that more than about 70% of the patients who present with proximal humerus fractures are above the age of 50 years ^[5, 6].

Proximal humerus fracture is a complex injury with a significant morbidity. The treatment options for this fracture has evolved from a more conservative approach previously to a more aggressive surgical treatment and rehabilitation.

The choice of treatment in the elderly population has always posed a dilemma. Who are the ideal candidates for surgical management and how much will it benefit the patient over a more conservative approach is the question. Several studies have been conducted in the past to determine who benefit from conservative and who surgical management. But there have been few targeting the elderly population and treatment of these fractures remains a controversy in this group of population. The goal of treatment in these fractures is maintenance of good shoulder function which may make a good difference for their independent life style. As rightly said by R.H Cofield, one must be careful in denying older patients effective treatment ^[7].

With the above in mind the study was designed to assess the functional outcomes of surgically treated proximal humerus fractures in the elderly population.

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2. Material and Methods

The study consists of patients with proximal humerus fracture who underwent treatment at our center between the period 1st June 2016 to 1st August 2017. All patients included in the study met the following inclusion criteria - Age group: > 50 years, Patients with proximal humerus fracture and treated within 3 weeks of the injury. Patients with fracture dislocation of proximal humerus or undisplaced fractures, associated with neurovascular deficits, previous history of shoulder injury or surgery and any co-morbidities that can affect the outcome of the study, were excluded from the study. Consent was taken from each patient enrolled in the study. The patients who were available for regular follow-up for a minimum period of 12 months were included in the study.

Patients were evaluated clinically and radiologically at the time of presentation. The fracture was classified by using Neer's classification of proximal humerus fractures^[13, 14]. The patients were informed about the treatment options and those willing for surgical management were included in the study. The patients were evaluated pre-operatively for fitness. The surgery was done under general anaesthesia and the delto-pectoral approach was used. The fracture was fixed by open reduction with internal fixation [ORIF] either by proximal

humerus plate or screw fixation. Post-operatively upper limb was immobilized in an arm pouch and shoulder mobilization was started at the second week with pendulum exercises initially and progressing as per patient's tolerance.

Patients were followed up at regular interval of 3 months, 6 months and 12 months post treatment. During each follow-up they were evaluated for wound healing, pain, shoulder function, range of movements and shoulder abduction strength. Fractures were also assessed radiologically. They were assessed for functional outcome at 3 months, 6 months and 12 months using Constants Scoring [Pain, activities of daily living and range of motion] method. The patients were also assessed for any complications and radiologically for any non-union, avascular necrosis, loosening of implants.

The functional assessment was done using Constant Scoring System. It has four basic parameters to be assessed Pain (15 points), Activities of daily living (20 points), Range of motion (40 points), Power (25 points). Total score is 100 for each shoulder. Higher the score better the outcome.

Collected data was analysed by frequency, percentage, mean, standard deviation, and by tests such as Analysis of Variance (ANOVA) for repeated measures and Chi-square test using the SPSS software.



Fig 1: Deltopectoral approach



Fig 2: Preop X ray



Fig 3a and 3b: Post -operative X ray

3. Results

The patients were evaluated on day 0 and at 3 months, 6 months and 12 months interval. They were all assessed using the Constant Scoring System. The functional outcomes of surgical each fracture type was assessed and compared.

With a total of 37 patients, 18 patients had 2 part fracture, 11 patients had 3 part fracture and 8 patients had 4 part fracture. Of the thirty seven patients a majority of them comprised of women (59.5%), whereas the men accounted for only 40.5% of the study population. Slip and fall was the most common

mode of injury seen in our study population, accounting for about 81%.

A total of 18 patients with 2- part proximal humerus fracture were included in the study. The average Constant score of surgically treated patients at 3 months follow up was 27.7, at 6 months was 42.4 and at final follow up was 66.2. A total of 11 patients with 3-part proximal humerus fracture were included in the study, the constant score of surgically treated 3 part fracture patients at 3 months follow up was 27.17, at 6 months was 39 and at final follow up was 59. The constant

score of surgically treated 4-part fracture at 3 months follow up was 24.8, at 6 months was 33.2 and at final follow up was 51.4. The overall constant score of surgically treated patients at 3 months follow up was 26.86, at 6 months was 39.24 and at final follow up was 60.62.

Patients with 2-part fracture treated surgically had a highly significant and better score compared to 3 and 4 part fractures with respect to pain, daily activity, range of movement and

shoulder strength at the final follow up with p value of 0.00

Of the 37 patients we observed that 6 patients had shoulder stiffness, 4 patients had some clinical signs of impingement. One patient had failure of implant and underwent revision surgery. There was no incidence of avascular necrosis, infections, non-union or any neurovascular deficit. We observed that in most cases stiffness was due to non-compliance to the rehabilitation physiotherapy.

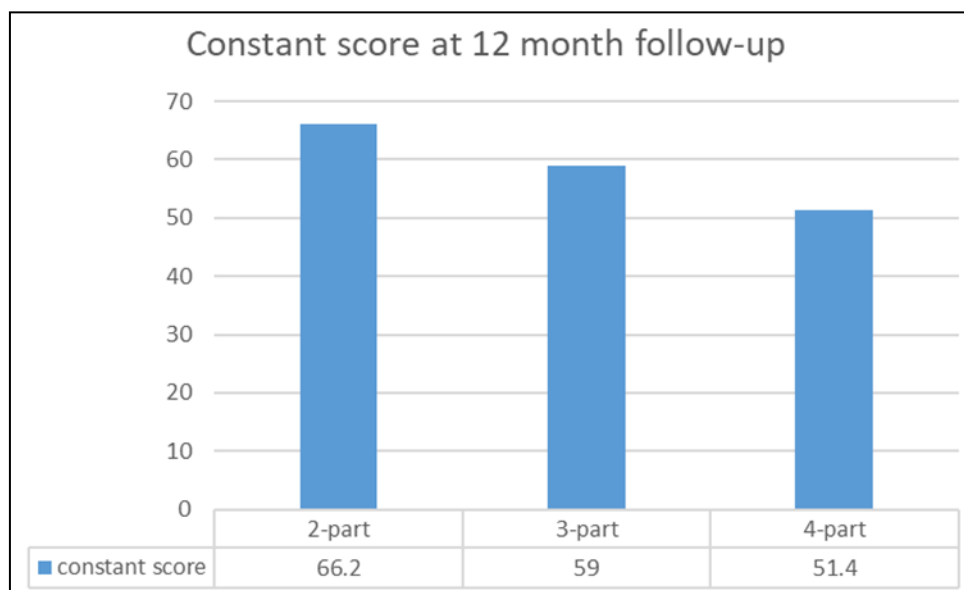


Fig 4: constant score of surgically treated proximal humerus fracture

4. Discussion

Earlier proximal humerus fractures were considered simple and were managed conservatively by plaster cast technique, slings or slabs. But recent advances in the understanding of anatomy, vascular supply of the proximal humerus, improvement in surgical skills and better fixation techniques have led to the emergence of various modalities for the treatment of these fractures like percutaneous pinning, intra medullary nailing, plate fixation or prosthetic replacement.

The choice of treatment in the elderly population has always posed a dilemma. The controversy over surgical versus non-surgical management continues to be a debate. But in an elderly patient the treatment has been based on various factors that can influence the recovery, ability to tolerate a major surgery and also on the level of desired recovery.

In our study on "Functional outcome following surgical management of Proximal humerus fracture in the Elderly" we selected 37 patients with proximal humerus fracture fulfilling the inclusion criteria. The patients underwent surgical management of the fracture and were followed up for a period of 12 months and the functional outcome was assessed using the constant scoring system.

Zyto *et al.* in their series has 40 patients, 35 women and 5 men with a mean age of 74 years^[8]. Fjalestad *et al.* in their study has a total of 50 patients, 44 women and 6 men with a mean age of 72.6 years^[9]. In our study we had a total of 37 patients of which 15 were men and 22 were women. The average age of our study population was 65.2 years. This shows that proximal humerus fracture is more frequently seen in the female population owing to their osteoporotic nature of bones. Also these fractures are seen more in the elderly population.

It was also noted that 81.9% of the proximal humerus fractures in the elderly were due to slip and fall at their residence and 18.1 % were due to RTA. Majority of the

proximal humerus fractures in the elderly are due to low force trivial trauma.

Canbora *et al.*^[15] in their study has a total of 29 patients of which 9 were 2- part fracture, 15 were 3-part fractures and 5 were 4-part fractures. Hintermann *et al.*^[17] in their series had a total of 42 patients with proximal humerus fractures of which 34 were 3-part fractures and 8 were 4-part fractures. In our study we observed that 2-part proximal humerus fractures occurred in a greater frequency in the elderly compared to the other types.

Yuksel *et al.*^[16] in their study on Non-Operative Treatment for Three- and Four-Part Fractures of the Proximal Humerus in Low-Demand Patients had 18 patients. The mean Constant score was 61.3, constant score of 3-part fracture on final follow-up was 60.5 and 4-part fracture was 53.55. Osteonecrosis was seen in 5 patients. Zyto *et al.* in their study on treatment of displaced proximal humerus fracture in the elderly had a total of 40 patients who were randomised to receive either surgical or conservative management. The mean Constant score on final follow-up was 60 in surgical group and 65 in the conservative group. He noted that surgical management did not have better outcomes with respect to pain and range of motion.

In our study we had a total of 37 patients of which eighteen were 2-part fracture, eleven were 3-part fracture and eight patients had 4-part fracture. The mean Constant score at 12-month follow-up in 2-part fracture was 66.2, in 3-part fracture was 59 and in 4-part fracture was 51.4. The overall mean Constant score was 60.20. Patients with 2-part fracture treated surgically had a highly significant and better score with respect to pain, daily activity, range of movement and shoulder strength at the final follow up compared to those with 3 and 4-part fracture [with p value of 0.00].

We observed that patients with 2-part fracture in the elderly population had a statistically significant and better functional

outcome with surgical management, especially in recovery of shoulder abduction strength and range of motion when compared to 3-part and 4-part fractures. Whereas in 3-part and 4-part fracture though there was difference in the final constant score, it was not highly significant.

Fjalestad *et al.* [9] in his series one case of implant failure, 2 patients who underwent conservative treatment had non-union, 11 patients treated surgically had penetration of screw and 2 developed avascular necrosis. Studies show higher incidence of complications in surgical management of these fractures. Similarly in the present study during the follow up for 12 months we observed that 6 patients had shoulder stiffness (16%) of which 2 were of surgical group, 3 patients who underwent surgical treatment has some clinical signs of impingement (8%). One patient had failure of implant and underwent revision surgery.

5. Conclusion

We are of the opinion that treatment of proximal humerus fractures in the elderly population is a challenge and one should not deny them a good functional outcome. Proximal humerus fracture treated by surgical methods have a better functional outcome, but have surgery related complications. Patients with 2-part fracture fared better and has a satisfactorily good functional outcome. Whereas in 3-part and 4-part fractures the outcomes do not vary significantly and patients with 4-part fracture had higher incidence of surgery related complication. The decision about surgical treatment should consider the necessity of the patients and the amount of functional recovery expected by them.

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