# A Retrospective Cohort Study of Non-Operative versus Operative Treatment of Proximal Humerus Fractures in Elderly Patients.

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**Authorship and contribution Declaration:**
Each author of this article fulfilled ALL 04 Criteria of Authorship:
1.Conception and design of or acquisition of data or analysis and interpretation of data.
2.Drafting the manuscript or revising it critically for important intellectual content.
3.Final approval of the version for publication.
4.All authors agree to be responsible for all aspects of their research work.

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## ABSTRACT

**Objective:** To determine the functional outcome of proximal Humerus fracture in elderly patients treated non operatively versus operatively.

**Methods:** This retrospective Cohort study was conducted in Orthopaedic Department Fazaia Ruth Pfau Medical College PAF Base Faisal Karachi. The medical records of all patients of proximal Humerus fractures fulfilling the inclusion criteria and managed in time period extending from 23rd June 2018 to 25th May 2022 were reviewed. The included subjects were divided into group A(non-operative) and group B(open reduction and internal fixation with Proximal Humerus Internal Locking System).Comparison of functional outcome in both groups at 6th, 12th , and 18th months of follow up was done using American Shoulder and Elbow Score(ASES).*P* value was calculated using Chi-square test, student t-test and one way ANOVA test. *P* value <0.05 was considered significant.

**Results:** The records of 92 patients of proximal humerus fractures were reviewed. Group A included 47(51.08%) patients and group B had 45(48.91%) patients. Mean age of group A was 61 ± 4.32 years and group B was 55± 2.33 years. The ASES score for two-part, three-part and four-part fractures at 18th months of follow up period was 79.9,75.2,81.2 in group A and 82.4,77.3 and 83.4 in group B respectively(p>0.05). Radiological union was achieved in average 5±1.2 months in group A and 3±2.1 months in group B(p<0.05).

**Conclusion:** Both non operative and operative treatments of proximal humerus fractures in elderly patients are equally effective in restoring shoulder function. However no significant difference in terms of functional outcome was noted between the two treatment modalities.

**Keywords:** ASES, Proximal Humerus fracture, Neer classification, PHILOS.

**This article may be cited as:** Aliuddin A,Ali DA,Shah GA, Ali A, Shah SK, Qureshi K, et al. A Retrospective Cohort study of Non-operative versus Operative treatment of proximal Humerus fractures in elderly patients.J Pak Orthop Assoc.2022;34(3):

## INTRODUCTION

There is no consensus regarding the optimum management of proximal humerus fractures in elderly patients although these are the common fractures after hip and distal radius in elderly population.[1-3] As the age advances the frequency of proximal humerus fractures increases due to osteoporosis.[4] Majority of the non displaced or minimally displaced proximal humerus fractures are treated non operatively in a sling.[5] Displaced fractures, two-part, three-part and four-part fractures often require open reduction and stabilization to restore early shoulder function.[6,7] Hertel *et al* was of the opinion that length of the calcar, integrity of the medial hinge and certain specific fractures types are the accurate predicators of humeral head ischemia after operative treatment of proximal humeral fractures.[8] Many studies preferred non-operative treatment over operative treatment in proximal humerus fractures in elderly patients.[9,10] Operative treatment of these fractures have been associated with many complications.[11]

In our department proximal humerus fractures in young patients are usually treated operatively while in elderly patients the decision to manage operatively or non operatively are subject to individual surgeon preferences and expertise. The objective of our study was to determine the functional outcome of proximal humerus fracture in elderly patients treated non operatively versus operatively.We hope that the results of this study would help us in formulating guidelines for managing proximal humerus fractures in elderly patients in our department.

## METHODS

We conducted this retrospective Cohort study in Orthopaedic Department Fazaia Ruth Pfau Medical College PAF Base Faisal Karachi. The medical records of all patients of proximal humerus fractures who were managed in time period extending from 23rd June 2018 to 25th May 2022 were reviewed. Our inclusion criteria was patients above 40 years of age, both gender with proximal humerus displaced two-part, three-part and four-part fractures as per Neer classification[12] with complete radiographs/3D CT scan records, consent for surgery and publication, managed by same surgical team and with two years follow up notes. All patients with pathological fractures, segmental fractures, isolated greater tuberosity fractures, open fractures, fractures with neurovascular injuries, revision surgeries and polytrauma patients requiring surgical interventions for other injuries were excluded. The study was approved by the Ethical Committee of our hospital.

The treatment protocol for group A (non-operative) was noted. It included closed reduction (if required) followed by sling immobilization for 6 weeks followed by supervised physical therapy. Follow up radiographs were taken at 2 weeks interval for assessment of fracture healing. Functional outcome at 6th, 12th, and 18th months of follow up was done using American Shoulder and Elbow Score(ASES)[13] The ASES score has 07 items pertaining to pain and 10 items pertaining to

activities of daily living. The total maximum score is 100 with 0 score indicates worse condition of the shoulder and 100 best condition of the shoulder joint. The medical records of group B(operative) revealed that these patients were operated under general anaesthesis in beach chair position following same standard technique of open reduction and internal fixation with Proximal Humerus Internal Locking System (PHILOS). Standard deltopectoral approach was made with identification of cephalic vein and lifting of conjoined tendon. Fracture was reduced and temporarily stabilized with k wires. An appropriate length PHILOS plate was applied and position of the implant and screws were assessed with image intensifier in different planes. Postoperatively intravenous Cefuroxime 1.2 gm twice daily was continued for 48 hours. All patients were advised sling postoperatively. Stitches were removed at 2 weeks. Postoperatively sling was discontinued and supervised physical therapy was started at 4th week. Follow up record was examined for radiological union, functional outcome as per ASES score.

We analysed our data with SPSS version 23.Frequency and percentage was calculated for qualitative variables. Mean and standard deviation was calculated for quantitative variables. Comparison of functional outcome in both groups at 6th, 12th , and 18th months of follow up was done after calculating American Shoulder and Elbow Score(ASES).*P* value was calculated using Chi-square test, student t-test and one way ANOVA test. *P* value <0.05 was considered significant. The data was presented in tables where necessary.

## RESULTS

In this retrospective Cohort study we reviewed the records of 92 patients of proximal humerus fractures. The non-operative group (A) included 47(51.08%) patients and the operative group (B) had 45(48.91%) patients.

Mean age of group A was 61 ± 4.32 years and group B was 55± 2.33 years. The baseline demographic variables of the two groups were identical (table I) The mean follow up was 18 ± 2.31 months in group A and 18 ± 1.28 months in group B. Although the post operative functional outcome of both the groups was improved but comparison of the ASES score between the two groups revealed no statistically significant difference(table II). The ASES score for two part, three-part and four-part fractures at 18th months of follow up period was 79.9,75.2,81.2 in group A and 82.4,77.3 and 83.4 in group B respectively (p>0.05). Radiological union was achieved in average 5±1.2 months in group A and 3±2.1 months in group B(p<0.05).

**Table I:** The demographic variables of our two groups.

| Demographic variables | Group A (n=47) | Group B (n=45) | *P* value |
|---|---|---|---|
| Mean Age (Years) | 61 ± 4.32 | 55 ± 2.33 | 0.08 |
| **Gender:** | | | |
| Male | 14 (29.78%) | 18 (40%) | 0.21 |
| Female | 33 (70.21%) | 27 (60%) | 0.29 |
| **Sides:** | | | |
| Right | 28(59.57%) | 25(55.55%) | 0.41 |
| Left | 19(40.42%) | 20(44.44%) | 0.88 |
| **Etiology of fracture:** | | | |
| Road traffic accident | 25 (53.1%) | 25 (55.5%) | 0.32 |
| Fall from height | 06 (12.7%) | 04 (8.8%) | 0.24 |
| Fall (Ground level) | 16 (34%) | 16 (35.5%) | 0.22 |
| **Neer Fracture type:** | | | |
| Two-part | 16 (34%) | 18 (40%) | 0.21 |
| Three-part | 14 (29.7%) | 12 (26.6%) | 0.32 |
| Four-part | 17 (36.1%) | 15 (33.3%) | 0.23 |

**Table II:** Comparison of American Shoulder and Elbow Score(ASES) between the two groups.

| Neer type of Fracture | Group A(n=47) | | | Group B(n=45) | | | *P* value |
|---|---|---|---|---|---|---|---|
| | 6th months | 12th months | 18th months | 6th months | 12th months | 18th months | |
| **Two-part fracture** | 75.3 | 77.3 | 79.9 | 90.1 | 86.3 | 82.4 | 0.29 |
| **Three-part fracture** | 69.3 | 69.9 | 75.2 | 71.2 | 68.2 | 77.3 | 0.37 |
| **Four-part fracture** | 77.4 | 77.7 | 81.2 | 76.8 | 76.8 | 83.4 | 0.34 |

We had documented few complications in our series. Nonunion was documented in3(6.38%) patients in group A and 1(2.22%) in group B. Varus and valgus angulation was noted in 4(8.51%) and 2(4.25%)patients in group A and 3(6.66%) in group B respectively. Superficial surgical site infection and deep infection was noted in 2(4.44%) and 1(2.22%) patients in group B respectively. Avascular necrosis of the humerus head was noted in 1 patient each in group A and B.

## DISCUSSION

In this retrospective Cohort study we documented no significant difference in the functional outcome between proximal humerus fractures in the elderly patients who were treated conservatively using sling immobilization and those treated operatively with PHILOS. Our results are supported by many studies in the literature. Handoll[5] analyzed 3179 patients(mean age >60 years) of proximal humerus fractures in 47 trials. He noted that no better outcome was noted at one year and two years follow up in the surgical intervention group than in the conservatively treated group. Brouwer and Reininga[14] treated 32 patients with mean age ≥65 years having three-part and four-part fractures non operatively and 32 operatively. At 10 years follow up no significant difference in the functional outcome was noted in both groups. The operated group although had better social interaction but higher resurgery rates. The famous PROFHER trial conducted by Handoll et al[15] assessed the records of 250 proximal humerus fractures with mean age 66 years. The types of fractures were Neer one-part fracture in 18 patients, two-part fractures in 128, three-part or four-part fractures in 104 fractures. At two years follow up no significant difference in the functional outcome was documented in the non operative versus operative groups. Caliskan[16] treated 47 patients of proximal humerus fractures non

operatively and 45 with PHILOS.Among the two groups Patients with three-part fractures and four-part fractures had no significant difference in ASES score and VAS. Caliskan preferred non operative treatment specially in patients with multiple fractures.

Contrary to the above studies Samborski et al[17] treated 41 proximal humerus fractures non operatively and 23 with open reduction and fixation(ORIF) and 24 reverse shoulder arthroplasty (RSA).The mean age was >60 years.At six months follow up ORIF and RSA had improved functional outcome and decrease pain than non operative group. A significantly higher complication rate however was reported in the ORIF group than non operative and RSA group. Okike and Lee[18] identified certain factors which can help in decision to treat proximal humerus fractures in the elderly conservatively or with sugery. Based upon their data of 229 patients these authors proposed that younger patients with higher AO type fractures, translational displacement, associated fractures and glenohumeral dislocation wore most likely the predictors of fracture fixation. A higher Neer/AO type fracture and higher Charlson score would predict arthroplasty rather than fixation. These authors also suggested that shoulder and upper limb surgeons more frequently favored surgical intervention in proximal humerus fractures than general Orthopaedic surgeons or trauma surgeons.

The retrospective design, small sample size and short follow up are the limitations of our study. Further studies are recommended to verify our results.

## CONCLUSION

Both non operative and operative treatments of proximal humerus fractures in elderly patients are equally effective in restoring shoulder function. However no significant difference in terms of functional outcome was noted between the two treatment modalities.

**Acknowledgement**

We authors would like to acknowledge Prof. Gulzar Saeed and Dr. Imran Javed for their valuable support and providing us with the record of cases and valuable insight in writing this manuscript.

**Conflict of Interest:** None

**Grants/Funding:** None

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