

Non-Operative Treatment of 3-Part and 4-Part Proximal Humerus Fractures and its Related Functional Aftermath

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ABSTRACT

Objective: To assess the functional outcomes of noninvasive treatment for proximal humerus three parts and four parts fracture.

Study Design: Prospective-cohort study

Place and Duration of Study: Department of Orthopaedics, Sialkot Medical College, Sialkot from 1st January 2021 to 31st March 2022.

Methodology: Fifty patients between 56-65 years and radiographically both anterior and lateral views were taken. There was a follow up plan in each patient at half month, three months, six months and a year with repeated imaging. Oxford-Shoulder Score and EuroQol-5 Dimensions-3 Levels was used for finding primary functional results while secondary functional outcomes were score through Visual Analog Scoring and University of California at Los Angeles Shoulder Score.

Results: The mean of the patients was 62.3±5.6 years with more females (70%) than males. Majority of the cases had a high incidence of fall due to feeling low in energy. The comparison of Oxford-Shoulder Score (OSS) and EQ 5D 3L method showed a high significance within each variable. Comparative imaging at follow ups have showed timely fixation of the humerus with non-invasive procedure with improved OSS values. One-year scores for Oxford-Shoulder Score were 33.1 with 95% confidence of interval while it was 0.59 for EQ-5D-3L. Considering the secondary outcomes it was noticed that mean outcomes score of treatment was 32.1 while visual analogue scale (VAS) pain score was 32.1 with 59.2 as VAS satisfaction score.

Conclusion: Good functional outcome of displaced 3-part and 4-part fracture of proximal humerus.

Keywords: Noninvasive treatment, Proximal humerus fractures, Osteoporosis Neers classification, Related functional aftermath, Functional outcome

INTRODUCTION

There has been advancement in orthopedic surgical procedures with variation and introduction of new and more non invasive procedures (NIP). In fixation of the proximal humeral-fractures (PHF) the non invasive methods are also given priority with research advancement. The incidence of PHF is highest in elderly population.¹ With the advancing age the concerns about using invasive methods becomes crucial due to osteoporosis, the involvement of long term anesthesia as well as risk of implant failure. However many studies still debates on usage of invasive PHF than non invasive methods.^{2,3}

Various fractures have been reported to be the consequence of PHF with a prevalence between 50 to 60 percent. Fractures related with the tuberosities as well as surgical-neck are well known. Such fracture persists and responds to NIP better than invasive techniques. Primarily collar as well as cuff is applied for pain relieving actions. Shoulder exercise protects from the freezing of the shoulder and physiotherapy.^{4,6}

The reliability of the results with non invasive treatment approach has been detailed in various literatures with satisfactory results in keeping bone health.⁷⁻⁹ Despite the fact that NIP has been repeatedly used in various treatment protocols for the PHF still the literature available in this context is not well detailed with a very slight focus on the health related outcomes and prognosis.¹⁰

The present study was designed to assess the functional outcomes of the NIP in fractures related with the PHF. The results of this research would be able to detail the long term outcomes of PHF and the reliability of the NIP for treatment of this condition.

MATERIALS AND METHODS

This prospective-cohort study was conducted at Department of Orthopaedics, Sialkot Medical College, Sialkot from 1st January 2021 to 31st March 2022. Fifty patients between 56-65 years were enrolled. Those patients who were having any fractures of proximal humerus due to pathological reasoning were excluded from the study. Square methodology was applied for categorization considering presence or absence of tuberosity. Tuberosity greater

than 1cm and or separation of humeral head from shaft or a displacement with 160-degree angular orientation were taken under exclusion. Moreover, patients already treated through surgical method and had higher or lower tuberosity was also not included in the study. All-inclusive patients were enrolled within 2 weeks of their injury. An informed consent was taken from each patient and demographic details as well as comorbidity assessment, imaging results were recorded. Clinical assessment was complete on basis of signs and symptoms presented of the patients. Magnetic resonance index was performed for imaging and reliable evaluation of the condition. There was a follow up plan in each patient at half a month, a year and two years. This follow-up included repeated imaging scans performance for bone comparison. There were total 60 patients under enrolment for PHF and were given a sling to wear for a period of three weeks. There were two analysis methods applied for measuring functional outcomes. For primary outcome measures Oxford-Shoulder Score (OSS) involving 12 score with zero to forty eight as range was used comprising on pain scoring in addition to daily activity scores. This was followed with EuroQol-5 Dimensions-3 Levels (EQ-5D-3L) scoring with 5domains for assessments of health and included anxiety in addition to pain self-care and mobility. Its range was 20.543-1.0 score. Increased score interpreted better results while negative score meant worst related outcomes. Secondary-outcomes were observed through Visual Analog Scale (VAS) protocol which is a scoring method for pain and where 100 mm scaling is applied. University of California at Los Angeles Shoulder Score (UCLA) method was also made in use. The date was entered and statistically analyzed through using SPSS version 26.0 by using Pearson correlation method. P value less than 0.001 was considered significant.

RESULTS

The mean of the patients was 62.3±5.6 years with more females (70%) than males. Majority of the cases had a high incidence of fall due to feeling low in energy. The comparison of OSS and EQ 5D 3L method showed a high significance within each variable. There

were very less proportion of patients who had a previous history of the shoulder fracture (Table 1).

The number of the patients presented mean value of 16.7 patients as with head-shaft translation. Tuberosity been presented in 15 cases while neck fractures seen in 36% of the cases. There were 44 cases which were residing in the hospital after getting NIP showing their low energy status during the injury time (Fig. 1). The MRI imaging has presented images with PHF. Comparative imaging at follow ups have showed timely fixation of the humerus with NIP with improved OSS values. More than 90% patients were satisfied with their way of treatment (Fig. 2).

Table 1: Comparison of Age, gender and clinical history within various scoring methods (n=50)

Variable		OSS	EQ5D3L	P value
Age (years)	62.3±5.6	-0.24	-0.27	<0.001
Female	35(70%)	32.3	0.55	
Male	15(30%)	34.8	0.66	
Earlier shoulder history	5(10%)	26.4	0.66	
Injury by fall	46(92%)	33.2	0.57	
Movement	38(76%)	36.6	0.64	

Table 2: Comparison of primary functional outcomes with various scoring methods

Out comes	Value at 1 year
Primary outcome	
OSS	33.1
EQ-5D-3L	0.59
Secondary outcome	
Pain VAS	32.1
Health VAS	68
Treatment Satisfaction VAS	59.2
UCLA activity score	20.4

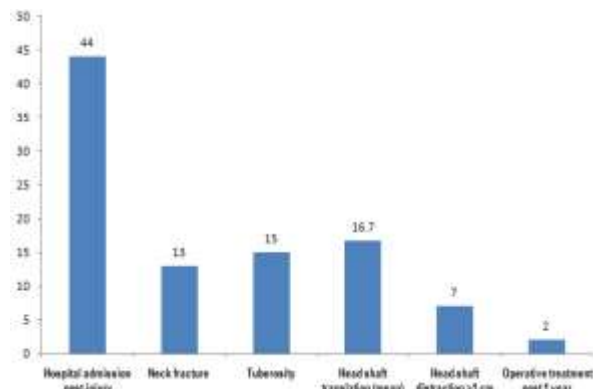


Fig. 1: Number of various clinical conditions and hospital admission

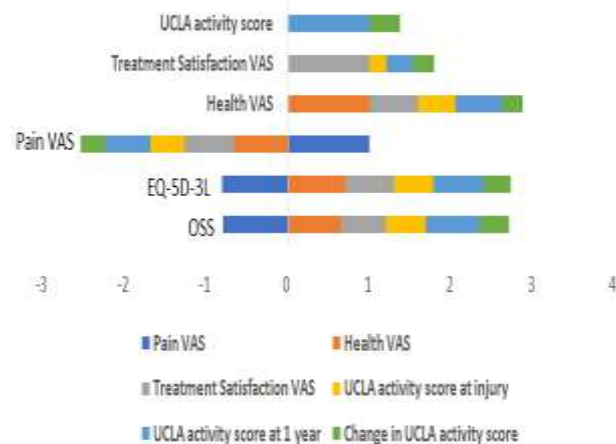


Fig. 2: Comparison of secondary functional outcomes

One-year scores for OSS were 33.1 with 95% confidence of interval while it was 0.59 for EQ-5D-3L. Considering the secondary outcomes it was noticed that mean outcomes score of treatment was 32.1 while VAS pain score was 32.1 with 59.2 as VAS satisfaction score. The mean one-year VAS health score was 68 and UCLA activity score as 20.4 which was lower than the one before injury. The person correlation analysis for primary and secondary functional outcomes presented that the score of OSS was 33.1 at a year time while of EQ 5D 3L had a score of 0.59 (Table 2). The primary and secondary functional outcomes presented the results as UCLA score as 32.1 at completion of a year follow-up. The pain scoring estimated through VAS has presented 68 score within a year of follow-up (Fig.3)



Fig. 3: MRI image of proximal humerus fixation

DISCUSSION

Non-invasive procedure is considered as a substantial non operative protocol which is widely used in treating PHF especially in adult populations. It has been reported in various literature that the reliability of this process is significantly high with long term beneficial outcomes.¹¹

The mean age of the patients was 62.3±5.6 years which is similar to earlier reported literature.¹² There are studies which have also published their data in early age groups but their results were not clearly identifying the significant of NIP in proximal humerus fractures as did the current research.¹³⁻¹⁶ Brouwer et al¹⁷ have also reported displacement of either 3 or 4 part of PHF where this study has reported for both. The results of the present study matched with already reported data in this context.¹⁷

Versteegh et al¹⁸ have also elaborated the fact that patient who are above the age of the late sixties do not get beneficial outcomes through NIP for PHF. Various researches have detailed that the decrease in EQ-5D was seen at an infrequent level in patients an age above late sixties.¹⁷⁻²⁰ A study of Versteegh et al¹⁸ and of Brouwer et al¹⁷ also has reported similar finding.

CONCLUSION

There is a significant health functional outcome for long term proximal humerus fracture though non invasive procedure where severe injuries and displacement are difficult to address, while displacement can be observed through imaging and better positioning of the humer bone.

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