



Original Article

Clinical Profile of Patients with 3-Part and 4-Part Proximal Humerus Fractures Attending Tertiary Care Hospital

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ABSTRACT

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Women have a higher vulnerability to PHFs compared to men, and the occurrence is most prevalent in females who are 85 years old or older. PHFs commonly occur through two distinct injury mechanisms, with high-energy injuries being more prevalent among younger individuals and low-energy injuries being more common among the elderly. The occurrence rates of PHFs have risen in the last thirty years. Upon admission, demographic data, historical information, clinical examination findings, and investigation details were documented in the research proforma. All patients who visited the orthopaedic department throughout the study period and were scheduled for conservative treatment were included in the study. The patients were presented with shoulder exercises, physiotherapy, and treated with analgesics. Out of 75 study participants, 20.0% (15 individuals) had hypertension, 10.7% (8 individuals) had diabetes and 3% (2 individuals) had bronchial asthma. Only 5% had coronary vascular disease. About 13% had the habit of consuming alcohol, while 10.7% (8 individuals) were smokers. In the present study, 57.3% (43 individuals) had a 3-Part fracture, while 42.7% (32 individuals) had a 4-Part fracture.

Keywords: Clinical Profile, 3-Part And 4-Part Proximal Humerus Fractures, PHF.

INTRODUCTION

They are a prevalent form of fracture, especially among elderly individuals, making up around 5–6% of all fractures. The prevalence of PHFs exhibits regional disparities, with rates ranging from 45.7 to 60.1 per 100,000 person- years. Women have a higher vulnerability to PHFs compared to men, and the occurrence is most prevalent in females who are 85 years old or older. PHFs commonly occur through two distinct injury mechanisms, with high-energy injuries being more prevalent among younger individuals and low-energy injuries being more common among the elderly. The occurrence rates of PHFs have risen in the last thirty years.^{1,2}

In 1934, Ernest Codman developed an initial categorization scheme for PHFs. His categorization failed to consider fracture displacement or distinguish between surgical and anatomic neck fractures.

Muller originally described the AO classification for proximal humerus fractures in 1988. It separates kinds of fractures into the typical 27 subcategories according to the location, kind, and seriousness of the fracture. In therapeutic settings, this approach is seldom employed. The Kocher, Codman, Jakob, and Ganz systems are only a few of the many others that

have been detailed.³

Neer categorization is the most popular, though. In his practical and theoretical examination of the proximal humerus, Neer distinguishes four "parts": the humeral shaft, the articular segment (head), the lesser tuberosity, and the greater tuberosity.

In 2004, Hertel et al. created the Codman-Hertel classification system to measure factors that could predict humeral head fracture-induced avascular necrosis. Fracture-induced humeral head ischemia was initially described by Hertel's group as being significantly correlated with the shape of the PHF. According to research by Majed et al., who looked at the reliability of PHF categorization methods between raters, Codman-Hertel had the best and AO/OTA the worst.⁴

Methodology:

STUDY DESIGN:

An observational analytical study

STUDY AREA:

The research study included individuals who were diagnosed with a proximal humerus fracture and were taken to the orthopaedics department.

STUDY PERIOD AND DURATION:

The research was conducted over a period of one year and four months

STUDY POPULATION:

Male and female patients with 3-part and 4-part proximal humerus fractures who meet the specified criteria and are admitted to the Department of Orthopaedics

SAMPLE SIZE CALCULATION

In 2016, Corley et al conducted a study which revealed that the occurrence rate of proximal humerus fracture was five percent. [23]

Formula:

$$N = 4 * p * q / d^2$$

Where,

P = prevalence

Q = compliment of p

D = absolute error (which is 5 percent) N = 75

Therefore, a minimum sample size of 75 was necessary to achieve a 95 percent confidence interval. The sample size was determined using nMaster software Version 2.0 by inputting the specified parameters into the formula mentioned above.

INCLUSION CRITERIA:

- All patients with 3-part and 4-part proximal humerus fracture
- Both gender of age more than 60 years
- Patients within minimum of one year duration from the period of study.

EXCLUSION CRITERIA:

- Patients with pathological fracture
- Patients underwent surgical treatment
- Patients with open fracture
- Patients with cognitive dysfunction
- Patients had a history of stroke and hemiplegia.

SAMPLING METHOD:

All consecutive patients diagnosed with 3-part and 4-part proximal humerus fracture between August 2022 and January 2024, who were hospitalized to the Orthopaedics department at the Tertiary Care Hospital in Bangalore, and had identical symptoms.

DATA COLLECTION PROCEDURE

After receiving appropriate approval and clearance, the patients who met the inclusion criteria were enrolled in the study after obtaining informed consent.

Upon admission, demographic data, historical information, clinical examination findings, and investigation details were documented in the research proforma.

All patients who visited the orthopaedic department throughout the study period and were scheduled for conservative treatment were included in the study. The patients were presented with shoulder exercises, physiotherapy, and treated with analgesics.

All routine investigations were sent and collected. Radiological investigations like chest x-ray, shoulder xray etc were carried out. Then all the patients were followed up after 6 months.

Assessed for functional and radiological outcome

Assessment of pain relief was done using VAS scoring

RESULTS

Table 1: Distribution of the study participants according to their age (n = 75)

Age		
Mean		72.56
Median		73.00
Mode		74
Std. Deviation		7.343
Minimum		61
Maximum		91
Percentiles	25	65.00
	50	73.00
	75	78.00

The table summarizes the age distribution of a group, with an average age of 72.56 years and a median of 73 years. The most frequently occurring age (mode) is 74 years. Ages range from 61 to 91 years, with a standard deviation of 7.343, indicating variability around the mean. The 25th percentile is 65 years, the 50th percentile (median) is 73 years, and the 75th percentile is 78 years.

Table 2: Distribution of the study participants according to their age group (n= 75)

Age group		Frequency	Percent
	61 to 70 years	26	35
	71 to 80 years	40	53
	More than 80 years	9	12
	Total	75	100.0

The study included 75 participants, distributed across three age groups. Participants aged 61 to 70 years comprised 35% (26 individuals) of the sample. The largest group, those aged 71 to 80 years, made up 53% (40 individuals). Participants older than 80 years represented 12.0% (9 individuals) of the total. Thus, the distribution indicates a majority of participants fall within the 71 to 80 years age range.

Table 3: Distribution of the study participants according to the presence of swelling (n = 75)

		Frequency	Percent
Swelling	No	35	47
	Yes	40	53
	Total	75	100.0

Out of 75 study participants, 47% (35 individuals) did not have swelling, while 53% (40 individuals) did. This indicates that more than half of the participants experienced swelling.

Table 4: Distribution of the study participants according to their ability to move shoulder joint (n = 75)

Ability to move shoulder joint		Frequency	Percent
	No	36	48.0
	Yes	39	52.0
	Total	75	100.0

Among the 75 study participants, 48.0% (36 individuals) were unable to move their shoulder joint, while 52.0% (39 individuals) retained the ability to move their shoulder joint. This shows a nearly even distribution, with a slight majority being able to move their shoulder joint.

Table 5: Distribution of the study participants according to the presence of hypertension (n = 75)

		Frequency	Percent
Hypertension	No	60	80.0
	Yes	15	20.0
	Total	75	100.0

Out of 75 study participants, 80.0% (60 individuals) did not have hypertension, while 20.0% (15 individuals) had hypertension. This indicates that a majority of the participants were free of hypertension.

Table 6: Distribution of the study participants according to the presence of diabetes (n = 75)

		Frequency	Percent
Diabetes	No	67	89.3
	Yes	8	10.7
	Total	75	100.0

Among the 75 study participants, 89.3% (67 individuals) did not have diabetes, while 10.7% (8 individuals) had diabetes. This indicates that the vast majority of participants were not diabetic.

Table 7: bronchial asthma (n = 75)

		Frequency	Percent
Bronchial asthma	No	73	97
	Yes	2	3
	Total	75	100.0

Of the 75 study participants, 97% (73 individuals) did not have bronchial asthma, while 3% (2 individuals) had bronchial asthma. This indicates that nearly all participants were free of bronchial asthma.

Table 8: tuberculosis (n = 75)

		Frequency	Percent
Tuberculosis	No	75	100.0

All 75 study participants (100.0%) did not have tuberculosis, indicating that none of the participants were affected by this condition.

Table 9: Distribution of the study participants according to the presence of distal pulsation (n = 75)

		Frequency	Percent
Distal pulsation	Present	75	100.0

All 75 study participants (100.0%) had distal pulsation present. This indicates that every participant exhibited this condition.

Table 10: Distribution of the study participants according to the presence of coronary vascular disease (n = 75)

		Frequency	Percent
Coronary vascular disease	No	71	95
	Yes	4	5
	Total	75	100.0

Out of 75 study participants, 95% (71 individuals) did not have coronary vascular disease, while 5% (4 individuals) did. This shows that a small minority of participants were affected by coronary vascular

Table 11: smoking (n = 75)

		Frequency	Percent
Smoking	No	67	89.3
	Yes	8	10.7
	Total	75	100.0

Out of 75 study participants, 89.3% (67 individuals) did not smoke, while 10.7% (8 individuals) were smokers. This

shows that a large majority of participants were non-smokers.

Table 12: Distribution of the study participants according to the presence of spouse with them (n = 75)

		Frequency	Percent
Spouse alive	No	9	12.0
	Yes	66	88.0
	Total	75	100.0

Among the 75 study participants, 88.0% (66 individuals) had their spouse alive, while 12.0% (9 individuals) did not. This indicates that most participants were living with their spouse.

Table 13: Distribution of the study participants according to the local rise in temperature (n = 75)

		Frequency	Percent
Local rise in temperature	No	7	9.3
	Yes	68	90.7
	Total	75	100.0

Out of 75 study participants, 90.7% (68 individuals) experienced a local rise in temperature, while 9.3% (7 individuals) did not. This indicates that a significant majority of participants reported a local rise in temperature.

Table 14: Distribution of the study participants according to the presence of tenderness (n = 75)

		Frequency	Percent
Tenderness	No	1	1.3
	Yes	74	98.7
	Total	75	100.0

Among the 75 study participants, 98.7% (74 individuals) experienced tenderness, while only 1.3% (1 individual) did not. This indicates that nearly all participants reported tenderness.

Table 15: Distribution of the study participants according to the type of fracture (n = 75)

		Frequency	Percent
Type of fracture	3-Part	43	57.3
	4-Part	32	42.7
	Total	75	100.0

Out of 75 study participants, 57.3% (43 individuals) had a 3-Part fracture, while 42.7% (32 individuals) had a 4-Part fracture. This shows that 3-Part fractures were more common among the participants.

DISCUSSION

A complete medical history and physical examination are the first steps in diagnosing a fracture in the proximal humerus. The shoulder itself may get all the attention, but any damage to the surrounding shoulder girdle, upper limbs, or cervical spine should be seriously considered. Falling while standing is the most prevalent cause among women who are elderly and have osteoporosis. Less frequently, high-energy traumas like falls from great heights, car accidents, convulsions, and electric shock can induce this condition. Glenohumeral dislocation can occur simultaneously.⁵ It is critical to identify a dislocation of the PHF. Neoplasms and metabolic bone diseases can cause pathologic proximal humerus fractures. Young patients with this kind of injury and a low-energy mechanism require extra care in this regard.⁶

In order to make informed clinical management decisions, it is necessary to evaluate the patient's functional capacity, hand dominance, functional demand, and ability to engage in rehabilitation. It is usual for patients suffering from a proximal humerus fracture to exhibit symptoms such as a painful, ecchymotic shoulder, reduced mobility, and swelling. Look for ecchymosis, previous surgical scars, and related lesions on the skin. The glenohumeral joint can dislocate if there is a noticeable abnormality. It is critical to do a thorough neurovascular evaluation, paying special attention to the axillary nerve. In extremely rare cases, such as those involving high-energy injuries, acute neurovascular impairment may signal the necessity for urgent surgical intervention. Hypoesthesias, weak distal pulses, and slow capillary refill are symptoms of vascular impairment.^{7,8}

CONCLUSION

Out of 75 study participants, 20.0% (15 individuals) had hypertension, 10.7% (8 individuals) had diabetes and 3% (2 individuals) had bronchial asthma. Only 5% had coronary vascular disease. About 13% had the habit of consuming alcohol, while 10.7% (8 individuals) were smokers.

In the present study, 57.3% (43 individuals) had a 3-Part fracture, while 42.7% (32 individuals) had a 4-Part fracture.

REFERENCES

1. Upper Limb [Internet]. Clinical Gate. 2015 [cited 2024 Jul 12]. Available from: <https://clinicalgate.com/upper-limb-2/>
2. Baker HP, Gutbrod J, Cahill M, Shi L. Optimal Treatment of Proximal Humeral Fractures in the Elderly: Risks and Management Challenges. *Orthop Res Rev.* 2023 Jun 26;15:129–37.
3. Neer CS. Displaced proximal humeral fractures: part I. Classification and evaluation. 1970. *Clin Orthop.* 2006 Jan;442:77–82.
4. Hertel R, Hempfing A, Stiehler M, Leunig M. Predictors of humeral head ischemia after intracapsular fracture of the proximal humerus. *J Shoulder Elbow Surg.* 2004;13(4):427–33.
5. Majed A, Macleod I, Bull AMJ, Zyto K, Resch H, Hertel R, et al. Proximal humeral fracture classification systems revisited. *J Shoulder Elbow Surg.* 2011 Oct;20(7):1125–32.
6. Robinson CM, Seah M, Akhtar MA. The epidemiology, risk of recurrence, and functional outcome after an acute traumatic posterior dislocation of the shoulder. *J Bone Joint Surg Am.* 2011 Sep 7;93(17):1605–13.
7. Hofman M, Grommes J, Krombach GA, Schmidt-Rohlfing B. Vascular injury accompanying displaced proximal humeral fractures: two cases and a review of the literature. *Emerg Med Int.* 2011;2011:742870.
8. Naranja RJ, Iannotti JP. Displaced three- and four-part proximal humerus fractures: evaluation and management. *J Am Acad Orthop Surg.* 2000;8(6):373–82.