ORIGINAL ARTICLE

NORTH BENGAL MEDICAL COLLEGE JOURNAL [2023], VOL., 9, No. 1 : 13-18

Comparative study between the Conservative and Surgical Management of Proximal Humeral Fractures

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ARTICLE INFO

Article history:
Received: 15 October 2022
Accepted: 09 December 2022

Online:
www.nbmc.ac.bd

Keywords:
Humeral fracture, Plating, Shoulder score

ABSTRACT

Introduction: *Proximal humeral fractures were treated conservatively in the past and often had compromised functional results. With the advancement of surgical techniques, these fractures, especially displaced one, are now more often managed operatively to meet the needs of the patient, and provide early rehabilitation and better functional outcome. This study was aimed to compare the outcome of surgically and conservatively managed proximal humeral fractures.* ***Methods:*** *This observational study was conducted in the Department of Orthopedics and traumatology of North Bengal Medical College and Hospital, Sirajganj, Bangladesh, from January, 2019 to December, 2022. A total of 36 patients with proximal humeral fractures were enrolled for this study. Twenty (n-20) patients were treated surgically and sixteen (n-16) were managed conservatively. Management outcome was observed by Swanson Shoulder Scoring System.* ***Results:*** *Maximum patients were male and majority of them belonged to >50 years of age. Left sided proximal humeral fractures were common and frequent causes were road traffic accident. In surgical management, 10 (50%) patients had a good outcome but 6 (30%) patients had an excellent outcome. However, in case of conservative management, the majority of the patients had good outcome 7 (43.75%).* ***Conclusion:*** *Finally better outcome was observed in the surgically managed patients having proximal humeral fractures. This success of the result depends on early surgery, good preoperative planning, minimal soft tissue intervention, stable reduction, supervised postoperative exercise and regular follow-up.*

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INTRODUCTION

Proximal humeral fractures are the second most common upper-extremity fracture and the third most common among the all fractures which account for about 5% of all injuries to the appendicular skeleton.[1] In young individuals, high-velocity trauma is the cause of these fractures, whereas a simple fall can be the cause in older individuals because of osteoporosis. Most of these fractures are stable, non-displaced, or minimally displaced and can be treated non-operatively.[2] Approximately 20% of displaced proximal humeral fractures may benefit from operative treatment.[3] Many surgical management techniques have been described, but no single approach is considered the standard of

care.[4] Many techniques have developed to treat displaced or comminuted proximal humerus fractures. Percutaneous pinning and intramedullary nailing have been employed with generally satisfactory results and carry a low risk for infection, soft tissue disruption, and blood loss.[5] However, many of these constructions are less stable than open reduction and internal fixation (ORIF) with locking plates.[5,6] ORIF with locking plating are promising options in treating displaced, comminuted proximal humerus fractures. This approach offers several advantages compared to traditional open techniques.[7] These benefits include improved fracture stability because of the fixed-angle construct, particularly in more comminuted fracture patterns and osteoporotic bone, and a short period of immobilization with the opportunity for earlier rehabilitation.[8] The aim of this study was to compare the results of surgically and conservatively managed proximal humeral fractures.

METHODS

This observational study was conducted in the Department of Orthopedics and traumatology of North Bengal Medical College and Hospital, Sirajganj, Bangladesh, from January, 2019 to December, 2022. A total of 36 patients with proximal humeral fractures were enrolled for this study. Twenty patients were treated surgically and sixteen were managed conservatively. Inclusion criteria were 1. Patients of all ages, 2. Patients with an injury duration <2 weeks and 3. Patients with Neer's two-part, three-part and four-part fractures and fracture-dislocation. Exclusion criteria were 1.Patients with any medical or surgical illness that may interfere with surgical procedures and anaesthesia, 2.Patients with previous fractures of the involved shoulder or any other shoulder pathology and a history of previous neuromuscular weakness.

Neer's trauma series X-rays were done to study the type of injury, which include (a) AP view and (b) Axillary view of shoulder joint. The indication for surgery was severely displaced two-part fractures not reducible by conservative method, displaced three-part fractures with the rotational displacement of an articular fragment, displaced four-part fractures with mal-alignment, and fractures dislocation. Synthes proximal humerus locking plate was used for all patients Figure 1 (A-D).

Figure 1: Preoperative and post-operative X-ray images with Synthes proximal humerus locking plate

For conservative management, the most important criteria was examining the proximal part of the humerus, which could be moved with most of the motion occurring at the glenohumeral joint and not at the fracture site. All fractures were considered stable if the shoulder motions are tolerated by the patients during its range of movement. The involved extremity was immobilized in an arm-to-chest bandage or shoulder immobilizer to relieve pain. At the three weeks, active and assisted physiotherapy of the shoulder was started under the supervision and guidance of a physiotherapist in the outpatient department (OPD), in the form of circumduction, wall clumping, rope pulling, back wiping, external rotation, and pendulum exercises. These exercises for the shoulder were started with the patient in the supine position for forward elevation, external rotation, and internal rotation. All patients were advised to follow up in 4 weeks, 6 weeks, 12 weeks, and 18 weeks. Patients were evaluated for functional outcome by using the Swanson Shoulder Scoring System. Result of the management has been expressed as per Swanson Shoulder Scoring system (Table I). Functional outcome was graded into Excellent, Good, Fair and Poor on the basis of three constant scores regarding range of motion (Table II), pain score (Table III), activity of daily living (Table IV) of the patients.

Table I:Swanson Shoulder Score (3x10=30 points)

Outcome	Shoulder Score Points
Poor	<18
Fair	18-22.9
Good	23-27.9
Excellent	28-30.0

Table II: Range of Motion (ROM)

	ROM Score (10 points)	
	Points	ROM
Abduction (2 points)	0.4	<20°
	0.8	21°-40°
	1.2	41°-60°
	1.6	61°-80°
	2	>80°
Adduction (1 point)	0.2	<10°
	0.4	11°-20°
	0.6	21°-30°
	0.8	31°-40°
	1	>40°
The extension (1 point)	0.2	0°
	0.4	1°-10°
	0.6	11°-20°
	0.8	21°-30°
	1	>30°
Flexion (4 points)	0.8	<20°
	1.6	21°-40°
	2.4	41°-60°
	3.2	61°-80°
	4	>80°
Internal rotation (1 point)	0.2	<20°
	0.4	21°-40°
	0.6	41°-60°
	0.8	61°-80°
	1	>80°
External rotation (1 point)	0.2	0°
	0.4	1°-10°
	0.6	11°-20°
	0.8	21°-30°
	1	>30°

Table III: Pain score (PS)

Pain Score (10 points)	
Degree	Points
Pain-free	<10
Minimal pain after heavy work	8
Pain with daily activity	6
Pain with shoulder motion	4
Pain at rest	2

Table IV: Activities of daily living (ADL)

ADL Score (10 points)	
Activity	Points
Independent, normal activities	10
Slight restrictions for heavy work overhead	8
Most ADL	6
Light activities only, assistance for some ADL	4
Inability to use the shoulder for function	2

All data were presented in a suitable table and chart according to their affinity. Informed written consent was taken from the study subjects. All calculations were performed manually.

RESULTS

In this study, most of the patients (16, 44.44%) were belonged to more than 50 years age group (Table V). Among the total patients, maximum (22, 61.11%) were male (Figure 2).

Table V: Age distribution of the study population (n-36)

Age range (Year)	Frequency	Percentage
<40	13	36.11%
40-50	7	19.44%
>50	16	44.44%
Total	**36**	**100 %**

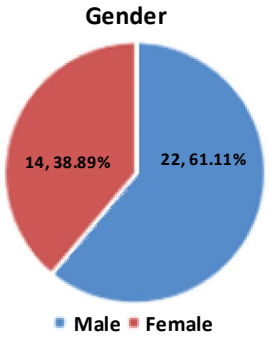

Figure 2: Gender distribution of the patients (n-36)

In the affected patients major cause of fracture was road traffic accident (21, 58.33%), and left sided fracture was common (22, 61.11%) (Table VI).

Table VI: Mode of injury and fracture side

Variables	Frequency	Percentage
Mode of injury		
Road traffic accident	21	58.33%
Fall from height	7	19.44%
Simple fall on the shoulder	3	8.33%
Fall on an outstretched hand (indirect injury)	3	8.33%
Sports Injury	2	5.56%
Side affected		
Right	14	38.89%
Left	22	61.11%

Outcome of the management has been expressed as per Swanson Shoulder Scoring system. Functional outcome was graded into Excellent, Good, Fair and Poor on the basis of three constant scores regarding range of motion, pain, activity of daily living of the patients.

Among the total surgically managed patients, 10 (50.00%) had a good outcome, 6 (30.00%) had an excellent outcome, 3 (15.00%) had a fair outcome but only 1 (5%) patient had a poor result. However, in conservative management, the majority patients (7, 43.75%) had good outcome, 6 (37.50%) patients had fair outcome and only 1 patient (6.25%) had poor outcome (Table VII).

Table VII: Functional outcome of the study

Outcome	Surgically managed (n-20)		Conservatively managed (n-16)	
	Frequency	Percentage	Frequency	Percentage
Excellent	6	30.00%	2	12.50%
Good	10	50.00%	7	43.75%
Fair	3	15.00%	6	37.50%
Poor	1	5.00%	1	6.25%

DISCUSSION

Proximal humeral fractures constitute 4-5% of all fractures of long bones. It represents 2-3% of the fractures of the upper limb. The incidence of these fractures is 73 per one lakh population, among them, 75% fractures are seen in the elderly, of which 80-85% are amenable to conservative treatment and remaining 15-20%

are significantly displaced and require some internal fixation.[9,10] Researcher[11] stated that the predominance of proximal humeral fractures in females in an elderly age group. However, Jain et al.[12] revealed that male to female ratio was 1:0.8. On the other hand, in our study, the male-to-female ratio was 1.6:1 (22:14) which is a bimodal presentation among the adolescents and younger middle age patients those are more prone to high-velocity injuries. But these fractures are seen in elderly patients (>50 years) due to osteoporosis.

In this study, leading fracture side was left and left and right ratio was 1.57:1, which is supported by Anand et al.[13] There was no bilateral involvement in any patient.

The mode of injury commonly observed in this study was road traffic accidents (21, 58.33%) followed by fall from height (7, 19.45%). These observations were found to be consistent with the findings of Herscovici et al.[10] However, fast pace modern life and accelerated travel increase the number of fractures.

In this study, surgically managed 10 (50%) patients had a good outcome, 6 (30%) patients had an excellent outcome, 3 (15%) patients had fair outcome and only 1(5%) patient had a poor result. Anand et al.[13] observed both of excellent and good outcomes (30.8%) in surgically managed patients, 38.4% patients had fair outcome and none of the patient showed poor outcome. This study revealed better surgical outcome than Anand et al.[13] due to early surgery, minimal soft tissue interference and good patient's compliance. In the present study, in conservative management, the majority of the patients had good (7, 43.75%), fair 6 (37.50%), excellent 2 (12.5%) and only 1 (6.25) patient had poor outcome. On the other hand, Anand et al.[13] demonstrated that there was no excellent outcome but 30.8% had poor outcome. They also observed good and fair outcomes in 15.4% and 53.8% cases respectively. Good patient's compliance and early start of passive exercise are major contributory factors for better conservative outcome in this study. These findings are consistent with the observations of other studies.[14-16]

CONCLUSION

This study concluded that, the surgically managed fractures have better outcome than conservative management for early and healthy recovery.

Limitations: This study may not represent the real scenario of whole country because of a smaller number of study subjects, limited area of observation and short period of study.

Acknowledgements: Authors are grateful to the patients who participated in this study with their full cooperation.

Conflict of interest: Not declared.

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