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THE OUTCOME OF THE TREATMENT OF PROXIMAL HUMERAL FRACTURES FIXED BY LOCKING PROXIMAL HUMERAL PLATE (LPHP)

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ABSTRACT

Objective: In this study our main aim is to assess the outcome of the treatment of proximal humeral fractures fixed by Locking Proximal Humeral Plate (LPHP). **Method:** This prospective observational study was carried out at Department of Orthopaedic Surgery, Chittagong Medical College Hospital, Chittagong. All the 30 patients are above 18 years of age and was admitted in different units of Orthopaedic ward of CMCH with displaced fractures of the proximal humerus of both sexes. **Results:** During the study, 80 percent cases locking proximal humeral plate was fixed within 3 weeks of occurrence of fracture while in the rest (20%) of cases, fixation was done after 3 weeks of the fracture. The mean interval between injury and plate fixation was 18 days and the minimum and maximum intervals were 2 and 36 days respectively. Vast majority (76.66 %) of injury were caused by low velocity injury i,e; due to simple fall and 7(23.33%) was of high velocity trauma i ,e ; road traffic accident and fall from height. During the course of the study 8(26.66%) patients developed superficial infection, 2(6.7%) patients developed delayed union, 4(13.3%) patients subacromial impringement. loosening of head screw, perforation of the head by screw was seen in 1(6.7%) patients each. The outcome of the patients was graded according to constant score criteria as good (>70) in 14(46.6%) patients, Fair (56-70) in 11 (36.66%) patients and poor (0-55) in 5(16.66%). **Conclusion:** Locking Proximal Humeral Plate (LPHP) in the treatment of unstable proximal humeral fracture minimizes the hospital stay and reduces the economic burden and enhances early return to work. So, it is an excellent method of proximal humeral fracture fixation in a developing country like Bangladesh.

KEYWORDS: Proximal humeral fractures, locking proximal humeral plate (LPHP), plate fixation.

INTRODUCTION

Incidence of proximal humeral fractures is between 4% to 5% of all fractures.[1, 2] They occur most commonly in the elderly. In people older than 60 years, the fractures of the proximal humerus is more frequent than fractures of the hip region.[3] In the younger patients, high energy trauma is the cause and displacement is often more severe. In the elderly, women become more susceptible to fracture secondary to the effect of osteoporosis. Some patients have an associated dislocation. Most of these fractures are stable and can be treated conservatively. However unstable displaced fractures have high morbidity, especially in older patients.

Operative treatment of proximal humerus fractures remains a significant challenge. These fractures are frequently comminuted and are often associated with poor quality of bone. Accurate reduction and stable fixation of proximal humeral fractures remain a technically demanding procedure in shoulder surgery. The introduction of new implants has created additional controversy regarding the best possible way for providing stable fixation.

The Neer system is commonly used to classify the proximal fractures. It is based on the presence or absence of displacement or angulation of one or more of four major segments of the proximal humerus.[4] Based on the epiphyseal line the four major segments of the proximal humerus are the anatomical head, the greater and lesser tuberosities, and the proximal shaft. Associated anterior or posterior dislocation of the humeral head can be easily incorporated into this classification system.

Over the last decades several techniques have been applied to the treatment of proximal humeral fractures.

Widely accepted is the initiation of a conservative treatment regimen for undisplaced fractures,[5] however the ideal treatment for displaced fractures, especially three and four part fractures, is still the center of scientific debate. Many different implants have been tested and investigated, demonstrating lack of concrete results.[6] In this study our main aim is to assess the outcome of the treatment of proximal humeral fractures fixed by Locking Proximal Humeral Plate (LPHP).

OBJECTIVE

- To evaluate the outcome of the treatment of proximal humeral fractures fixed by Locking Proximal Humeral Plate (LPHP).

METHODOLOGY

Study design: This was a prospective observational study.

Place of study: This study was carried out at Department of Orthopaedic Surgery, Chittagong Medical College Hospital, Chittagong.

Study population: All the patients are above 18 years of age and was admitted in different units of Orthopaedic ward of CMCH with displaced fractures of the proximal humerus of both sexes. For diagnosis Neer's classification of the proximal humerus fracture was used. Cases were selected purposively.

Sample size: Total 34 patients were enrolled in the study. Four patients were lost to follow-up. So, finally 30 patients were available for evaluation.

Inclusion criteria

Patients with following characteristics will be included in the study.

- Patients with closed displaced two, three- or four-part fractures and fracture dislocations.
- Age above 18 years.
- The patients who are mentally fit and physically alert (ASA-grorp 1-3)
- Patients without any neurovascular disorder.

Exclusion criteria

Patients with following characteristics will be excluded from the study.

- Open fracture
- Pathological fracture
- Previous shoulder surgery
- Chronic shoulder pain
- Ipsilateral upper limb fractures

Data collection

- Pretested and predesigned pro-forma containing history and examination finding of the patients and operative procedure & follow up were used to collect the data as was approved in the protocol.

Data analysis

- Once data collection was completed, data was compiled and tabulated according to key variables. Analysis of different variables were done according to standard statistical method and calculations were done using scientific calculators & using MS-excel program in computer.

RESULTS

Table-1 demonstrates age distribution where out of 30 patients 5(16.66%) were 26 to 35 years of age, 3(10%) were 36 to 45 years old, 5(16.66%) were 46 to 55 years old, 15(50%) were 56 to 65 years, and 2(6.66%) patient were 66 to75 years old. The mean age of the patients was 63.13 years and the youngest and the oldest patient was 26 years and 75 years respectively. The following table is given below in detail:

Table 1: Age distribution of the patients (n=30).

Age in years	Frequency	Percentage
26-35	5	16.66
36-45	3	10
46-55	5	16.66
56-65	15	50
66-752	26.66	6.66

Mean age = 63.13 years, Range-26 to75 yrs.

In figure-1 shows sex distribution. Majority (56.66%) of the patients were female and the rest (43.33%) male giving a male to female ratio of roughly 1.30:1. The following figure is given below in detail:

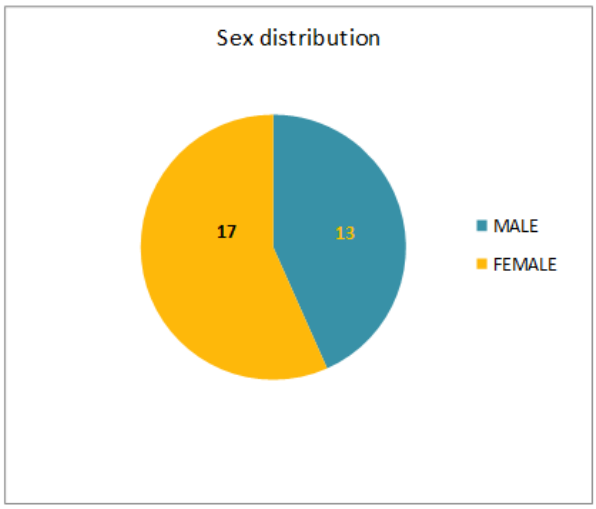

Figure 1: Pie chart shows Sex distribution of the patients (n=30).

Table 2: Time interval between injury and plate fixation (n=30).

Time interval	Frequency	Percentage
<3 weeks	24	80
>3 weeks	6	20

$P < 0.001$ in x^2 test, the result is highly significant

In table-2 shows time interval between injury and intervention or operation. In 80 percent cases locking proximal humeral plate was fixed within 3 weeks of occurrence of fracture while in the rest (20%) of cases, fixation was done after 3 weeks of the fracture. The mean interval between injury and plate fixation was 18 days and the minimum and maximum intervals were 2 and 36 days respectively.

Table 3: Distribution of the patients by mechanism of injury (n=30).

Mechanism of injury	Frequency	Percentage
High Velocity Injury	7	23.33
Low Velocity Injury	23	76.66

$P < 0.001$ in x^2 test, the result is highly significant

In table-3 shows mechanism of injury. Vast majority (76.66 %) of injury were caused by low velocity injury i,e; due to simple fall and 7(23.33%) was of high velocity trauma i ,e ; road traffic accident and fall from height.

Table 4: Distribution of patients according to forward flexion movement (n=30).

Range of motion	No	percentage
61^0-90^0		
91^0-120^0	10	33.3
121^0-150^0	16	53.3

$P > 0.001$ in x^2 test, the result is significant.

In table-4 shows forward flexion of the patients. According to the constant scoring criteria the forward of shoulder was 610 -900 in 4(3.3%) patients, 910-1200 in 10(33.3%) patients and 1210-1500 in 16(53.3%) patients.

Table 5: Distribution of patients according to power of shoulder (n=30).

Power of shoulder	Frequency	Percentage
0-10	8	26.6
11-15	14	46.8
16.20	8	26.6

$P > 0.01$ in x^2 test, the result is significant.

In table-5 shows power of shoulder. According to Constant scoring criteria power was measured with a spring balance with an average record from five pulls against a measured weight and expressed in kilograms. 8(26.6%) patients had a power of not more than 10 kg, 14(46.7%) patients had a power in between 11 to 15 kg. and 8(26.6%) patients had a power in between 16 to 20 kg.

Table 6: Distribution of patients according to status of fracture union (n=30).

Status of union	Frequency	Percentage
Yes	28	93.3
No	2	6.7

$P < 0.001$ in x^2 test, the result is highly significant

In table-6 shows fracture union. At final follow up 28(93.3%) patients showed union of the fracture and in 2(6.7%) patients union was delayed. The following table is given below in detail:

Table 6: Distribution of patients according to complication (n=15).

Complication	Frequency	Percentage
Superficial infection	8	26.66
Delayed union	2	6.7
Subacromial impringement	2	6.7
Avascular necrosis	0	0
Loosening of head screw	2	6.7
Screw perforation of head	2	6.7
Varus malunion	6	20.0
Subluxation of head	8	26.6

$P<0.01$ in x^2 test, the result is very highly significant.

In table-6 shows complication of the patients where During the course of the study 8(26.66%) paitents developed superficial infection, 2(6.7%) patients developed delayed union, 4(13.3%) patients subacromial impringement. loosening of head screw, perforation of the head by screw was seen in 1(6.7%) patients each. No patient of avascular necrosis was found. Radiological evaluation revealed Varus malunion in 6(20%) and subluxation of head in 8(26.6%) patients.

Table 7: Evaluation of outcome at final follow up (n=3).

Outcome	Frequency	Percentage
Satisfactory	25	83.33
Unsatisfactory	5	16.66

$P < 0.001$ in x^2 test, the result is highly significant.

In table-7 shows final outcome of the patients where a total of 25(83.33 %) patients were in the satisfactory group and only 5(16.66%) patients were in unsatisfactory group.

DISCUSSION

In the present series, the basis of diagnosis was clinical examination and radiological evaluation of the affected part in both antero-posterior and lateral views. All the cases were displaced two, three or four part fractures and some were also associated with dislocation of the humeral head and all were treated by open reduction and internal fixation by Locking Proximal Humeral Plate (LPHP). After operation long arm back slab or U-cast was applied and kept for 2 weeks till the stitch is removal. Pendulum exercise was started as early as 2nd week. Physiotherapy is vital for early recovery of the patient and is supervised very closely in almost all patients.

Aksu et al evaluated the complications encountered following locking plate fixation of proximal humerus fractures in 103 patients for four years.[7] Five patients (4.9%) had varus inclination, four patients (3.9%) developed varus displacement, and intra-articular screw

penetration was seen in five patients (4.9%). The remaining complications were fixation failure, implant fracture and deep infection (n=1). S¨udkamp et al. found the most common complication, noted in twenty-one (14%) of 155 patients, was intraoperative screw perforation of the humeral head.[8]

Stable forth (1984)[9] reported 100% satisfactory results with a similar technique. Neer (1970)[10] experienced 86% satisfactory results with a suture tension band technique. Jabber at al. (1992)[11] reported 95% fracture union with closed reduction and percutaneous pinning.

In the present series Locking Proximal Humeral Plate showed satisfactory result in 25(83.33%) patients and unsatisfactory result in 5(16.66%) patients (Table XIV). Although the follow-up time in this study was relatively short and it was not a randomized controlled study, the results demonstrate several benefits of the LPHP plate. Most importantly, it is easy to use, it is biological in the sense that the blood circulation to the humeral head is not compromised, the plate does not need to be configured and the angular screw fixation ensures a fixed-angle stabilization. Moreover, complications associated with the plate were few, and the functional outcome was comparable with earlier studies. Thus, many of the common complications of the conventional plating can possibly be avoided.

CONCLUSION

Locking Proximal Humeral Plate (LPHP) in the treatment of unstable proximal humeral fracture minimizes the hospital stay and reduces the economic burden and enhances early return to work. So, it is an excellent method of proximal humeral fracture fixation in a developing country like Bangladesh.

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