



Evaluation of Outcome of Non-Operative and Operative Treatment of Humeral Shaft Fractures- A Comparative Study

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Abstract

Background: Fractures of shaft of humerus are common, they account for 3% of all the orthopedic injuries, and it resulted in a significant load to society because of loss productivity and wages. Operative treatment is done with the help of external fixation, intramedullary nailing, or plate-and-screw fixation, with each method showing a high rate of union. The present study was conducted with the aim to compare the outcome of operative and non-operative management of humeral shaft fractures.

Materials and Methods: The present retrospective study was conducted in the department of orthopedics for a period of 2 years, Subjects more than 18 years were included in the study. The mechanism of trauma, treatment received and signs of radial palsy were noted in all the cases. All the data was arranged in a tabulated form and analyzed using SPSS software. Chi square test was used to determine the level significance. Probability value of less than 0.05 was considered as significant.

Results: The study enrolled 60 subjects, out of which 30 were managed operatively and 30 were managed non-operatively. The mean age of the subjects was 42.45 \pm 6.37 years. There were 35 males and 25 females. The mean total time for type A fractures was 15 weeks with the range of 12-18 weeks. The mean total time for type B fractures was 16 weeks with the range of 13-23 weeks. Delayed union was seen in a total of 20% (n=12) cases, out of which 23.3% (n=7) were that of non-operative group and 16.7% (n=5) were that of operative group.

Conclusion: According to the present study, there was no significant difference in the operative and non-operative surgical treatment modality. The study observed similar rates of delayed union and radial nerve palsy in both operative and non-operative treatment modality.

Keywords: humerus, intramedullary, orthopedics.

Introduction

Fractures of shaft of humerus are common, they account for 3% of all the orthopedic injuries, and it resulted in a significant load to society because of loss productivity and wages.^{1,2,3} Treatment options

have been greatly modified since its first description in ancient Egypt era in around 1600 BC however, basic management formulae have been consistent throughout the time.⁴ Nonoperative treatment options continue to be the

mainstay for managing majority of these injuries, with satisfactory healing in around than 90% of patients. Surgical management is generally kept for open fractures, multi trauma patients, ipsilateral humeral shaft fractures, and in cases where maintenance of alignment in functional brace is difficult.^{1,5,6} Advances in internal fixation modalities have improved surgical outcomes.^{7,8,9} Operative treatment is done with the help of external fixation, intramedullary nailing, or plate-and-screw fixation, with each method showing a high rate of union.^{6,10} Despite the numerous surgical modalities, plate and screw fixation is the gold standard for managing fixation of humeral shaft fractures. Functional management of shaft of humerus fractures is the current gold standard treatment option; however, more recent studies have questioned this management protocol for all the fractures.^{11,12} According to the study by Denard et al.¹¹ performed a retrospective comparative study comparing the operative versus non-operative management of humerus fractures. They found a significantly lower nonunion and malunion rate amongst patients undergoing operative management, although there was no significant difference in the final range of motion. The present study was conducted with the aim to compare the outcome of operative and non-operative management of humeral shaft fractures.

Materials and Methods

The present retrospective study was conducted in the department of orthopedics, SMS Medical College, Jaipur, Rajasthan, for a period of 2 years; Subjects more than 18 years were included in the study. Subjects with pathological fractures of the humerus were excluded from the study. The study was approved by the institutional ethical board. Fractures of humerus fractures are generally defined as the space between the surgical neck and immediately above the supracondylar ridge. Classification of all the fractures was done using AO system.¹⁰ Information regarding the consolidation period, site affected and delayed union were obtained from the radiographs.

Presence of cortical bridging in 3 cortices were regarded as the signs of radiological consolidation. The mechanism of trauma, treatment received and signs of radial palsy were noted in all the cases. Mechanism of trauma was divided into simple fall or high energy accident. All the data was arranged in a tabulated form and analyzed using SPSS software. Chi square test was used to determine the level significance. Probability value of less than 0.05 was considered as significant.

Results

The study enrolled 60 subjects, out of which 30 were managed operatively and 30 were managed non-operatively. The mean age of the subjects was 42.45 \pm 6.37 years. There were 35 males and 25 females.

Table 1 shows the time required for consolidation in both operative and non-operative groups. The mean total time for type A fractures was 15 weeks with the range of 12-18 weeks. The mean total time for type B fractures was 16 weeks with the range of 13-23 weeks. The mean time for type C fractures was 23 weeks with a range of 20-25 weeks. In non-operative group the mean time for type A fractures was 14 weeks and for type B fractures was 15 weeks. In operative group the mean time for type A fractures was 15 weeks and for type B fractures was 18 weeks. The time for Type C fractures was 23 weeks. There was no significant difference between the two groups as the p value was more than 0.05.

Table 2 illustrates the source of radial nerve paralysis and delayed union in both the groups. Delayed union was seen in a total of 20% (n=12) cases, out of which 23.3% (n=7) were that of non-operative group and 16.7% (n=5) were that of operative group. Radial nerve palsy was due to trauma in 8.3% (n=5) cases and it was due to surgery in 3.3% (n=2) cases.

Table 1: Time required for consolidation in both operative and non-operative groups

TYPE OF FRACTURE	TOTAL TIME (weeks)	NON-OPERATIVE	OPERATIVE	P VALUE
A	15(12-18)	14(9-19)	15(11-19)	>0.05
B	16(13-23)	15(10-21)	18(14-24)	>0.05
C	23(20-25)	-	23(20-25)	>0.05

Table 2: Source of radial nerve paralysis and delayed union in both the groups

VARIABLE	TOTAL	NON-OPERATIVE	OPERATIVE	P VALUE
Radial nerve palsy				
Trauma	5(8.3%)	3(10%)	2(6.7%)	
Surgery	2(3.3%)		2(6.7%)	
Total	7(11.7%)	3(10%)	4(13.3%)	>0.05
Delayed union	12(20%)	7(23.3%)	5(16.7%)	>0.05

Discussion

Humeral fractures are a common fractures generally presenting to the trauma centers, and have an incidence of 13 every 100000 per year.¹³ The incidence of these fractures varies with age, gender and the peak incidence amongst males is 20 to 30 years of age and peak for elder females is between 60-70 years of age.¹⁴ Due to increase in the percentage elderly subjects in the recent years there is a tendency of increase in the incidence of fractures and that can have a significant effect on the healthcare services.¹⁵ Managing such fractures in near future would significantly impact the trauma management system, therefore it is necessary to understand the management protocols in detail. In the current study 11.7% of the subjects had radial nerve palsy. Incidence between 2% and 17% have been described off in the literature¹⁶, but a study by Shao et. al reported an average rate of incidence was 11.8%.¹⁷ Many operators believe radial nerve palsy as an absolute incidence of surgery.¹⁸ According to Denard et al.¹¹ there is deficiency in the current studies when comparing the outcome of non-operative and operative treatment of humeral shaft fractures. A total of 213 subjects were enrolled in the study. The primary variables studied in survey was time to union, malunion, chances of radial nerve palsy and range of motion. There were 9% cases of non-union in the operative group and 21% in that of non-operative group. The malunion incidence was also less in the operative compared to the non-operative group. There was no significant difference in the infection rate and the radial nerve

palsy between the two. According to the present study the mean total time for type A fractures was 15 weeks with the range of 12-18 weeks. The mean total time for type B fractures was 16 weeks with the range of 13-23 weeks. The mean time for type C fractures was 23 weeks with a range of 20-25 weeks. In non-operative group the mean time for type A fractures was 14 weeks and for type B fractures was 15 weeks. In operative group the mean time for type A fractures was 15 weeks and for type B fractures was 18 weeks. The time for Type C fractures was 23 weeks. There was no significant difference between the two groups as the p value was more than 0.05. According to a recent study by Mahabier et al.¹⁹ similar complication rate was observed both in operatively and non-operatively managed humeral shaft fractures. Mahabier et al.¹⁹ analysed 186 subjects aged more than 16 years during a period of 5-year. A total of 91 subjects were managed non-operatively and 95 were managed operatively. There were 9% cases in non-operative group and 10% subjects in operative group that had radial nerve palsy. Delayed union is defined as failure to heal within 24 weeks of the surgery. As per our study, delayed union was seen in a total of 20% (n=12) cases, out of which 23.3% (n=7) were that of non-operative group and 16.7% (n=5) were that of operative group. Radial nerve palsy was due to trauma in 8.3% (n=5) cases and it was due to surgery in 3.3% (n=2) cases.

Conclusion

According to the present study, there was no significant difference in the operative and non-operative surgical treatment modality. The study observed similar rates of delayed union and radial nerve palsy in both operative and non-operative treatment modality. Humerus shaft fractures are common clinical condition reporting in the daily practice and managing them should be based on proper clinical and radiological examination.

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