

Study of Functional Outcome of Surgical Management of Distal Humerus Fractures

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Abstract

Background: Less than 2% of all adult fractures are distal humerus fractures, which are infrequent injuries. Adult distal humeral fractures must typically be surgically repaired for better functional results. The aim of this study was to assess the functional outcome & complications of open reduction and internal fixation surgical method of distal humeral fractures among the patients at tertiary care hospital.

Materials and Method: A Prospective clinical study was conducted over a period of 2 years which included 25 patients in the tertiary care centre. Surgery was performed either under general anaesthesia or under brachial block. The patients were treated with primary open reduction and internal fixation. The implants used were Recon plates, DCP, DHP, 1/3 tubular plates and cancellous screws. During the follow up patients were received in outpatient department once in every 3 weeks and fracture union was assessed clinically and radiologically. All study variables were analyzed using descriptive statistical methods such as frequencies and percentages for categorical variables

Results: The average age of the patients in our study was 39.8 years with a range of 21-70 years. Male predominance was found in the study with 75% male and 25% female patients. The results were excellent in 10(40%) patients, good in 8 (32%) patients, Fair in 6 (24%) and Poor in 1(4%) patients. 2 (8 %) patients had superficial wound infections with hardware pain. 1(4%) patient had delayed union and 1 (4%) patient had presented with hardware pain.

Conclusion: The idea of open reduction and internal fixation of distal humerus fractures is very useful in restoring the joint surface and getting the patient back to work quickly, which reduces morbidity and leads to good results.

Keywords: Distal Humerus, Open Reduction, Fracture, Functional Outcome

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Background

The distal humerus is involved in two joints: the ulnohumeral joint, which allows for elbow flexion and extension, and the radiocapitellar joint, which allows for forearm rotation [1]. Distal humerus fractures are uncommon, accounting for

about 2% [2] of total body fractures, the majority of which are intercondylar. Adult distal humerus fractures and treatment are difficult for orthopedists to treat due to the distal humerus's precise architecture and limited surgical site [3].

The distal humerus' unusual three-dimensional geometry presents a significant obstacle to reconstruction [4]. To ensure that early motion does not compromise fracture union, anatomic restoration of the articular surface and stable fixation of the fracture fragments are required after a fracture of the distal section of the humerus. These objectives are now broadly accepted within the orthopaedic community [5].

Historically, distal humeral fractures have been associated with a poor clinical prognosis after treatment. Prolonged elbow immobilisation while waiting for union increases the risk of joint stiffness, muscle atrophy, and lifelong functional disability. As a result, the consensus has turned toward treating these fractures with open reduction and stable internal fixation such that early mobilisation can restore painless and adequate elbow function [6]. The purpose of this study was to determine the functional outcome & complications of open reduction and stable internal fixation surgical method of distal humeral fractures among the patients at tertiary care hospital.

Materials and Methods

This two-year prospective study was conducted at a tertiary care hospital with 25 patients. Patients who were admitted to the hospital with a distal end humerus fracture and willing to receive surgical treatment and participate in the study were eligible. Children with distal humerus complex fractures, patients under the age of 21, and patients who were medically

unfit for surgery were excluded from the study. Every patient provided written informed consent for the surgery and participation in the study. The AO classification was used to classify fractures.

The patients were evaluated using a standardised pre-anesthetic work-up, and any accompanying injuries were treated according to the disease's protocol. On admission, a thorough history was obtained from the patient or attendants in order to determine the mechanism of injury. The surgery was either conducted under general anaesthetic or under brachial block. Primary open reduction and internal fixation were used to treat the patients. Recon plates, DCP, DHP, 1/3 tubular plates, and cancellous screws were used as implants.

Patients were kept in the postoperative ward for the first 48 hours before being transferred to the appropriate general ward. On the second post-operative day, the drain was removed and an antiseptic dressing was applied. A post-operative X-ray was taken. Patients were seen in the outpatient department once every three weeks during the follow-up period, and fracture union was examined clinically and radiologically. The follow-up time spans from 20 to 40 weeks, with an average of 7 months. The data was compiled in Microsoft Excel and analysed in SPSS version 16. All variables in the study were examined using descriptive statistics, such as frequencies and percentages for categorical variables.

Results

Table 1: Distribution of patients based on age

Age distribution	No. of patients	Percentage (%)
21-30 yrs.	8	32
31-40 yrs.	6	24
41-50 yrs.	7	28
51-60 yrs.	1	4
> 60 yrs.	3	12
Total	25	100
Mean \pm SD	39.88 \pm 13.45	

The distribution of age of the study population is from 21 to 70 years. In the present study distal humerus fractures were common in 21-50 years, with 32% in 21-30 years, 28% in 41-50 years and 24% in 31-40 years. Average age in the present study is 39.8 years.

Table 2: Distribution of patients based on SEX

SEX	No of Patients	Percentage (%)
Male	16	64
Female	9	36
Total	25	100

In the present study fractures were more common in males with 64% of cases

Table 3: Distribution based on Muller's classification

Muller's Classification	No. of patients	Percentage (%)
AO 13. A2	2	8
AO 13. A3	2	8
AO 13. B1	1	4
AO 13. B2	1	4
AO 13. C1	6	24
AO 13. C2	5	20
AO 13. C3	8	32
Total	25	100

In the present study C3 fractures were seen in 32% cases, C1 fractures in 24% cases and C2 fractures in 20% cases. Overall type C fractures constitute 76%.

Table 4: Mechanism of injury

Mechanism of injury	No. of patients	Percentage (%)
Road traffic accident	18	72
Accidental Fall	7	28
Total	25	100

Common mechanism of injury in this study was RTA 72%. Direct fall over elbow constituted 28% cases.

Table 5: Side affected

Side affected	No of Patients	Percentage%
Left	12	48
Right	13	52
Total	25	100

In the present study, right side involved in 52% of cases and left side involved in 48% of cases.

Table 6: Outcome of management of distal Humerus fractures in adults.

Outcome	No. of patients	Percentage (%)
Excellent	10	40
Good	8	32
Fair	6	24
Poor	1	4
Total	25	100.0

outcome of management of distal humerus fractures in adults was evaluated using Cassebaum scale it was observed that 40 % cases presented with excellent outcome, 32 % cases presented with good outcome, 24 % cases presented with fair outcome, 4 % cases presented with poor outcome.

Table 7: Complications observed

Complications	No. of patients	Percentage (%)
None	21	84
Delayed union	1	4
Sup wound infection +hardware pain	2	8
Hardware pain	1	4
Total	25	100.0

In the present study, 8 % patients had superficial wound infections with hardware pain and 4 % patients had presented with hardware pain and delayed union, respectively.

Discussion

Fractures were frequent among the patients in our study, with an average age of 39.8 years. Our findings are comparable to those of Jupiter *et al*, Gabel *et al*, Henley *et al*, and Wang *et al*. Jupiter *et al*. reported 57 years as the average age in their series in 1985 [7]. Gabel *et al*. observed 45 years as the average in their series in 1987 [8]. In 1987, Henley *et al* found that the average age in their series was 32 years [9]. Wang *et al*. identified 47 years as the average age in their series in 1994 [10].

Our study indicated a male predominance of 64 percent male and 36 percent female patients, which was equivalent to Wang *et al*'s study [10]. Jupiter *et al* found approximately 47 percent male and 53 percent female in their study [7]. According to a study conducted by Henley *et al*, the incidence is 52 percent male and 48 percent female [9]. Wang *et al*. [10] reported a 60% male and 40% female occurrence [8]. Male predominance is most likely owing to their greater involvement in outdoor activity and RTA.

Type B fractures were the least common in our study. Similar findings were made in previous research by Sane *et al* [10], Ouzaa MR *et al* [11], and Manueddu CA *et al* [12].

In our study, road traffic accidents accounted for 75% of the cases, while direct falls accounted for 25%. Whereas Gabel *et al* [8] attributed 100% of their cases to direct fall According to Henley *et al*., road traffic accidents account for 61% of his cases, whereas direct falls account for 39% [9]. Wang *et al* reported that 30% of his cases were caused by a direct fall and 70% by a road traffic accident [13].

We accounted for around 52 percent of fractures on the right side and 48 percent of fractures on the left side. Jupiter *et al* colleagues reported a 62% incidence of fractures in the left distal end of the humerus [7]. In Henley, fractures in the left distal end of the humerus occurred at a rate of 55% [9].

In 18 cases, our functional results were excellent or good (72%). Sane's in Dakar *et al*. reported 63.9 percent outstanding and good results. [10] Elhage, Clavert, and Ducrot, who found 74 percent, 88.9 percent, and 95 percent excellent and good results, respectively [14-16].

In compared to Henley *et al*'s study, which documented 4% superficial infection, 7% ulnar neuropathy, 5% implant failure, 2% non-union, and 4% heterotrophic ossification, we found 2 cases of superficial infection, one case of pain, and one case of delayed union [9].

Conclusion

The concept of open reduction and internal fixation of distal humerus fractures is very useful in restoring the joint surface and

getting the patient back to work quickly, which reduces morbidity and leads to good results

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