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ORIGINAL ARTICLE

Assessment of clinical and functional outcome of distal humerus fractures

Keshav Gupta[1], Sanjay Kumar[2]

[1]Associate Professor, Department of Orthopaedics, Sakshi Medical College and Research Centre, Guna, M.P., India; [2]Assistant Professor, Department of Orthopaedics, K.M. Medical College, Mathura, U.P., India

***ABSTRACT*:**

Background: Distal humerus fractures constitute 2% of all fractures in the adult population. The injuries are distributed in a bi-modal fashion with the first peak being seen in the young resulting from high-energy trauma. The present study was conducted to assess clinical and functional outcome of distal humerus fractures. **Materials & Methods:** 74 cases of distal humerus intraarticular fractures AO type 13C were included. Osteosynthesis was performed through posterior triceps-sparing paratricipital approach using orthogonal plate constructs. **Results:** Out of 74 patients, males were 44 and females were 30. The mean elbow flexion was 120.4 degree, supination was 78.2 degree, arc of motion was 113.8 degree, flexion deformity was 6.14 degree, ROM in C1 was 128.2 degree, in C 2 was 120.4 degree and in C 3 was 96.3 degree. Functional range was present in 60 and functional range was absent in 14 patients. The difference was significant (P< 0.05). **Conclusion:** Open reduction and internal fixation of intraarticular distal humerus fractures with triceps-sparing paratricipital approach provide better clinical and functional outcome.

Key words: Humerous, Open reduction, Internal fixation

Corresponding author: Dr. Sanjay Kumar, Assistant Professor, Department of Orthopaedics, K.M. Medical College, Mathura, U.P., India

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INTRODUCTION

Intraarticular distal humerus fracture (AO type 13C) is a challenging condition for orthopedic surgeons. These fractures demand technically difficult operative treatment, often with a relatively high morbidity. It is troublesome to choose an approach for intraarticular distal humerus that provides easy access for reduction and fixation of fracture with minimal soft tissue and extensor mechanism disruption.[1]

Distal humerus fractures constitute 2% of all fractures in the adult population. The injuries are distributed in a bi-modal fashion with the first peak being seen in the young resulting from high-energy trauma and the second peak being seen in the elderly osteoporotic population.[2] Although relatively rare, the incidence of these fractures is rising as Pavlanen et al[3] reported a 5 fold increase in distal humerus fractures between 1970 and 1998. Treatment is aimed at restoring a functional elbow, which described as requiring 30 to 130 degree range of motion. Loss of this movement can severely affect activities of daily living and lead to a loss of independence in the elderly population. Treatment of these injuries is challenging due to fracture comminution, poor bone quality and difficulty in restoring the complex anatomy of the distal humerus.

These injuries have been treated non-operatively although most studies report this management to be associated with significant functional impairment.[4] Evolution in implant design and surgical technique has led to improved outcomes in operatively treated patients and has resulted in fixation being the current standard of care. Operative fixation has been shown to give satisfactory results with long term follow up demonstrating good or excellent outcome in 86%. In an elderly population, internal fixation has been reported to result in better function than those managed non-operatively.[5] The present study was conducted to assess clinical and functional outcome of distal humerus fractures.

MATERIALS & METHODS

The present study was conducted among 74 cases of distal humerus intraarticular fractures AO type 13C of both genders. All were informed regarding the study and their consent was obtained.

Demographic profile such as name, age, gender etc. was recorded. Osteosynthesis was performed through posterior triceps-sparing paratricipital approach using orthogonal plate constructs. Parameters such as Mayo Elbow Performance Index (MEPI) and clinically, the range of elbow motion was measured using handheld goniometer. The triceps muscle strength was assessed manually by surgeon using the uninjured arm as control. Complications were also recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 74		
Gender	**Males**	**Females**
Number	44	30

Table I shows that out of 74 patients, males were 44 and females were 30.

Table II Assessment of clinical parameters

Parameters	Value (Degree)
Elbow flexion	120.4
Supination	78.2
arc of motion	113.8
flexion deformity	6.14
ROM C1	128.2
C 2	120.4
C 3	96.3

Table II, graph I shows that mean elbow flexion was 120.4 degree, supination was 78.2 degree., arc of motion was 113.8 degree, flexion deformity was 6.14 degree, ROM in C1 was 128.2 degree, in C 2 was 120.4 degree and in C 3 was 96.3 degree.

Graph I Assessment of clinical parameters

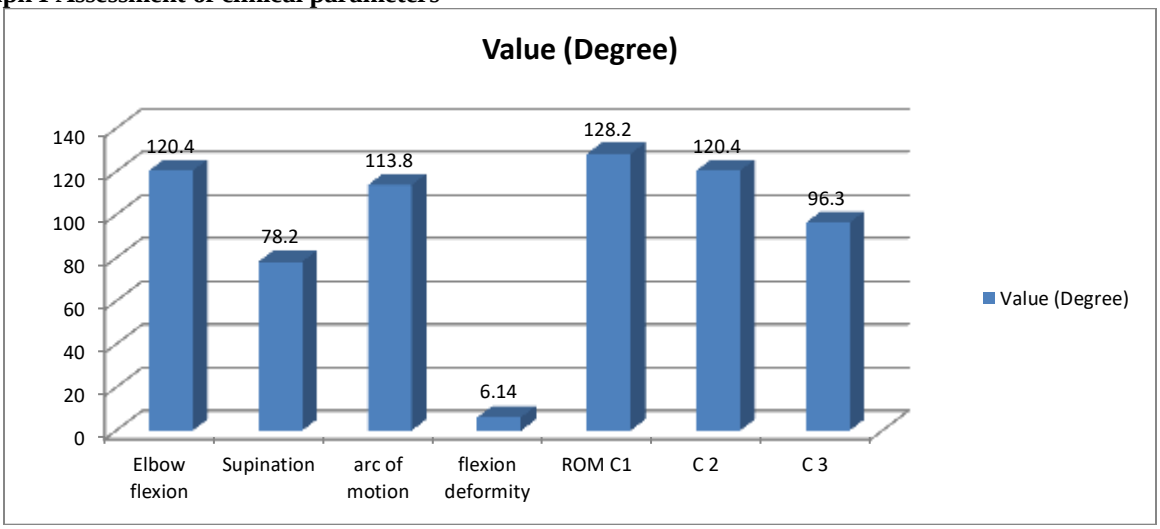

Table III Functional outcome

Functional outcome	Number	P value
Functional range present	60	0.01
Functional range absent	14	

Table III shows that functional range was present in 60 and functional range was absent in 14 patients. The difference was significant (P< 0.05).

DISCUSSION

Numerous surgical approaches to the distal humerus have been described, each conferring differing advantages in terms of exposure and soft tissue disruption. Stanley[6] demonstrated that the trans-olecranon approach gave the best articular exposure; the median percentages of visible distal humeral articular surface for the triceps splitting, triceps reflection, and olecranon osteotomy approaches were 35%, 46% and 57%, respectively. Despite the olecranon osteotomy

providing the greatest exposure of the distal articular surface, 40% of the anterior surface remained unvisualised. In addition, an olecranon osteotomy carries the risk of non-union, future need for the removal of metalwork and potentially limiting any future arthroplasty.[7] The triceps splitting approach was first described by Campbell but has the potential to result in triceps weakness. Bryan and Morrey described a triceps reflecting technique that spares the triceps mechanism by reflecting from medial to the lateral direction and has the advantage of avoiding damage to the extensor mechanism.[8] The present study was conducted to assess clinical and functional outcome of distal humerus fractures.

In present study, out of 74 patients, males were 44 and females were 30. Yadav et al[9] found that 25 patients with intraarticular distal humerus fracture were operated using triceps-sparing paratricipital approach with orthogonal plate construct. There were 16 male and 9 female patients and average age was 42.16 years (range 23-65 years). The mechanism of injury was fall from height (n = 8), road traffic accident (n = 13) and ground level fall (n = 4). Clinical, radiological, and functional assessment with Mayo Elbow Performance Index (MEPI) were obtained at follow up period. All fractures united primarily. At the mean follow up of 13.58 months (range 6-22 months), mean elbow flexion was 121.08° (range 94°–142°) and mean motion arc was 114.92°(range 65°-140°). The mean MEPI score was 94.40 points (range 70–100) with 17 excellent, five good, and three fair results. The mean flexion deformity or extension loss was 6.16° (range 5°–15°).

We found that mean elbow flexion was 120.4 degree, supination was 78.2 degree, arc of motion was 113.8 degree, flexion deformity was 6.14 degree, ROM in C1 was 128.2 degree, in C 2 was 120.4 degree and in C 3 was 96.3 degree. Morrey et al[10] studied fifteen activities of daily living with respect to elbow motion and forearm rotation in a normal elbow, and concluded that 100° of elbow flexion and 100° of forearm rotation are required for most of the daily living activity. Vasen et al[11] studied 12 activity of daily living in one hundred elbows in normal population with respect to flexion and extension. By isolating the allowable ROM of the elbow and allowing for compensatory motions and strategies of the normal adjacent joints, the functional elbow ROM was established as 75–120° flexion.

We observed that functional range was present in 60 and functional range was absent in 14 patients. Zhang et al[12] compared triceps sparing with olecranon osteotomy approach in 67 patients with type C distal humerus fracture in an elderly population and concluded that triceps-sparing group has better functional outcomes, faster patient recovery, and lower complication rate, all without compromising visibility of articular surface or impairing fracture reduction during fixation.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that open reduction and internal fixation of intraarticular distal humerus fractures with triceps-sparing paratricipital approach provide better clinical and functional outcome.

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