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Original Article

A Prospective Study on Functional Outcome of Distal End Humerus Fractures Treated with Locking Compression Plate

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Abstract

Introduction: Fractures of the distal humerus are relatively uncommon, representing approximately 2% of all fractures, yet they remain a therapeutic challenge due to complex anatomy, intra-articular involvement, comminution, and poor bone quality in elderly patients. With rising incidence linked to road traffic accidents (RTAs) and falls, effective surgical strategies are essential to restore elbow function and minimize long-term disability. This prospective observational study aimed to evaluate functional outcomes of distal humerus fractures managed with locking compression plates (LCPs).

Materials and Methods: A total of 31 patients aged >18 years with AO type C1, C2, and C3 distal humerus fractures were enrolled at Ramkrishna Care Hospital, Raipur, between July 2023 and June 2024. All underwent open reduction and internal fixation with pre-contoured distal humerus LCPs, predominantly through the olecranon osteotomy approach. Post-operative rehabilitation emphasized early mobilization. Functional outcomes were assessed using the Mayo Elbow Performance Score (MEPS) over a 6-month follow-up.

Results: The majority of patients were aged 41–50 years (25.8%), with a male predominance (61.3%). RTAs accounted for 71% of injuries, and C2 fractures were most common (45.2%). At the final follow-up, MEPS outcomes were excellent in 41.9% of patients, good in 32.3%, fair in 16.1%, and poor in 9.7%, with a mean score of 82.25 ± 12.76. Complications occurred in 42%, primarily elbow stiffness (19.4%), transient ulnar neuropraxia (6.5%), and superficial infection (6.5%). No cases of non-union were noted.

Conclusion: Fixation of distal humerus fractures with LCP provides stable constructs, permits early rehabilitation, and achieves favorable functional outcomes with acceptable complication rates. LCPs remain a reliable modality for complex distal humeral fractures, though larger, long-term studies are needed to validate these findings.

Key words: Complications, Distal humerus fracture, Functional outcome, Locking compression plate, Mayo elbow performance score, Open reduction and internal fixation

INTRODUCTION

Fractures of the distal humerus constitute approximately 2% of all fractures and 3% of humeral fractures, with an incidence of 5.7/100,000 annually.[1-3] They exhibit a bimodal distribution, commonly affecting young males following high-energy trauma and elderly females due to osteoporosis.[4] These fractures present significant treatment challenges owing to comminution, poor bone quality, and complex anatomy. Although these fractures are relatively uncommon, their incidence is increasing. The goal of treatment is to restore a functional elbow, which requires a range of motion from 30 to 130°.[5]

Surgical management, particularly open reduction and internal fixation (ORIF) with locking compression plates (LCP), has become the preferred treatment to restore elbow function and enable early mobilization. This study evaluates

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the functional outcome of distal humerus fractures treated with LCPs.

Aim and objective

Aim

To evaluate the functional outcome of distal humerus fractures treated with LCPs.

Objectives

- To assess outcomes using the Mayo Elbow Performance Score (MEPS)
- To identify complications associated with LCP fixation.

MATERIALS AND METHODS

Study Design

Prospective observational study.

Study Site

Ramkrishna Care Hospital, Raipur, Chhattisgarh.

Study Duration

July 2023–June 2024.

Sample Size

A total of 31 patients (calculated using Cochran's formula).

Inclusion Criteria

Age >18 years, closed or compound injuries (Type I and II GA classification), AO types C1–C3, and willing to participate.

Exclusion Criteria

Age <18 years, pathological fractures, neglected fractures, severe intra-articular comminution in the elderly, vascular injuries, and patients unwilling to participate.

Methodology

Pre-operative immobilization, radiographs, and CT scans for fracture assessment.

Surgical technique

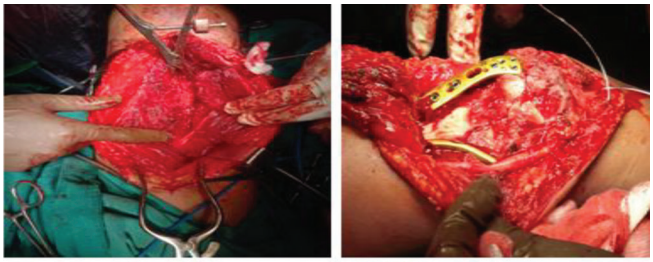
The patients were given general anesthesia or regional anesthesia and were positioned in the lateral position, with the involved limb supported over bolsters in the OT table. All the patients underwent ORIF according to AO principles. First, the intercondylar segment is reduced temporarily with K-wires, and the articular surface is reconstructed using 4 mm screws passed from lateral to medial. The intercondylar segment is reduced to the distal metaphysic using a 3.5 mm distal humerus locking plate applied in a 90° fashion, both medially and dorsolaterally.

Post-operative protocol: Early mobilization from day 3 to 7, regular follow-ups up to 6 months. Outcome measured using MEPS.

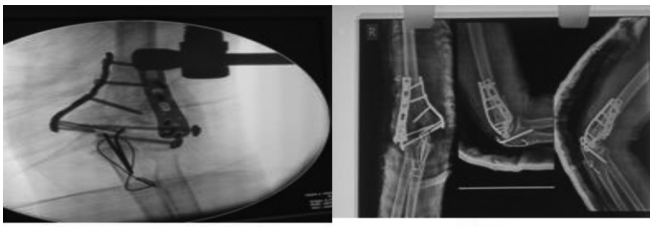
Case Illustration

Case of road traffic accidents (RTA), 50-year-old female.

Pre-operative computed tomography scan and AP and lateral radiograph.



REDUCTION AND FIXATION ORTHOGONAL PLATING



INTRAOPERATIVE RADIOGRAPH

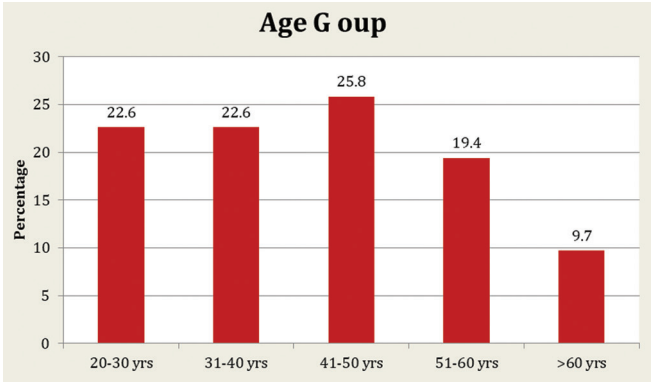
IMMEDIATE POSTOPERATIVE RADIOGRAPH

4 WEEKS POSTOPERATIVE RADIOGRAPH

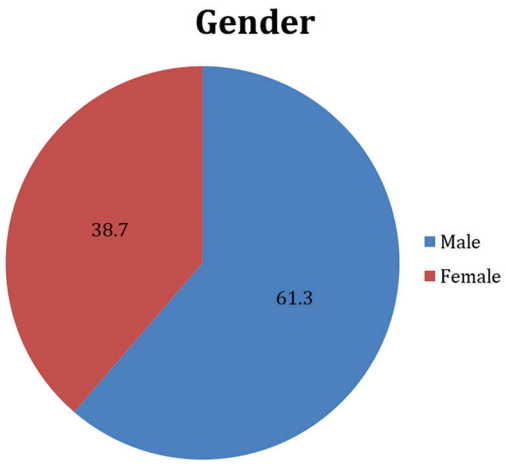
RESULTS

Statistical analysis was carried out using the statistical packages for IBM SPSS version. 22 for Windows. Continuous and categorical variables were expressed as mean ± SD and percentages, respectively.

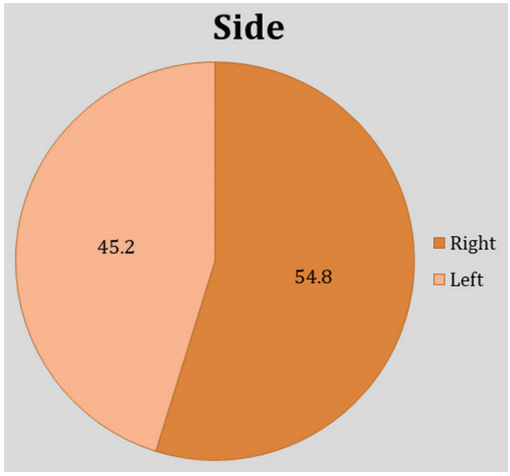
- Descriptive statistics were done for the distribution of age, gender, affected limb side, parity, mode of injury, AO type fracture pattern, approach taken, associated injury, MEPS score, and complications
- Chi-square test was used to see the association of gender and mode of injury
- Two-sided *P*-values were considered statistically significant at $P < 0.05$
- Age distribution: Majority (25.8%) were 41–50 years with a mean age of 41.8 ± 13.5 years

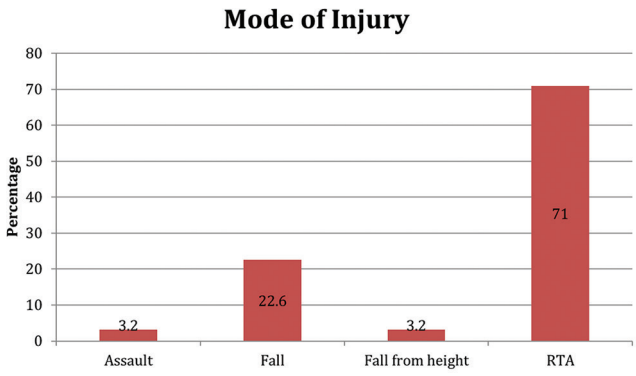


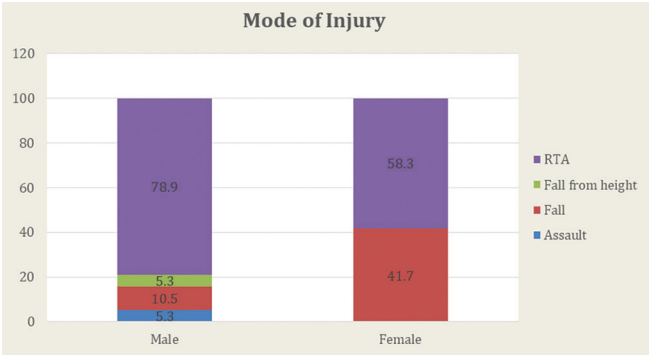
- Gender: 61.3% were males and 38.7% were females

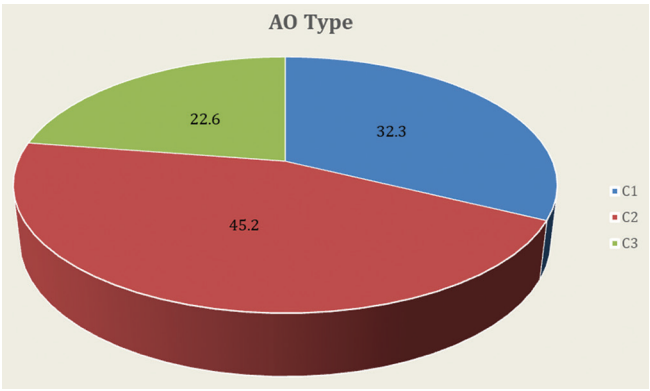


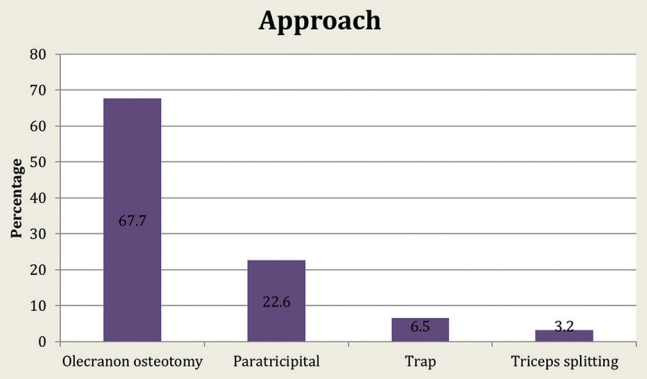
- Among the study participants, 54.8% were affected on the right side, whereas the remaining (45.2%) were affected on the left side.
- Mode of injury: RTA was the most common cause (71%) of which the majority were males.
- Fracture pattern: AO type C2 is the most common (45.2%).
- Surgical approach: Olecranon osteotomy was used in 67.7% of patients.



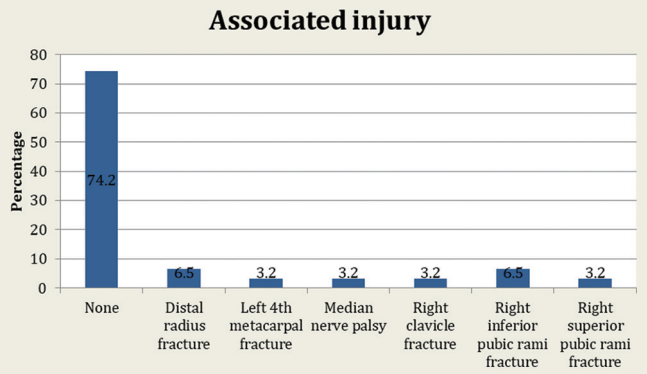






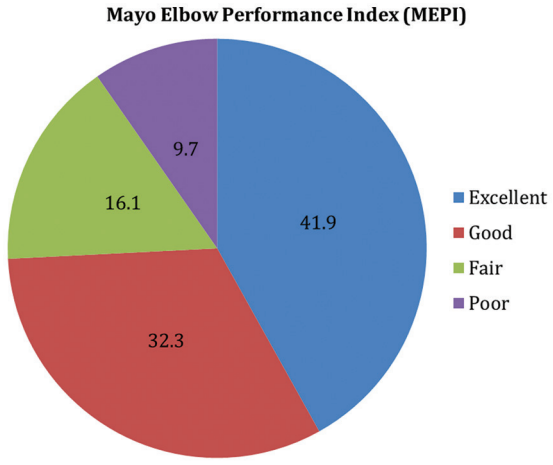


Among the patients, 74.2% had no associated injury.

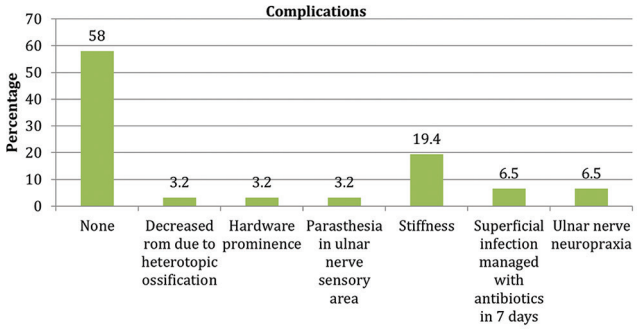


Functional Outcome was measured by MEPS, which was as follows:

- Excellent: 41.9%
- Good: 32.3%
- Fair: 16.1%
- Poor: 9.7%
- Mean MEPS: 82.2 ± 12.7.



Complications: (58%) had no complication, Stiffness (19.4%), ulnar neuropraxia (6.5%), superficial infection (6.5%), and others (3.2% each: hardware prominence, parasthesia, and heterotopic ossification). No cases of non-union.



DISCUSSION

AO type C distal humerus fractures are complex and often complicated by osteoporosis and comminution. Early fixation with rigid constructs is essential for restoring joint congruity and permitting early motion.

This study observed a predominance of middle-aged[6] males[7] injured in RTAs[8] with right side affected[8] more commonly affected with an AO type C2 fracture, consistent with prior literature. Olecranon osteotomy remained the most common approach, providing optimal articular visualization.[9]

Functional outcomes were satisfactory, with 74.2% achieving excellent/good MEPS scores, in line with similar studies.[10] The common complications seen following surgical management of distal humerus AO type C fractures, as noted by Jupiter and Mehne[3] in a review article, include elbow stiffness, infection, non-union, ulnar neuropathy, and heterotopic ossification. While in our study, 58% patients had no complications. Notably, no cases of non-union or deep infection were recorded, suggesting favorable outcomes with LCP fixation when combined with early mobilization.

CONCLUSION

Distal humerus fractures are best treated with ORIF using LCPs. The majority of patients achieved excellent/good functional outcomes with minimal complications. Olecranon osteotomy remains the most effective surgical approach. Early mobilization is critical in achieving good results.

LCP fixation is a reliable option for distal humerus fractures, offering stable fixation, early functional recovery, and predictable outcomes. Larger studies with longer follow-up are recommended for validation.

REFERENCES

1. Rose SH, Melton LJ 3rd, Morrey BF, Ilstrup DM, Riggs BL. Epidemiologic features of humeral fractures. Clin Orthop Relat Res 1982;168:24-30.
2. Anglen J. Distal humerus fractures. J Am Acad Orthop Surg 2005;13:291-7.
3. Jupiter JB, Mehne DK. Fractures of the distal humerus. Orthopedics 1992;15:825-33.
4. Robinson CM, Hill RM, Jacobs N, Dall G, Court-Brown CM. Adult distal humeral metaphyseal fractures: Epidemiology and results of treatment. J Orthop Trauma 2003;17:38-47.
5. Morrey BF, Askew LJ, Chao EY. A biomechanical study of normal functional elbow motion. J Bone Joint Surg Am 1981;63:872-7.
6. Shin SJ, Sohn HS, Do NH. A clinical comparison of two different double plating methods for intraarticular distal humerus fractures. J Shoulder Elbow Surg 2010;19:2-9.
7. Gautam V, Gupta S, Pandey S, Mathur M. A prospective study to evaluate the functional outcome in intra-articular distal humerus fractures treated by dual plating. Int J Orthop Sci 2022;8:500-8.
8. Jagadish U, Vinod Kumar K, Shanthappa AH. Functional Outcome of distal humerus fractures treated with open reduction and internal fixation with bicolumnar plating in a tertiary care setting. Cureus 2023;15:e33540.
9. Wilkinson JM, Stanley D. Posterior surgical approaches to the elbow: A comparative anatomic study. J Shoulder Elbow Surg 2001;10:380-2.
10. Vikram M, Manikandan M, Arumugam V. A prospective study on functional outcome of distal humerus fracture treated by orthogonal plating. Int J Sci Res 2023;12:2277-8179.

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