

A Prospective Analysis of Functional Outcome of Surgical Management of Distal Humerus Fractures Using Bicolumnar Plating

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ABSTRACT

Background: Distal humerus fractures constitute 2% of all fractures in the adult population. Geriatric fragility fractures of the distal humerus can be successfully treated with bicolumnar 90-90 plating. Hence; the present study was conducted for assessing the functional outcome of surgical management of distal humerus fractures with bicolumnar plating.

Materials & Methods: Twenty individuals were recruited who had distal humerus fractures. All of the patients' clinical and demographic information was gathered. Within a week following the incident, all procedures were performed in the lateral position, using the conventional posterior midline method. The elbow range of motion and physiotherapy procedures were applied to every patient. The Mayo Elbow Performance (MEP) score and the Disabilities of Arm, Shoulder, and Hand (DASH) score were computed.

Results: Mean age of the patients was 60.8 years. There were 12 males and 8 females. Mean DASH score and mean MEP score was 21.8 and 86.9 respectively. While assessing the outcome with MEP score, excellent results were seen in 20

percent of the patients while good results were seen in 44 percent of the patients.

Conclusion: Internal fixation with bicolumnar plating offers good functional results.


Key words: Distal, Humerus, Bicolumnar plating.

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INTRODUCTION

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. Treatment is aimed at restoring a functional elbow, which Morrey 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.¹⁻³

The Dubberley classification distinguishes between fracture types involving the capitellum and trochlea and comprises techniques for treatment. Internationally, most commonly used is the AO classification, classically categorizing extra-articular, partial articular, and articular fractures. Further comminution and specific fracture patterns being defined by numbers 1-3. Surgical treatment being the gold standard, conservative treatment has

been playing only a minor role in the management of fractures of the distal humerus. Non operative treatment seems to be only advisable in cases of non-displaced fractures, in patients being assessed not fit for surgery, or as a temporary treatment in the elderly before arthroplasty to avoid stiffening and heterotopic ossification.⁴⁻⁶

Geriatric fragility fractures of the distal humerus can be successfully treated with bicolumnar 90-90 plating. These cases are typically low energy with the transcondylar pattern with or without simple intra-articular split being the most common. Multiple points of fixation in different planes into the diminutive osteopenic short distal segments provide optimal construct rigidity to foster uneventful fracture union and early rehabilitation. Usage of both small and minifragment fixed-angle plate fixation is well suited for this anatomical location.^{7,8}

Hence; the present study was conducted for assessing the functional outcome of surgical management of distal humerus fractures with bicolumnar plating.

MATERIALS & METHODS

The present study was conducted for assessing the functional outcome of surgical management of distal humerus fractures with bicolumnar plating. A total of Twenty individuals were recruited who had distal humerus fractures. All of the patients' clinical and demographic information was gathered. Using a medial locking or reconstruction plate medially and a posterolateral or lateral locking plate for bicolumnar plating, all patients underwent open reduction

internal fixation. Within a week following the incident, all procedures were performed in the lateral position using the conventional posterior midline method. The elbow range of motion and physiotherapy procedures were applied to every patient. The Mayo Elbow Performance (MEP) score and the Disabilities of Arm, Shoulder, and Hand (DASH) score were computed. All the results were subjected to statistical analysis.

Table 1: Outcome

Variable	Mean	SD
DASH score	21.8	5.2
MEP score	86.9	12.8
Mean flexion Arch (degree)	106.1	18.2
Supination (degree)	82.9	10.3
Pronation (degree)	76.2	9.7

Table 2: Outcome as per MEP score

Outcome	n	%
Excellent	5	20
Good	11	44
Fair	3	12
Poor	1	4
Total	20	100

RESULTS

Mean age of the patients was 60.8 years. There were 12 males and 8 females. Mean DASH score and mean MEP score was 21.8 and 86.9 respectively. While assessing the outcome with MEP score, excellent results were seen in 20 percent of the patients while good results were seen in 44 percent of the patients.

DISCUSSION

Fractures of the distal humerus continue to present a significant dilemma in management despite recent advances in surgical technique. Mercifully these fractures remain uncommon with a UK incidence of 5.7 per 100,000, and constitute 2% of all fractures in adults. The resulting functional deficits can be profound, and the limited soft tissue envelope surrounding the elbow also means these injuries are often open. Formerly, they were seen in young males following high energy trauma, but the last few decades have seen an increase in elderly females resulting from relatively low energy trauma.⁷⁻⁹

Distal humerus fractures are uncommon injuries requiring specific clinical and radiographic analysis in order to plan the optimal therapeutic strategy. In particular, bicolumnar distal humerus fractures (Type A2, A3 and C) are complex fractures. In the last years, double plating fixation became the standard treatment: this procedure helped surgeons to obtain a stable and anatomical fixation and an early mobilization, which is the main outcome for obtaining valuable functional results.^{10,11} Hence; the present study

was conducted for assessing the functional outcome of surgical management of distal humerus fractures with bicolumnar plating.

Mean age of the patients was 60.8 years. There were 12 males and 8 females. Mean DASH score and mean MEP score was 21.8 and 86.9 respectively. While assessing the outcome with MEP score, excellent results were seen in 20 percent of the patients while good results were seen in 44 percent of the patients. Leigey DF et al managed 15 patients with a bicolumnar 90-90 plating construct as a novel method of enhancing distal fixation in these fractures. Fourteen patients went on to radiographic union at an average of 77 days after surgery with an average arc of motion of 105°. One patient was lost to follow-up. Bicolumnar 90-90 plating of distal humerus fractures in elderly patients may represent a viable alternative to traditional ORIF or TEA.¹⁰

Kural C et al evaluated functional results and complication rate of patients who underwent medial-dorsolateral plating for intra-articular distal humeral fracture (Müller AO type 13C). Twenty-four patients (14 men, 10 women; mean age: 47 years) with AO type 13C distal humerus fracture were included in the study. Mean follow-up time was 28 months. Nine patients were in 13C1 subgroup, according to AO classification system, 11 patients were categorized as 13C2, and 4 patients were 13C3. Final follow-up assessment of outcomes included Broberg and Morrey radiological criteria; Mayo Elbow Performance Score, disabilities of the Arm, Shoulder and Hand (DASH) Outcome Measure, score

based on Jupiter criteria; and range of motion (ROM) values. The mean carrying angle of operated elbows was 11.37° (range: 0-20°). According to Broberg and Morrey radiological criteria, 14 patients had radiologically normal elbow, 4 patients had mild change, 3 patients had moderate change, and 3 patients had severe radiological change. Mean DASH score was 21.91 (range: 0-50), and mean Mayo rating was 83.37 (range: 55-100). Jupiter criteria evaluation revealed excellent results in 10 cases, good in 12, and fair results in 2. One patient with fair results had open fracture, and the other had previous hemiparesis in the same extremity. There was no instance of nonunion observed at follow-up. Osteosynthesis with medial-dorsolateral plating is a safe and effective method for the treatment of intra-articular fractures of distal humerus.¹¹ Jayakumar P, et al described 3 patients (ages 27, 49, and 73 years) with a bicolumnar fracture of the distal humerus where very short distal locking screws were used. Intra-articular screw placement was avoided but loss of fixation occurred in two patients and a third was treated with a prolonged period of immobilization. They postulated that fixed-angle screw trajectories may make it difficult for the surgeon to place screws of adequate length in this anatomically confined region and may lead to insufficient distal fixation. Surgical tactics should include placement of as many screws as possible into the distal fragment, as long as possible and that each screw passes through a plate without necessarily locking in.¹²

CONCLUSION

Internal fixation with bicolumnar plating offers good functional results.

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