

Management of Fractures of The Distal Humerus in Adults Using Bipillar Plating(90:90)



Medical Science

KEYWORDS : Distal Humerus Fractures, Bipillar Plating(90:90), Mayo Elbow Performance Index

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ABSTRACT

Objective: to assess the results of fractures of distal humerus in adults, treated by bipillar plating technique in terms of the final range of elbow motion, union time, pain relief and rate of complications.

Introduction: distal humerus fractures are uncommon injuries that account for fewer than 2% of all adult fractures. The complex shape of the elbow joint, the adjacent neurovascular architecture, and the sparse soft tissue envelope combine to make these fractures difficult to treat. Acceptable results have been reported in a majority of patients treated by open reduction and internal fixation. Restoration of painless and satisfactory elbow function after a fracture of the distal humerus requires anatomic reconstruction of the articular surface, restitution of the overall geometry of the distal humerus, and stable fixation of the fractured fragments to allow early and full rehabilitation.

Methodology: adult patients having distal humerus fractures were admitted to ssg hospital attached to Baroda Medical College and were taken up for study after obtaining their informed and written consent. This is a prospective study of 40 adult patients having distal humerus fractures from June 2014 to June 2015. All patients are treated with open reduction and internal fixation with bipillar plating (90:90) and were assessed in terms of union time, rate of complication, elbow range of motion, pain relief at final follow up (minimum of 6 months), all patients were assessed as per the Mayo Elbow Performance Index.

Results: the mean age of patients was 35 (range 18-60) with maximum (42.5%) of them being in the range of 31-40 years. Average time to union was 17.3 weeks. 92.5% of the fractures united without any major significant complications. Only 10% patients showed implant related complications. 60% patients showed final elbow flexion arc of 50-100 degree and 30% patients showed flexion arc of >100 degree. At final follow up Mayo score was good in 70% patients and was excellent in 17.5% patients.

INTRODUCTION

Distal humerus fractures are uncommon injuries that account for fewer than 2% of all adult fractures. The complex shape of the elbow joint, the adjacent neurovascular architecture, and the sparse soft tissue envelope combine to make these fractures difficult to treat. Acceptable results have been reported in a majority of patients treated by open reduction and internal fixation.

Restoration of painless and satisfactory elbow function after a fracture of the distal humerus requires anatomic reconstruction of the articular surface, restitution of the overall geometry of the distal humerus, and stable fixation of the fractured fragments to allow early and full rehabilitation.

Depending upon the amount of comminution and displacement, open reduction and internal fixation with medial and lateral anatomical plates, 1/3 tubular plate, extra articular distal humerus plate, Reconstruction plate, Cancellous screws, 'K' wire and double tension band wiring can be done individually or in combination.

The aim of the present study is to evaluate the functional outcome of surgical management of distal humerus with extra and intra articular extension in adults using bipillar plating.

AIMS AND OBJECTIVES

- To assess the results of fractures of the lower end of humerus in adults, treated by the Bipillar plating technique.
- To assess the final range of movement of the elbow.
- To assess the union time for the fracture treated by this method.
- To assess the rate of complications

METHODOLOGY

Adult Patients having Distal humerus fractures were admitted to SSG Hospital attached to Baroda Medical College and were taken up for study after obtaining their informed and written consent. This is a prospective study from June 2014 to June 2015.

Inclusion Criteria:

- Patients of or above the age of 18 years at the time of admission.
- Patients with close and open grade 1 (according to Gustilo-Anderson classification) fractures of the distal humerus.
- Patients with extra and Intra Articular Distal Humerus fracture.

Exclusion Criteria:

- Patients with multiple procedures previously performed on same limb.
- Patients with open grade 2 and open grade 3 fractures.
- Patients with repeat trauma to same limb after the initial surgery under study.
- Patients less than 18 years of age.
- Patients unfit for major surgery.

Collection of data for patients presenting with fracture of Distal humerus are as follows:-

- History by Verbal communication
- Clinical examination, both local and systemic.
- Radiological examination routine and other imaging modalities.
- Investigation baseline and others.
- Fracture anatomy assessed with X-rays.
- Traction X-ray- antero-posterior view and lateral view
- 3D Ct Scan of Elbow (when indicated to rule out intra

- articular and severely comminuted fractures)
- Diagnosis – Clinical and Radiological.
- Informed and written consent for Surgical procedure and anaesthesia.
- Surgery – Open reduction and Internal fixation with Bipillar plating(90:90).
- Follow up at 4 weeks,8 weeks,12 weeks,16 weeks and 24 weeks were done and all patients were assessed clinically and radiologically.



Figure-1:intra op image

RESULTS AND OBSERVATION

Table 1 : Age Group

Age Group	No. of Patients	Percentage
18 to 20	1	2.5%
21 to 30	5	12.5%
31 to 40	17	42.5%
41 to 50	12	30%
51 to 60	5	12.5%
Total	40	100%

Table 2 : Type of Fixation

Type of Fixation	No. of Patients	Percentage
Anatomical Plate	38	95%
3.5 mm Extrarticular distal humerus plate + 1/3 Tubular Plate+Recon. plate	2	5%
Total	40	100%

Table 3: ARC of Motion

ARC of Motion	No. of Patients	Percentage
Arc > 100 degrees	12	30
Arc 50 to 100 degrees	24	60%
Arc < 50degrees	4	10%
Total	40	100%

Table 4: Union Time

Type of Fracture (AO Type)	Average Union Time (16 to 24 weeks)	No. of Patients	Percentage
Type A	18	9	22.5%
Type B	16	5	12.5%
Type C	18	26	65%
Total	18	40	100%

Table 5 : Complications

Complications	No. of patients	Percentage
Superficial Infection	6	15%
Non Union	3	7.5%
palpable implant	4	10%
Nerve palsy	0	0%
Malunion	0	0%

Loss of fixation	0	0%
Olecranon nonunion	0	0%

Table 6 : Grading of Results

Results	No. of Patients	Percentage
Excellent	7	17.5%
Good	28	70%
Fair	1	2.5%
Poor	4	10%
Total	40	100%

DISCUSSION

In our study 38 cases of fractures of distal humerus including extra and intra articular were treated with two Anatomical plates(90:90 orthogonal) and 2 cases of fractures of distal humerus were treated with combinations of 3.5mm extra articular distal humerus plate & 1/3 Tubular Plate and Recon.plate. Our experience with these methods of fixation has given favorable results. The findings, the end results and various other data have been analysed and compared in the following discussion.

In the present study maximum number of patients were found to be in 3rd and 4th decade.

There was a significant male predominance in the present study 29patients (72.5%).

Left side 28(70%) distal humerus fractures were more common than right side 12(30%) in the present study.

In the present study domestic fall 29(72.5%) was more common than Road traffic accidents 9(22.5%).

In this series 38 (95%) patients were fixed with Anatomical plates and 2 cases (5%) patients were fixed with 3.5mm extra articular distal humerus plate + 1/3 Tubular Plate+Recon. plate.

In our series in all 40(100%) Patients both columns were fixed.

In our study average injury to surgery interval was found 4 days with maximum of 14(35%) patients operated within two days and minimum of 1(2.5%)patient operated at 9th day.

In our study Average duration of Surgery was 2 hours with maximum of 3 hrs and minimum of 1 hr.

In our study 62.5% patients were discharged within 15 days after suture removal, adequate mobilization and proper instruction. 17.5% patients were discharged after suture removal within 10 days. The Average duration of Hospital stay was 13 days.

Fractures were classified according to AO classification and grading was according to Gustilo-anderson classification. All the cases were followed up and findings were recorded regularly.

In our series we accounted for 26(65%) cases of fractures of AO type C, 9 (22.5%)cases of AO type A and 5(12.5%) cases of AO type B .

Results were analysed according to Mayo elbow performance score.

In our study ,only 4(10%)patients complained of moderate pain at final follow up, 22(55%) patients complained of mild pain and only 14(35%) patients complained of no pain at final follow-up.

In our study, 24(60%) patients could move their elbow with an arc of 50-100 degrees and 4(10%) patients could move their elbow with an arc of less than 50 degrees. 12(30%) patients could move their elbow with an arc of more than 100 degrees.

In our study, elbow joint of 37(92.5%) patients was stable and of only 3(7.5%) patients was moderately unstable and no one had grossly unstable elbow at final follow up.

The complications like superficial infection in 6 (15%) patients, non union in 3 (7.5%) patient, palpable implants in 4 (10%) patients were noted mostly due to their open grade fracture severity and associated soft tissue injury.

In our study AO type A fractures united at the average time of 18 weeks AO type B fractures united at the average time of 16 weeks and AO type C fractures united at the average time of 18 weeks. 3 patients had non union considered at the time of more than 24 weeks average for distal humerus fracture.

In our study as per the Mayo Functional Assessment score five functions were taken in account, Out of which 39(97.5%) patients could do daily hygiene work by themselves. 28(70%) patients could comb their hair by themselves, all 40(100%) patients could feed by their own. 34(85%) patients could put on their shirts by their own and 36 (90%) patients could put on their shoes by their own.

In our study functional outcome based upon Mayo Elbow Performance Score is excellent in 7 patients (17.5%), good in 28 patients (70%) , fair in 1 patients(2.5%), poor in 4 patients (10%).

CONCLUSION

In this study carried out in 40 cases of distal humerus fractures, we came to the following conclusions:

Fractures of the Distal humerus are common in adult males.

The common mode of injury is domestic fall on elbow and Road traffic accident is next common mode of injury.

Inter condylar fractures demands careful evaluation, classification of fracture type and pre-operative planning.

Trans-olecranon approach provides best visualisation of articular surface.

Open reduction internal fixation should be done as early as possible. Delay in open reduction internal fixation with delayed soft tissue dissection leads to increased chances of elbow stiffness due to periarticular fibrosis.

For a successful internal fixation of closed distal humeral fracture, it is necessary to maintain anatomic and stable reconstruction of the articular surface and of both humeral columns using two 90-90 plates. Operative treatment with rigid anatomical internal fixation should be the line of treatment for all grades of extra and Intercondylar fractures, more so in young adults as it gives best chance to achieve good elbow function.

Nearly 92.5% distal humerus fractures united at the average period of 16 to 24 weeks and 7.5% fractures were non united due to mild or moderate instability during implant fixation, intra articular comminution, open grade fractures, infection, and predisposing factors like diabetes.

During open reduction internal fixation, anatomic nature of articular surface should be given prime importance.

Early Vigorous, active physiotherapy is a must for good results. Stable fixation allows early, active and aggressive postoperative mobilisation.



PRE-OP XRAY

Figure-2



IMMEDIATE POST OP XRAY

Figure-3



Extension

Figure-4



Flexion

Figure-5

(Rang of movements at 6 months follow up showing excellent score & results)

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