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Outcome of dual column fixation for intra articular distal humerus fracture

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Abstract

Introduction: In young adults, most distal humerus fracture occurs from high energy trauma, sideswipe injuries, road traffic accidents, fall from height, and gunshot wounds. and also it follows a bimodal age distribution (1).

Most distal humerus fractures are intra-articular and involve both the medial and lateral columns

Aim: To evaluate functional and radiological outcome of patients treated with bicolumn fixation with LCP in intra-articular distal humerus fractures.

Materials and Methods: Our study is a prospective study in which we selected 20 cased remdomly with distal humerus fracture with intraarticular extension and treated with open reduction and internal fixation with dual plating.

Results: Union was achieved in all cases with in study period. There was no case of non-union, elbow stiffness occurred in one patient.

Conclusions: Proper functioning of elbow joint depends on anatomical reduction and good fixation of intraarticular fracture with dual LCP and early mobilization so that mobilization of elbow should be started as early as possible after fracture fixation.

Keywords: Distal humerus, dual plating, bicolumnar fixation, inter condylar fracture, early mobilisation

Introduction

In young adults, most distal humerus fracture occurs from high energy trauma, sideswipe injuries, road traffic accidents, fall from height, and gunshot wounds. and also it follows a bimodal age distribution [1].

Most distal humerus fractures are intra-articular and involve both the medial and lateral columns.

Management of inta-articular distal humerus fracture is very challenging due to involvement of multiple factors as fractures patterns, quality of the bone, location of the implant, and the biomechanical properties of the implants [2].

Our main aim in management of such type of fractures is to achieve a stable, accurate articular and bony reconstruction that allows early range of motion for rehabilitation and eventually a successful functional outcome.

There are various classification system described for intra-articular fracture of distal humerus. Risedborough and Radin[1] described 4 types of intercondylar “T-type” distal humerus fractures: Type 1 a non-displaced fracture, Type 2 displaced but without rotation of the fragments, Type 3 includes fragment rotation, and Type 4 involved severe comminution.

The Orthopaedic Trauma Association’s (OTA) alpha-numeric system, assigned three main types: Type A (extra-articular), Type B (partial articular), and Type C (complete articular) but The OTA system’s clinical application is limited and is hindered by poor inter-observer reliability beyond identification of the basic three types.

The main treatment of intraarticular distal humerus fracture is open reduction and fixation with locking plates, non-operative treatment of distal humerus fractures is limited and primarily involves patients with very low demand or in poor health.

In surgical management of such type of fracture there are several variables which plays important role in succesfull management of these fractures- restoration of articular congruity,

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secure bony fixation, achievement of bony healing, maintenance of a functional range of motion, and avoidance of complications such as hypertrophic ossification and ulnar neuropathy [2].

Aim

Our aim is to evaluate functional and radiological outcome of patients treated with bicolumn fixation with LCP in intra-articular distal humerus fractures.

Material and Methods

Our study is prospective type of study of 20 cases of supra condylar fracture humerus with inter condylar extension treated surgically with dual plating which were admitted to Deptt of orthopaedics and trauma centre GR Medical College and J.A. Hospital, Gwalior, Madhya Pradesh, between November 2013 to October 2016 with following

Inclusion criteria

1. Intra-articular displacement of >2mm.
2. Marked fracture comminution and displacement.
3. Age > 18 years.
4. Floating elbow and multiple fracture patients.

Exclusion criteria

1. Patients unfit for surgery.
2. Patients who have lost follow up.
3. Severe contaminated open fractures.
4. Severe osteopenia.
5. Fracture with neurovascular injury, crush injury, mangled extremity severity score >7.



Fig 1: pre-op x-ray of elbow

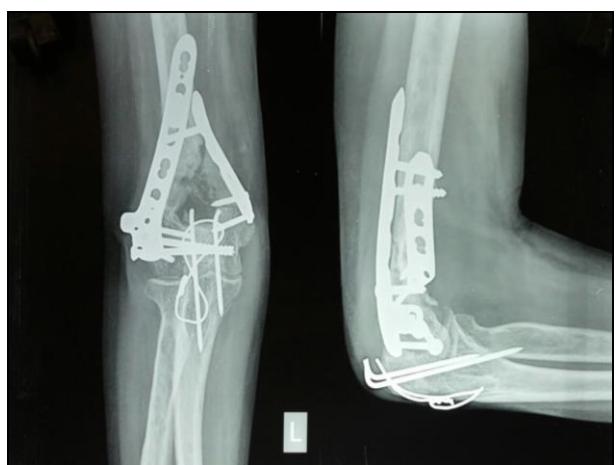
Both AP and LAT view showing Fracture of distal humerus
All the patients who attended orthopaedic department opd and trauma centre with suspected injury to elbow, x-ray of injured elbow done in both antero-posterior and lateral plane to confirm the fracture and examined for neurovascular injury followed with above elbow pop slab application.

The detailed nature, fracture geometry and fracture configuration were assessed and understood before surgery, the fracture in which fracture geometry were not clear on plane x-rays, 3D CT Scan were done to know exact fracture geometry.

Those patients which fulfills the inclusion criteria of our study and willing for surgery, preoperative investigations done to get fitness for surgery and those patients which were found fit for surgery were with in a week of injury.

Surgical Technique

Those patients who were posted for surgery, supraclavicular block was used in 14 cases and general anesthesia in 6 cases. Pneumatic tourniquet was used in all cases. Scrubbing and draping of injured upper limb done. Tourniquet was inflated and time noted. Elbow was exposed posteriorly through midline incision beginning 8cm proximal to the tip of the olecranon and with slight radial deviation at the olecranon tip and extending distally 6 cm towards fore arm. Skin and subcutaneous tissue dissected to expose the olecranon and triceps tendon. The ulnar nerve is isolated and fascia over the flexor carpi ulnaris is longitudinally split to enhance the nerve mobility, and then gently retracted from its bed with a moist tape. Distal end of the humerus is exposed through Trans olecranon approach. An intra-articular olecranon osteotomy was made in a shallow 'V' or Chevron fashion in the center of the olecranon sulcus that is approximately 2cm from the tip of the olecranon using thin bladed oscillating saw and completed with a thin osteotome. The osteotomized olecranon fragment was elevated proximally along with the triceps tendon. The fracture was exposed fracture fragments were assembled. Reduced condyles were provisionally fixed with K (Kirschner) wire. 4mm cancellous screw was inserted across the reduced condyles. Reduction and temporary stabilization of the medial and lateral columns was done by using crossed K wire. Medial and lateral pillars were reconstructed using pre-contoured 3.5mm reconstruction plate and screws or one third tubular plate along with 3.5 mm screws. To enhance the mechanical strength the plates were placed in 90-90 configuration i.e., one plate on medial boarder and another on posterior surface of lateral column. The stability of the internal fixation was tested by putting the elbow through a range of motion. The olecranon osteotomy was reduced under direct vision and held with reduction clamp and fixed with tension band wiring with obliquely placed K wire. At the completion of the fixation the elbow was again put through a range of motion to test the stability of the internal fixation. The tourniquet was deflated and hemostasis carefully secured. The wound was closed in layers over negative suction drain. Compression bandage was applied and CC sling/elbow pouch given. Post operatively check x-ray done in both antero posterior and lateral views of elbow joint.



Operated limb were kept in CC sling/elbow pouch and advised patient to move his fingers. After 48 hours of surgery check dressing was done and suction drain was removed. Intravenous antibiotics were given for 5 days and oral antibiotics and analgesic drugs given for 10 more days. Suture removal was done after 12 days of surgery or depending upon

condition of wound, range of movements were started on 2nd day of surgery.

Check x-rays was done on next day of surgery and patient was discharged from hospital on 6th day or depending upon condition of patient.

First Follow up was done at the time of suture removal than followed every 2 weeks for first 2 months and monthly for next 2 months than every 2 months until fracture healing and full range of motion regained.

Evaluation of functional outcome was done using Mayo Elbow Performance Index and radiological outcome using post-operative x-rays [3].



Results

Age incidence

Age of Patients (years)	No	Percentage
18-30	4	20%
30-40	6	30%
40-50	10	50%
TOTAL	20	

In our study were treated cases of intracondylar fracture with plating and their agewise distribution are-4 (20%) patients were between 18-30 years, 6 (30%) patients were between 30-40 years, 10 (50%) patients were between 40-50 years of age, so the maximum incidence in our study were between 40-50 years of age.

Sex Incidence

Sex	No	Percentage
Male	12	60%
Female	8	40%

In our study sex distribution were 12 (60%) were male patients and 8(40%) were female patients.

Side Incidence

Side	No	Percentage
Right	13	65%
Left	7	35%

In our study right side were involved in 13 (65%) patients and left side were involved in 7(35%) patients.

Mode of Injury

Mode of injury	No	Percentage
Rta	16	80%
Fall from height	2	10%
Assault	2	10%

In our study 16 (80%) patients were having history of road traffic accident, 2 (10%) patients having history of simple fall/slip from height, 2 (10%) patients were having history of physical assault.

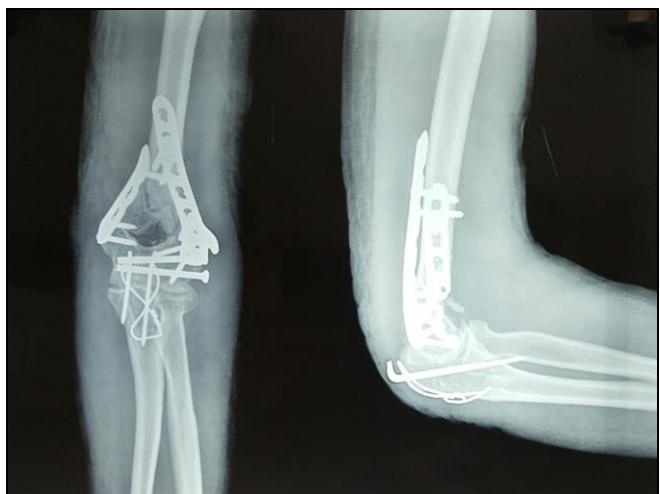
Complications

Complications	No	Percentage
Nerve injury	1	5%
Superficial wound infection	1	5%
Elbow stiffness	1	5%

In our study in post op period 1 (5%) patients developed nerve injury, tourniquet palsy which was pan-nerve palsy and was result of prolonged duration of tourniquet application but patients was fully recovered at 8th week of followup which show that it was neuropraxia type of nerve injury although we also identified nerve intraoperatively in all of the patients.

Also 1 (5%) case developed superficial wound infection and which was healed with prolonged use of antibiotic and wound dressing.

1 (5%) developed elbow stiffness but limb were functional in both of the patients.



MEP Score Outcome

Outcome	No	Percentage
Excellent (91-100)	5	25%
Good (75-90)	12	60%
Fair (60-74)	2	10%
Poor (<60)	1	5%

As Per Mayo Elbow

Performance Score (MEP) outcome of our study is as-
5 patients were having excellent outcome, 12 patients were havind good outcome and 2 patients were having fair outcome and in only 1 patients poor outcome occurs.

Discussion

Elbow joint is very crucial for upper limb functioning in adults of all socialemconomic group and proper functioning of elbow joint after distal humerus fracture depends on proper fracture fixation and early rehabilitation.

In our study majority of patients were male (60%) with male and female ratio of 32 as compared to 11 observed by Robinsons *et al*, resultant of our society where male travels more and more prone for RTA as compared to female [4].

In our study 80% of cases are due to RTA, compared to study of Robinsons *et al*. where majority of patients were due to history of fall. This may be due to majority of cases at our centre due to secondary referral centre and we receives all major referal trauma cases from nearby region. And also due to increase incidence of RTA nowadays. In our study incidence of involvement of right and left upper limb was 65% and 35% respectively as compared to stidies of Jupiter *et al*. where percentage of right and left upper limb were 60% and 40% respectively [4].

In our study majority of patients (60%) scored good MEP score as compared to study done by shaik *et al*. where 50% of patients scored good MEP score [5].

In our study complications were nerve injury in 1 patients which was due to tourniquet palsy because of prolonged duration of tourniquet but patient fully recovered at 8th week of follow up with conservative treatment, one patients had superficial wound infection and healed with prolonged use of antibiotics and another patient had elbow stiffness.

Conclusions

Now a days there is increase in incidence of distal humerus fracture due to high energy trauma during RTA and proper functioning of elbow joint depends on anatomical reduction and good fixation of intraarticular fracture with dual LCP and early mobilization so that mobilization of elbow should be started as early as possible after fracture fixation [6].

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Conflict Of Interest-None declare

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