



Functional and surgical outcome of intraarticular distal humerus fracture fixation using transolecranon approach

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Abstract

Distal humerus fractures are common and represent 2% of all fractures and approximately 30% of those affecting the humerus. The management of distal humerus fractures is complicated by the complex 3-dimensional anatomy of the elbow, the limited bone stock for internal fixation, and often comminuted and osteopenic nature of the articular segment. Surgical treatment should be conducted in a systematic manner to minimize complications. Using the principles of anatomic articular reconstruction with stable fixation to allow early range to motion, good to satisfactory outcomes can be expected in most patients.

Methodology: This was prospective study of 30 cases of intraarticular distal humerus fractures in adults who were admitted in Hospital for Bone and Joint Surgery Barzulla Srinagar, an associated hospital of Govt. Medical College Srinagar between November 2017 and June 2019.

Results: In our study of 30 cases, there were 25 male and 5 female patients with mean age of 35 years.

63.33% of the cases admitted were due to RTA, 36.67% due to fall with right side being more common side affected. Riseborough and Radin Type III fractures accounted for 53.33% of cases and Type IV accounted for 46.67% . Out of 30 cases Excellent to Good results were seen in 80% of cases in our study according to Mayo Elbow score.

Conclusion: From our study we conclude that for a successful internal fixation of distal humerus fractures, it is necessary to maintain anatomic and stable reconstruction of the articular surface and of both humeral columns using two parallel or 90-90 plates.

Keywords: Distal humerus fractures, Mayo elbow score, Riseborough and Radin.

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 rehabilitation¹. Depending upon the amount of comminution and displacement, open reduction and internal fixation with Y plate, 1/3 tubular plate, reconstruction plate, Cancellous screws, 'K' wire and double tension band wiring can be done individually or in combination². The aim of the present study was to evaluate the functional and surgical outcome intraarticular distal humerus fracture fixation using trans olecranon approach

Materials and Methods

This prospective study consists of 30 cases of intrarticular distal humerus fractures treated surgically which were admitted to Hospital for Bone and Joint Surgery Barzulla Srinagar, an associated hospital of Govt. Medical College Srinagar. All the patients of intercondylar fracture distal humerus with age between 18 to 60 years with medical fitness for surgery were included in the study. Patients medically unfit for surgery and those not willing for surgery were not included in this study. All the necessary pre-operative work-up was done in the form of Radiological and hematological investigations. Well written informed consent was taken from all the patients enrolled in the study. The Mayo Elbow Performance (MEP)³ score 4-6 were calculated. The MEP score is an elbow centric score that assesses the pain, mobility, stability and function of the elbow.

Surgical technique

Brachial block was used in 22 cases and general anesthesia in 8 cases. Pneumatic tourniquet was used in all cases. Scrubbing and draping of injured upper limb done. Tourniquet was inflated and time noted. The standard surgical steps were followed. All the patients were administered three doses of second generation cephalosporin (one at the time just before the procedure and two doses at 12 hourly interval postoperatively). 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 forearm. Skin and subcutaneous tissue dissected to expose the olecranon and triceps tendon. The ulnar nerve was isolated and fascia over the flexor carpi ulnaris was longitudinally split to enhance the nerve mobility, and then gently retracted from its bed with a moist tape. Distal end of the humerus was exposed through transolecranon 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 3.5 mm reconstruction plate and screws or one third tubular plate along with 3.5 mm screws. Adequacy and anatomical reduction was checked in both the

orthogonal views at every important step. Meticulous wound closure was done and arm pouch was given post-operatively Patients were instructed to keep the limb elevated and move their fingers. Intravenous antibiotics given up to 5th postoperative day. Oral antibiotics and analgesics were given to the patient till the time of suture removal. Sutures were removed after the 10th postoperative day depending on wound condition. . Similar pain control protocols were followed for all the cases. An arm pouch was given to all the patients postoperatively for 2 weeks. Mobility in the form of elbow and shoulder exercises was started from post-operative day 1.

Results and Observation

The study consists of Adult Patients having distal humerus fractures involving articular surface who are admitted to Hospital for Bone and Joint Surgery Barzulla Srinagar after obtaining their informed written consent.

Table 1: Age distribution

Age Group	No of Patients
18 - 20	5
21 - 30	9
31 - 40	6
41 - 50	6
51 - 60	4

Table 2 : Complications

Study	Superficial infection	Ulnar neuropraxia	Non union	Heterotropic ossification	Implant failure
Soon JL et al ⁴	6.66%	13.33%	6.66%	Nil	Nil
Our study	3.33%	3.33%	3.33%	-	3.33%

Table 3: MEP Score

Study	Good / Excellent scores (based on MEPS)
Teng-Le Huang –et-al (2004)	87.5%
I Ibomcha Singh et al (2004)	81.8%
K. Reising et al (2009)	85%
Our study	80%

Discussion

Treatment of distal humerus fractures mainly the intra articular types is a challenging task. These fractures may be compounded by many problems such as significant comminution and multiple intra-articular fracture lines A study by Meloy GM at al. ⁵, show that Patients treated with single-column plating had similar union rates and alignment. However, single-column plating resulted in a significantly better range of motion with less complications. This problem is further compounded by increased incidence of osteoporosis in the older population. Several studies have demonstrated a good outcome of fixation in these fractures. However, many studies have quoted a significant failure rate of upto 25% especially in elderly patients. In adults, most of distal humerus fractures are intra-articular and involve both the medial and lateral columns . Due to the characteristic intra articular involvement, displacement, and poor control of fracture fragments with closed treatment, we typically treat these fractures operatively. The goal of treatment is restoring painless and functional elbow in a fractured distal humerus which requires anatomical reconstruction and stable fixation . In our study distal humerus fractures are intra articular and involve both the medial and lateral columns. The decision to offer operative intervention for distal humerus fractures is based on many factors, including fracture type, intra articular involvement,

fragment displacement, bone quality, joint stability, and soft-tissue quality and coverage⁶. In addition, individual factors, such as patient age, overall health condition, functional extremity demands, and patient compliance, are all considered. Preoperatively, patients must understand outcome expectations and the importance of rehabilitation⁶. Primary goals for operative intervention are to restore articular congruity and elbow stability⁷. Another goal is to decrease the possibility of posttraumatic arthritis and elbow stiffness. Studies have supported the notion that distal humerus fractures in adults are optimally treated with open anatomic reduction and stable fixation to allow early anatomic restoration and upper-extremity ROM. Although operative intervention is not without complications, the risk can be reduced by paying detailed attention to anatomic reduction, soft-tissue handling and preservation, stable fixation, and early mobilization. For articular fractures and unstable nonarticular fractures, operative treatment with direct visualization of the joint surface and anatomic reduction and stabilization can prevent accelerated arthritis associated with articular incongruity⁸. Newer, minimally invasive, percutaneously inserted bridge plates also have been described and have been used to avoid extensive dissection and potential nerve injury^{9,10}.

Conclusion

In this study carried out in 30 intercondylar fractures we came to the following conclusions:

- ❖ Inter condylar fractures of the humerus are common in adult males.
- ❖ The common mode of injury is RTA and direct fall on elbow 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 parallel/ 90-90° plates. Operative treatment with rigid anatomical internal fixation should be the line of treatment for all grades of Riseborough Radin Intercondylar fractures, more so in young adults as it gives best chance to achieve good elbow function.
- ❖ 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 mobilization



Fig.1: Ulnar nerve identified, olecranon osteotomy, fracture fixed internal



Fig. 2: Pre op Post op At 6 months follow up with implant for olecranon fixation removed

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