

Fixation of Distal Humerus Fracture Preserving the Extensor Mechanism of Elbow

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Abstract

Introduction: Intra-articular fracture of the distal humerus is a relatively rare injury & constitutes 0.5% to 0.7% of all fractures and 30% of elbow fractures. Traditionally these fractures have been managed operatively with various extensor mechanism disrupting approaches which are often associated with delayed/non union of the olecranon, triceps muscle weakness and osteotomy related implant prominence. Open Reduction and internal fixation of these fractures can be effectively accomplished through an 'EXTENSOR MECHANISM on APPROACH.' We present a detailed description of surgical technique and management of Compound Intra-articular fracture distal end of humerus. **Case Report:** 25 year old male patient came to our Hospital following a fall from a height of 20 feet on his right elbow. Patient had a Compound Type III B injury (Gustillo Anderson Classification) with type C 2 distal humerus fracture. The fracture was initially managed with debridement, surgical toilet and external fixator application. This was followed with two weeks of regular wound care supplemented with parenteral antibiotics. After the wound condition improved, definitive fixation of the intra-articular fracture was done with dual plating through an extensor mechanism on approach. **Conclusion:** Intra-articular fractures of distal humerus can be treated safely and successfully through extensor on approach which avoids extensor mechanism disruption and also avoids complications of olecranon osteotomy. This approach can be converted to conventional olecranon osteotomy if required intra-operatively.

Keywords: Distal Humerus; Plating; Extensor on Approach; Extensor Preserving.

Introduction

Intra-articular fractures of the distal humerus is a relatively rare injury & constitutes 0.5% to 0.7% of all fractures and 30% of elbow fractures. These fractures are seen in the younger age groups secondary to high energy trauma and in elderly women as a result of relatively lower energy trauma. The chances of functional impairment and deformity are very high following conservative treatment of such distal intra-articular fractures of the humerus, and stable internal fixation may be difficult to achieve due to the complexity of the fracture and associated

osteoporosis. Good anatomical alignment, stabilization, gentle soft tissue handling and early mobilization can provide satisfactory results. Severe comminution, bone loss, and osteopenia predispose to unsatisfactory results because of inadequate fixation of the fracture.

Open Reduction and internal fixation of these fractures can be effectively accomplished through an 'EXTENSOR MECHANISM on APPROACH.' Traditionally these fractures have been managed operatively with various extensor mechanism disrupting approaches (1-7) which are often associated with delayed/non union of the olecranon,

triceps muscle weakness and osteotomy related implant prominence (8-10)

Case Report

A 25 year old male patient came to K.L.E. Hospital & Medical Research Center casualty following a fall from a height of 20 feet on his right elbow while working in a factory. Patient had a Compound Type III B injury (Gustillo Anderson Classification) with type C 2 distal humerus fracture. The wound was grossly contaminated with grease and initially managed with debridement, surgical toilet and external fixator application. This was followed with two weeks of regular wound care supplemented with parenteral antibiotics. After the wound condition improved, definitive fixation of the intra-articular fracture was done with dual plating through an extensor mechanism on approach.

Patient was administered G.A. and put in a prone position, a posterior longitudinal incision taken extending 3 to 4 cms distal to the tip of olecranon and full thickness fascio-cutaneous flap was elevated medially and laterally. Next, the ulnar nerve was indentified along the I-M septum and dissected and separated. The medial and lateral borders of the triceps were elevated from their respective inter-muscular septae. Laterally, the dissection was continued anterior to the anconeus allowing it to be elevated along with the triceps and thus preserving

it'sneuro-vascular supply. The triceps was then freed from the posterior aspect of humerus in an extra-periosteal fashion and the medial and lateral windows connected with blunt dissection followed by medial and lateral elbow arthrotomies posterior to the collateral ligament complexes. This, allows visualization of about 60% of the overall articular cartilage surface of the distal part of humerus. Then, the fracture fragments were reduced anatomically under direct vision and indirectly under fluoroscopy. Provisional fixation was done with k-wires with care being taken not to interfere with screw and plate placement. The reconstructed, distal articular block was approximated to the humeral diaphysis. Fixation was completed with fixation of orthogonal plates on the medial and postero-lateral surface with reconstruction plates and multiple screws. The K wires were removed and final assessment was done to assess stability, range of motion and confirmation done that no implants were in the joint and the olecranon fossa prior to closure. The triceps fascia was repaired laterally and medially with absorbable sutures and the ulnar nerve was anteriorly transposed followed by closure in layers.

Postoperatively, dressing was changed after two days and active assisted elbow movements & grip strengthening therapy program started. Radiological fracture union was seen in eight weeks post-operatively patient had good ROM with result being Excellent as per the QUICKDASH score with no triceps strength loss. No signs of infection were present.

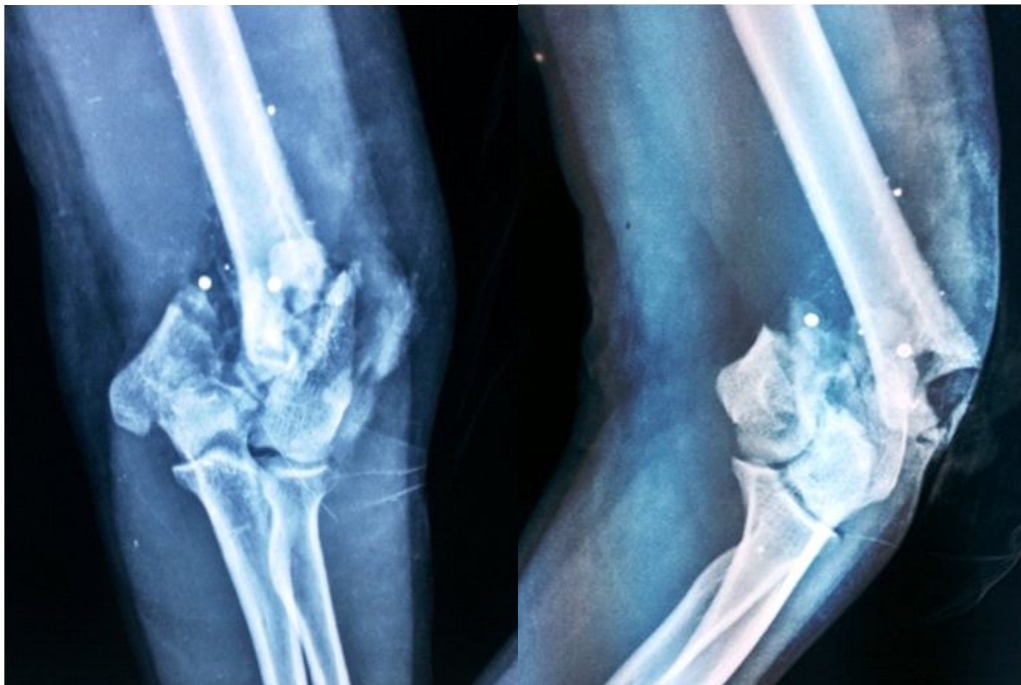


Fig. 1: Pre Op AP & Lateral Views

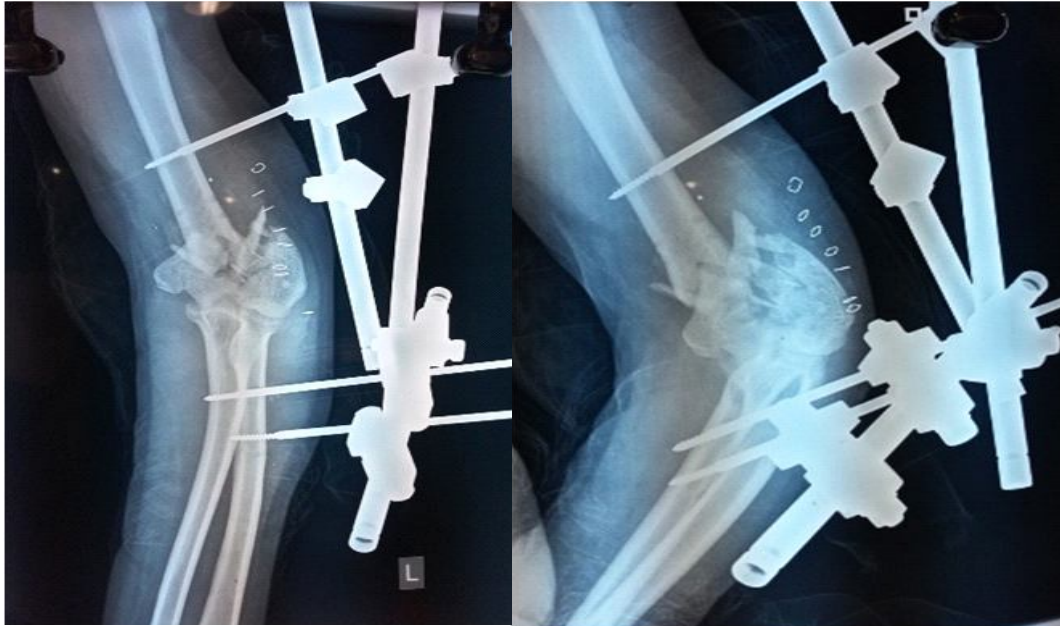


Fig. 2: X rays after Ex-Fix Application

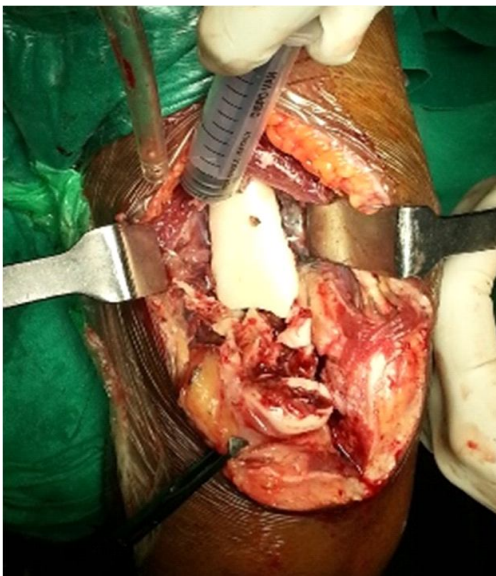


Fig. 3: Fracture Exposure with intact triceps



Fig. 5: Plating with triceps preservation

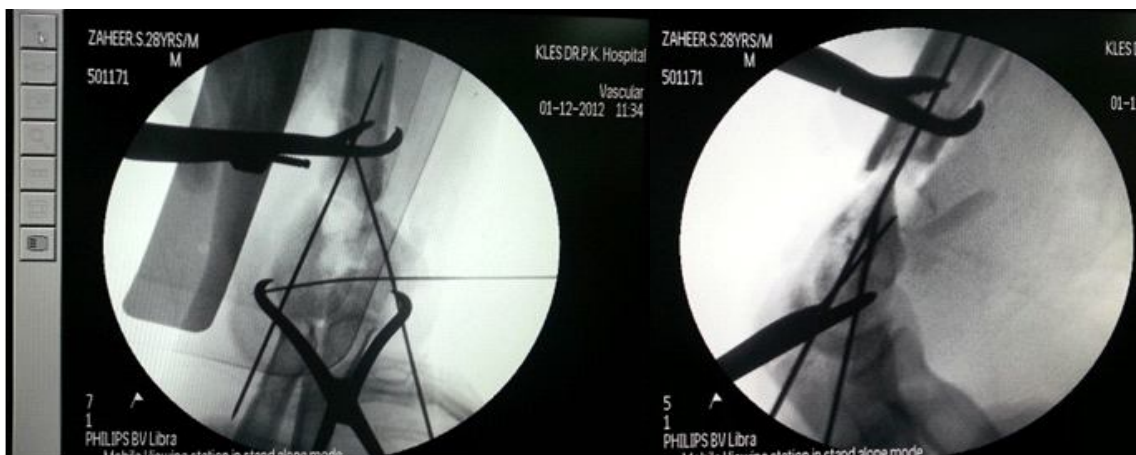


Fig. 4: Provisional Fixation with K-wires



Fig. 6: Plates over both columns with intact triceps

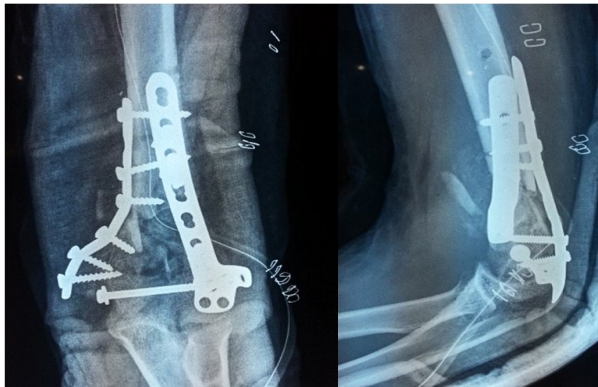


Fig. 7: Post Operative AP & Lateral Views



Fig. 8: Function at final follow up showing the healed surgical scar and full flexion



Fig. 9: Function showing full extension and supination

Discussion

Intra-articular fractures of the distal humerus are relatively rare but difficult fractures to treat. Gentle soft-tissue handling, anatomic articular reduction, rigid fixation and early mobilization are the pillars for a successful outcome. These fractures have historically been approached through extensor-disrupting approaches which may result in loss of elbow extension or complications associated with olecranon osteotomy. This fracture can also be approached with the technique of anconeus muscle preserving approach with bi-columnar visualization through lateral and medial windows that avoids the disruption of the triceps muscle or its insertion. The intact sigmoid notch serves as a template for reduction. We managed anatomic articular reduction and bi-columnar fixation without disrupting the extensor apparatus.

Conclusion

Fractures of distal humerus can successfully be treated with 'Extensor on Approach'. The advantages of this approach include early rehabilitation due to preservation of the extensor mechanism of elbow and avoidance of complications of olecranon osteotomy such as non/delayed union and hardware prominence. Another advantage of this approach is that it can easily be converted to an olecranon osteotomy without any additional soft tissue injury

if the reduction cannot be obtained or inadequately assessed.

Clinical Message

Intra-articular distal humerus fractures are difficult to treat. It is very important to try and avoid as much soft tissue disruption as possible for better functional outcome and "Extensor on approach" provides one such excellent alternative to preserve the extensor apparatus of the elbow.

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