

PARALLEL PLATE FIXATION FOR DISTAL HUMERUS FRACTURE - A CASE REPORT

Orthopaedics

Dr. Vaishak B

MS Ortho Postgraduate 2nd Yr SBMCH, Sree Balaji Medical College And Hospital SBMCH, BIHER, No. 7, Works Road, New Colony, Chromepet, Chennai - 600044, Tamilnadu, India

Dr. Srinivasan*

Associate Professor, Department of Orthopaedics, Sree Balaji Medical College and Hospital SBMCH, BIHER, No. 7, Works Road, New Colony, Chromepet, Chennai - 600044, Tamilnadu, India *Corresponding Author

ABSTRACT

Distal humerus intercondylar fractures are intra-articular, comminuted fractures involving soft tissue injury.¹ These fractures present therapeutic challenges due to the complexity of the local anatomy and are generally treated surgically with parallel or orthogonal plate fixation of the medial and lateral columns. Olecranon osteotomy is regarded as the gold standard technique, because it best exposes articular discrepancies; however, even comminuted fractures can reportedly be anatomically reduced and fixed using paratricipital incisions.² The locking compression plate system produces high-quality reconstructions and sufficient stability, thereby enabling early mobilization for distal humerus fractures.³ Complications include loss of reduction, implant failure, nonunion, malunion, ulnar nerve neuropathy, elbow stiffness, and heterotopic ossification.⁴ In general, the standard management for most intra-articular fractures is anatomic restoration of the articular surface and stable fixation, followed by early mobilization.

KEYWORDS

Distal Humerus, Intra-articular, osteotomy, Ulnar Nerve Neuropathy, Heterotopic Ossification, Heterotopic Ossification.

INTRODUCTION

Parallel medial-lateral plating technique follows an arch-keystone concept like the principles of architecture in which 2 columns are anchored at their base and linked together at the top to provide stable fixation.⁵ This technique has been shown to achieve satisfactory function of the elbow joint and high rate of union.⁶ Since there is difficulty in maintaining articular congruity during parallel plating technique, screw fixation first to the intercondylar fragments and parallel plating has been proposed for articular congruency and operation convenience. Green reported that the distal humerus is composed of lateral and medial columns that diverge distally, with the trochlea situated between these columns to form a stable triangular construct, and the elbow joint is very constrained because of its complex anatomy. As distal humerus is triangle shaped, parallel plating coupled with articular fixation would be suitable for bicolumn restoration. We hypothesized that bicolumn restoration with triangle-shaped screw and plate fixation (referred to as triangular fixation) would allow excellent healing and good elbow motion for distal humerus fracture.

CASE REPORT

A 77 year old female presented in SBMCH orthopaedic out patient department with severe pain in the left elbow joint since 2 weeks following h/o self fall at her residence. Patient apparently underwent native splinting for 2 weeks and presented to hospital later. Patient was unable to flex or extend the elbow joint following fall. Pain was sudden in onset, continuous and gradually progressive associated with swelling and not associated with radiculopathy or numbness. On examination, no external injuries, no obvious deformity, associated with swelling, local warmth, severe tenderness and unable to flex or extend the elbow joint. No neurovascular deficit. X-ray showed distal humerus fracture for which CT was done which showed left distal humerus bicolumnar fracture with intra articular extension AO/OTA 13-C1.1



Fig 1-AP and LAT elbow X-ray

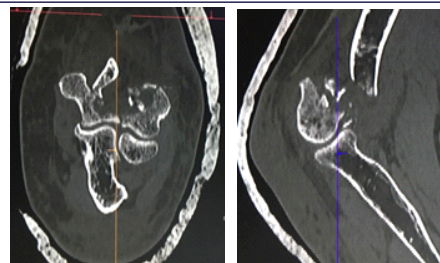


Fig 2 CT elbow



Fig 3- CT 3D reconstruction

Surgical fitness was obtained and pre anesthetic check-up was done. Under Regional block, under Tourniquet control, lateral decubitus position with the elbow flexed over an arthroscopy positioner, parts painted and draped. Posterior longitudinal incision curving over the olecranon was performed (for better wound closure) (fig 4), skin and soft tissues retracted, ulnar nerve was identified and protected. V-shaped chevron olecranon osteotomy was performed in customary manner (fig 5), articular surface was visualized. Distal intra-articular fragments were reduced and temporarily stabilized with Kirschner wires (K-wires) (fig 6), and medial and lateral anatomically pre

contoured titanium locking compression plate was used (fig 7). Intraoperative fluoroscopy was used to check correct positioning of distal screws (fig 8). Elbow flexion and extension movements were full and fixation was found to be stable. V-type olecranon osteotomy was fixed with cannulated cancellous screw and tension band wiring (fig 9). Ulnar nerve transposition was not performed. Thorough wound wash was given and wound closed over the drain. Heterotopic ossification (HO) prophylaxis was carried over.

POST OPERATIVE REHABILITATION

Post operatively (Fig 10) patient was immobilized with Above elbow slab for 2 weeks with wrist and shoulder mobilization exercise were started, following which slab was removed and gentle elbow flexion – extension exercise were started (fig 11) and continued with arm sling. 1 month post surgery full range of motion started with caution of lifting weight of more than 5 kgs.

INTRAOPIMAGES



Fig 4 skin incision



Fig 5 chevron osteotomy



Fig 6 fracture fixation with k-wire



Fig 7 plate fixation

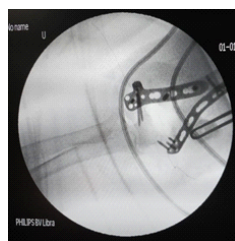
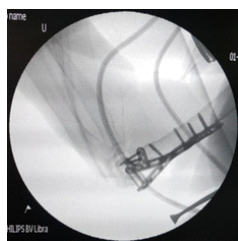


Fig 8- intra-op C-arm images



Fig 9- olecranon fixation



Post op xray Fig



Post op 2 weeks follow-up Fig 11

DISCUSSION

As result of anatomical properties, distal humeral fractures are problematic for both surgeons and patients. Main surgical principle in repair of these intra-articular fractures is to achieve stable and absolute fixation.⁷ Conventional plate systems had failure rates of 30%, especially in osteoporotic bones.⁸ Those unsatisfactory results led to development of new plate designs. Currently, locked, low-profile, anatomical plate systems for distal humerus have gained in popularity for bicolunar fixation. New designs of headless compression screws have made it possible to manage small intra-articular fragments. These new inventions allow for stable fixation and early physiotherapy of the joint.

The bicolunar theory is particularly helpful in understanding the biomechanical rationale for treating distal humerus fracture. The lateral column, which is composed of the capitulum and the lateral metaphysis, provides radiocapitellar stability through the osseous buttress and the lateral ligamentous structures. The medial column, which is composed of the trochlea and the sigmoid notch, establishes the primary load-bearing surface of the ulnotrochlear joint through the osseous buttress and the medial ligamentous structures. Reducing the articular surfaces of the capitulum and trochlea is a requisite for achieving congruity of the elbow joint. A common pitfall is that the parallel plating technique requires a certain amounts of soft tissue dissection, sometimes resulting in medial or lateral instability. During the dissection of soft tissue around the lateral supracondylar ridge and epicondyle, collateral ligaments and joint capsules are sometimes injured. In conclusion, triangular fixation technique for bicolunar restoration was an effective and reliable method in treatment of distal humerus intercondylar fracture. This technique maintained articular congruity and restored both medial and lateral columns, resulting in good elbow function.

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