



Irreducible Fracture Dislocation of the Elbow Due to Medial Epicondyle Entrapment Associated with Median Nerve Palsy in Adult: A Case Report

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Purpose: Medial epicondyle fractures are common elbow injuries in pediatric and adolescent population. However, this condition is extremely rare in adults, with only a few cases reported in the literatures. This report presents the case of an adult patient with an irreducible fracture dislocation of the elbow due to intra-articular entrapment of the medial epicondyle associated with median nerve palsy.

Methods: A case of 36-year-old man presented with posterolateral fracture dislocation of the left elbow with displaced medial epicondyle and median nerve palsy. Closed reduction was attempted, resulting in a grossly unstable elbow. Post-reduction radiographic study demonstrated the articular incongruence with the entrapped medial epicondyle. The patient underwent an open reduction and median nerve exploration. A fragment of the medial epicondyle was found comminuted and repaired using our novel technique with suture anchors. The lateral ulnar collateral ligament was repaired because of varus residual instability. The dislocated elbow was successfully reduced.

Results: At 6 months follow-up, the elbow was stable with nearly full range of motion, although radiographic studies demonstrated union fractures with partially fragment resorption. Both sensation and motor function of the median nerve were gradually recovered.

Conclusions: We presented a novel fixation technique for a rare case of irreducible fracture dislocation of the elbow due to intra-articular entrapment of the medial epicondyle associated with median nerve palsy in adults. The median nerve should be explored in every case, and delayed diagnosis should be avoided, which may lead to devastating complications.

Keywords: irreducible elbow fracture dislocation, entrapment, incarcerated, medial epicondyle, median nerve palsy

Article history:

Received: December 26, 2023 Revised: February 22, 2024

Accepted: March 12, 2024

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Medial epicondyle fractures are common elbow injuries in the pediatric and adolescent populations. Most injuries occurred in boys, commonly between the ages of 9 and 14 years. They account for up to 20% of all elbow fractures in pediatric patients and 60% of which are associated with elbow dislocation⁽¹⁾. In addition, the entrapment of medial epicondyle may occur after closed

reduction, which usually requires surgical intervention.

However, this phenomenon is rare in adults. There are only a few reported cases of entrapped medial epicondyles after closed reduction of the elbow in literature⁽²⁻⁴⁾. To the best of our knowledge, there has been no previous report of an incarcerated medial epicondyle associated with median nerve injury.

We present a case of irreducible fracture dislocation of the elbow due to intra-articular entrapment of the medial epicondyle associated with median nerve palsy.

CASE REPORT

A 36-year-old man presented with left elbow after slipping and falling from an outstretched hand. Physical examination in the emergency department revealed a swelling and deformity of the left elbow. There was a decrease in light-touch sensation in the area innervated by the median nerve, and paralysis of the flexor pollicis longus (FPL) and flexor digitorum profundus (FDP) of the index finger. The patient could perform palmar abduction of the thumb and fingers abduction and adduction without any weakness. Radiographic studies showed posterolateral fracture-dislocation of the elbow with a displaced medial epicondyle. A closed reduction was attempted under intravenous sedation, which resulted in a grossly unstable elbow. Post-reduction radiographic study demonstrated the articular incongruence with the entrapped medial epicondyle (Fig. 1). Computed tomography revealed comminution of the medial epicondyle fragment, a non-displaced radial head fracture, and avulsion of the lateral collateral ligament from the distal humerus (Fig. 2). To reduce the dislocated elbow, stabilize the fracture, and explore the median nerve, surgery was performed 4 days after the injury owing to limitations of the operating room.

After brachial plexus block, a curved incision was made along the medial aspect of the elbow. After carefully dissection, the flexor-pronator muscles were stripped from the medial ridge of the distal humerus, and the intact median nerve was identified with contusion along the

nerve. The ulnar nerve was identified proximally posterior to the intermuscular septum and released from the surrounding tissue along its course. The medial epicondyle was entrapped within the ulnohumeral joint, and the anterior bundle of medial collateral ligament (AMCL) was attached to the fragment. The fragment was meticulously removed from the joint.

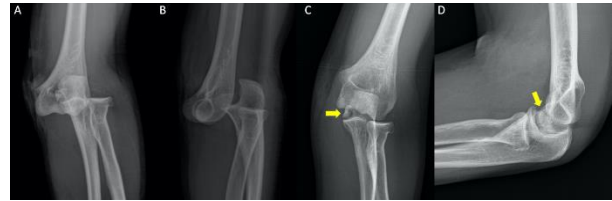


Fig. 1 Pre-reduction (A,B) and post-reduction (C,D) plain radiographs in AP and lateral views. Incarcerated comminuted medial epicondyle fragment is labelled with yellow arrows.



Fig. 2 Computed tomography of left elbow after closed reduction demonstrates incarcerated comminuted medial epicondyle fragment.

To stabilize the elbow, the medial epicondylar fragment with the attached AMCL was repaired. We applied a 3.5 mm metal suture anchor (PARCUS, USA) to the most distal fracture site of the distal humerus, passed the suture ends through the origin of the AMCL and grasped the collateral ligament using a Krackow stitch. The knot was secured after elbow was placed in flexion with varus force and the forearm was placed in the supinate position to achieve the proper tension of

the AMCL. Because the medial condyle was comminuted, we decided to use suture anchor fixation instead of screw fixation to avoid further fracture. We applied another 3.5 mm metal suture anchor to the most proximal fracture site of the distal humerus, separated the two sutures to cover the anterior and posterior halves of the fragment, and tied the sutures with the other ends of the suture from the first suture anchor in a V-shaped configuration. Using this technique, we achieved a stable fixation of the comminuted medial epicondylar fragment (Fig. 3). The flexor-pronator muscles were repaired back to the humerus using vicryl 2-0. The ulnar nerve was left in place without transposition as it had no subluxation with elbow motion.

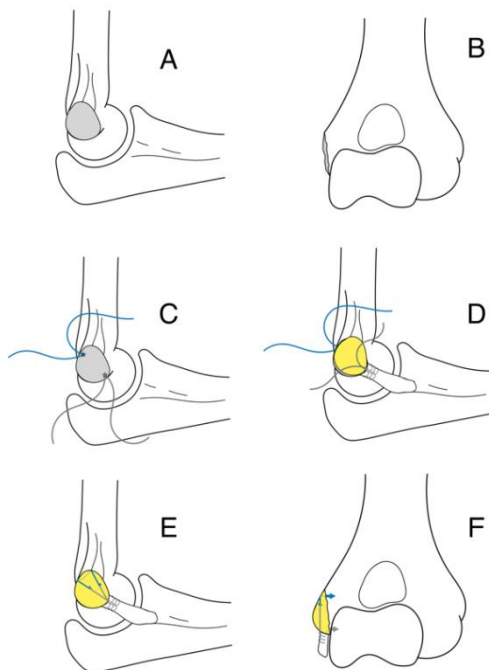


Fig. 3 Diagram of fixation technique. A and B = The fracture site of distal humerus (grey), lateral and AP views; C = Two anchor sutures are fixed to the most proximal and distal of the fracture site; D = The anterior bundle of the medial collateral ligament is grasped by the suture from the distal anchor using Krackow stitch, and both end are brought over the medial epicondyle fragment (yellow); E and F = Two sutures from proximal anchor are separated to cover the anterior and posterior halves of the fragment and tied over the fragment with the suture from the distal anchor, lateral and AP views.

After repairing all structures at the medial site, stability was evaluated using fluoroscopic assessment, and residual instability with varus force was confirmed. With another surgical approach on the lateral side of the elbow, the lateral ulnar collateral ligament was repaired back to its origin using a 2.5 mm metal suture anchor (PARCUS, USA). Both the surgical wounds were closed. The long-arm slab was placed in the neutral position. The elbow was immobilized in 90° flexion for 2 weeks to minimize swelling, and range of motion exercises were initiated.



Fig. 4 Postoperative radiographs of the left elbow 6 months after surgery.



Fig. 5 Range of motion of the elbow at 6 months after surgery.

At 6 months follow-up, radiographic studies revealed union fractures with partial fragment resorption (Fig. 4). However, the elbow was stable with a nearly full range of motion. Both the sensation and motor function of the median

nerve partially recovered. The 2-point discrimination was 4 mm for the thumb, index, and middle fingers. The motor power of the FPL and FDP of the index finger was grade 4 on the Medical Research Council scale. The range of motion was 10-130° flexion with full rotation (Fig. 5).

DISCUSSION

In the pediatric population, medial epicondyle fracture is the most common fracture associated with elbow dislocation because it is the last ossification center that fuses in the distal humerus, typically between the age of 15-20 years⁽⁵⁾. In addition, the incidence of fragment incarcerated in the ulnohumeral joint after reduction is between 15% and 25% and the most common associated nerve injury is the ulnar nerve, given its location directly posterior to the medial epicondyle⁽¹⁾.

However, complex injuries are extremely rare in adults. There were only five reported cases of intra-articular entrapment of the medial epicondyle after reduction of the dislocated elbow of which only one case was associated with ulnar nerve injury⁽²⁻⁴⁾. Our presented case is believed to be the first reported case of incarcerated medial epicondyle associated with median nerve injury in an adult.

While the ulnar nerve is the most common nerve injury associated with elbow dislocation, the entrapment of the median nerve concomitant with elbow dislocation is a rare complication that commonly delays diagnosis^(6,7). In cases of median nerve palsy associated with elbow dislocation, we strongly recommend median nerve exploration to ensure no entrapment of the nerve.

The indications for surgical intervention for medial epicondylar fractures are inconclusive. Absolute indications included open fractures and fragments incarcerated in the joints. Several fixation techniques have been described, including Kirschner wire (K-wire) fixation, screw fixation, suture fixation, excision of the fragment, and repair of the soft tissue to the medial elbow⁽¹⁾. Although there is no consensus for any technique over the others, K-wire fixation is mostly chosen in pediatric patients with small medial epicondyle fragments, while screw fixation is preferred in larger frag-

ments^(1,5,8,9). However, in cases with comminuted medial epicondyle fragments, these techniques may not achieve stable fixation and might result in more comminuted fractures. In such situations, suture fixation can provide stable fixation without complication⁽¹⁰⁾.

In our case, we presented a novel technique for fixation of the comminuted medial epicondyle and achieved good tension in AMCL repair using two suture anchors. Short-term follow-up confirmed a stable elbow with union of the medial epicondyle. The median nerve palsy was gradually recovered.

CONCLUSIONS

In conclusion, we presented a rare case of irreducible fracture-dislocation of the elbow due to intra-articular entrapment of the medial epicondyle associated with median nerve palsy in an adult. Our novel fixation technique using anchor sutures may be an alternative treatment method in patients with comminuted medial epicondylar fragments. Median nerve palsy after elbow dislocation is a devastating complication that should not be delayed and should be investigated in every cases.

REFERENCES

1. Gottschalk HP, Eisner E, Hosalkar HS. Medial epicondyle fractures in the pediatric population. *J Am Acad Orthop Surg* 2012;20:223-32.
2. Abdel Nour HG, El Rassi GS, Daoud JC, et al. Intra-articular entrapment of the medial epicondyle following a traumatic fracture dislocation of the elbow in an adult. *Case Rep Orthop* 2018;2018:1-6.
3. Khan SA, Zahid M. Dislocation of the elbow with intra-articular entrapment of the medial epicondyle in adults. Report of two cases. *Acta Orthop Belg* 2002;6883-6.
4. Purser DW. Dislocation of the elbow and inclusion of the medial epicondyle in the adult. *J Bone Joint Surg Br* 1954;36-B:247-9.
5. Dodds SD, Flanagan BA, Bohl DD, et al. Incarcerated medial epicondyle fracture following pediatric elbow dislocation: 11 cases. *J Hand Surg Am* 2014;39:1739-45.

6. Dubey V, Saify A, Samant A, et al. Median nerve entrapment after elbow dislocation and the role of ultrasonography - A case report. *J Orthop Case Rep* 2017;7:21-4.
7. Hallett J. Entrapment of the median nerve after dislocation of the elbow. A case report. *J Bone Joint Surg Br* 1981;63-B:408-12.
8. Louahem DM, Bourelle S, Buscayret F, et al. Displaced medial epicondyle fractures of the humerus: surgical treatment and results. A report of 139 cases. *Arch Orthop Trauma Surg* 2010;130:649-55.
9. Pace GI, Hennrikus WL. Fixation of displaced medial epicondyle fractures in adolescents. *J Pediatr Orthop* 2017;37:e80-2.
10. Rickert KD, Sarrel KL, Sanders JS, et al. Medial epicondyle fractures: Biomechanical evaluation and clinical comparison of 3 fixation methods used in pediatric patients: Biomechanical evaluation and clinical comparison of 3 fixation methods used in pediatric patients. *J Pediatr Orthop* 2020;40:474-80.