

INTRA-ARTICULAR MEDIAL EPICONDYLE AVULSION FRACTURE ENTRAPMENT FOLLOWING CLOSED REDUCTION ATTEMPT OF POSTERIOR ELBOW DISLOCATION

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Abstract

Introduction: Pediatric complex elbow dislocations are uncommon injuries as intra-articular medial epicondyle fracture incarceration associated with posterior elbow dislocation occurs in 5-18% of all cases. A high-index of suspicion necessitates a computed tomography (CT) evaluation of the elbow joint as conventional two-plane radiography can be falsely interpreted as normal. The proposed treatment for this type of injury is surgical with multiple techniques being described in the literature.

Case report: A fifteen-year-old male presented to our emergency department with left elbow pain, medial elbow region bruising, valgus deformity and decreased range of motion (ROM) of the affected elbow seven hours post-injury. Unsuccessfully closed reduction maneuver at the local hospital with persistent symptoms was followed by CT of the elbow joint with consequent patient transfer to our institution where another closed reduction under appropriate analgesia failed. Urgent open reduction and internal fixation (ORIF) with two second generation 3.5x30 mm fully threaded headless compression screws of the medial epicondyle fracture incarceration was done. The patient was followed-up for three months resulting in laudable patient satisfaction as a result of the painless full range of motion in everyday and sport activities.

Conclusion: The imperative in diagnosing this type of injuries in pediatric posterior elbow dislocations following closed reduction attempt is to be aware of its existence. A high-index of suspicion should be further evaluated by CT. ORIF with second generation headless compression screws (HCS) fixation provides a satisfactory functional outcome.

Keywords: medial epicondyle fracture, intra-articular entrapment, incarceration, posterior elbow dislocation, headless compression screw

Introduction

Dislocation of the elbow joint in pediatric population accounts for only 3-6% of all elbow injuries while medial epicondyle fractures represents approximately 12% of all elbow fractures^[1,2]. The Watson-Jones classification as one the most widely used classifications for this type of fractures although with multiple inconsistencies describes four grades based on

which a treatment protocol is proposed^[3]. Fracture-dislocations of the medial epicondyle can be explained by the characteristic anatomy and soft-tissues attachments on the medial epicondyle consisting of the *flexor carpi radialis*, *flexor carpi ulnaris*, *flexor digitorum superficialis*, *palmaris longus*, part of the *pronator teres* and the ulnar collateral ligament with subsequent traction forces being employed in case of trauma. In this paper, we present a case of a medial epicondyle fracture-dislocation with intra-articular incarceration in an adolescent boy following closed elbow reduction maneuver of posterior elbow dislocation.

Case report

Case presentation

A fifteen-year-old male presented to our emergency department with left elbow pain, obvious deformity and decreased range of motion (ROM) of the affected elbow seven hours post-injury sustained in amateur football league match. The mechanism of injury was a fall on an outstretched hand with the elbow in extension upon impact after collision with a fellow player during the match as described by the patient. The medical team present at the match transferred the patient to a local hospital. At the local medical center, he was seen by the attending orthopedic surgeon which was followed by elbow reduction maneuver and splinting. Inadequate elbow reduction with persisting symptoms initiated a computed tomography (CT) of the elbow, which revealed an intra-articular medial epicondyle fracture entrapment (Figure 1). The patient was transferred to our tertiary care institution for further treatment. On presentation, a severe elbow pain and swelling, decreased ROM with obvious elbow deformity, medial elbow region bruising and positive valgus elbow stress test was noted. There was no neurovascular compromise. The patient had no comorbidities and he never sustained any injury to the upper extremity previously.

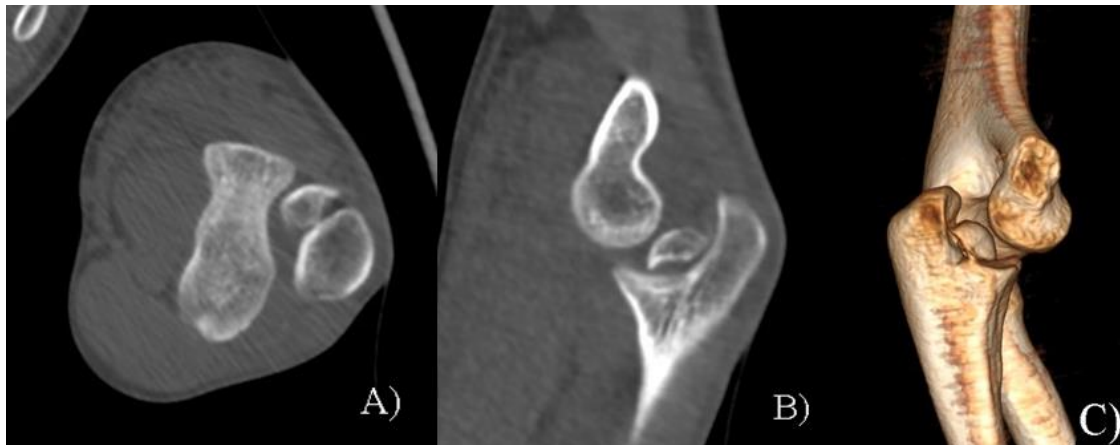


Fig. 1. CT of the elbow joint depicting the intra-articular medial epicondyle fracture incarceration. A) Axial plane B) Sagittal plane C) 3d reconstruction

Treatment

The computed tomography of the elbow joint previously obtained confirmed the diagnosis. Under adequate analgesia, another closed reduction maneuver was tried which was unsuccessful. After acquiring informed consent and anesthesiology preparation conformation, we proceeded to urgent ORIF of the fracture dislocation. The patient was placed in a supine position with abducted upper limb on a radiopaque table. Adequate prepping and draping followed by a direct medial approach to the elbow joint was conducted. Open reduction of the medial epicondyle and temporary fixation with a Kirschner wire (K-wire) was done (Figure 2). After C-arm conformation of the reduction, we proceeded to definitive fixation with two

second generation 3.5x30 mm fully threaded headless compression screws. Intraoperative stability tests were satisfactory. Wound closure in layers and dressing with consequent above elbow backslab immobilization was later converted to articulated elbow joint orthotic in 90° elbow flexion. Postoperative radiography in antero-posterior and lateral views confirmed the reduction and stable internal fixation (Figure 3).

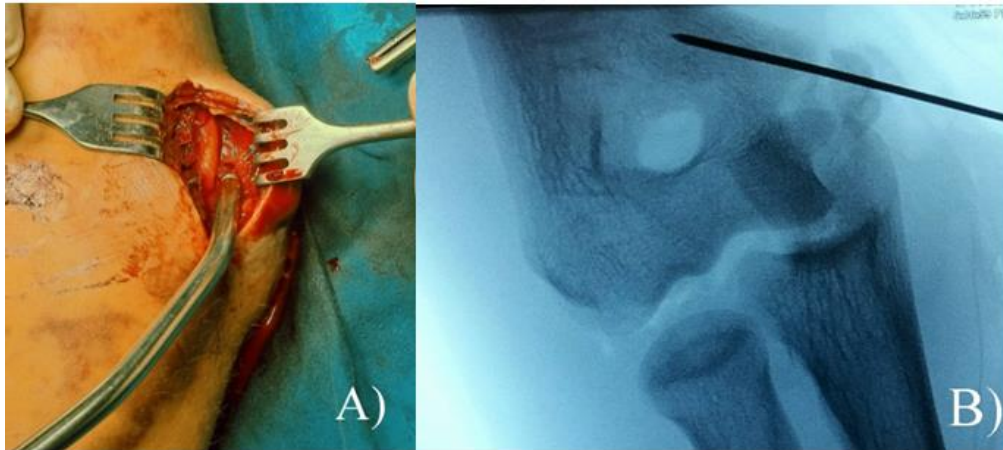


Fig. 2. A) Direct medial approach to the elbow joint with isolation of the ulnar nerve; B) Intraoperative temporary fixation of the medial epicondyle fracture with K-wire



Fig. 3. Postoperative x-rays A) lateral plane B) antero-posterior plane

Follow-up and outcome

The patient was closely observed at our institution for additional 3 days as per standard postoperative protocol. On the tenth postoperative day, sutures were removed. Two weeks after ORIF, we suggested gradual physiotherapy. Following the early rehabilitation protocol advised, on the one-month follow-up we observed slightly decreased ROM compared to the contralateral elbow joint and mild tenderness over the medial epicondyle. Intensive physiotherapy and rehabilitation was initiated. Two months post-injury, we noted painless full range of motion of the affected elbow with laudable patient satisfaction as a result of the return to painless everyday activities shortly after followed by return to the amateur sport activity previously practiced (Figure 4).



Fig. 4. A) and B) ROM at two months follow-up

Discussion

Pediatric complex elbow dislocations are most commonly associated with medial epicondyle fracture following posterolateral elbow dislocation. This type of traumatic pediatric complex elbow dislocations are rare injuries with medial epicondylar fracture intra-articular incarceration occurring in 5-18% of all cases^[4].

Watson-Jones classification as one of the most widely used classifications in medial epicondyle fractures although with multiple inconsistencies describes four grades. Type I fractures with less than 5 mm displacement and no rotation should be treated conservatively contrary to the type II fractures that have greater than 5 mm displacement with rotation. Type III fractures have intra-articular fragment entrapment without dislocation and Type IV fractures are represented by fragment incarceration associated with elbow dislocation. Type III and Type IV are treated surgically while in Type II fractures an austere patient selection consideration is advised^[3].

These types of complex dislocations can be difficult to visualize on conventional two plane radiography because of fracture fragment and distal humerus overlapping or due to misinterpretation of the elbow ossification centers. Unrecognized injury could result in severe elbow mobility restriction and ulnar neuropraxia with devastating disability, thus a high-level of suspicion must indicate further evaluation with CT of the elbow joint.

An absolute indication for ORIF includes open elbow fracture dislocation, ulnar neuropraxia, elbow instability and intra-articular epicondyle fracture fragment entrapment as described in this paper.

Surgical treatment options previously described in the literature are: closed or open reduction and Kirshner wires fixation^[5,6], open reduction and suture anchor fixation^[7], open reduction and cannulated screws fixation with or without washers^[8], open reduction and resorbable magnesium screws fixation^[9] as well as fragment excision and suturing^[10]. Published surgical complication rates are found to be from 0-41% consisting of wound infections, pin tract infection, non-union, symptomatic screw head prominence, irritation and partial lesion of the distal triceps myotendinous junction, median nerve entrapment syndrome, ulnar nerve palsy, reduced elbow ROM and elbow stiffness^[11,12].

Minimization of the incidence of potential late deformities and disability with high-level everyday activity restitution are the main objectives of the surgical treatment. The

chosen surgical method must provide stable fracture fixation with reduced supplementary immobilization, early joint mobilization and rehabilitation, therefore reducing the likelihood of elbow stiffness as well as implant related reoperation rates reduction^[13].

In this paper we have presented a novel and alternative ORIF method for medial epicondyle fracture using two 3.5x30 mm fully threaded second generation HCS with the main purpose of overcoming the potential symptomatic screw head prominence or the supplementary immobilization being needed in cannulated screws and K-wires fixation, respectively. The fully threaded headless compression screw design provides stable, rigid interfragment compression fixation as a result of the large thread-to-bone contact area, thus allowing the desired and encouraged early elbow mobilization^[7,13].

Conclusion

Pediatric posterior elbow dislocations must be thoroughly reevaluated following a closed reduction attempt, keeping in mind the rarity of this types of injury and the potential complications due to overlook and delayed definitive treatment. ORIF with second generation fully threaded HCS provides a stable fracture fixation, reduced supplementary immobilization, early joint mobilization and rehabilitation with a satisfactory outcome.

Conflict of interest statement. None declared.

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