

## CASE REPORT

# A missed medial humeral epicondyle fracture with incarcerated fragment in the elbow joint and ulnar nerve palsy: A rare case report

Subhash Kumar Das<sup>1</sup>  | Sujan Bohara<sup>2</sup>  | Ravi Bhandari<sup>1</sup>  | Ritesh Sinha<sup>1</sup> | Bikash Das<sup>3</sup> | Samikshya Karki<sup>2</sup>

<sup>1</sup>Department of Orthopedics, Nepalese Army Institute of Health Sciences, Shree Birendra Hospital, Kathmandu, Nepal

<sup>2</sup>Nepalese Army Institute of Health Sciences, Shree Birendra Hospital, Kathmandu, Nepal

<sup>3</sup>National Medical College and Teaching Hospital, Birgunj, Nepal

## Correspondence

Subhash Kumar Das, Department of Orthopedics, Nepalese Army Institute of Health Sciences, Shree Birendra Hospital, Chhauni, Kathmandu, Nepal. Email: subhash1122das@gmail.com

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## Abstract

Medial epicondyle fracture associated with incarcerated intra-articular fragment and ulnar nerve palsy is uncommon and frequently missed. We report a case of 13-year-old boy with incarcerated medial epicondyle fracture fragment in ulno-humeral joint and ulnar nerve palsy, which was managed successfully by open reduction internal fixation and ulnar nerve transposition.

## KEYWORDS

elbow joint, incarcerated, medial epicondyle fracture, ulnar nerve palsy, ulnohumeral joint

## 1 | INTRODUCTION

Medial humeral epicondyle fracture accounts for 11%–20% of all elbow fracture in pediatric population with peak age of occurrence between 9 and 14 years. It is four times more common in boys. It is commonly associated with elbow dislocation (approximately 50%), incarcerated fracture fragment in elbow joint (15%–18%) and ulnar nerve palsy (10%–15%) in these children.<sup>1,11,14</sup>

The most common mechanism for its occurrence is an avulsion force resulting from a fall onto hand with the elbow extended in slight valgus leading to distal pull of the epiphysis by forearm flexors originating from it. Rarely, it may occur due to direct trauma to the elbow.<sup>1,14</sup>

Plain X-ray antero-posterior, lateral, and oblique views as well as computed tomography scan remain the imaging modalities for the diagnosis of this type of fracture. Based on displacement of fracture fragments on AP radiograph and the presence of concomitant elbow dislocation, medial epicondyle fractures are classified by Watson Jones into four types: type 1: small degree of avulsion, type 2: a non-entrapped avulsed fragment at the level of joint, type 3: avulsed fragment entrapped in the joint, type 4: fracture associated with elbow dislocation.<sup>2</sup>

Medial epicondyle fractures are mostly treated conservatively, but surgery is indicated in special circumstances such as intra-articular incarcerated fragment, ulnar nerve palsy, open fracture, or significant instability. However,

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there is controversy in the literature regarding the outcome of delayed construction of missed medial epicondyle fracture with entrapped intra-articular fracture fragment.<sup>3-5</sup>

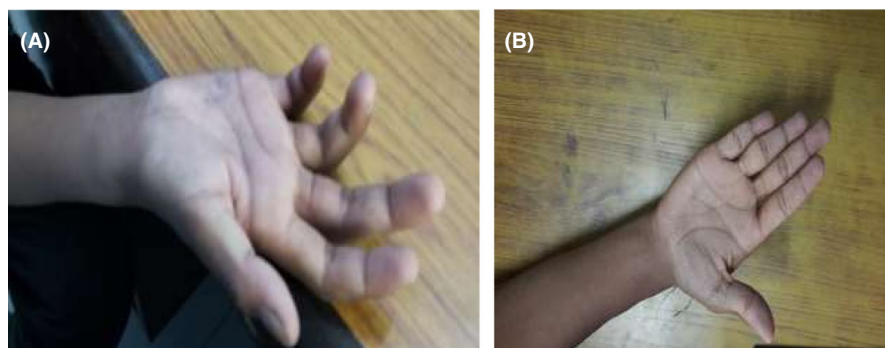
The goal of this study was to highlight the importance of accurate radio-clinical evaluation of a traumatized pediatric elbow and to rule out the entrapped intra-articular fracture fragment after reduction of a dislocated elbow. The specific aim was to study the functional outcome of missed medial epicondyle fracture in a 13-year-old boy with entrapped intra-articular fragment with ulnar nerve palsy.

## 2 | CASE PRESENTATION

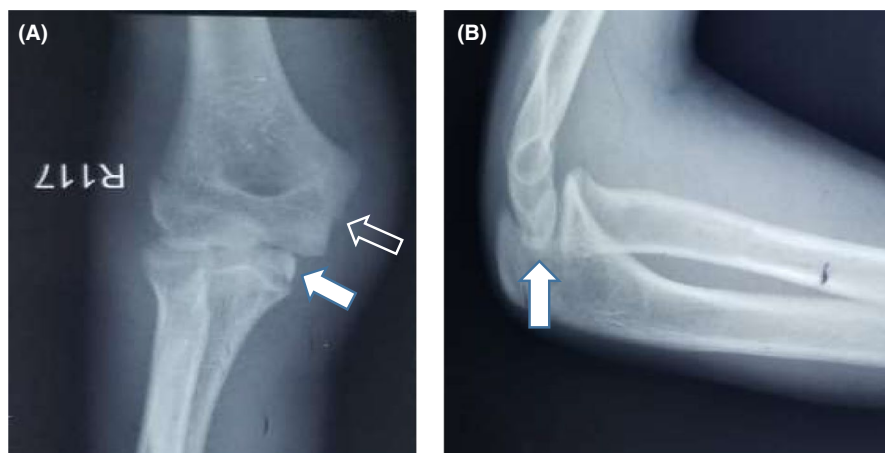
A 13-year-old boy presented to our center with complaints of painless restricted range of motion of right elbow and loss of sensation and clawing of right ring and little finger following fall onto outstretched right dominant hand. He experienced the fall 2 months back and was treated at other center as soft tissue injury with analgesics, long arm cast immobilization for 2 weeks, followed by physiotherapy. Two months after the fracture, the child developed paresthesia and numbness over ulnar aspect of forearm and hand. Clinical assessment showed clawing of ring and little finger, wasting of hypothenar eminence (Figure 1A), positive Wartenberg sign, positive Froment

test, and positive Tinel sign at the elbow. Wartenberg sign was elicited by asking the patient to hold all the fingers of both hands adducted with metacarpophalangeal joint and interphalangeal joint extended, and his right little finger went into abduction involuntarily.<sup>6</sup> Froment test was performed by asking the patient to hold a piece of paper pinched between his thumbs and index fingers. The examiner then attempted to pull the paper away from the patient. It was noted that in order for the patient to maintain his hold on the affected side, his thumb flexed at the interphalangeal joint.<sup>7</sup> Tinel sign was elicited by gently tapping with index finger along the course of ulnar nerve from distal to proximal at the affected elbow, and the boy reported current-like sensation along the course of the nerve.<sup>8</sup> These signs are suggestive of ulnar nerve palsy, which further confirmed the possible compression of ulnar nerve. Range of motion of the elbow was 30–90° in flexion extension axis with supination 60° and pronation 50°.

Reviewing the initial radiographs (Figure 2A,B) showed medial epicondyle fracture with incarcerated intra-articular fragment. Computed tomography (CT) with 3D reconstruction (Figure 3) confirmed the medial epicondyle fracture with lodged intra-articular fragment (1.5 cm in diameter). After discussion with patient parents, the child was planned for removal/fixation of medial epicondyle with ulnar nerve transposition.



**FIGURE 1** (A) Preoperative photograph showing clawing of ring and little finger with wasting of hypothenar eminence and (B) post-operative photograph showing complete resolution of claw hand and hypothenar wasting



**FIGURE 2** Initial plain radiographs of the right elbow. AP (2A) and Lateral (2B) radiograph shows medial epicondyle fracture (hollow arrow) with intra-articular incarcerated fragment (solid arrow) which was missed on initial interpretation of the radiograph

Under general anesthesia, open exploration of the right elbow was done by postero-medial approach. Ulnar nerve was identified and isolated. The incarcerated intra-articular fragment was removed along with attached common flexor origin (CFO) from the elbow joint and anatomically reduced to its bed in the distal humerus and fixed by 2 K wires (Figure 4A,B). Decompression and anterior transposition of ulnar nerve was done (Figure 5). Capsulo-ligamentous structures were repaired. The elbow was immobilized by above elbow slab in 90°

flexion for 3 weeks followed by hinged elbow brace was applied for another 3 weeks. Early gradual active and passive ROM exercises were started. K wires were removed after 6 weeks.

At the 3 months postoperative follow-up, the child had regained full range of motion and the fracture had healed completely. After 1-year follow-up, the child had regained full recovery of sensory and motor deficits and clawing of fingers had disappeared. Post-operative functional outcome was assessed using Mayo Elbow Performance Score (MEPS). MEPS is a reliable and validated instrument for assessing elbow function. It has four subscales: pain, arc of motion, stability, and daily function. The score ranges from 0 (worst) to 100 (excellent).<sup>9</sup> The child showed complete resolution of pain, flexion arc of 120° (10°-130°), stable elbow to both varus and valgus stress as well as could perform his daily activities. Thus, his MEP score was graded as excellent. (MEP score 100.)



FIGURE 3 CT-3D construction of right elbow joint showing medial epicondyle fracture with lodged intra-articular fragments

### 3 | DISCUSSION

Missed medial humeral epicondyle fractures are rare entities, and those associated with incarcerated intra-articular fragment and delayed ulnar nerve palsy are even rarer. To date, we found only a handful of publications that reports missed medial epicondyle fracture with incarcerated intra-articular fragment and associated ulnar nerve palsy with or without concurrent elbow dislocation.<sup>3-5,10</sup> We observed a similar scenario in our case except for the absence of concurrent elbow dislocation.



FIGURE 4 Immediate postoperative Plain X-ray Antero-posterior (A) and lateral view (B)



**FIGURE 5** Intra-operative image showing constricted segment of ulnar nerve

The medial epicondyle fracture is challenging to diagnose on conventional radiograph because of appearance of various ossification centers in pediatric age group and the small fracture fragment get superimposed over distal humerus in the radiograph.<sup>3,9,10,12,14</sup>

Hence, high index of clinical suspicion is required to identify these cases and if doubtful additional imaging (CT scan) should be done.<sup>13</sup>

To date, there is no clear consensus regarding the treatment of missed medial epicondyle fractures. Incarcerated fracture fragment and ulnar nerve palsy are absolute indications for surgery.<sup>3-5</sup> Anatomical repositioning of the fragment and excision of the fragment with or without ulnar nerve transposition remains two reported surgeries done in this case.<sup>1,3-5,10</sup>

All of the publications report good functional outcome and complete ulnar nerve recovery following surgery. Lima et al<sup>3</sup> and Lotz et al<sup>10</sup> performed anatomical repositioning of the fragment and anterior ulnar nerve transposition whereas Haflah et al<sup>5</sup> and El-Sobky et al<sup>4</sup> performed excision of the fragment without ulnar nerve transposition. Our surgical strategy is similar to that performed by Lima et al and Lotz et al. In our patient, fragment size was sufficiently large (2 cm) and CFO was attached to it hence the fragment was vascular. Ulnar nerve was transposed anteriorly to minimize the risk of postoperative irritation of the nerve.

In two cases, in which excision of fragment was done, both child regained excellent functional outcome at 1 year post surgery.<sup>4,5</sup> Whereas, the two cases, where anatomical fragment reposition and ulnar nerve transposition was

performed, they regained excellent functional outcome at 6 months and 3 months, respectively.<sup>3,10</sup> This is similar to our case where the fracture healed and child achieved excellent outcome at 6-month follow-up.

## 4 | CONCLUSIONS

The diagnosis of medial epicondyle fracture in children requires high index of suspicion. A thorough knowledge of normal pediatric elbow anatomy, diligent clinical examination, and meticulous interpretation of elbow radiographs is crucial for early diagnosis. Additional imaging should be done in doubtful cases. Surgery is required in the case of incarceration of the fragment. Anatomical repositioning of fracture fragment with ulnar nerve transposition yields good functional outcome despite delayed reconstruction.

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## CONFLICT OF INTEREST

None.

## AUTHOR CONTRIBUTIONS

Subhash Kumar Das and Sujan Bohara contributed in conception, data accretion, drafting, revision, and molding of the initial manuscript. Bikash Das and Samikshya Karki involved in editing the draft and revision of the content of manuscript. Ritesh Sinha and Ravi Bhandari contributed in complete supervision, revision, and critical appraisal of the manuscript.

## CONSENT

Informed written consent was obtained by all participants in this study from the patient.

## DATA AVAILABILITY STATEMENT

Not applicable.

## ORCID

Subhash Kumar Das  <https://orcid.org/0000-0002-9710-6789>

Sujan Bohara  <https://orcid.org/0000-0003-3056-5283>

Ravi Bhandari  <https://orcid.org/0000-0003-0113-0424>

## REFERENCES

1. Gottschalk HP, Eisner E, Hosalkar HS. Medial epicondyle fractures in the pediatric population. *J Am Acad Orthop Surg.* 2012;20(4):223-232.

2. Ramsey RW, Herman MJ. Medial epicondyle fractures. In: Abzug JM, Herman MJ, eds. *Pediatric Elbow Fractures*. Springer. 2018;95-109.
3. Lima S, Correia JF, Ribeiro RP, et al. A rare case of elbow dislocation associated with unrecognized fracture of medial epicondyle and delayed ulnar neuropathy in pediatric age. *J Shoulder Elbow Surg*. 2013;22(3):e9-e11.
4. El-Sobky TA, Haleem JF, Sakr HM, Aly AS. A neglected markedly displaced medial epicondyle fracture with simultaneous ulnar nerve palsy in an adolescent. *Clin Orthop Surg*. 2017;9(4):542-546.
5. Haflah NHM, Ibrahim S, Sapuan J, Abdullah S. An elbow dislocation in a child with missed medial epicondyle fracture and late ulnar nerve palsy. *J Pediatr Orthop B*. 2010;19(5):459-461.
6. Kuschner SH, Berihun H. Robert Wartenberg syndrome and sign: a review article. *Open Orthop J*. 2021;15(1):13-16.
7. Richardson C, Md GF. Froment's sign. *J Audiov Media Med*. 2003;26(1):34-34. 10.1080/0140511031000091284
8. Hoffmann P, Buck-Gramcko D, Lubahn JD. The Hoffmann-Tinel sign. 1915. *J Hand Surg Edinb Scotl*. 1993;18(6):800-805. 10.1016/0266-7681(93)90249-f
9. Cusick MC, Bonnaig NS, Azar FM, Mauck BM, Smith RA, Throckmorton TW. Accuracy and reliability of the mayo elbow performance score. *J Hand Surg*. 2014;39(6):1146-1150.
10. Lotz B, Akilapa O, Karthik K. Delayed reconstruction following incarceration of the medial epicondyle in the elbow joint: a case report and review of the literature. *JBJS Case Connect*. 2018;8(3):e69.
11. Pathy R, Dodwell ER. Medial epicondyle fractures in children. *Curr Opin Pediatr*. 2015;27(1):58-66.
12. Keats TE, Anderson MW. *Atlas of Normal Roentgen Variants that may Simulate Disease: Expert Consult-Enhanced Online Features and Print*. Elsevier Health Sciences. 2012.
13. El-Sobky TA, Samir S, Aly AS. Neglected anterior monteggia lesion with a displaced intra-articular medial condyle fracture in a child: a rare and challenging association. *J Musculoskelet Surg Res*. 2017.1(2):49-52.
14. Beatty JH, Kasser JR. The elbow : Physeal fractures, apophyseal injuries of the distal humerus, osteonecrosis of the trochlea, and t-condylar fractures. Beatty JH, Kasser JR, *Rockwood and Wilkins' Fractures in Children*. Philadelphia,PA: Lippincott Williams & Wilkins; 2005:628-642.

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