

Medial Epicondyle Fracture

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Abstract

Medial epicondyle fractures represent up to 20% of pediatric elbow fractures. Diagnosis is made with radiography, although CT may be used for complex fractures. Management decisions are guided by factors such as the degree of displacement, patient age, and activity level. With timely and appropriate treatment, the prognosis is excellent, and most patients achieve full recovery of elbow function.

Keywords: Trauma, upper extremity, elbow

Case Summary

A preteen injured her elbow after falling on an outstretched hand while playing tag.

Image Findings

Elbow radiograph (Figure 1) showed an avulsion fracture of the medial epicondyle. The avulsed fragment was displaced within the elbow joint. Subsequent elbow CT (Figure 2) confirmed the avulsion fracture and the intra-articular displacement of the fragments. The fracture was reduced intraoperatively (Figure 3) with a screw transfixing the fracture.

Diagnosis

Medial epicondyle fracture

The differential diagnosis includes supracondylar fracture, medial epicondylitis, elbow dislocation, olecranon bursitis, cubital tunnel syndrome, and ulnar collateral ligament injury.

Discussion

Fractures of the medial epicondyle represent approximately 10-20% of elbow fractures in children and adolescents, with boys between the ages of 9 and 14 years most commonly affected.¹ These injuries typically occur when a child falls onto an outstretched hand, creating a valgus force across the elbow joint.² The resulting lateral movement of the forearm places tension on the ulnar collateral ligament and flexor-pronator mass, generating a pulling force that avulses the medial epicondyle.²

The medial epicondyle is a critical bony prominence located on the ulnar side of the distal humerus. It serves as the attachment site for the flexor-pronator muscles of the forearm and the ulnar collateral ligament. When fractured, patients typically present with pain, swelling, and bruising along the medial elbow, often accompanied by a limited range of motion. In cases of significant displacement, visible deformity or joint instability may also be observed.²

The elbow has six ossification centers that appear in a predictable order during childhood development. Familiarity with this sequence aids in the accurate interpretation of pediatric elbow radiographs. The mnemonic CRITOE summarizes the order: Capitellum, Radial head, Internal (medial) epicondyle, Trochlea, Olecranon, and External (lateral) epicondyle. The capitellum ossification appears first at 2-24 months, followed by the radial head at 3-6 years, the medial epicondyle at 4-7 years, the trochlea and olecranon between 8 and 10 years, and the lateral epicondyle at 10-13 years.

Knowing the order of ossification is critical for identifying a displaced medial epicondyle avulsion fracture. Since the medial epicondyle ossifies before the trochlea, the presence of the trochlear ossification center without a visible medial epicondyle suggests that the medial epicondyle has been avulsed and is displaced. Standard anteroposterior and lateral radiographs can usually detect the fracture, but they may not reliably assess the degree of displacement. A 45-degree internal oblique view improves measurement accuracy and provides better consistency between observers.³ In complex cases, such as when the medial epicondyle fragment is displaced into the elbow joint, advanced imaging with three-dimensional CT offers a more detailed evaluation.⁴

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Figure 1. (A) Anteroposterior and (B) lateral radiograph of the elbow shows avulsion of the medial epicondyle (arrow) with intra-articular displacement of the fragment. The donor site (arrowhead) is visible on the AP view.

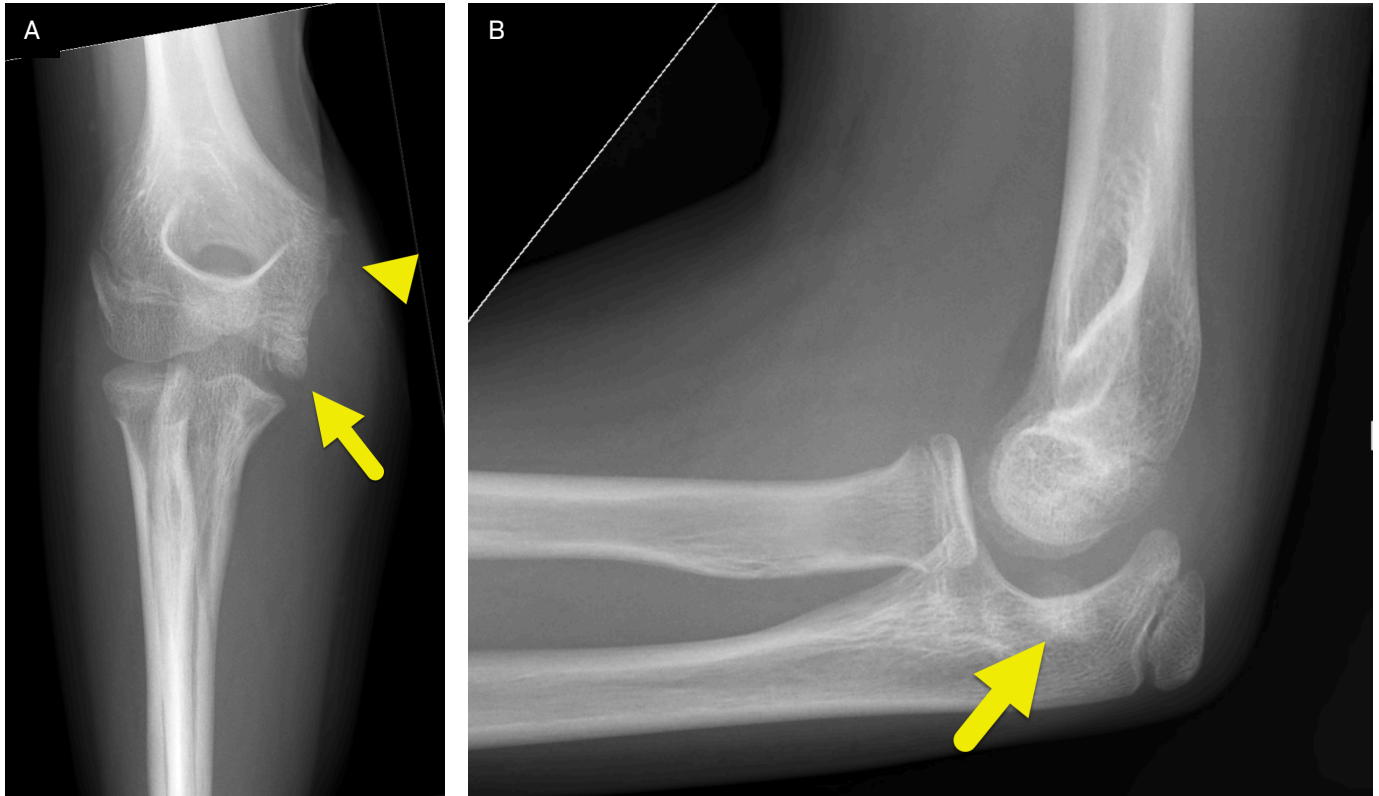
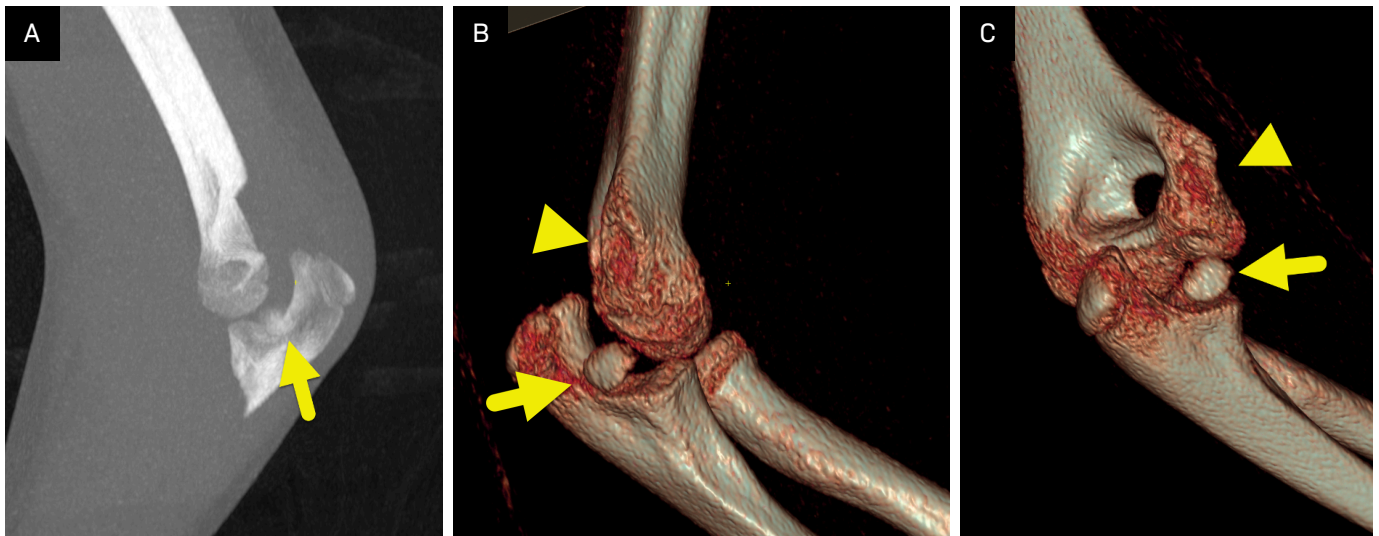


Figure 2. (A) Sagittal maximum intensity projection from elbow CT shows the entrapped medial epicondyle avulsion fragment (arrow). (B) and (C) Rotated 3-dimensional reconstructed images from the elbow CT show the intra-articular avulsed medial epicondyle fragment (arrow) and the donor site (arrowhead).



The management of medial epicondyle fractures is guided by the degree of displacement, the patient's age, activity level, and the presence of associated

injuries. Minimally displaced or non-displaced fractures are typically managed conservatively with immobilization in a cast or splint for several weeks, followed

by physical therapy to restore range of motion and strength. In contrast, fractures with significant displacement, instability, or intra-articular entrapment

Figure 3. Intraoperative C-arm fluoroscopic image during open fracture reduction shows placement of a screw transfixing the medial epicondyle avulsion.



of the fracture fragment often require surgical intervention. The preferred surgical approach is open reduction and internal fixation to restore joint stability and alignment.⁵

Medial epicondyle fractures in children and adolescents can lead to both short- and long-term complications. However,

with appropriate treatment, the overall prognosis is favorable. In the acute setting, patients may experience significant pain, swelling, bruising, limited range of motion, and, in cases of displaced fractures, visible deformity or instability. Some patients experience an ulnar nerve injury, which can cause sensory loss or muscle weakness in the forearm and hand. Long-term complications include nonunion, chronic pain, restricted mobility, and post-traumatic arthritis due to improper healing. In younger children, damage to the growth plate may lead to growth disturbances, resulting in deformity or altered joint mechanics. Despite these potential risks, most patients recover fully and regain normal elbow function, especially when fractures are promptly recognized and appropriately managed.²

Conclusion

Medial epicondyle fractures represent up to 20% of pediatric elbow fractures. Diagnosis is made with radiography, although CT may be used for complex fractures. Management decisions are

guided by factors such as the degree of displacement, patient age, and activity level. With timely and appropriate treatment, the prognosis is excellent, and most patients achieve full recovery of elbow function.

References

- 1) Masquijo JJ, Ferreyra A, Torres-Gomez A, Allende V. Medial epicondyle fractures: current practices and preferences between SLAOTI members (Sociedad Latinoamericana de Ortopedia y Traumatología Infantil). *J Pediatr Orthop.* 2020;40(6):267-270. doi:10.1097/BPO.0000000000001457
- 2) Mollah R, Fallahi AKM. Medial epicondylar elbow fractures. In: *StatPearls*. StatPearls Publishing. 2023.
- 3) Pathy R, Dodwell ER. Medial epicondyle fractures in children. *Curr Opin Pediatr.* 2015;27(1):58-66. doi:10.1097/MOP.000000000000181
- 4) Gottschalk HP, Bastrom TP, Edmonds EW. Reliability of internal oblique elbow radiographs for measuring displacement of medial epicondyle humerus fractures: a cadaveric study. *J Pediatr Orthop.* 2013;33(1):26-31. doi:10.1097/BPO.0b013e318279c673
- 5) Park KB, Kwak YH. Treatment of medial epicondyle fracture without associated elbow dislocation in older children and adolescents. *Yonsei Med J.* 2012;53(6):1190-1196. doi:10.3349/ymj.2012.53.6.1190