

Medial epicondyle avulsion after elbow dislocation in an adolescent non-professional soccer player treated with a cannulated screw: a case report

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Summary. Background and aim of the work: Medial epicondyle fractures of the humerus account for 11–20% of all elbow injuries in children and in 30–55% of cases they are associated with an elbow dislocation. Undisplaced fractures are usually treated conservatively but literature is controversial regarding the treatment of displaced fractures (≥ 5 mm) in paediatric fractures. In recent years, there is an emerging consensus that such patients may benefit more from open reduction and internal fixation. Authors report a case of a 15 years old nonprofessional soccer player who suffered of an elbow dislocation with an intra-articular fragment derived from avulsion of the medial epicondyle. *Methods:* Clinical and instrumental evaluation confirmed elbow dislocation with an intra-articular fragment derived of the medial epicondyle. After the reduction an open reduction and internal fixation with cannulated screw was performed. *Results:* Clinical evaluation after 90 days showed resolution of pain and almost complete ROM and complete recovery of strength and of functionality of the operated limb. Furthermore, x-rays demonstrated consolidation of the fracture. *Conclusions:* this case confirms that a precise evaluation of the fracture and its displacement is at the base of satisfactory outcomes. If fracture is displaced ≥ 5 mm and patient is near skeletal maturity open reduction and fixation is indicated. (www.actabiomedica.it)

Key words: elbow, dislocation, medial epicondyle, reduction, fixation, screw, outcome.

Introduction

The medial epicondyle is a traction apophysis which is constantly solicited during elbow movements by the powerful epicondylar muscles and the medial collateral ligament. These structures, thus including capsule, are considered the key of elbow stability (1,2).

Medial epicondyle fractures of the humerus account for 11–20% of all elbow injuries in children and in 30–55% of cases they are associated with an elbow dislocation (3, 4).

Avulsion of the medial epicondyle and elbow dislocation occurs when a valgus force is exerted with the

elbow completely or slightly extended. This lesion can only occur as a result of damage of the capsuloligamentous and anteromedial muscular structures (5).

The literature is controversial regarding the management of these pediatric fractures: disagreement lies particularly in identifying the correct treatment for children with considerable displacement (≥ 5 mm) (6).

Some reports suggest that displaced medial epicondyle fractures can be nonoperatively treated but more than 60% of patients have radiographic nonunion or valgus instability and elbow stiffness is common (7,8).

For these reasons, in recent years, there is an emerging consensus that such patients may ben-

enefit more from open reduction and internal fixation (ORIF) (9, 10).

The most commonly used methods for the fixation of displaced fractures include Kirschner wires in younger patients with open physis and screws with or without a washer in adolescent near skeletal maturity (11).

This case reports of a medial epicondyle avulsion in an adolescent soccer player near skeletal maturity which was synthesized with 1 cannulated screw.

Case Report

A 15-year-old male, non-professional soccer player, arrived at the emergency department complaining of pain and swelling in his left elbow.

He reported intense pain following a fall on his elbow during a soccer match; no vascular or nervous impairments were detected.

After the clinical visit an elbow dislocation was suspected; x-rays confirmed this suspicion (figure 1).

The patient also underwent to a CT scan, which confirmed the dislocation and also demonstrated the presence of an intra-articular fragment resulting from the avulsion of the medial epicondyle (figure 1).

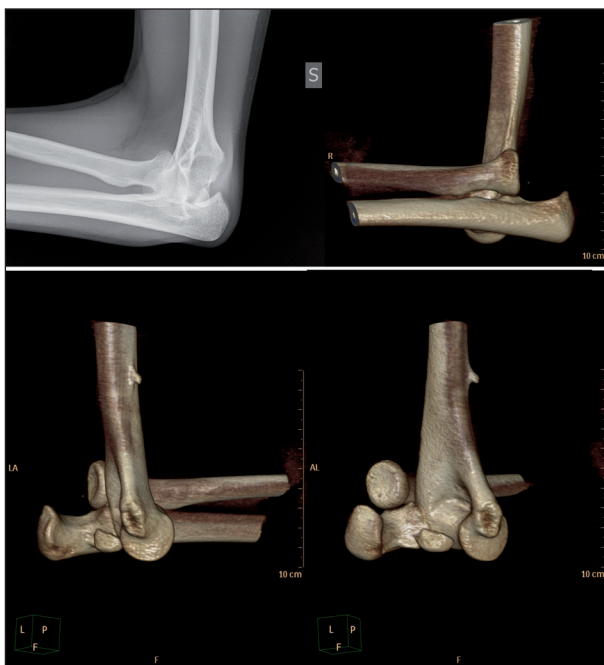


Figure 1. X-ray and 3D CT with fracture-dislocation of the left elbow.

The dislocation was therefore reduced in deep sedation, but clinically valgus instability, and intra-articular impingement could be yet appreciated; no vascular or nervous impairments were detected after the reduction.

Radiographs and a CT following sedation showed the success of the reduction and the presence of a big intra-articular fragment (figure 2).

The day after the patient had ORIF of the fragment with a cannulated screw and a washer through a medial approach.

The ulnar nerve, which is potentially vulnerable during this approach, was identified, isolated and protected (figure 3).

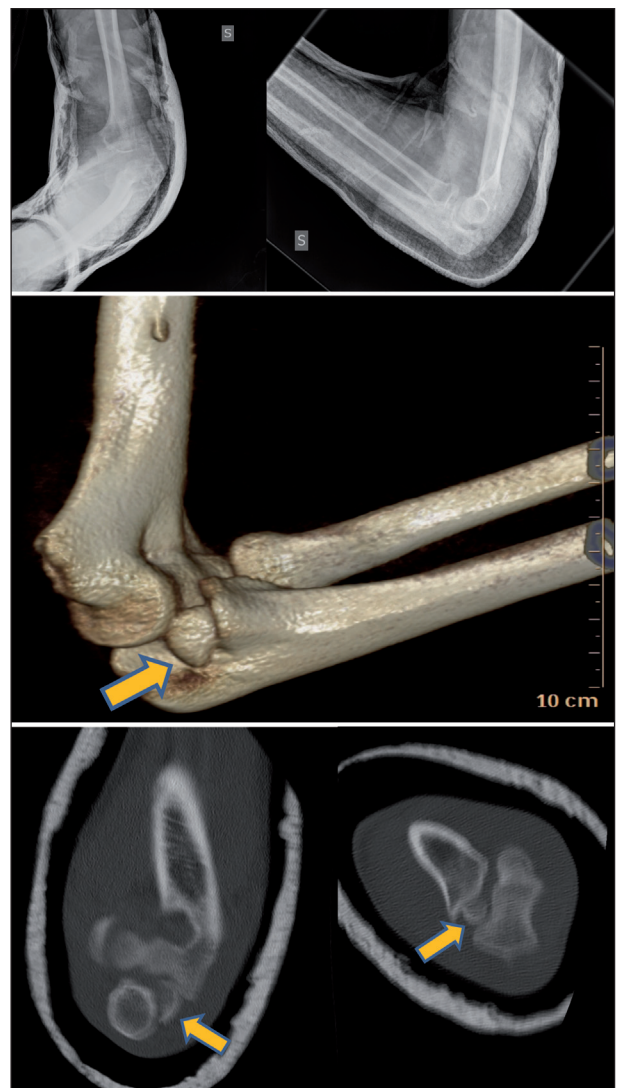


Figure 2. X-rays and 3D CT after reduction. Arrows show intra-articular fragment

The intra-articular fragment was then identified and reduced in its anatomical position; it was first stabilized with a kirschner wire and definitively synthesized with a cannulated half threaded screw with a washer (figure 4 and 5).

After 14 days of cast immobilization patient followed an intensive physiotherapy program of 40 days characterized by progressive assisted active and passive

kinesis and idrokinesis therapy. The final check 90 days after surgery showed that the operated limb had no deficit in bending with respect to the healthy one.

In extension, there was a deficit of 5 degrees (table 1); no residual pain and no lack of strength was present. The patient was satisfied with the result achieved. X-rays demonstrated consolidation of the fracture (Figure 6).

Discussion

The medial epicondyle is the anatomic origin of the flexor carpi radialis, flexor carpi ulnaris, flexor digitorum superficialis, palmaris longus, part of the pronator teres, and the ulnar collateral ligament; it is constantly solicited during elbow movements by the powerful epicondylar muscles and the medial collateral ligament. All these structures, thus including capsule, are considered the key of elbow stability.

The medial epicondyle is the last ossification centre to fuse to the distal humerus. Fusion usually occurs after 15 years of age (12).

Medial epicondyle fractures of the humerus account for 11–20% of all elbow injuries in children and in 30–55% of cases they are associated with an elbow dislocation (3,4).

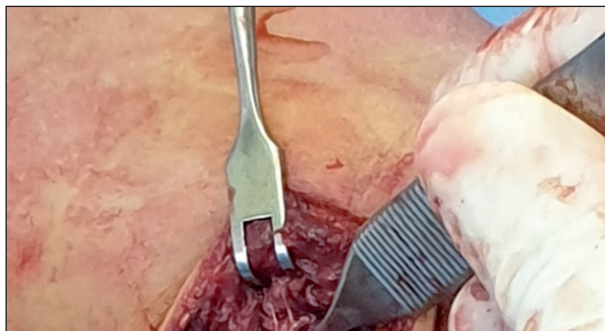


Figure 3. Identification and protection of the ulnar nerve.

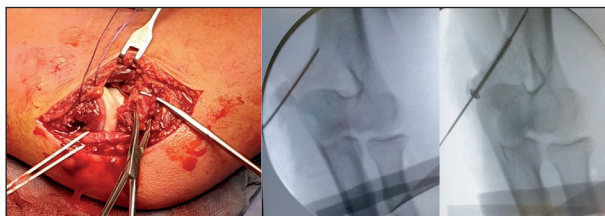


Figure 4. Reduction of the fragment and fixation with a cannulated half threaded screw and one washer.

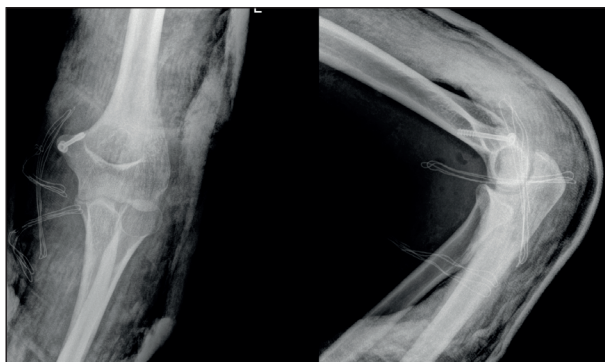


Figure 5. Postoperative radiographs.

Table 1. Flexion and extension of both elbows.

	Right (healthy)	Left (operated)
Flexion	40°	43°
Extention	180°	175°

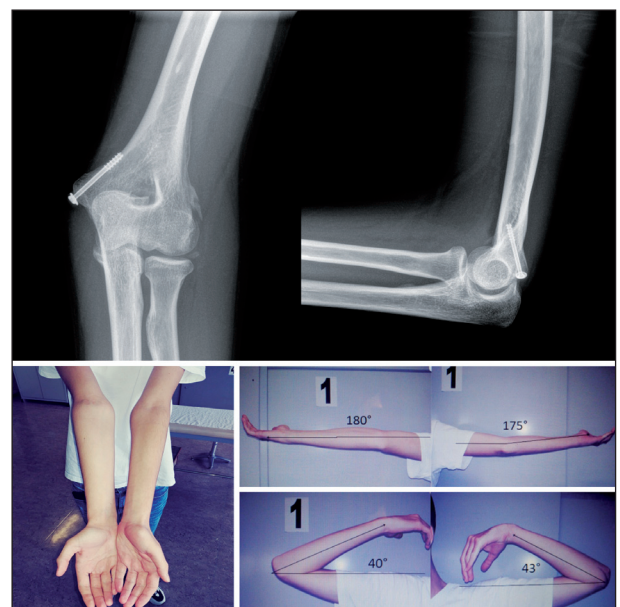


Figure 6. X-rays and clinical evaluation 90 days after surgery.

There are 3 theories about the mechanism of acute medial epicondylar apophyseal injuries: a direct blow, an isolated avulsion mechanism, and an association with elbow dislocation (13,14).

The literature is controversial regarding the management of these paediatric fractures: disagreement lies particularly in identifying the correct treatment for lesions with considerable displacement (≥ 5 mm) (6).

There is a consensus that fractures displaced < 2 mm should be treated conservatively with a plaster cast; instead those with displacement ≥ 5 mm should be treated surgically.

Most common treatments include kirschner wires and cannulated screw fixation (15).

Kirschner wires should be preferred, in younger patients who still have open physis (and therefore growth potential), because this approach minimizes the risk of developing cubitus varus deformity due to a screw across the growing apophysis. Instead, cannulated screws with or without a washer should be used in adolescent near skeletal maturity, where the possible complications mentioned above are minimal (16). Furthermore, operative treatment with ORIF has a crucial role in avoiding the painful nonunion and minimizing the risk of symptomatic valgus instability.

In this type of injuries not only bone has to be considered. Fracture often reflects significant damage to «invisible» soft tissue. The capsular, ligamentous and muscular injuries are often underestimated and a high degree of instability may be masked in an undisplaced or minimally displaced fracture (17).

For all these reasons Authors decided to fix the epicondyle with ORIF. Outcomes confirmed that this decision was indicated.

Conclusions

Results confirm that all patients, with medial epicondyle avulsion with displacement ≥ 5 mm, with or without elbow dislocation should be surgically treated. ORIF with screws is preferred in adolescent near skeletal maturity, thus diminishing non-union, residual valgus instability and elbow stiffness rate.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

References

1. Wilkins KE, Chambers HG. Fractures involving the medial epicondylar apophysis. In: Rockwood CA Jr, Wilkins KE, Beaty JH, editors. Fracture in children 4. Philadelphia: Lippincott-Raven; 1996; 4: 801-19.
2. Schwab GH, Bennet JB, Wood GW, Tullos HS. Biomechanics of elbow instability: the role of the medial collateral ligament. Clin Orthop Relat Res 1980; 146: 42-52.
3. Fahey JJ. Fractures of the elbow in children. AAOS Inst Course Lect 1960; 17: 13-46.
4. Rang M. Children's fractures 2nd Edn. Philadelphia, J B Lippincott Lippincott, 1983: 9.
5. Kilfoyle RM. Fracture of the medial condyle and epicondyle of the elbow in children. Clin Orthop Relat Res 1965; 41: 43-50.
6. Kamath AF, Baldwin K, Horneff J, Hosalkar HS. Operative versus non-operative management of pediatric medial epicondyle fractures: a systematic review. J Child Orthop 2009; 3: 345-57.
7. Josefsson PO, Danielsson LG. Epicondylar elbow fracture in children: 35-year follow-up of 56 unreduced cases. Acta Orthopaedica Scandinavica 1986; 57: 313-15.
8. Lee HH, Shen HC, Chang JH, Lee CH, Wu SS. Operative treatment of displaced medial epicondyle fractures in children and adolescents. J Shoulder Elbow Surg 2005; 14:178-85.
9. Duun PS, Ravn P, Hansen LB, Buron B. Osteosynthesis of medial humeral epicondyle fractures in children: 8-year follow-up of 33 cases. Acta Orthop Scandinavica 1994; 65: 439-41.
10. Pathy R, Dodwell ER. Medial epicondyle fractures in children. Curr Opin Pediatr 2015; 27: 58-66.
11. Patel NM, Ganley TJ. Medial epicondyle fractures of the humerus: how to evaluate and when to operate. J Pediatr Orthop 2012; 32: S10-3.
12. Wilkins KE. Fractures of the medial epicondyle in children. Instr Course Lect 1991; 40: 3-10.
13. Smith FM. Medial epicondyle injuries. JAMA 1950; 142:3 96-402.
14. Watson-Jones R. Primary nerve lesions in injuries of the elbow and wrist. J Bone Joint Surg 1930; 12: 121-40.
15. Wilkins KE. Fractures involving the medial epicondylar apophysis. In: Rockwood CA Jr, Wilkins KE, King RE, editors. Fractures in children. 3rd ed. Philadelphia: JB Lippincott 1991; 509-828.
16. Ergin ÖN, Demirel M, entürk F, Bayram S, Bilgili F. Long-term comparative study of internal fixation with Kirschner wires or cannulated screws for displaced medial epicondyle fractures of the humerus in children: A 10-year

- follow-up of 42 cases. *Ulus Travma Acil Cerrahi Derg.* 2020 Jan;26(1):137-143.
17. 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.

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