

Pure Medial Elbow Dislocation without Concomitant Fracture in a 10-Year-Old Child

Abstract

Pediatric elbow dislocations are rare injuries and are often accompanied by concomitant fractures. We report a rare case of medial dislocation of the right elbow without accompanying fracture in a 10.5-year-old boy after fall from a bicycle. After radiographic and magnetic resonance imaging evaluation, closed reduction under general anesthesia was performed and the elbow was immobilized in a posterior above-elbow slab. Elbow mobilization was started after 2 weeks and the posterior slab was discontinued after 4 weeks. At 3 months, the patient had a full range of active elbow flexion extension and pronation supination. At 4-year followup, radiographs show a normal alignment of the elbow with mild changes of heterotopic ossification. We believe that this is the first such case ever reported in literature. Early recognition and prompt diagnosis is the key to achieve a good result.

Keywords: Elbow dislocation, medial, pediatric

MeSH terms: Elbow joint, dislocations, fractures

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Introduction

Pediatric elbow dislocations are rare injuries and comprise only 3%–6% of all elbow injuries in childhood.¹ They are often seen in the adolescent age group of 11–15 years. Elbow dislocations are described by the position of the proximal radioulnar joint relative to the distal humerus and are classified as: posterior, anterior, lateral, or medial.^{1,2} Elbow dislocations usually occur due to a fall on an outstretched hand, as a combination of axial-compressive and rotational-shear forces which are conducted across the joint. The direction of instability is often dictated by the accompanying fractures and mechanism of injury. Simple dislocations are those that involve purely ligamentous injury, while complex dislocations include periarticular fractures. Pure dislocations are uncommon, and the majority (65%–75%) of paediatric elbow dislocations are accompanied by concomitant fractures around the elbow.^{3,4} Simple medial elbow dislocation without accompanying fracture in the pediatric age group has not been previously reported in the English language literature to the best of our knowledge.

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Case Report

A 10.5-year-old boy presented with pain, swelling, and deformity of his right elbow after a fall from his bicycle. On physical examination, the elbow was kept in an attitude of flexion. There was swelling, tenderness, and restriction of movements of the right elbow. Finger movements were normal, and there was no neurovascular deficit. Anteroposterior radiograph of the right elbow revealed a medial dislocation of the elbow [Figure 1a], with the radial head articulating with the trochlea and the ulna displaced medially. On the lateral view, the elbow appeared to be reduced, indicating no displacement in the sagittal plane [Figure 1b]. There was no evidence of any concomitant fractures around the elbow region.

Since elbow dislocations are often associated with occult cartilaginous and osteochondral injuries,¹⁻⁴ the elbow was splinted in an above elbow plaster slab, and an urgent magnetic resonance imaging (MRI) was performed. Multiplanar, multiecho MRI was performed on a 3 Tesla scanner (MAGNETOM Verio TIM, Siemens, Germany). Two-dimensional images were obtained in axial, coronal, and sagittal planes followed by three-dimensional (3D) dual-echo steady-state (DESS) sequence. DESS is a 3D coherent

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(steady state) gradient echo sequence which provides high-resolution detail of the pediatric articular, epiphyseal, and physal cartilage.⁵ As the child's elbow was immobilized in flexion due to the dislocation and the posterior slab, 3D DESS imaging was of particular use to create multiplanar, reformatted isotropic images for precise anatomical assessment of the injury pattern. This technique also decreases scan time, thus facilitating compliance in an injured child. The MRI showed a pure medial dislocation of the radiocapitellar and ulnotrochlear joints, without any associated bony, osteochondral, or cartilaginous injury [Figure 2a and b]. No marrow contusions were identified, and the unossified epiphysis and articular cartilage were intact. The capsule and both collateral ligaments were ruptured; this was demonstrated well on the reformatted coronal and sagittal images [Figure 2c and d]. Mild joint effusion was also noted.

Within 8 h of admission, the patient was shifted to the operating room for closed reduction under general anesthesia. Consent for open reduction was also taken, in case of failure to obtain a closed reduction with one or two attempts. After induction of general anesthesia and with adequate muscle relaxation, a gentle closed reduction was attempted. Longitudinal traction was applied to the forearm while simultaneously applying a varus force (laterally directed) to the elbow. A clunk of reduction was felt, and the elbow could immediately be moved through a full range. We were satisfied that the elbow was clinically stable with restoration of bony configuration and could be moved throughout the range of motion without redislocation after the closed reduction procedure. Excessive varus-valgus stressing was not performed. The quality of reduction and stability was confirmed on image intensifier, and the absence of concomitant fractures was reconfirmed. The elbow was immobilized in an above elbow slab in 90° flexion and supination, and the patient was discharged the following

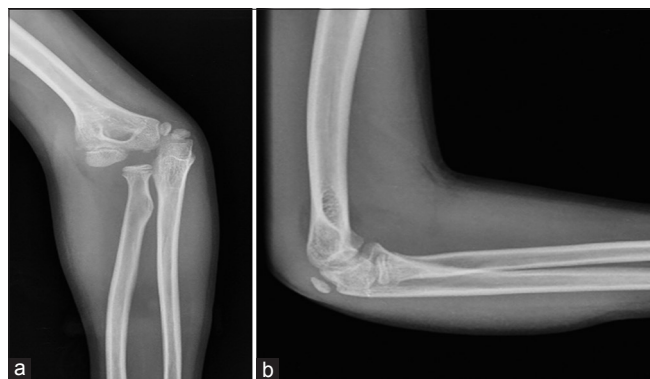


Figure 1: (a) Anteroposterior radiograph of the right elbow showing a pure medial dislocation of the elbow joint. Note that the radial head is articulating with the trochlea and the ulna is displaced medially. (b) Lateral radiograph of the right elbow. The proximal ulna is overlapping the capitellum, but the radiocapitellar joint appears to be reduced, indicating no displacement in the sagittal plane

day. No prophylaxis for heterotopic bone ossification was administered.

A postreduction radiograph at 2 weeks confirmed an anatomical reduction of the elbow joint [Figure 3a and b]. Intermittent active elbow range of motion exercises were instituted five to six times a day, in order to prevent elbow stiffness. At 4-week followup, the elbow range was from 30° to 100° and the above elbow slab was discontinued. Active and active-assisted range of motion exercises were continued. At 3-month followup, the elbow demonstrated a full range of flexion extension and pronation supination of the forearm. The elbow was clinically stable, and the child had no functional limitations. Anteroposterior and lateral radiographs [Figure 4] showed normal alignment with evidence of mild anterior heterotopic ossification (Hastings and Graham Grade I).⁶ At 2-year followup, the patient had a full range of motion of the elbow with no pain or instability [Figure 5a, b and Videos 1-3]. The radiographs showed normal growth of the distal humerus and the

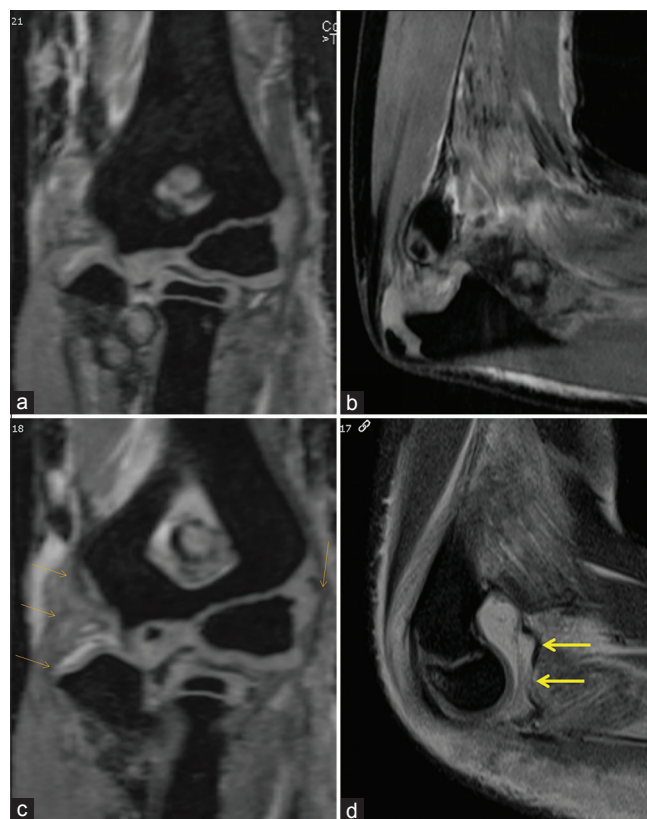


Figure 2: (a) Coronal reconstruction of three-dimensional double echo at steady-state sequence showing medial dislocation of the radius and ulna. The articular cartilage is intact and there are no concomitant fractures or osteochondral lesions. (b) Sagittal reconstruction of three-dimensional double echo at steady-state sequence showing no articulation between the proximal ulna and the trochlea. (c) Coronal reconstruction of three-dimensional double echo at steady-state sequence showing discontinuity of medial and lateral collateral ligaments of the elbow (yellow arrows) indicating rupture. (d) Sagittal proton-density image at the level of the capitellum showing absent radial head, confirming radiocapitellar dislocation. Furthermore, joint effusion, extensive soft-tissue injury, and anterior capsular disruption are seen (yellow arrows)

proximal radius and ulna, with normal elbow alignment. Persistent ossification was still visible over the anterior aspect of the elbow joint [Figure 5c and d]. At the final followup, 4 years after the injury, the child is able to participate in all throwing sports and other upper limb activities. The elbow is clinically stable and has a full range of motion. Radiographs show a skeletally mature elbow with normal alignment and mild mature heterotopic ossification over the anterior aspect of the elbow joint [Figure 6a and b].

Discussion

Dislocation of the elbow joint is a relatively rare injury in the pediatric age group. It is frequently associated with fractures, particularly of the medial epicondyle, proximal radius, and coronoid process.¹⁻⁴ Most dislocations occur posteriorly or posterolaterally. Less common types which can occur are anterior, lateral, divergent, translocation, and medial dislocations.^{1,2} Complications such as compartment

syndrome, neurological injury (10%), vascular injuries (6%–8%), residual elbow instability, and heterotopic ossification are occasionally observed in these rare injuries.¹⁻⁴



Figure 3: (a) Anteroposterior radiograph of the right elbow at 2 weeks showing that the elbow joint is well reduced. The radiograph is taken in the semi-flexed position since the elbow does not have full extension yet. (b) Lateral radiograph of the right elbow at 2 weeks showing that the elbow joint is well reduced. Early heterotopic ossification is seen along the anterior capsule (arrow)

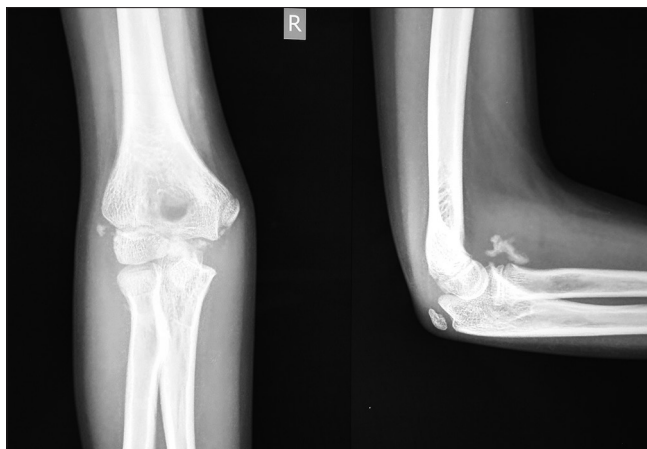


Figure 4: Anteroposterior and lateral radiographs of the right elbow at 3 months showing normal alignment of the elbow joint. There is evidence of maturing heterotopic ossification along the anterior capsule (Hastings and Graham Grade I). Calcification is also visible near the medial and lateral epicondyles indicating healing of the ruptured collateral ligaments of the elbow

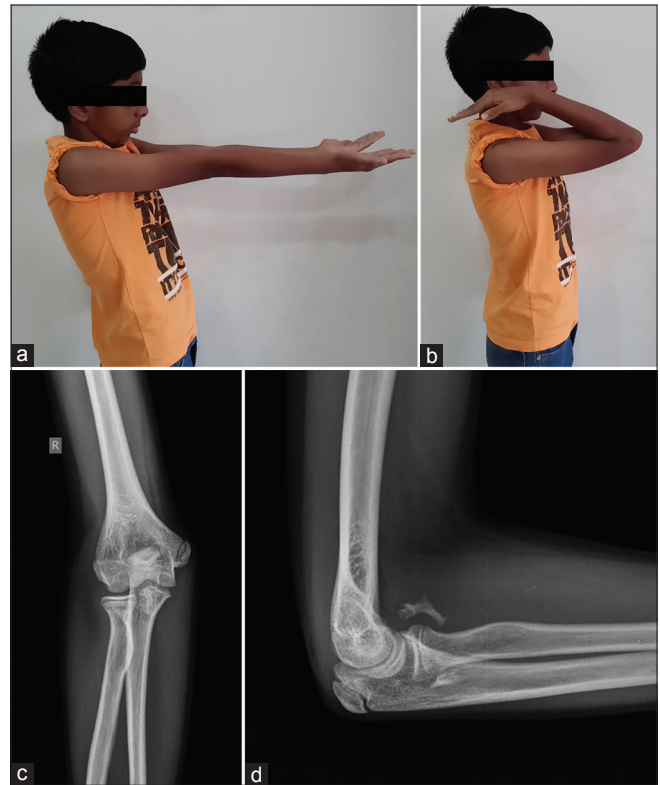


Figure 5: (a and b) Clinical photograph at 2-year followup showing full extension full and flexion of the elbow. (c) Anteroposterior radiograph of the right elbow at 2-year followup showing normal alignment of the elbow joint. (d) Lateral radiograph of the right elbow at 2-year followup showing normal alignment of the elbow joint. The heterotopic ossification has reduced as compared to the 3-month followup radiograph but is still persistent

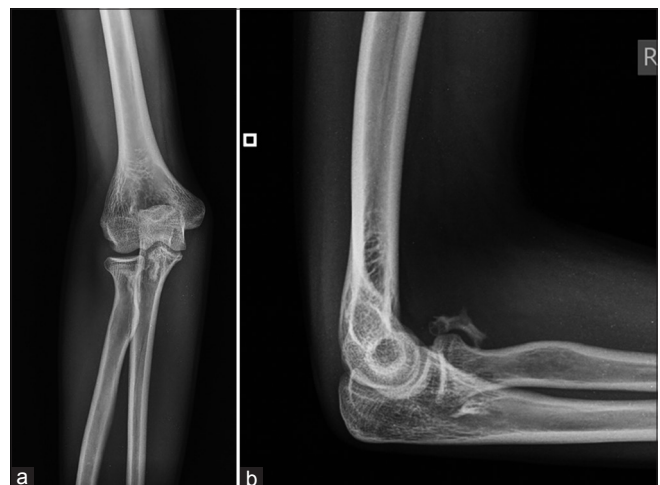


Figure 6: (a) Anteroposterior radiograph of the right elbow at 4-year followup showing normal alignment of the elbow joint. The child is skeletally mature and all epiphyses around the elbow have fused. (b) Lateral radiograph of the right elbow at 4-year followup showing normal alignment of the elbow joint. Persistent heterotopic ossification is still visible in the anterior capsule

While medial dislocations have been mentioned in the classification of elbow dislocations, no case has ever been reported in literature. Two large studies on elbow dislocations in children^{3,4} failed to find a single case of pure medial dislocation. The preeminent textbook of pediatric orthopedic trauma¹ mentions that “there are no recent reports of medial dislocations in children” and offers no guidelines about its diagnosis or management. Most reports of “medial” dislocations in children are actually posteromedial dislocations and are often associated with concomitant fractures.^{7,8} Four types of posteromedial dislocations have been described. The first consists of an isolated medial elbow dislocation, which has never been reported in literature. The second type is associated with distal humerus epiphyseal separation and is therefore a pseudo-dislocation because the actual joint remains congruent. The third type is a dislocation secondary to traumatic trochlear hypoplasia and the fourth type consists of posteromedial dislocations of the elbow with lateral condyle fracture.^{7,8}

Medial elbow dislocations have rarely been reported in adults. Jockel *et al.* reported on 4 cases of medial elbow dislocation out of 184 elbow dislocations (2%) over a 12-year period.⁹ The mean age of the patients was 56 years (range 49–61 years). All four patients presented with recurrent subluxation or dislocation after an attempted closed reduction as the initial treatment. Two patients had evidence of ulnar neuropathy. Open reduction, lateral collateral ligament repair, and extensor tendon origin repair were performed in all patients, with two patients requiring more than one surgery to achieve a successful result. They concluded that medial elbow dislocations in adults have a higher rate of recurrent instability than the more commonly encountered patterns of elbow dislocations and that closed reduction is rarely successful in this type of dislocation.

In contrast, we had a successful outcome following gentle closed reduction in our patient. At 4- years followup, the child had a full range of elbow motion and forearm rotation, had a stable elbow, and was able to participate in all upper limb sports.

Conclusion

We report a rare case of pure medial elbow dislocation without concomitant fracture in a child. Early recognition and prompt diagnosis is the key to achieve a good result. An MRI is crucial to confirm the diagnosis and rule

out concomitant fractures, osteochondral lesions, or cartilaginous injuries, which may be associated with this pattern of dislocation. A single attempt of gentle closed reduction should always be attempted. Once stability is confirmed, early active elbow mobilization at 2 weeks is desirable to prevent stiffness and ensure a good outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initial will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Stans AA, Lawrence JT. Dislocations of the elbow and medial epicondylarhumerus fractures. In: Flynn JM, Skaggs DL, Waters PM, editors. Rockwood and Wilkins' Fractures in Children. 8th ed. Philadelphia, PA: Wolters Kluwer; 2015. p. 651-701.
2. Mencia GA, Swiontkowski MF, editors. Green's Skeletal Trauma in Children. Philadelphia, PA, W.B. Saunders; 2015. p. 234-40.
3. Carlioz H, Abols Y. Posterior dislocation of the elbow in children. *J Pediatr Orthop* 1984;4:8-12.
4. Rasool MN. Dislocations of the elbow in children. *J Bone Joint Surg Br* 2004;86:1050-8.
5. Welsch GH, Scheffler K, Mamisch TC, Hughes T, Millington S, Deimling M, *et al.* Rapid estimation of cartilage T2 based on double echo at steady state (DESS) with 3 tesla. *Magn Reson Med* 2009;62:544-9.
6. Hastings H 2nd, Graham TJ. The classification and treatment of heterotopic ossification about the elbow and forearm. *Hand Clin* 1994;10:417-37.
7. Kirkos JM, Beslikas TA, Papavasiliou VA. Posteromedial dislocation of the elbow with lateral condyle fracture in children. *Clin Orthop Relat Res* 2003;408:232-6.
8. Eksioglu F, Uslu MM, Gudemez E, Cetik O. Medial elbow dislocation associated with a fracture of the lateral humeral condyle in a child. *Orthopedics* 2008;31:93.
9. Jockel CR, Katolik LI, Zelouf DS. Simple medial elbow dislocations: A rare injury at risk for early instability. *J Hand Surg Am* 2013;38:1768-73.