
Case Report

Medial humeral condyle fracture in a 2-year-old child with abnormal displacement and mechanism of injury: A Case Report

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ABSTRACT

Fractures of the medial humeral condyle are considered a rare injury of a pediatric elbow injury, accounting for only 1-2% of pediatric elbow fractures. The current mechanism of injury describes the fracture to be caused by direct trauma at the point of the flexed elbow or by an avulsion injury due to a valgus strain of the elbow upon falling with an outstretched arm. We report a case of early presentation of an atypical injury mechanism, as well as proximal displacement of the medial condyle fracture fragment (Kilfoyle Type III) in a 2-year-old child treated with open reduction internal fixation (ORIF) with a 3-month follow-up period. The patient was treated with ORIF using 2 Kirschner wires and presented with a periosteal reaction. The implants were maintained for 3 months, allowing full extension and 90 active flexions of elbow movement after removal. The direction of the shearing force upon injury could explain the proximal displacement of the fracture; however, the absence of rupture of the surrounding tendons upon exploration contradicts the possibility and hence remains unknown. In conclusion, treatment with ORIF using 2 Kirschner wires is sufficient to reduce the medial humeral condyle fracture; however, the risk of developing elbow stiffness as a complication is still present, as shown in this case.

Keywords: Medial condyle humerus, pediatric, osteosynthesis, proximal displacement
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INTRODUCTION

Fractures of the medial condyle are rare in skeletally immature children, accounting for 1 to 2% of fractures of the distal humerus.¹⁻⁴ The diagnosis is often missed, especially in cases before distal humerus ossification, which appears at 5 years of age, resulting in a poor outcome if not treated acutely.⁴

Literature on physeal fractures of the medial condyle describes the mechanisms of injury as either being caused by falling directly on the point of the flexed elbow or falling on an outstretched arm causing an avulsion injury from the valgus strain of the elbow.¹⁻⁴ The metaphyseal fragment of the medial condyle fracture is attached to the origin of the common flexor of the forearm muscles, causing the rotation of the loose fragments to be displaced distally. The anterior capsule of the joint and the lateral aspect of the origin of the common flexor was often torn.⁴ The literature on medial condyle fractures reports on the consequences of late diagnosis and potential complications. We hereby report a case of early presentation of medial condyle fracture with an atypical mechanism of injury and fracture displacement, along with a 3-month follow-up.

CASE PRESENTATION

Mechanism of Injury

The injury happened when the patient was in a prone position on the bed with his left arm under his body and was struck with an estimated 30kg load. The position of the left arm was demonstrated to have his shoulder flexed above 90 degrees and internally rotated, the elbow flexed above 90 degrees, and his wrist supinated.

Patient Care

The initial examination of the left elbow showed swelling with local tenderness throughout the elbow without obvious deformity upon inspection. Vascular, neurological, and motor function distal to the elbow did not show a deficit, but the range of motion of the elbow was limited by pain. Radiographic imaging with plain X-ray was performed to evaluate the deformity (Figure 1).

Surgical Exploration

The patient was placed under general anesthesia with an incision made using the posterior approach. The ulnar nerve was identified and secured (Figure 2). A fracture of the medial epicondyle of the humerus was found,

reduced, and fixed with two divergent Kirschner wires of 1.2 mm diameter. The stability of the fracture after fixation was checked and declared stable. The operation site was irrigated with normal saline and then closed with sutures. A long arm splint was applied and a postoperative elbow X-ray was taken (Figure 3).

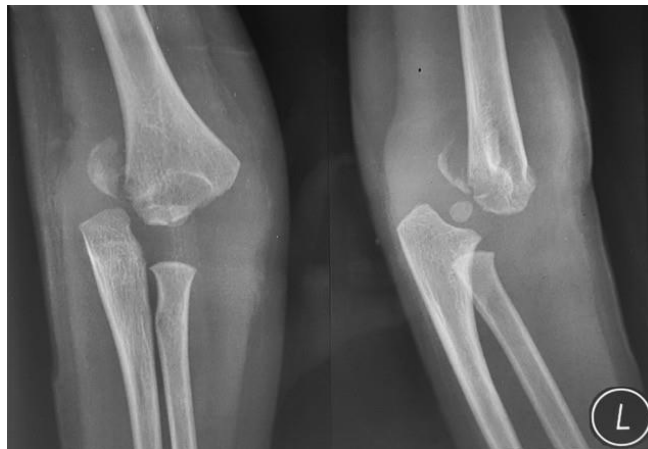


Figure 1. Plain X-ray of the right elbow upon arriving at the emergency department, Anteroposterior view (right), and Lateral view (left).



Figure 2. Preservation of the ulnar nerve upon exposure to the fracture site

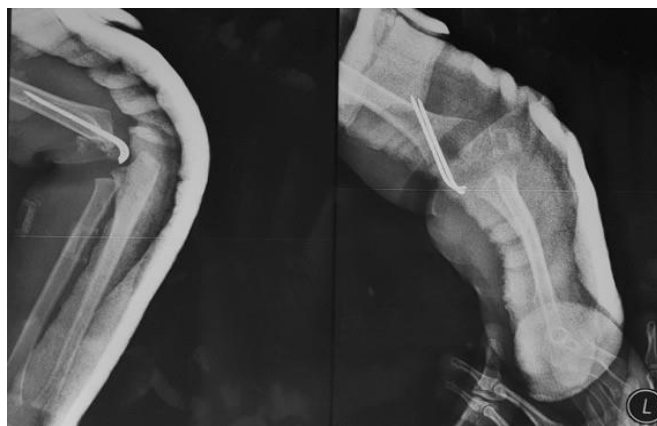


Figure 3. Plain X-Ray Lateral view (left) and AP view (right) of the right elbow after open reduction and internal fixation using two divergent Kirschner wires and immobilization

Postoperative Care

The movement of other joints distal and proximal to the elbow was maintained, and the patient was only irritable when required to move the elbow. The vascular and neurological function was retained and the wound was properly closed.

The patient was followed up weekly for the first month without complaints of tenderness or restlessness upon palpation of the lateral side of the elbow joint, with a range of motion limited to 10°–90° of flexion-extension, and underwent physical therapy. The X-ray taken after 1 month is as shown in Figure 4, showing an apparent discontinuity on the lateral side of the elbow, as well as incomplete callus formation of the medial condyle fracture.

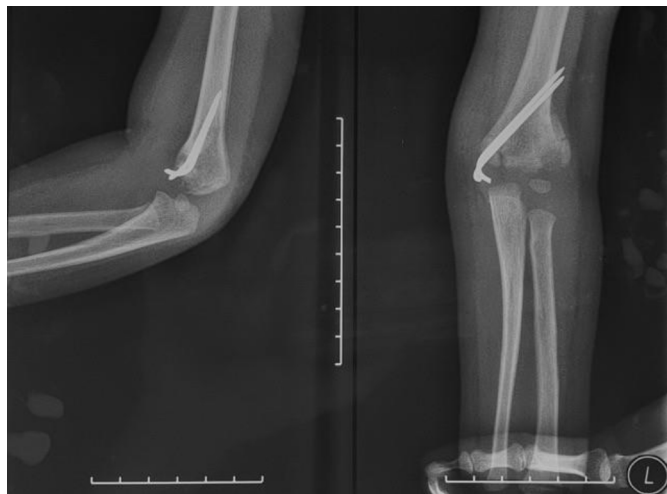


Figure 4. Elbow X-ray Lateral and Anteroposterior View at 1 month after surgery



Figure 5. Elbow X-ray Lateral and Anteroposterior View at 3 months after surgery

Implant removal was postponed and was removed after the third month as a radiographic union at both the medial condyle fracture site and on the lateral side (Figure 5). The removal of the two K wires was performed under general anesthesia and the post-operative range of motion showed that the elbow was capable of active flexion of 90, extension of 0, and passive flexion of 100. The patient continued to undergo physical therapy after removal.

DISCUSSION

Fractures of the medial condyle of the elbow are rare, accounting for less than 1% of fractures of the distal humerus.¹⁻³ The main concern upon facing medial condyle fractures is that they are often missed, resulting in poor outcomes if early treatment was not provided¹⁻⁵. The classification of the medial condyle fracture is based on which part of the trochlea the fracture line traverses (Milch Classification), and the displacement pattern (Kilfoyle Classification).^{5,6} In our case, the fracture pattern resembles a Milch type I injury and a Kilfoyle type III displacement.

The current literature often discusses two separate mechanisms of action to cause physeal fracture of the medial condyle; the sharp edge of the semilunar notch divides the trochlea directly, or falling on its outstretched arm, resulting in an avulsion injury due to valgus strain.^{2,4,7} However, the mechanism of injury, in this case, is caused by the load on the patient while lying in a prone position resulting in a shearing force, with the shoulder flexed above 90 degrees and internally rotated, the elbow flexed above 90 degrees, and his wrist supinated. The shear force was initiated mainly due to the position of the patient, with the load on the patient's body as the main force pushing down the elbow, the elbow being pressed to the bed as a counterforce, resulting in the displaced fracture.

The fracture fragment was expected to be displaced distally as the medial condyle is the origin of the pronator teres muscle and the common flexor tendon,^{6,8} hence the associated tendons were suspected to have been ruptured.

Surgery was performed with a posterior approach rather than a posteromedial approach in anticipation of finding the fragment of the fracture, as it had displaced proximally⁹. Reduction and fixation with two K wires were performed to counteract the sagittal rotation forces

of the common flexor muscles.^{6,9} Surgical exploration had shown no rupture of the common flexor tendon or the origin of the pronator teres tendon and was supported by the result of postoperative examination after the fourth week, showing no neurological or motor deficit. The examinations suggest that the proximal displacement of the fragment had occurred without the presence of a ruptured tendon.

Implant removal was postponed because bone callus formation of the fracture site was incomplete and the lateral elbow showed an apparent discontinuity 4 weeks after the operation (Figure 4). This discontinuity is suspected to be a periosteal reaction caused by the drilling process during the fixation of the K wire to a thick periosteum, fitting as the patient is 2 years old, and noting that the fracture was absent in the initial X-ray (Figure 1), so it is unlikely that it was caused by the initial mechanism of injury. Another differential is calcific tendonitis, although unlikely because there were no complaints of pain during the resorptive phase or crepitation upon movement during the physical examination. Then a radiographic union of both the medial condyle and the lateral humerus was achieved (Figure 5), and the implant was removed.

The normal range of motion of extension and flexion of the elbow is approximately 0 -160, while daily activity can be performed with at least 30 - 130 flexion extension.^{10,11} In our case, the patient had an active flexion extension of 0 -90, that is, a moderate case of elbow stiffness.¹² Nonoperative treatment should be considered within the onset of fewer than 6 months, consisting of dynamic splinting, serial casting, continuous passive movement, physical therapy, and manipulation under general anesthesia.¹⁰

Late complication of the fracture is the formation of 'fishtail deformity', which occurs when the intraarticular vessels of the medial epicondyle and medial metaphysis are damaged and can cause functional impairment, ongoing pain, and the development of early osteoarthritis.¹³⁻¹⁶

CONCLUSION

The medial condylar fracture of the humerus is a rare injury that can be successfully reduced and fixed with K-wires. The risk of elbow stiffness remains the most concerning residual symptoms following the procedure.

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