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Epiphyseal injury of the lateral condyle related to throwing in a young baseball player: a report of a rare case

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Repeated throwing can lead to osteochondral injuries of the elbow in young baseball players with skeletal immaturity.³ Tremendous valgus stress during the late cocking, and acceleration phases of throwing motion produce a distracting force on the ulnar collateral ligament and can lead to avulsion of the medial epicondylar apophysis.⁶ However, lateral radiocapitellar compression stress and shearing force can lead to osteochondritis dissecans (OCD) of the humeral capitellum.^{4,13} These osteochondral injuries are well known as throwing-related injuries occurring in skeletally immature baseball players. Earlier studies have demonstrated that playing the catcher position is one risk factor associated with elbow pain in young baseball players.^{7,10,12} During late acceleration and the follow-through phases of throwing motion the common extensor muscles create traction force to the lateral epicondyle of the humerus.⁶ Repeated traction force to the lateral epicondyle of the humerus before the appearance of the epiphyseal nucleus might induce lateral elbow epiphyseal injury in skeletally immature baseball players. This report describes a case of lateral elbow epiphyseal injury to a 7-year-old boy playing catcher caused by repetitive throwing.

Written informed consent for publication of this case report was obtained from the patient and his parent.

Institutional review board approval was not required for this case report.

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Case report

A 7-year-old right-hand-dominant baseball catcher presented with gradually worsening right lateral elbow pain after playing in a competitive baseball game. He had been playing baseball for only 6 months, but he played the catcher position regularly despite being 7 years old because of a decrease in the number of baseball team members. He had experienced no trauma history before the appearance of right lateral elbow pain. He and his parents had consulted a doctor. Based on a right elbow X-ray, his chief complaint of pain was inferred to have originated from the epiphyseal line of the lateral condyle (Fig. 1). The boy was referred to our hospital for evaluation of right lateral elbow pain. No tenderness of the humeral capitellum or the medial epicondyle or radial head of the right elbow was found during a clinical examination. However, tenderness of the lateral epicondyle of the humerus was found. No subjective elbow pain during movement was found. Active elbow flexion was up to 145°; extension was 5° with no instability on bilateral sides. The forearm motion range was 90° for pronation and 90° for supination on bilateral sides. Radiographs of the right elbow showed osteochondral fragmentation in the epiphyseal line of the capitellum but no epiphyseal nucleus of the lateral epicondyle of the humerus (Fig. 2). Magnetic resonance imaging (MRI) revealed osseous edema around the osteochondral fragmentation (Fig. 3, A and B). After diagnosing the patient as having epiphyseal injury classified as Salter–Harris type II,¹¹ we instructed him to stop intensive use of the elbow for motions such as throwing and batting. Posterior shoulder girdle tightness of the throwing side



Figure 1 Oblique plain radiograph of the *Right* elbow showing the irregular epiphyseal line of the lateral condyle →.



Figure 2 Anteroposterior plain radiograph of the *Right* elbow showing fragmentation in the epiphyseal line of the lateral condyle →.

and bilateral hamstring muscle and iliopsoas muscle tightness were observed. Physiotherapy such as that for the shoulder girdle, core, hip, and lower limb stretches was performed to resolve general tightness. Bone healing of the lateral epiphyseal line developed gradually over time (Fig. 4A, 4 weeks; 4B, 8 weeks; 4C, 12 weeks). He returned to baseball activities 3 months after the start of conservative treatment and played baseball with no throwing-related elbow pain. Written informed consent for publication of this case report was obtained from the patient and his parent.

Discussion

The 7-year-old boy, described in this report, presented 6 months after starting to play as a catcher with pain of the lateral epicondyle of the humerus with no apparent trauma elbow injury. Radiographs of his right elbow revealed no ossification of the lateral epicondyle, which begins ossifying at around age 11 years.² Therefore, the lateral part of his elbow is apparently vulnerable to lesions. During the arm cocking and arm acceleration phases, substantial varus torque is generated in the elbow joint as the elbow extends through a range of approximately 65°.⁵ Furthermore, during the arm acceleration phase until ball release, the wrist joint changes gradually from dorsiflexion to palmar flexion.¹ This combination of elbow extension and varus torque to the elbow and wrist motion seems to exert stretching force on the common extensor muscle of forearm and lateral ligaments of the elbow joint.⁶ This traction force of the common extensor muscle of the forearm to the nonossified lateral epicondyle might have caused epiphyseal injury of the external condyle in the young baseball catcher with skeletal immaturity.

The patient, in our casem presented the epiphyseal injury classified as Salter–Harris type II in the distal lateral epiphyseal line of the humerus. Radiographic diagnosis of acute Salter–Harris injuries of the extremities in children might be difficult, especially in an early phase. In our case, the first X-ray showed a blurred image of a flake metaphyseal fragment that was attached to the epiphysis of the distal lateral humerus. When the epiphyseal lesion is obscured by X-ray examination, MRI can be helpful for the detection of epiphyseal injury and for confirming the diagnosis. Hypointensity on the T1-weighted images and high intensity on T2-weighted images with fat saturation around the epiphysis represent bone marrow edema.⁸ MRI findings obtained in our case revealed bone marrow edema in the epiphysis of the lateral distal humerus.

The patient, in our case, had been playing baseball for only 6 months, but because of a decrease in the number of baseball team members, he played the catcher position regularly despite being 7 years old. Earlier studies revealed higher rates of elbow pain and X-ray fragmentation findings around the medial epicondyle apophysis in young catchers than in pitchers or fielders.^{7,12} That finding might be explained by the fact that throws by a catcher are probably as numerous as those of a pitcher, and are more numerous than those of fielders.⁷ Moreover, Hang et al speculated that throwing from a squatting or semi-squatting position causes higher stress on the throwing elbow in catcher players.⁷ Throwing motions are performed through activation of a kinetic chain for which individual body segments, or links, are coordinated in their movements by muscle activity and body positions to generate, summate, and transfer force through these segments to the terminal link.⁹ Throwing from a squatting or semi-squatting position, which is a different throwing position compared to that of a pitcher or fielder, might disturb the kinetic chain of the throwing motion and might influence the elbow joint condition. Furthermore, his immaturity of baseball skills such as throwing and catching might have contributed to the onset of the epiphyseal injury of the distal lateral humerus. Coaches should be cautious about using immature players as catchers.

Conclusion

Results obtained from the examination of this case indicate that overthrowing might cause epiphyseal injury of the distal lateral humerus in young baseball catchers. Awareness of this

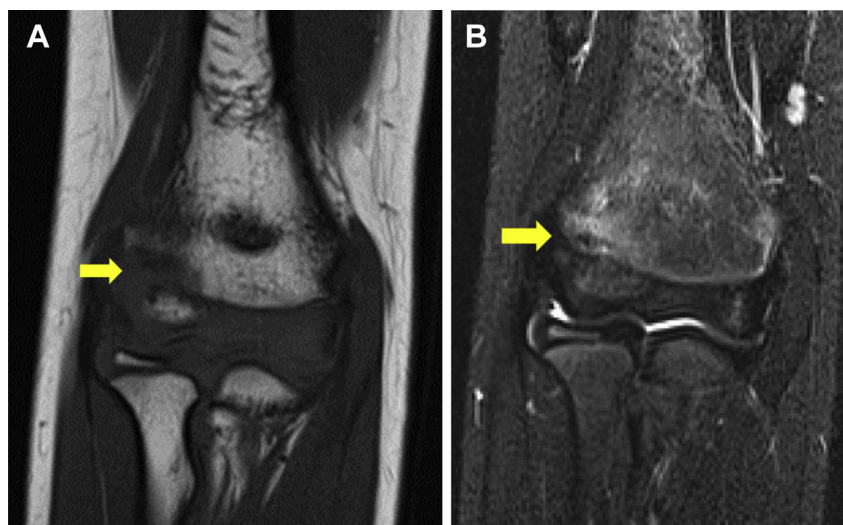


Figure 3 Coronal T1-weighted magnetic resonance (A) and fat-saturated, T2-weighted magnetic resonance images (B) of the *Right* elbow reveal edema around the epiphyseal line of the lateral condyle →.

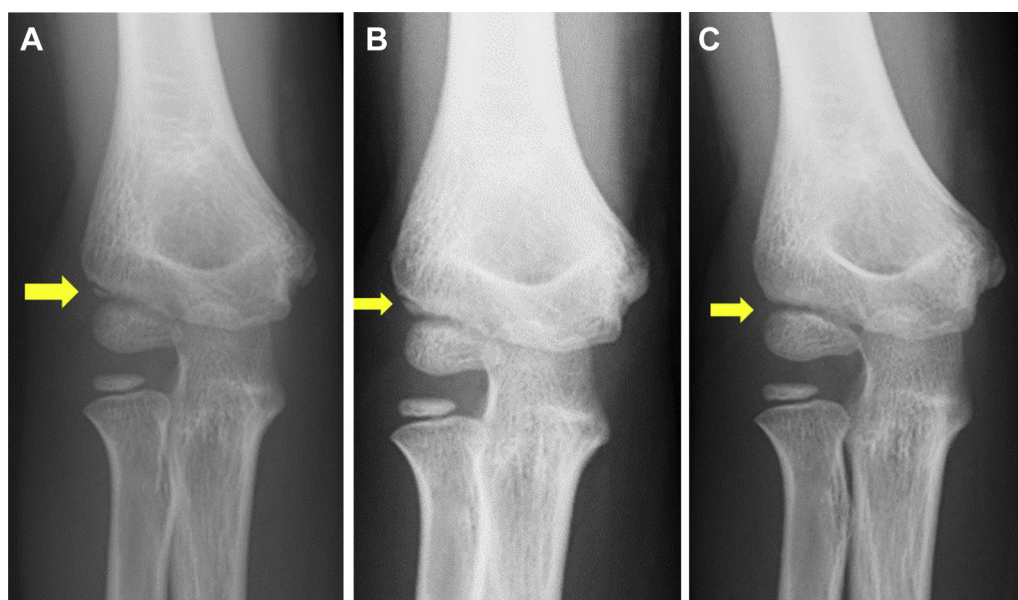


Figure 4 Bone healing developed gradually over time →: A, 4 weeks; B, 8 weeks; C, 12 weeks.

pathophysiology can raise confidence in proper diagnoses as a distinction for lateral elbow joint pain other than OCD of the humeral capitellum in young baseball players. Their coaches and parents should also devote due attention to the establishment of training programs and player management for skeletally immature baseball players.

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