Pediatric Elbow and Wrist Pathology Related to Sports Participation

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KEYWORDS

• Little league elbow • Gymnast wrist • Overuse injuries

KEY POINTS

- Upper extremity overuse injuries in the pediatric athlete have become increasingly more common.
- The identification and treatment of childhood elbow and wrist injuries are crucial to prevent long-term damage to growth and limb alignment.
- Gymnast wrist may be related to a traction injury caused by hyperextension of the wrist.
- Most of the overuse injuries at the skeletally immature elbow are associated with valgus overload syndrome.
- Osteochondrosis and osteochondritis dissecans may represent a spectrum of disease based on comparative anatomy studies.

LITTLE LEAGUE ELBOW

The term Little League elbow was originally used in 1960 by Brogdon and Crow to describe a medial epicondyle fracture seen in adolescent pitchers.[1] Although the term has been used to refer to a constellation of injuries to the pediatric elbow, many authors have tried to associate the terminology with only medial epicondyle apophysitis. For the sake of this review, the constellation of injuries will be discussed, as many of them likely represent a spectrum of elbow overuse in children.

Little League elbow has been described as a valgus overload syndrome. This is defined as repetitive throwing that imparts a tensile fore on the medial epicondyle and a compressive force at the lateral epicondyle.[2] Twenty-eight percent of youth pitchers report a history of elbow pain.[3] There is a spectrum of injuries that can occur from medial to lateral on the elbow and even posterior. Medial injuries are the most common, especially with valgus overload during the early and late cocking phases of throwing.[4] This force is transferred to the medial epicondyle, leading to apophysitis in younger children (Fig. 1) and epicondyle avulsion fractures in those nearing skeletal maturity. Lateral side injuries also occur, such as Panner disease and octeochondritis dissecans (OCD) of the capitellum and radial head. These occur slightly later in the throwing cycle from compressive forces during late cocking and early acceleration phases. Posterior injury patterns also occur, including olecranon apophysitis and posteromedial impingement, along with flexion and capsular contractures, often seen in conjunction with either medial and/or lateral pathology.

Medial Injures

Medial injuries of the elbow can range from irritation of the flexor–pronator mass to avulsion of the medial epicondyle. Patients typically present with medial elbow pain usually associated with increases in pitch count or training intensity. Although it has been hinted that pitch type may

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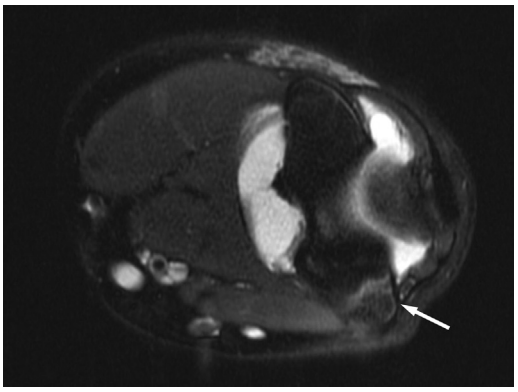

Fig. 1. MRI axial T2 FAT SATURATED image of a 12-year-old girl who plays year-round softball demonstrating elbow medial epicondyle apophysitis. Note the edema within the epicondyle and bright signal at the apophysis (*arrow*). (*Courtesy of* San Diego Pediatric Orthopedics, San Diego, CA; with permission.)

be related to an increase in injuries, this has not been born out in the literature. They typically have decreased throwing velocity and medial elbow pain that is tender to palpation.[5] Avulsion of the medial epicondyle has been reported to occur in athletes who have not adhered to the USA Baseball youth baseball pitching guidelines. Treatment of these injuries is controversial also, but most authors agree that nondisplaced or minimally displaced fractures (0-5 mm) can be treated nonoperatively with immobilization. Operative intervention is indicated for those with displaced fractures (> 5 mm), incarcerated fragment, or those associated with an elbow dislocation.[6]

Lateral Injuries

Lateral injuries of the elbow typically are caused by either Panner disease or OCD. Panner disease, named after the Danish radiologist Hans Jessen Panner, is an osteochondrosis of the capitellum of the elbow typically seen in younger athletes (< 10 years) with no history of trauma. It causes pain and stiffness that may limit extension. They typically have a good prognosis with full return of function (Fig. 2A). OCD (Fig. 2B), however, presents in an older patient population (typically > 13 years). This has been theorized to occur secondary to a disruption in the subchondral blood flow to the capitellum.[7] The radial head can then become secondarily involved. Pain usually occurs at late cocking through acceleration when the compressive forces are the greatest at the elbow.[7]

Posterior Injuries

Posterior injuries typically occur because of shear forces during both the acceleration and deceleration phases of throwing. The main area of injury is to the olecranon apophysis (Fig. 3). These injuries typically present as localized tenderness and pain with elbow extension. Imaging may demonstrate widening of the

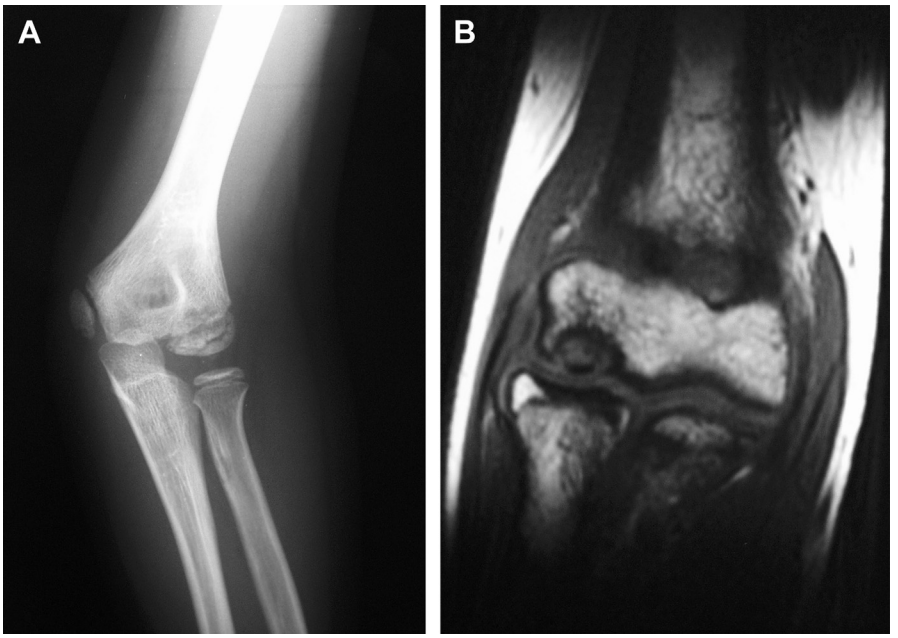

Fig. 2. Radiograph of elbow capitellum Panner disease (*A*) in a younger patient and an MRI image of OCD (*B*) in an older patient. (*Courtesy of* San Diego Pediatric Orthopedics, San Diego, CA; with permission.)