Technical Tip

Radial Head Subluxation

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Author Disclosure
Drs Meckler and Spiro have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Case Presentation
A previously healthy 6-year-old girl presents with an inability to move her left upper extremity for 24 hours. There is no history of trauma or evidence of injury on physical examination. The parent denies the presence of fever. The child slept well the night before, and her appetite has been normal.

Introduction
Reduction of a radial head subluxation is a gratifying procedure for both clinicians and parents. With a simple maneuver, a child can be restored to full function in minutes, without the need for costly or time-consuming studies. Radial head subluxation also is referred to as nursemaid’s elbow, pulled elbow, or annular ligament displacement. Clinicians working in the office, urgent care center, or emergency department should be familiar with this common diagnosis.

Epidemiology
Radial head subluxation has been identified as the most common orthopedic injury among children younger than 6 years of age. It has been described in infants as young as 2 months of age, but has a peak incidence among toddlers, with a mean age of 27 months. Girls are affected more often than boys, and the left arm is involved more often than the right, likely due to most parents being right-handed.

Anatomy and Pathophysiology
Much debate has surrounded the exact anatomic, developmental, and mechanical explanations for radial head subluxation. Most theories are based on cadaveric evidence or conjecture. The annular ligament wraps around the head and neck of the radius, holding the radial head against the capitellum. This ligament is relatively weak in young children, and the distal attachment may be torn as a result of longitudinal traction. For example, a toddler’s arm may be pulled suddenly by the parent while the child is attempting to walk independently across a street. Because the anterior portion of the radial head forms an acute angle compared with the posterior and lateral aspects, the torn portion of the annular ligament can slip over the radial head when the pulled arm is in pronation. Under these circumstances, the displaced ligament may become trapped between the capitellum and the radial head. Given these observations, some argue that the term radial head subluxation is a misnomer and prefer the term annular ligament displacement.

Clinical Presentation and Diagnosis
Most textbooks place equal weight on the history and physical findings in diagnosing radial head subluxation. Classically, the caregiver reports pulling on the child’s arm, followed by pain and subsequent disuse of the injured extremity. The child usually presents in no apparent distress, but guards the affected arm in slight flexion at the elbow with pronation of the forearm, refusing to use it.

On physical examination, there is no obvious deformity or swelling and no significant tenderness to palpation of the distal humerus. However, there may be some tenderness over the radial head. Several studies have noted that only 50% of children who experience radial head subluxation have a classic mechanism of injury. It is possible that another mechanism such as a fall is remembered, but the subsequent lifting of the child by the caretaker is omitted in the history. Therefore, children presenting with the classic posturing of radial head subluxation, regardless of the history, can have the subluxation reduced safely without radiographic evaluation. In two studies, the few patients diagnosed with fracture after attempts at reduction did not show any significant displacement of their fractures as a result of the manipulation. Radiographs appear normal in 95% to 100% of children who have radial head subluxation and, therefore, are not indicated.

Radiographs are indicated when there is an obvious effusion of the elbow joint, edema, ecchymosis, or a mechanism of injury that may be associated with a fracture (eg, fall >4 ft). However, radiographs often are thera-
peutic, because manipulation for correct positioning in the radiology suite frequently reduces the injury by the time the patient returns to the examination room!

**Treatment**
The traditional method for reducing radial head subluxation is forced supination of the wrist followed by flexion of the elbow while holding gentle pressure over the radial head with the clinician’s thumb, as demonstrated in the first supplemental video [video link]. An audible or palpable “click” often is heard as the annular ligament is returned to normal position. Alternatively, a method of forced pronation of the wrist sometimes followed by flexion or extension of the elbow may be used, as in the second supplemental video [video link]. Of the three prospective, randomized trials comparing supination with flexion, two demonstrated statistically significant superiority of the pronation technique, and one showed a trend favoring this method. In addition, the pronation technique may be less painful for the child compared with the traditional supination/flexion method. Although both techniques share high success rates, increasing evidence favors the pronation maneuver. When reduction fails after use of one or both of these techniques, the recommended treatment is splinting, using a posterior long arm splint with follow-up by an orthopedic physician in several days.

**Outcomes**
Most radial head subluxations are reduced successfully. The time to recovery of normal function typically is brief when reduction is successful, usually within minutes. Among the studies reporting outcomes for children who failed reduction and received conservative treatment with long arm splints, all children had recovered by follow-up. Recurrence of radial head subluxation is common, with reported rates ranging from 5% to 39%. Recurrence is more common among children younger than 2 years of age and usually occurs in the same arm. Prevention consists of educating parents about the condition and having them avoid pulling on the child’s arm.

**Summary**
- Radial head subluxation is the most common upper extremity injury of children younger than 6 years of age, with the peak incidence occurring among toddlers.
- The diagnosis is clinical and is based on classic posturing of an arm held limply at the side in slight flexion of the elbow and pronation of the forearm without physical evidence of trauma.
- Radiographs usually are unnecessary.
- Pronation of the wrist is the preferred method for reducing radial head subluxation, although supination followed by flexion also is effective.
- Most children who experience radial head subluxation regain normal function within 10 to 15 minutes of successful reduction.

**Suggested Reading**
Macias CG. Radial head subluxation [comment]. *Acad Emerg Med*. 2000;7:207–208
Teach SJ, Schutzman SA. Prospective study of recurrent radial head subluxation. *Arch Pediatr Adolesc Med*. 1996;150:164–166