

## **MRI of Sports Related Injuries: Elbow**

**Miriam A. Bredella, MD**

**Associate Professor of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA**

**Target audience:** Radiologists with special interest in musculoskeletal imaging

**Learning objective:** To review normal MR imaging anatomy of the elbow and MR imaging findings of sports related pathology of the ligaments, tendons, cartilage and bone. Imaging protocols and normal variants will also be reviewed. Special attention will be paid to throwing injuries of the elbow with review of the throwing cycle and the “valgus extension overload syndrome”.

**Throwing injuries of the elbow:** The elbow is frequently injured in overhead throwing athletes, especially in baseball pitchers, due to repetitive excessive valgus forces during the throwing cycle. Typical injuries occur due to medial joint distraction, lateral joint compression, and rotatory forces at the olecranon.

During the throwing cycle, the elbow joint is subject to high valgus stress, leading to high distraction stress at the medial compartment. This can cause injuries to the medial elbow soft tissue restraints, namely the ulnar collateral ligament (UCL) and common flexor tendon. The valgus stress can also cause compressive forces to the lateral compartment, which can lead to osteochondral defects of the capitellum. Furthermore, valgus forces during rapid elbow extension can lead to shear forces to the posteromedial olecranon, which can lead to osteophyte formation of the posteromedial olecranon. Knowledge of the pathophysiology of the valgus extension overload syndrome allows for a structured approach in reviewing elbow MR imaging findings in throwing athletes.

Repetitive varus stress involving the proximal tendon of the lateral muscle group, the common extensor tendon, can lead to tendinopathy or tearing (lateral epicondylitis, or tennis elbow). Injury to the common extensor tendon is frequently associated with trauma to the adjacent ligaments. Associated injury to the lateral ulnar collateral ligament (LUCL) has been reported in lateral epicondylitis.

Rupture of the distal biceps tendon is rare, representing <5% of all biceps tendon injuries. It can be recognized by absence of the low signal tendon at the radial tuberosity insertion site, or by a gap within the tendon and a variable degree of proximal tendon retraction. It might be necessary to increase the field of view to include the retracted tendon. The bicipital aponeurosis, or lacertus fibrosis, can act to restrict proximal retraction of a completely torn tendon.

### **References:**

- 1) Kijowski R, Tuite M, Sanford M. Magnetic resonance imaging of the elbow. Part II: Abnormalities of the ligaments, tendons, and nerves. *Skeletal Radiol* 2005; 34:1-18.
- 2) Ouellette H, Bredella M, Labis J, Palmer WE, Torriani M. MR imaging of the elbow in baseball pitchers. *Skeletal Radiol* 2008; 37:115-121.
- 3) Sampath SC, Sampath SC, Bredella MA. Magnetic resonance imaging of the elbow: a structured approach. *Sports Health* 2013;5:34-49