Musculotendinous and ligament injuries of the elbow are common among throwing athletes and vary across a wide spectrum. Injuries range from mild soft tissue inflammatory changes, such as medial epicondylitis and posterolateral plica syndrome, to attenuation and incompetency of the ulnar collateral ligament (UCL), with the Ulnar collateral ligament of the elbow showing anterior bundle (ab), posterior bundle (pb), and transverse ligament (t). Repair or reconstruction of the ulnar collateral ligament should generally be reserved for highly competitive overhead athletes. Overhead athletes place tremendous stress on the ligaments that stabilize the medial side of the elbow. Athletes participating in sports that rely on such motions as in baseball, javelin throwing, and tennis are at risk of injuring these ligaments. Maximizing recovery after such an injury requires knowledge of the anatomy of the medial side of the elbow, the specifics of overhead throwing, and treatment options. The purpose of this article is to help athletic trainers and therapists better understand the complex anatomical, biomechanical, and diagnostic problems associated with UCL injury so that they can more effectively craft appropriate therapeutic solutions for their throwing athletes.

**Anatomy**

The UCL consists of an anterior and a posterior bundle and an obliquely oriented transverse ligament (Figure 1). The primary stabilizer of the medial elbow joint is the anterior bundle of the UCL. This bundle originates from the medial epicondyle of the humerus, inserts on the ulna, and remains taut throughout the range of motion of the elbow. It serves as the primary restraint to valgus stress and prevents the medial side of the elbow joint from opening up when a baseball player throws a ball. The posterior bundle tightens only after the elbow is flexed to approximately 70° or more and contributes little to stability while the elbow is near extension. The
transverse ligament does not cross the elbow joint or contribute to stability. The bones that make up the joint also help stabilize the elbow but contribute significantly only at less than 20° or more than 120° of flexion, making the anterior bundle of the UCL especially important between these two extremes of elbow position.

**Overhead Throwing**

During overhead activities the greatest stress is placed on the UCL during the late cocking and acceleration phases of throwing. These valgus stresses are distributed among the muscles and ligaments of the medial elbow. Repetitive overhand activities that place too much stress on these structures because of either overuse, poor conditioning, or fatigue lead to recurrent episodes of microtrauma. These chronic insults to the ligament result in scarring and stretching, leading to attenuated medial structures that lose much of their function. The most common examples of athletes with chronic elbow instability are college and professional baseball players. A player might present with a gradual onset of pain and instability or might experience a sudden pop during the acceleration phase of throwing, indicating an acute disruption of the anterior bundle.

Valgus instability of the elbow—often caused by overhead throwing—can lead to medial elbow pain and disability. This instability, however, predisposes an athlete to additional medial elbow trauma with resultant injury and associated symptoms. Medial elbow instability can cause traction injury to the ulnar nerve because the joint opens excessively with valgus stress. Injury to the nerve can lead to medial elbow pain, which can make accurately determining the source of medial elbow symptoms more difficult. Medial elbow instability can also predispose an athlete to articular injury. Such bony injury can lead to degenerative changes, because the contribution that bony geometry makes to joint instability is increased to compensate for UCL insufficiency. These degenerative changes can cause medial elbow symptoms, as well. Finally, medial collateral ligament insufficiency can result in symptoms attributable to medial epicondylitis as a result of overload of the forearm muscles that originate from the medial epicondyle. The excessive joint laxity that results from ligament insufficiency can cause recurrent injury to these muscle origins and lead to medial elbow pain.

**Diagnosis**

The diagnosis of UCL instability is based on a history of medial elbow pain associated with the acceleration phase of throwing. There might also be complaints of grinding, catching, or popping in the elbow, indicating the presence of loose bodies, posteromedial impingement, or chondromalacia. Ulnar neuropathy is often associated with chronic medial instability (Conway, Jobe, Glousman, & Pink, 1992) and should be carefully evaluated as part of the history and physical examination. In addition to the normal elements of a routine physical examination of the arm, special attention should be paid to flexibility of the shoulder and valgus stress about the elbow that is causing symptoms over the medial elbow. Thus, if a throwing athlete has medial elbow pain, the shoulder should always be examined, in addition to the elbow itself.

Valgus stress testing of the elbow is performed by taking the patient’s hand and placing it underneath the examiner’s arm against the side of the body. The elbow is held at 30° of flexion to relax its bony constraints. One hand is used to apply valgus stress to the elbow while the other hand palpates the medial side of the elbow (Figure 2). Stability is tested throughout the entire arc of flexion. Valgus force is continued...