**Pitcher’s elbow - medial elbow pain in the overhead-throwing athlete**

Overhead throwing requires extreme skill coupled with intricate movement. This combination places extraordinary demands on a throwing athlete’s shoulder and elbow. These extraordinary demands tend to lead to a significant amount of valgus stresses throughout the throwing cycle which may lead to the dreaded general diagnosis of “pitcher’s elbow.” As the number of these injuries steadily rise, it is important as clinicians to establish a well-structured rehabilitation program to restore functions that is limited by pitcher’s elbow. This program should be a multiphase approach with emphasis on controlling inflammation, restoring muscle imbalances, improving soft tissue flexibility, enhancing proprioception/neuromuscular control, and returning patient to competitive throwing.

 Since baseball has been rising in popularity with younger athletes, the incidence rate of “pitcher’s elbow” has increased significantly. Due to the complexity of both the elbow anatomy and of the athlete’s throwing mechanics, a clinician should have a working knowledge of both to be able to accurately diagnosis and treat impairments effectively. We will review the anatomy first then proceed to throwing biomechanics.

The ulnar collateral ligament is the main stabilizer against valgus forces, it experiences the highest level of valgus stress between 30-120 degrees of flexion during overhead throwing.1,2 The common flexors comprised of the pronator teres, flexor carpi radialis, palmaris longus, flexor carpi ulnaris, and flexor digitorum superficialis all originate from the medial epicondyle and are primary stabilizers to valgus forces. The last important medial structure is the ulnar nerve which passes through the cubital tunnel and is near the UCL and common flexors. Compression, inflammation, or subluxation of the ulnar nerve can lead to pain, numbness, and weakness distally. Lateral stability is provided by the radial collateral ligament and common extensors however these structures are less commonly injured in overhead athletes.3

 Throwing mechanics have been widely studied and is comprised of five main phases. The first phase is “the windup” which involves initial preparation to throw as the elbow flexes and the forearm is slightly pronated. Phase II is called “early cocking”. Shoulder abduction and external rotation are initiated at this phase. Phase III, “late cocking”, is characterized by further shoulder abduction and maximum external rotation. At this phase, the elbow should flex between 90 to 120 degrees and the forearm pronate to 90 degrees. Phase IV is known as “rapid acceleration” and involves the throwing athlete to generate a large forward directed force on the extremity which ends with rapid elbow extension as the ball leaves the thrower’s hand. This is the stage in which a tremendous valgus stress is generated over the UCL and on the flexor-pronator musculature of the elbow. Finally, there is Phase V, “follow-through”, which involves the distribution of all remaining kinetic energy as the elbow reaches full extension.3

 The forces that are produced during throwing leave the elbow joint more susceptible to injury. The typical injury resulting from throwing is created by repetitive microtrauma or chronic stress. The injury that is becoming more and more common is UCL deficiency resulting in valgus instability of the elbow. Injury to the UCL can result in pain, loss of throwing velocity, lack of throwing endurance, and general instability at the elbow. The most affected population for this injury is high school throwing athletes.4

 As physical therapists, how do we diagnosis this? First, the patient will usually describe a “popping” sensation with sudden onset of pain with throwing. As the injury becomes more chronic, patients will describe worsening pain at late cocking or early acceleration phases. After we rule out the shoulder and scapula, we should then examine the affected elbow in a flexed position. The flexed position unlocks the olecranon from its fossa therefore allowing isolated testing of the UCL. Palpate the UCL, then provide a valgus stress to test any medial joint space opening which indicates UCL laxity. Another special test, known as the milking maneuver can help rule in UCL injury. In the milking maneuver, the clinician positions the shoulder at 90 degrees of abduction, the elbow is flexed greater than 90 degrees, and the forearm is supinated. In this position, the clinical will then pull the patient’s thumb posteriorly. The test is positive if there is pain or laxity at the affected UCL. Of course, the gold standard for diagnostic imagining of the injury is the MRI.

 Now we know what it is, so how do we treat it? The main focus should be eliminating the aggravating factor which is throwing for an extended period. Once the aggravating factor is eliminated, a clinician should focus on maintaining elbow range of motion and strengthening flexor-pronator musculature. A clinician should also provide additional exercises for the core, shoulder, and scapular to minimize forces across the elbow and optimize neuromuscular control of the extremity. Once the elbow becomes pain free with general strengthening then it is appropriate to transition to a more sports specific strengthening program coupled with a well supervised return to throwing program.

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