Ulnar Collateral Ligament

Matthew I. Leibman, MD; Andrew S. Rokito, MD

Medscape Orthopaedics & Sports Medicine 6(2), 2002.

Posted 08/16/2002

Introduction

Extreme valgus forces are generated across the medial aspect of the elbow during overhead throwing activities, such as pitching, throwing a javelin, and serving a tennis ball. The ulnar collateral ligament (UCL), located on the medial aspect of the elbow, is the primary structure responsible for resisting these valgus loads. The repetitive motions concentrate tremendous amounts of stress on the UCL that may eventually result in damage to this structure. Injury to this ligament does not commonly lead to symptomatic elbow instability in the general population. However, overhead throwing athletes have a unique dependence on this ligament, and they may require operative treatment in order to stabilize their elbow after injury and allow them to return to competitive athletics.[1,2]

Case Presentation

A 24-year-old right-hand-dominant college pitcher was seen with complaints of pain about the medial aspect of his elbow of 2 months duration. The patient is a competitive athlete pitching 8 months out of the year. He has no prior history of injury to his right elbow. The patient described feeling a pop in his elbow while pitching in a game approximately 8-9 weeks ago. He has been unable to pitch effectively since that event.

On physical examination, there was tenderness to palpation over the UCL. The elbow had full active and passive range of motion. There was laxity and pain referable to the medial aspect of the elbow with valgus stress testing. A complete set of x-rays, including stress views, were taken. These demonstrated slight opening of the medial ulnohumeral joint in comparison to the contralateral side.

The athlete was diagnosed with a UCL injury, and it was recommended that he rest and stop pitching until symptoms subside. Rehabilitation focused on flexibility and strengthening of the shoulder and elbow; pitching mechanics were initiated. His medial elbow pain decreased significantly over the next 2 months, but when he attempted to throw beyond 75% of his capacity, the pain returned. At this time, an MRI was performed, which demonstrated a midsubstance tear of the UCL (Figure 1).

Figure 1. Coronal MRI of elbow demonstrating midsubstance UCL tear (yellow arrow).

The patient was then indicated for surgical reconstruction of his UCL. At the time of surgery, the UCL was identified through a muscle-splitting approach, and it was found to be quite lax and degenerated.

Pathophysiology

The elbow is an extremely congruous joint, and the osseous anatomy contributes to approximately 50% of its stability. The anterior bundle of the UCL is the primary restraint to valgus loads. Extreme valgus forces are transmitted to the UCL during the transition from the late cocking to the early acceleration phase of the pitching cycle. It is during this

phase that the UCL is under maximum stress; at the same time, the osseous geometry contributes little to overall stability. Microscopic tears can occur within the UCL, eventually leading to its attenuation or rupture. The resulting valgus instability can lead to degenerative changes in the posteriomedial aspect of the elbow. Forty percent of patients presenting with UCL insufficiency will have ulnar nerve symptoms secondary to the surrounding inflammation and instability.[1,2]

UCL Reconstruction

Surgical reconstruction of the UCL is indicated for competitive athletes who have failed at least 3-6 months of nonoperative management. The patient must understand that there is a lengthy recovery period as well as an intensive postoperative rehabilitation that is required.[3]

Surgical Technique

The approach is carried out over the center of the medial epicondyle. The medial antebrachial cutaneous nerves are at risk and must be protected. The flexor-pronator origin on the medial epicondyle is next identified. It is then split in line with its fibers in the fascial raphe between the flexor carpi ulnaris and the rest of the flexor-pronator mass. Alternatively, the approach can be carried out, as it was originally described, by transecting the conjoined tendon of the flexor-pronator mass and reflecting it distally to expose the UCL. The UCL is inspected and then incised to visualize the elbow joint. The distal anatomic insertion of the UCL is identified on the coronoid process of the ulna at the sublime tubercle and a transosseous drill hole is made. Next, the proximal anatomic origin of the UCL on the undersurface of the medial epicondyle is identified. A single drill hole is made in the medial epicondyle with 2 divergent exit holes anterosuperiorly. The ulnar nerve is directly posterior to the medial epicondyle and lies extremely close to the proximal drill holes. Care must be taken not to penetrate the posterior cortex so as to avoid injury to the nerve. The harvested palmaris longus graft is then passed through the transosseous tunnels in a figure-eight pattern and sutured to itself. The graft is tensioned with the elbow at 45 degrees of flexion. Other graft options include the gracilis or semitendinosus tendons, contralateral palmaris longus, 5-mm strip of Achilles, or flexor carpi radialis tendons. At this time, the ulnar nerve can be transposed if preoperative neurologic symptoms are present (Figure 2 and Figure 3).[1,3,4]

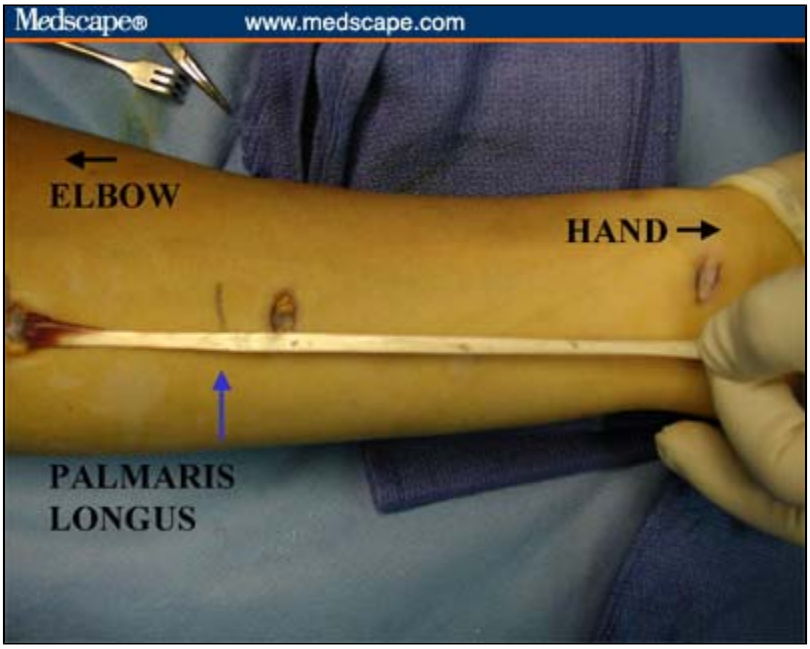

Figure 2. Volar surface of forearm -- Palmaris Longus harvesting from ipsilateral forearm through 3 small incisions.

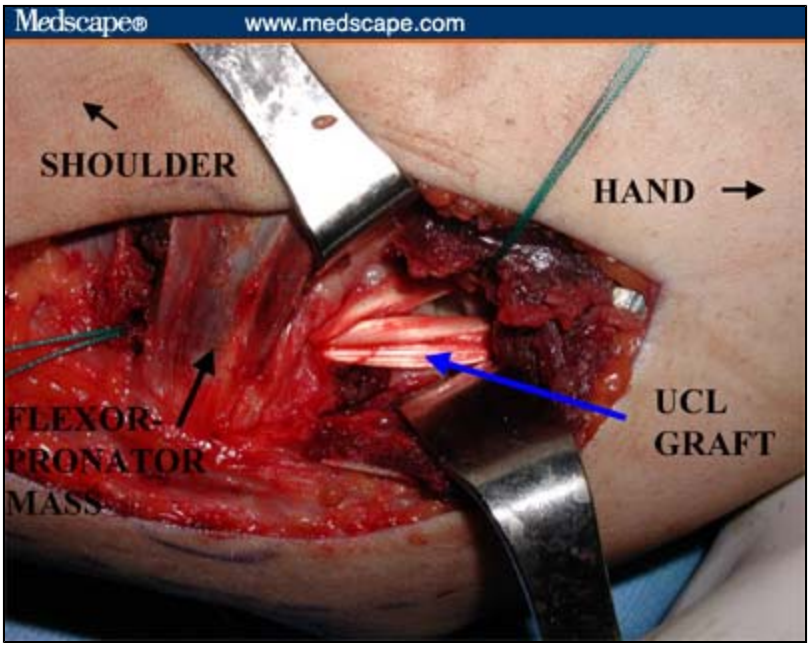

Figure 3. UCL graft passed through transosseous drill holes in a figure-eight fashion.

Rehabilitation

Patients are kept immobilized in a posterior splint for 1-2 weeks. A hinged elbow brace can then be used if so desired by the surgeon. Shoulder range-of-motion exercises are also begun at this time. At 6 weeks, an elbow-strengthening program is started with the use of light weights. A progressive throwing program is instituted at 3-4 months, under strict supervision. Not until 9 months after surgery can the athlete return to full throwing, and observation is continued for an additional 3-4 months. It will take most athletes 12-18 months to return to their preinjury level of function.[1]

Results

UCL reconstruction has demonstrated excellent results in athletes with competitive overhead throwing injuries. Conway and colleagues[5]reported that 68% of their patients returned to preinjury level with a mean recovery time of 12 months. Patients who had previous elbow surgery tended to have poorer results. Thompson and colleagues,[6] in 1997, reported 82% excellent and 12% good results with surgery; full recovery required an average time of 13 months. Azar and colleagues[3] had 79% successful outcomes with reconstruction and an average follow-up of 35 months.

Cutaneous nerve injury and ulnar nerve neuropathies are by far the most common complications associated with this procedure and may occur in up to 25% of cases.[1,3]

Discussion

Overhead throwing athletes place a tremendous amount of stress on the UCL of their elbows. The repetitive throwing motion can lead to distinct changes within the ligament, resulting in acute rupture or chronic attenuation. The result is valgus instability of their elbow, which prevents these athletes from performing their sport at a maximum level. It is this select patient population that has demonstrated excellent results with operative reconstruction of the UCL. It must be emphasized that the patients must first have failed 3-6 months of nonoperative management before they are considered for surgery. Patients must understand that a long and extensive postoperative course accompanies UCL reconstruction. Proper patient selection for UCL reconstruction, with highly motivated competitive athletes, can lead to extremely satisfying results for the patient and the surgeon.[1,2]

References

1. Hyman J, Breazeale NM, Altchek DW. Valgus instability of the elbow in athletes. Clin Sports Med. 2001;20:25-45.
2. Chen FS, Rokito AS, Jobe FW. Medial elbow problems in the overhead-throwing athlete. J Am Acad Orthop Surg. 2001;9:99-113.
3. Azar FM, Andrews JR, Wilk KE, Groh D. Operative treatment of ulnar collateral ligament injuries of the elbow in athletes. Am J Sports Med. 2000;28:16-23.
4. Jobe FW, Stark H, Lombardo SJ. Reconstruction of the ulnar collateral ligament in athletes. J Bone Joint Surg Am. 1986;68:1158-1163.
5. Conway JE, Jobe FW, Glousman RE, Pink M. Medial instability of the elbow in throwing athletes: surgical treatment by ulnar collateral ligament repair or reconstruction. J Bone Joint Surg Am. 1992;74:67-83.
6. Thompson WH, Jobe FW, Yocum LA, Pink MM. Ulnar collateral ligament reconstruction in throwing athletes: muscle-splitting approach without transposition of the ulnar nerve. J Shoulder Elbow Surg. 1997;10:152-157.

Matthew Leibman, MD, Orthopaedic Resident, Hospital For Joint Diseases, New York, NY.

Andrew Rokito, MD, Assistant Professor of Orthopaedics, Associate Director of Sports Medicine, Hospital for Joint Diseases, New York, NY.