

Patient Guide to Ulnar Collateral Ligament (UCL) Injuries of the Elbow

Eric Eisner

Edward McFarland, M.D.

Andrew J. Cosgarea, M.D.

Brian J. Krabak, M.D.

Johns Hopkins Sports Medicine

What is the Ulnar Collateral Ligament?

A ligament is a structure that holds bones together and helps to control the movement of joints.

The best way to think of a ligament is as a tether between the bones, which gets too tight when the bones move. When a ligament is torn, the tether is too long and the bones move too much. This can lead to pain, a sense of instability or looseness, and inability to work or do your sport. The ulnar collateral ligament complex (UCL) is located on the inside (or medial side) of the elbow (small finger side of the arm). It is composed of three bands or divisions, the anterior, posterior, and transverse bands. The UCL attaches on one side to the humerus (the bone of the upper arm) and on the other to the coronoid process of the ulna (a bone in the forearm).

Of the three bands in the UCL, the anterior band of the UCL is the arm's primary restraint from stress to the elbow, while the posterior and transverse bands do less to stabilize the elbow. The largest stresses in the elbow are those forces that cause twisting and bending of the elbow, such as the throwing of a baseball or javelin. These motions put extreme stress on the ligament during certain parts of the motion.

How is the UCL injured, and what are the symptoms?

The UCL can be injured in several different ways. Most commonly, there is a gradual onset of medial elbow pain due to repetitive stresses on the ligament. For athletes participating in overhead or throwing sports, poor mechanics, inflexibility, or fatigue can eventually lead to muscle strain, which places more stresses on the UCL. These stresses create microscopic tears in the ligament, which can add up to one big tear over time. This gradual stress causes the ligament to stretch and become too long. Once it gets too long, it no longer holds the bones tightly enough during throwing activities.

Occasionally, throwing athletes may experience a sharp "pop" or develop sharp pain along the inside of the elbow joint on one particular throw leading to the inability to continue throwing. Pain on the inside of the elbow may also be felt after a period of heavy throwing or other overhead activity, or the athlete may be unable to throw beyond 50% to 75% on successive attempts. Pain is usually felt during the phase of throwing in which the arm accelerates forward, just prior to releasing the ball. Occasionally the athlete may get irritation of the ulnar nerve ("funny bone" nerve) on the medial side of

the elbow. This is due to stress on the nerve once the ligament is stretched and is felt as tingling or numbness in the last two fingers (small and ring fingers) in the hand.

While the instability resulting from a tear of the UCL may inhibit the ability to participate in throwing sports, it is unlikely to impair the activities of daily living, such as carrying a bag of groceries. Interestingly, a tear of the UCL rarely prevents exercising, lifting weights, batting, running, or other non-throwing sports.

How is a tear of the UCL diagnosed?

A tear of the ulnar collateral ligament can often be diagnosed by a physician through a history and physical examination. A valgus stress test, in which the physician tests the patient's elbow for instability, is the best way for the physician to assess the condition of the UCL. A magnetic resonance (MRI) scan and x-ray may also be done to further assess the condition of the structures in the patient's elbow, but these tests are not the sole basis for a diagnosis. These tests often demonstrate changes in the ligament indicating it has been under stress, which is common in throwing athletes. Sometimes it will show a definite tear in the ligament, but often times a MRI will not make the diagnosis completely. Injecting dye (gadolinium) into the joint before the MRI sometimes increases its accuracy. The most difficult part of treating a UCL problem is making the diagnosis. This is because the examination is often inexact and the tests are not 100% accurate.

What are the options if I have a UCL tear?

The treatment options following a UCL tear depend primarily on the patient's goals. If joint stability and pain relief is the patient's main goals, then non-surgical treatment is usually adequate. But, if the patient wishes to return to strenuous overhead or throwing activities and they do not respond to non-surgical treatments, then surgical repair of the UCL is recommended. Once the ligament has torn, it does not really heal well enough to allow a return to throwing.

Non-Surgical Treatment

The goal of non-operative treatment of a torn UCL is to restore stability to the elbow joint and provide pain relief to the patient. Treatment consists of an initial period of rest along with taking non-steroidal anti-inflammatory medications (like aspirin, ibuprofen, naproxen, etc.) and applying ice to the elbow daily until the pain and swelling are gone. After inflammation of the elbow has decreased, the patient may begin physical therapy. The purpose of the physical therapy is to strengthen the muscles around the elbow to compensate for the torn ligament.

Surgical Treatment

There are two types of surgical treatments used in dealing with a torn UCL: (1) Repair of the existing ligament or (2) replacement (reconstruction) of the ligament. However, direct repair of the existing ligament is only performed when the ligament has

pulled away from its humeral attachment. This is known as an “avulsion” and is rare. More commonly, the torn UCL must be replaced with a tendon “graft.” The material used to reconstruct the ligament is called a graft. The ligament is reconstructed using a tendon most commonly taken from the patient’s wrist and forearm (an accessory tendon called the palmaris longus tendon).

The most commonly used material is a tendon from the patient’s own body (autograft) but in rare instances the ligament is reconstructed with a donor (cadaver) tendon called an allograft. Other tendons that can be used include forearm tendons (half of the flexor carpi radialis), toe tendons (one toe tendon which goes to the big toe – it has two), a hamstring tendon, or part of the Achilles tendon. There are advantages and disadvantages to all of these, and they are used because some people do not have a palmaris longus tendon in their forearm. Approximately 15-18 cm of tendon is needed to reconstruct the UCL. Several small incisions are made in the patient’s forearm to extract the tendon.

The surgery is usually done with a nerve block of the arm so that it is completely numb. A 10-cm incision is made on the inside of the patient’s elbow. To expose the anterior band of the UCL, the flexor-pronator muscle mass is split lengthwise. This muscle-splitting approach is less traumatic to the muscle than detaching the muscle from the bone, and may allow the patient to recover faster and with less pain. However, sometimes it is necessary to release the muscles to get more exposure; the muscles are re-attached and the recovery is still excellent with no known bad effects. Tunnels are then drilled in the ulna and humerus at the site of attachment of the original anterior band of the UCL. The graft is then passed through these tunnels to form a figure-of-eight, thus reconstructing the ligament. Any remnants of the patient’s original ligament are sutured into the graft to give it added strength.

How long does rehabilitation take after surgery?

The postoperative rehabilitation program begins immediately following surgery and is divided into three phases (see Rehabilitation after UCL Reconstruction).

Following surgery, the patient is placed in a splint for seven to ten days to immobilize the elbow and allow the wound to heal. During this ten day period, gentle wrist, hand, and shoulder range of motion exercises are performed. After this initial period, a range of motion brace is utilized to gradually allow the patient to regain full range of motion in the elbow joint. Throughout phase I, shoulder and arm strengthening, as well as total body conditioning exercises are performed.

During phase II, full range of motion is restored and wrist and forearm strengthening exercises are begun. At about six weeks after surgery, elbow strengthening exercises may begin, but stresses to the elbow which might overstress the graft should be avoided for four months.

Phase III consists of a sport-specific strengthening program. Throwing athletes may begin to toss a ball without a wind-up motion 4-5 months after surgery. At 6 months postoperative, the patient may begin to use an easy wind-up from flat ground while continuing to increase throwing distance, and at 7 months baseball pitchers may return to the mound. Throwing in competition is allowed after nine months if the patient is pain-free

and has regained normal strength and range of motion. Some individuals may progress more rapidly than this but it must be done with caution.

A patient's rehabilitation is monitored closely by both the physical therapist and the physician. Particular attention is paid to an athlete's throwing mechanics to limit the amount of stress placed upon the elbow. Also, patients are cautioned not to attempt to accelerate the rehabilitation period. The graft must be given adequate time to be incorporated into the body. Too much stress on the graft before it has healed increases the risk of failure.

What are the results of surgery?

Approximately 75-85 percent of athletes return to their previous level of competition following reconstruction of the UCL. Some baseball pitchers even report increased velocity after surgery. The average rehabilitation time for throwing athletes is about 1 year, but it may take up to 24 months for a patient to return to their previous ability level.

What are the potential problems of surgery?

The most common complications following surgery involve the nerves in the elbow, but fortunately these are uncommon with modern techniques. Ulnar nerve symptoms are the most common problem, and it is usually just tingling and numbness which goes away shortly after surgery. Nerve impairments usually can be corrected by re-operation if necessary.

Stretching or even a rupture of the graft is possible but very uncommon. In these cases, a new graft may be used to perform a second reconstruction.

Potential complications may also arise from the graft harvesting site, but these too are rare. These can usually be resolved with medication.

Personal Experience with UCL Reconstruction by Eric Eisner

As an eighteen year-old college freshman, the last thing I wanted to hear was that I had torn the ulnar collateral ligament in my pitching elbow. Not being able to play baseball in my first year at Hopkins was hard to deal with. However, thanks to modern surgical techniques I was able to return to pitching the following season. In fact, I was able to throw harder than before I had "Tommy John Surgery."

Prior to surgery I worked hard to strengthen the muscles in my forearm and biceps. I believe this helped me to stay on-track with the prescribed rehabilitation schedule, which kept me optimistic about my return to pitching. The first few weeks of my rehab included stretching exercises and some light shoulder work. This period went by very fast, with surprisingly little discomfort. After regaining full range-of-motion, I was ready to begin re-strengthening the muscles in my forearm and biceps. This was the most frustrating period of my rehab because I could feel the strength coming back to my arm, but I was unable to apply any stress to my elbow. Finally, after four months I was able to begin throwing again. I can still remember the first throw I made, all ten feet of it. I can honestly say that I have never been more nervous about any one throw. Needless to

say, that first throw went well and I was free to enter the final phase of my rehabilitation. About seven months after the surgery I was able to begin throwing with an easy wind-up and was soon long-tossing. The only snag I had during my rehab occurred about two months into the long-toss and pitching phase of the program. I can definitely attribute this problem to trying to throw too hard too soon. I cannot stress enough the importance of going slow during the entire rehab process. Have confidence that you will reach the next step in the program when your arm is ready. After being idle for about two weeks, I slowly returned to the rehab program, making sure that my arm was ready before I progressed to the next level.

While some people may be ready to pitch competitively in as few as nine months after surgery, it took me about a year before I was completely ready. In terms of pitching, arm strength definitely returns before control and feel. Also, it took many hours of working out with Philadelphia Phillies pitcher Randy Wolf to smooth out my mechanics. Before my injury, I took my mechanics for granted, but during my rehab I found that the only way to be successful is to have a flawless pitching motion. Most importantly, I noticed that I was able to throw harder than before I injured my elbow. To actually have more velocity on my fastball than I did before my injury not only amazed me, it also provided me with the confidence needed to overcome any doubts I had upon my return to competitive pitching.

About the Author: Eric Eisner is a Johns Hopkins University Undergraduate student who aspires to be a physician and to throw 95mph. He is currently applying to medical school and plays baseball for the Johns Hopkins University Blue Jays.

References

1. McFarland EG, Cosgarea AJ, Sherbondy PS: Valgus Elbow Instability in Athletes. *Biomechanics*: Figures 1-5, December 1999
2. Jobe FW, El Attrache NS: Treatment of Ulnar Collateral Ligament Injuries in Athletes
3. Conway JE, Jobe FW, Glousman RE, Pink M: Medial Instability of the Elbow in Throwing Athletes. *Journal of Bone and Joint Surgery* 74: 61-83, 1992
4. Azar FM, Andrews JR, Wilk KE, Groh P: Operative Treatment of Ulnar Collateral Ligament Injuries of the Elbow in Athletes. *American Journal of Sports Medicine* 28: 16-23, 2000
5. Andrews JR, Timmerman LA: Outcome of Elbow Surgery in Professional Baseball Players. *American Journal of Sports Medicine* 23: 407-413, 1995.
6. Timmerman LA, Schwartz ML, Andrews JR: Preoperative Evaluation of the Ulnar Collateral Ligament by Magnetic Resonance Imaging and Computed Tomography Arthrography. *American Journal of Sports Medicine* 22: 26-32, 1994