

Summary of Anterior Cruciate Ligament Tears & Options for Treatment

What is the ACL?

The ACL, or anterior cruciate ligament, is an important ligament located inside the knee joint, which acts as the primary stabilizer preventing forward displacement of the lower leg upon the thigh bone.

How can the ACL be injured or torn?

Much to the surprise of many patients, this important structure may be torn without a contact injury but rather may occur simply with a sudden stop, hyperextension or twisting injury of the knee. Sports, such as basketball, that call for the foot to be planted followed by a sudden change in direction have a high incidence of ACL tears. Collision sports like football, which combine the possibility of twisting the knee with the chance of a direct blow from another player, are also a common source of this injury.

What are the signs and symptoms of acute (sudden) ACL injury?

Most athletes who have torn their ACL recall hearing or feeling a snap or pop in their knee at the time of the injury. Many patients report a feeling of instability followed by a lack of full range of motion at the knee joint. Rapid swelling is also characteristic of the injury and is the result of bleeding within the knee joint. The athlete usually is unable to continue play at the time of the injury but in many cases can walk off the field without aid. Swelling and soreness may subside in a few days or weeks and the significance of the injury may not be recognized until recurrent "giving way" occurs upon the return to sports. A chronic recurrent symptom that may occur as a result of the tearing of the ACL consists of a sudden going out of the knee, much as occurs at the time of the initial injury. The giving out of the knee is a sudden shift of the lower leg on the thigh, which occurs at the time of a pivot, hence, the term "pivot shift".

How can an ACL tear be diagnosed?

As with most orthopedic injuries, a thorough history and physical examination are the best ways a physician can diagnose injuries to the ACL. Special tests can be performed in the office by an experienced examiner that may reproduce the patient's symptoms. While X-rays may be ordered to rule out fractures, they are not useful for viewing soft tissue structures such as ligaments and tendons. Magnetic resonance imaging, or MRI, is commonly used to detect torn or otherwise injured ligaments and tendons.

What are the risks involved with continued play without treatment?

The recurrence of pivot shifts (knee giving way) during sports not only results in impaired ability to compete in sports which involve sudden stopping and pivoting but also predisposes the knee to significant other injuries including the tearing of menisci cartilage and damage to articular cartilage. It is the damage to the menisci or joint cartilage, secondary to the instability, which may result in irreparable damage to the knee and subsequent post-traumatic or degenerative arthritis. Therefore, it is desirable and important to prevent recurrent pivot shifts from occurring. A source of some confusion for patients and

for treating physicians is that not everyone who tears his anterior cruciate ligament will experience recurrent pivot shifts. Some individuals may be able to return to sports after rehabilitation, not experience recurrent pivot shifts and suffer little loss of function. Patients with minimal demonstrable instability may be treated without surgical repair or reconstruction of the ligament. However, even these individuals are at risk for developing pivot shifts several years later as other secondary stabilizing ligaments stretch out with use as they are not protected by the primary restraint of the intact anterior cruciate ligament.

What are treatment options for a torn ACL?

It has generally become well accepted to give strong consideration to surgical repair or reconstruction of the anterior cruciate ligament in young individuals who are physically active and intend to remain physically active in sports which involve sudden stopping, jumping and cutting. In more sedentary individuals who are perhaps older or willing to restrict their activities to decrease the chances of developing pivot shift phenomena, conservative management consisting of rehabilitation and possible arthroscopic trimming of torn cartilage is more strongly considered. Exceptions may be made in some individuals who are young and wish to continue sports. If there is minimally detectable instability associated with the ligament tear; the timing is such that repair or reconstruction of the ligament is shortly proceeding an important season; and sufficient time is not available to allow recovery from repair or reconstruction of the ligament to allow the athlete to be ready for the season; the athlete may elect to forego repair or reconstruction of the ligament and attempt to play after rehabilitation and bracing. An arthroscopic surgery which requires only a short rehabilitation period may be necessary to trim torn cartilage while electing not to proceed with the more extensive ligament repair or reconstruction.

Can a torn ACL simply be repaired?

Less than 10% of patients tear the anterior cruciate ligament in such a way that the ligament is, in fact, repairable without further reconstructive procedures. In those individuals where the ligament is torn off of bone, the treatment of choice is primary repair of the ligament.

What are surgical options for ACL reconstruction?

There are two options that I (Dr. Garth) discuss with patients in regards to reconstruction of the anterior cruciate ligament. The first option is the use of a strip of the patient's own patella tendon. Another option is available which further reduces the pain, swelling and atrophy associated with anterior cruciate ligament reconstruction. This option is the use of a transplant tendon or allograft to reconstruct the anterior cruciate ligament.

What are pros and cons of using an autograft (your own tissue)?

The autograft technique uses a strip of the patient's own patella tendon to reconstruct the anterior cruciate ligament. Harvesting of this tendon graft requires an incision large enough over the front of the knee to allow exposure of the patella tendon, however, unlike the routine of the past, no further ligaments are cut and the knee cap is not dislocated. Rather, arthroscopic examination of the knee is performed, visualizing guide wires which are placed within the knee, over which tunnels are reamed, and the ligament is inserted without ever actually opening the knee by dislocating the knee cap. This procedure represents a considerable improvement over conventional major ligament reconstructive

surgery and affords a reduction in pain and soreness and improves the ability of the patient to regain range of motion.

However, use of the patient's own tendon does require an incision which runs from the knee cap to the insertion of the patella tendon and results in soreness and swelling over the tendon with resultant initial loss of quadriceps strength, tone, and size (atrophy). Also pain at the site of graft harvesting resulting from patellar tendinitis is a risk, particularly if running and jumping progresses too rapidly in the first five to six months following surgery. Rarely, fracture of the knee cap from which the graft was harvested may complicate this technique of ACL reconstruction.

What are pros and cons of using an allograft (donor tissue)?

The allograft technique makes use of a transplant tendon to reconstruct the anterior cruciate ligament. Therefore, no removal of tissue from the patient's own tendon is necessary which makes the post-operative pain from tendinitis or complication of patellar fracture less and recovery quicker. Unlike conventional transplant surgery where immunosuppressant medications are necessary to prevent the patients from rejecting donated organs, ligament transplant type surgery does not require the use of these potentially dangerous drugs.

There is good experimental data to show that the freezing of tendinous tissue as routinely done actually destroys the antigens on the tendinous structures that would elicit rejection responses. It is believed that the use of this tissue (as well as grafts harvested from the patient's own tendon) actually functions as a scaffold over which patients rebuild their own ligaments so that the foreign ligamentous and bony material is replaced by creeping substitution over a period of months to years by the patient's own living tissue. In fact, failure of this replacement of grafts with living tissue is believed to occur in a small percentage of cases with either grafts taken from the patient's own tissue or transplanted grafts and may result in ultimate failure of the new ligament. The cause of this failure in occasional patients is unknown. Living replacement and remodeling of grafts normally occurs over a 9 to 12 months period following surgery and thus we recommend caution during that period following surgery. Should the patient desire to return to sports during the first 9-12 months following surgery, we recommend the use of a stabilizing brace to protect the graft until it has regained strength.

One potential disadvantage of the use of allograft must be addressed. As you probably know, the UAB Medical Center is very active in the field of transplants and has an excellent reputation nationally and internationally regarding these types of procedures. Every precaution is taken in the harvesting of tissues for donation in the transplant program to ensure that the donor patient has no diseases that are transmittable to the recipient. Specifically, the donor patient is checked for any type of bacterial infection; hepatitis, syphilis or AIDS. However, there is always the very slight risk that the donor patient could have contracted a disease such as AIDS only shortly before death and would have not had time to produce antibodies which could be detected to reveal that individual had been exposed to the AIDS virus. In that circumstance, the donated tissue could potentially transmit AIDS without it being medically detectable. Therefore, despite the best medical studies possible, there is theoretically a very slight risk of contracting diseases from transplanting tissues from one patient to another. This risk is at the highest reportedly 1:50,000. To my knowledge HIV infection resulting from a ligament transplant harvested from a donor screened as done at UAB has not occurred despite widespread use of these tendons nationwide. Nevertheless some patients may choose not to use a transplant tendon because of this concern.

What are the possible complications of ACL reconstruction surgery?

Other risks associated with anterior cruciate ligament reconstruction include those risks associated with any orthopedic procedure, e.g. infection (<1%), anesthesia risks (most candidates for this surgery represent very small risks for anesthesia), and nerve palsies (<1%) resulting from pressure or stretching at surgery or in the post-operative period. Further risks include arthrofibrosis, a response of scar tissue within the knee that makes regaining full motion difficult. Some degree of arthrofibrosis may occur in 5-10% of patients. Some of these patients who develop arthrofibrosis may require a second arthroscopic procedure to clean out scar tissue to regain motion. Rarely, patients may require a series of injections to the sympathetic nerves of the operated lower extremity in order to reduce pain and facilitate motion. Since arthrofibrosis may occur in the injured knee which is not operated on and since an increased rate of arthrofibrosis is known to occur in operated knees which have been acutely traumatized, it is our custom to allow the initial swelling and stiffness to subside following injury prior to surgical reconstruction. This may mean a delay of 2-6 weeks following injury prior to the recommended surgery.

What type of rehabilitation follows ACL reconstruction surgery?

Rehabilitation following reconstruction of the anterior cruciate ligament begins immediately following surgery. Motion is encouraged as well as strengthening exercises with an exercise cycle and weights. A long hinged brace is worn while walking until normal motion is restored in two to six weeks following surgery. Our protocol utilizes a smaller sports brace during walking for another one to two months and for more vigorous activities for nine to twelve months following surgery.

How sure can I be that ACL reconstruction surgery will work for me?

At the present time, we can with confidence recommend the use of an individual's own tissue for reconstruction of the anterior cruciate ligament and anticipate within an approximate 95% certainty that the individual will have a good result with a significant chance of having no further instability. There is evidence that allograft ligament reconstructions in select cases can be just as successful but require smaller incisions, smaller surgery and less pain and morbidity. However, use of the patient's own tissue is still the standard operation and is used in the majority of cases.

William P. Garth, Jr., M.D.

www.uabsportsmedicine.com