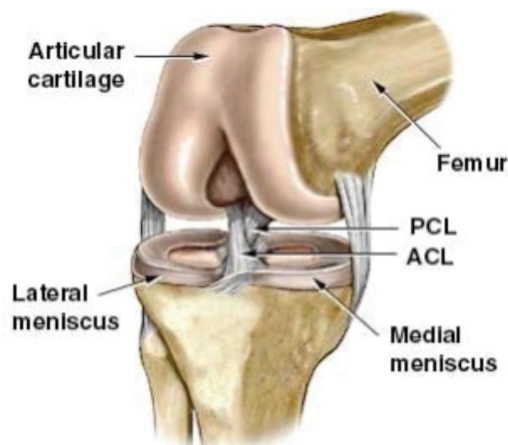


ACL Tear

Knee Anatomy

The bones of the knee, the femur (or thigh bone) and the fibula and tibia (bones of the lower leg), meet to form a hinge joint. The front of this joint is protected by the patella (kneecap). Like all joints, it is cushioned by articular cartilage, a kind of protective padding that covers the ends of the tibia and femur, as well as the underside of the patella. Pads of cartilage, known as the lateral meniscus, and medial meniscus further cushion the joint, acting as shock absorbers between the bones. Whenever there is a major injury to the knee, this cartilage is also at risk. Repairs/reconstruction to the knee help prevent the onset of arthritis caused by wear and tear on the meniscus and articular cartilage.



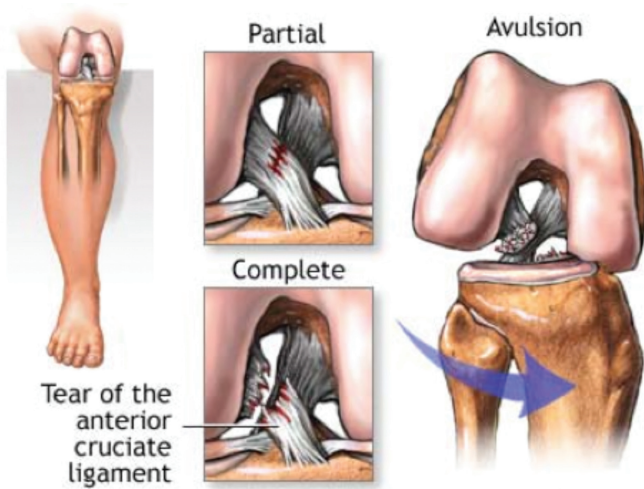
In many cases when the knee is injured, a ligament in the knee becomes strained or torn. A ligament is made of tough fibrous material and functions to control excessive motion by limiting joint mobility. Ligaments also help to stabilize the knee. There are four ligaments that are critical to the stability of the knee joint. The anterior cruciate ligament (ACL), which runs down the middle of the knee is the most frequently injured ligament. The ACL attaches the tibia (shin bone) to the femur in the middle of the knee. Behind the ACL lies the posterior cruciate ligament (PCL), which manages the backward movement of the tibia. Working with the muscles in the leg, the ACL and PCL control the amount of stress put on your knee when using it to walk, run or jump.

What is an ACL Tear?

As sporting activities have become more popular in the last few decades, injuries to the ACL have steadily increased. The ACL has received a great deal of attention from orthopedic surgeons over the past 15 years. Very successful operations to reconstruct the torn ACL have been developed as a result. The ACL is most commonly injured during sporting activities, when an athlete suddenly pivots, placing excessive rotational force, on the ligament. Measuring about the size of a finger, the ACL is a large, dense cord that can take up to 500 pounds of pressure before it will tear. The ACL's vital function of directing the tibia in its correct path from the end of the femur maintains joint stability. If the ACL tears or ruptures, bleeding will occur and the knee will become unstable.

Causes of an ACL Tear

In general, athletes or people who participate in sports are at a greater risk of tearing their ACL. Many football players and basketball players suffer ACL tears, as do ice skaters or dancers, who pivot and land suddenly at great speed. The ACL can also be torn during severe trauma, such as a car accident, or as the result of a work injury. Age does not affect whether or not a person will tear an ACL. Ruptures of the ACL happen when the tibia moves too far forward or when the knee is hyper-extended. If the knee is



twisted violently, such as in a clipping injury in football, the ACL may not be the only ligament torn. Physicians often see simultaneous injury in both the medial collateral ligament (MCL) and the ACL.

Symptoms of an ACL Tear

Complete and incomplete ruptures of the ACL produce bleeding into the knee that causes the knee to swell and have pain. The immediate application of ice to the injury can help limit this rush of blood into the joint. Once torn, the knee usually becomes noticeably unstable. **The ACL has a relatively poor vascular supply and will not heal without medical intervention.**

At the time of injury, a popping sensation may be felt and heard. In addition, the following symptoms could appear: pain, swelling and “giving way” of the knee.

Diagnosis of an ACL Tear

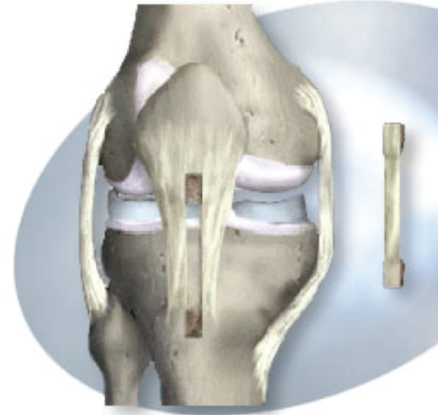
Dr. Gudeman will be able to diagnose a knee problem by performing a physical exam of your knee and by examining your medical history. He may also use any of the following methods to diagnose the condition: X-ray, magnetic resonance imaging (MRI) scan or arthroscopy. Dr. Gudeman may aspirate the joint, using a syringe to drain the swollen region of fluid. If blood is discovered while draining the knee, it is likely to be the result of a torn ACL. Dr. Gudeman may also use arthroscopy to diagnose and treat problems inside a joint. Arthroscopy is a surgical process using a fiber optic endoscope, similar to a TV camera, that allows an orthopedic surgeon to look directly into the knee joint. The vast majority of ACL tears are diagnosed clinically, however, arthroscopy is used more for the treatment of tears than for their diagnosis.

Treatments of an ACL Tear

After diagnosing the injury, Dr. Gudeman will usually prescribe rest, ice, compression and elevation (RICE) along with the use of crutches. Additionally, he may recommend rehabilitation exercises to prepare you for surgery, or prepare you for a life without a stable ACL. Non-surgical treatment is sometimes recommended for older patients who do not regularly participate in high demand sports involving cutting or pivoting. The three components of non-surgical treatment are physical therapy, activity modification and the use of a brace. A special brace, fitted by a physical therapist or athletic trainer, can help prevent the knee from giving way during certain activities. Treatment options following an ACL tear are individualized for each patient depending on age, activity level and the presence or absence of injury to other components of the knee. Surgery is usually recommended for young patients who are active in high-demand pivoting sports, such as basketball, football and soccer. Surgery is also recommended for those whom the ACL tear is associated with injury to other structures in the knee and for those people with a physically demanding job or lifestyle activities. **While the main reason most people give for electing to have surgery is the desire to return to a favorite sport with a stable knee joint, surgery also helps protect the cartilage, especially the meniscus cartilage, from the chronic wear and tear that can result in the onset of arthritis. The two pads of meniscus cartilage in the knee serve as shock absorbers between the bones and each time the knee gives way, these pads are affected.** There are a number of surgical methods for reconstructing (as opposed to repairing) the torn ACL, and the type of procedure chosen depends on the judgment of the surgeon who considers factors unique to each individual patient. In most cases, the ACL can be reconstructed either using an allograft or autograft.

Autograft

The material used to reconstruct the ligament is called a graft. This is often an autograft, from one's own body. The most commonly used form of ACL reconstruction today uses a patellar tendon autograft. This graft makes use of the central or middle third of the patellar tendon and its attached piece of bone from both the kneecap (patella) and the tibia. Because of the structures involved, this is known as a bone-tendon-bone graft. Hamstring (semitendinosus) autograft is another popular graft option.



Allograft

If an allograft, or tissue from another person's body is used, this material is harvested from a donor at the time of death and sent to a tissue bank where it is checked for infection, sterilized and frozen. The advantage of using an allograft is that the surgeon does not have to disturb or remove any of the normal tissue from your knee for the purpose of creating a graft.

Anterior Cruciate Ligament Reconstruction



1. Holes are drilled in the femur and tibia, and the torn ACL is removed.



2. The graft is passed through the drill holes to replace the torn anterior cruciate ligament.



3. The graft is anchored in place using screws or staples.

Arthroscopic Surgery for a Torn ACL

Arthroscopy is usually used for the surgical procedure. Three small incisions are made on the knee, but repair in the joint itself is done with the arthroscope, a fiber optic telescope. The use of arthroscopy enables a physician to see into the joint and make repairs through a very small incision rather than the large incisions needed for open surgery. Pencil-sized instruments containing a small lens and lighting system magnify and illuminate the structures inside the joint. The arthroscope is inserted into the joint and attached to a miniature television camera, allowing a magnified view of spaces in the joint that would otherwise be inaccessible. This technology makes possible more precise treatment of specific parts of an injury. In a typical reconstructive surgery, the torn ends of the ACL are first removed. The ACL graft can be taken from many sources: patella tendon (bone-tendon-bone), hamstring tendon or a quadriceps tendon. As stated above, the graft choice will be made between the surgeon and patient. Factors influencing this choice include age and activity level.

In most cases the graft is threaded across the joint, through the bone tunnel that is drilled into both the tibia and femur. The graft may be secured in the position of the original ACL. Securing devices include screws, sutures, buttons or small anchoring devices.

At the same time that the ACL is reconstructed, repair can be done to other injured structures within the knee. A torn meniscus can be trimmed or repaired (see meniscal injury handout) and other ligaments fixed as well.

Rehabilitation for ACL Surgery

Following an ACL reconstruction, rehabilitation includes three basic phases. A structured rehabilitation plan including a home exercise program that the patient follows helps reach the goals during each phase.

Phase I

The first phase consists of controlling the pain and swelling in the knee, regaining knee motion and beginning to regain muscle strength. Crutches are required for three to six weeks, although as swelling decreases and muscle strength improves, the patient progresses to putting full weight on the leg independent of crutches. This phase of treatment typically takes 6 to 12 weeks.

Phase II

In the second phase, the focus is on continued control of swelling and recovery of full muscle strength. From three to six months after surgery, you are encouraged to begin activities such as cycling, treadmill running and light jogging. Swimming is also an excellent method of strengthening the muscles around the knee.

Phase III

The final phase represents gradual return to full activity, including participation in the sport or work activity that may have caused the injury. For this to happen, full motion, normal muscle strength and the absence of swelling are required. Depending on the particular patient and the nature of their activities, this phase can occur between 5 and 12 months after surgery.

During all phases, both the surgeon and a physical therapist or athletic trainer monitor rehabilitation closely. They caution against any premature return to full activity, which might easily cause the knee to become inflamed or re-injured. Complete success in an ACL reconstruction cannot occur until the graft has both healed into place and has been incorporated into the knee. Putting too much stress on the joint prematurely increases the risk of graft failure.

Following ACL reconstruction, most patients, including professional athletes, experience full or nearly complete recovery and resume their previous level of activity. A small percentage of patients complain of pain, stiffness and limited motion in the joint.

Possible Complications of Surgery for ACL Reconstruction

Although surgery for an ACL tear is usually without any significant problems, there may be occasional unforeseen complications associated with anesthesia infection, injury to nerves and blood vessels, fracture, weakness, stiffness, graft failure, graft rejection, implant failure or instability of the joint. Since this is an elective procedure, you should evaluate and compare the surgical risks with the expected benefits.

The vast majority of patients who undergo ACL reconstruction experience no complications. Those who follow the recommendations of a physical therapist or athletic trainer usually return to full activity within the first year after surgery. It is important to keep in mind that all surgical procedures are tailored to meet individual needs. Recovery depends not on surgery alone but also on commitment to the rehabilitation process.

Informative Websites

www.saveyourknees.org
www.orthoinfo.org
www.sportsmed.org
www.aana.org

Helping you achieve the optimal activity level for your lifestyle is my first priority.

- Scott Gudeman, MD



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