

ANTERIOR CRUCIATE LIGAMENT TEAR

In many cases when the knee is injured, a ligament in the knee becomes strained or torn. Ligaments are fibrous tissue connecting bone to bone; they give strength and stability to joints. The ACL, or Anterior Cruciate Ligament, is a ligament in the center of the knee that becomes damaged when twisted too far, such as in a skiing accident or some sport that requires rapid rotation or pivoting.

As sporting activities have become more popular in the last few decades, injuries to the anterior cruciate ligament have steadily increased. The most commonly injured ligament of the knee, 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 anterior cruciate ligament is most commonly injured during sporting activities, when an athlete suddenly pivots, placing excessive rotational force on the ligament. A sport like basketball, in which a foot is planted while the body abruptly changes direction, results in a high incidence of ACL injury. Many football players suffer ACL tears, as do ice skaters or dancers who pivot and land suddenly at great speed. With the introduction of ski boots that come up higher in the calf, downhill skiers now experience many more injuries to the knee than the ankle or lower leg. Knee injuries occur in 25 percent of all skiing accidents. The ACL can also be torn during severe trauma (such as a car accident) or as the result of a work injury.

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 at also at risk; repairs to the knee help prevent the onset of arthritis caused by wear and tear on the meniscus and articular cartilage.

There are four ligaments that are critical to the stability of the knee joint, and the ACL, which runs down the middle of the knee, is the one most frequently injured. A ligament is made of tough fibrous material and functions to control excessive motion by limiting joint mobility. Ligaments help to stabilize the knee.

The ACL attaches the tibia (shin bone) to the femur at 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.

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. A ligament connects bone to bone and provides strength and balance to the joint. 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.

Out of all ligaments in the knee, the ACL is the most commonly injured. Overall, knee ligament injuries are on the rise according to reports from The Stone Clinic in San Francisco,

while ankle sprains and tibia fractures are down. Additionally, statistics show that women are two to eight more times more likely than men to sustain an ACL injury.

Causes of an ACL Tear

In general, athletes or people who participate in sports are at a greater risk of tearing their ACL. Age does not affect whether or not a person will tear an ACL.

Ruptures of the anterior cruciate ligament 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. Doctors often see simultaneous injury in both the medial collateral ligament and the ACL.

According to The Stone Clinic, 25 percent of all reported skiing injuries involve the knee.

Symptoms of an ACL Tear

Complete and incomplete ruptures of the ligament produce bleeding into the knee that cause the knee to swell and cause 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 anterior cruciate ligament 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
- "Giving Way" of the Knee

Your physician will be able to diagnose a knee problem by first giving you an overall physical and by examining your medical history. He or she may also use any of the following methods to diagnose the condition:

- X-ray
- Computerized Axial Tomography (CAT) scan
- Bone scan
- Magnetic Resonance Imaging (MRI) scan
- Arthroscopy

Your doctor 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.

Orthopaedic surgeons 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, and arthroscopy is used more for the treatment of tears than for their diagnosis.

Treatments of an ACL Tear

After diagnosing the injury, and probably aspirating the joint for fluids, your doctor will usually prescribe rest and the use of crutches.

Non-surgical treatment is recommended for 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 physician or physical therapist, can help prevent the knee from giving way during strenuous activity. Since most orthopedic surgeons

recommend wearing a brace for at least one year after surgical reconstruction, a brace is a good investment even if you should decide to have surgery.

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, as well as for those in whom the ACL tear is associated with injury to other structures in the knee.

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 is reconstructed using another tendon from around the knee.

The material used to reconstruct the ligament is called a graft. This is often an autograft, from one's own body, and 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.

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.

Another very common graft involves combining two of the hamstring muscle tendons attaching to the tibia just below the knee joint - the gracilis tendon and the semitendinosus tendon. These two tendons can be removed without really affecting the strength of the leg, as there are other larger and stronger hamstring muscles that can take over the function of the two tendons that are removed.

Arthroscopic Surgery for a Torn ACL

Arthroscopy is usually used for the surgical procedure. One or two small incisions are made on the knee, but repair in the joint itself is done with the arthroscope, a fiber optic telescope. The word arthroscopy comes from two Greek words, "arthro" (joint) and "skopein" (to look). The term literally means, "to look within the joint."

The use of arthroscopy enables a doctor 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 typical reconstructive surgery, the torn ends of the ACL are first removed. In most cases the graft is taken from the patellar tendon, and a tunnel is drilled into both the tibia and femur. The graft is threaded across the knee, leaving a piece of bone in each of the tunnels. The patellar tendon is secured in the position of the original ACL, most commonly by "wedging" a screw between the side of the bone and the tunnel. Other securing techniques may involve using staples, sutures, or small anchoring devices to be permanently left in place. 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 (in a procedure known as a meniscectomy) and other ligaments fixed as well.

Rehabilitation for ACL Surgery

Following an ACL reconstruction, rehabilitation includes three basic phases. The first consists of controlling the pain and swelling in the knee, regaining knee motion, and beginning to regain muscle strength. The leg is usually placed in a brace after surgery and a continuous passive motion machine may be part of the initial rehabilitation protocol for the first few days. Crutches are required for 2-3 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.

In the second phase the focus is on continued control of swelling and recovery of full muscle strength. From 3 to 6 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. Sometimes a sport brace replaces the postoperative knee brace.

The final phase represents graduated return to full activity, including participation in the sport that caused the injury. For this to happen, full motion, normal muscle strength, and the absence of swelling are required. A brace is often used in the return to activity, and may be recommended for up to one year or even longer. Depending on the particular patient and the nature of their activities, this phase usually occurs between 5 and 12 months after surgery.

Both the surgeon and a physical therapist monitor rehabilitation closely. They caution against any premature return to full activity, which might easily cause the knee to become inflamed or reinjured. Complete success in an ACL reconstruction cannot occur until the graft has both healed into place and 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 recovery and resume their previous level of activity. A small percentage of patients complain of pain, stiffness and limited motion in the joint.

Although surgery for anterior cruciate ligament tear is usually without any significant problems, there may be occasional unforeseen complications associated with anesthesia or caused by infection, injury to nerves and blood vessels, fracture, weakness, stiffness, 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 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.

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