

Anterior Cruciate Ligament (ACL) Injury

Pathogenesis:

The ACL (Anterior Cruciate Ligament) is a strong ligament that attaches the femur (thighbone) to the tibia (shin bone) and prevents the shin bone from moving forward and rotating. The ACL can be injured in many different ways, but the most common mechanism occurs with a sudden stop and change of direction. About one third of injuries occur with contact mechanism on the outside of the knee. Many patients describe that the ACL injury feels like a hyperextension of the knee. A popping sensation at the time of injury is also common. Further participation in the sporting activity is rarely possible due to the sensation of instability and feeling that the knee gives way. The knee usually swells within hours of injury.

ACL tears in adults most often involve complete tears of the ligament. In partial tears, the few remaining fibers are stretched beyond their ability to stabilize the knee and are treated as complete tears. In a small minority, there is enough intact ACL to maintain knee stability and although the ACL is prone to future injury, do not need surgery. In children that are still growing the bone attachment of the ligament is often the weakest link. In this case, instead of tearing the ligament a small fragment of bone is pulled away from the attachment site. This type of bony avulsion is rare in adults.

ACL tears occur in one of every 3000 active people in the United States each year. 70% occur in sporting activities with skiing being particularly high risk sport. Women who play basketball, soccer, and volleyball are at higher risk of ACL tear than their male counterparts. Although there are no known genetic factors, ACL tears seem to be more prevalent in some families. After an ACL tear in one knee the risk of tearing the opposite ACL goes up. Over 100,000 ACL reconstructions are performed annually in the United States.

Diagnosis:

X-rays and physical examination by a physician can help sort out ACL tears from other injuries. MRI is useful to delineate the extent of the other injuries, since Meniscus tears and bruising of the gliding surface (articular) cartilage are quite common with ACL injuries.

Medications:

Anti-inflammatory medications usually taken by mouth can be useful to reduce the pain and swelling symptoms associated with ACL tears, but do not improve healing or knee stability. No medications or nutritional supplements have been scientifically documented as beneficial for ACL healing.

Exercises:

After the initial ACL injury; rest, ice, compression and elevation help improve comfort and function. Quadriceps strengthening exercises are useful to reduce swelling and restore normal muscular control to an injured knee. Some degree of quadriceps weakness is measurable for a year after ACL injury, so these exercises are important to reduce symptoms and speed recuperation. The hamstring muscles are positioned to resist the forward movement of the tibia that occurs with ACL tears, so are also an important part of rehabilitation.

Surgery:

Arthroscopic ACL reconstruction is a minimally invasive method to restore ACL function to an injured knee in order to allow participation in sporting activities. The goal of surgery is to reproduce this important anatomical structure to prevent the abnormal forward rotational slipping of the tibia. This abnormal slipping prevents participation in sports that require cutting and pivoting. In addition this abnormal slipping is likely to injure other knee structures, like the meniscus and gliding surface cartilage.

In the hands of an experienced surgeon, ACL reconstruction is successful in returning patients to their desired level of activity in 90% of patients. After the graft heals in the bone tunnels, the body repopulates the ligament with new cells, so the graft is a living biologic structure that will not wear out. It can however, be re-injured, which occurs in approximately 5%.

What if you don't want surgery?

A small percentage of patients are able to get back to cutting and pivoting sports without having surgery, but for the vast majority, the choice is to give up these kinds of sporting activities or have an ACL reconstruction surgery. Unfortunately, most patients who tear their ACL will experience early knee arthritis. The changes can be seen on x-ray within 10-15 years after injury, but typically begin later. Surgery does not prevent early arthritis of the knee.