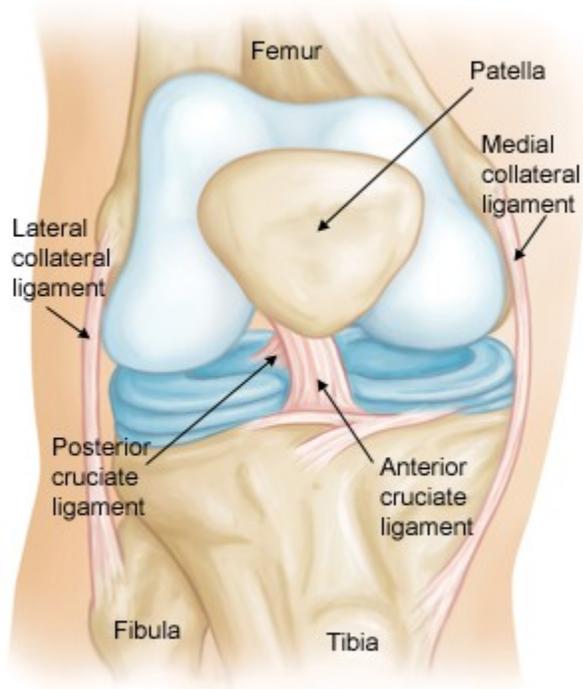


ACL

To repair or not ?

Anatomy



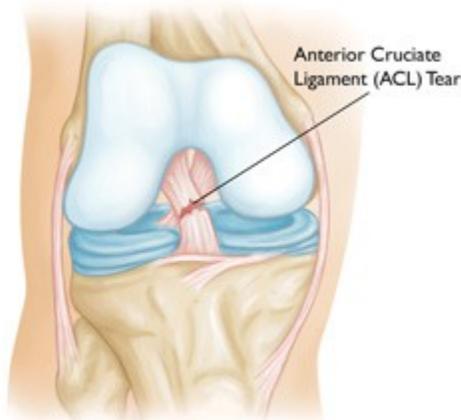
Normal knee anatomy.

The bone structure of the knee joint is formed by the femur, the tibia, and the patella. The ACL is one of the four main ligaments within the knee that connect the femur to the tibia.

The knee is essentially a hinged joint that is held together by the medial collateral (MCL), lateral collateral (LCL), anterior cruciate (ACL) and posterior cruciate (PCL) ligaments. The ACL runs diagonally in the middle of the knee, preventing the tibia from sliding out in front of the femur, as well as providing rotational stability to the knee.

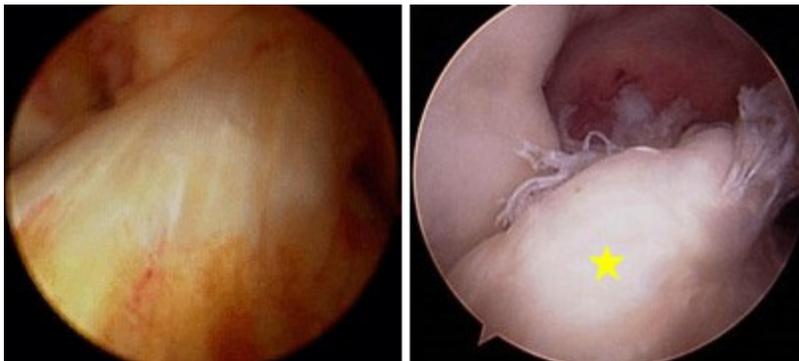
The weight-bearing surface of the knee is covered by a layer of articular cartilage. On either side of the joint, between the cartilage surfaces of the femur and tibia, are the medial meniscus and lateral meniscus. The menisci act as shock absorbers and work with the cartilage to reduce the stresses between the tibia and the femur.

Description



The anterior cruciate ligament (ACL) is one of the most commonly injured ligaments of the knee. The incidence of ACL injuries is currently estimated at approximately 200,000 annually, with 100,000 ACL reconstructions performed each year. In general, the incidence of ACL injury is higher in people who participate in high-risk sports, such as basketball, football, skiing, and soccer.

Approximately 50 percent of ACL injuries occur in combination with damage to the meniscus, articular cartilage, or other ligaments. Additionally, patients may have bruises of the bone beneath the cartilage surface. These may be seen on a magnetic resonance imaging (MRI) scan and may indicate injury to the overlying articular cartilage.



It is estimated that 70 percent of ACL injuries occur through non-contact mechanisms while 30 percent result from direct contact with another player or object.

The mechanism of injury is often associated with deceleration coupled with cutting, pivoting or sidestepping maneuvers, awkward landings or "out of control" play.

Several studies have shown that female athletes have a higher incidence of ACL injury than male athletes in certain sports. It has been proposed that this is due to differences in physical conditioning, muscular strength, and neuromuscular control. Other hypothesized causes of this gender-related difference in ACL injury rates include pelvis and lower

extremity (leg) alignment, increased ligamentous laxity, and the effects of estrogen on ligament properties.

Immediately after the injury, patients usually experience pain and swelling and the knee feels unstable. Within a few hours after a new ACL injury, patients often have a large amount of knee swelling, a loss of full range of motion, pain or tenderness along the joint line and discomfort while walking.

Doctor Examination



MRI of complete ACL tear. The ACL fibers have been disrupted and the ACL appears wavy in appearance [yellow arrow].

When a patient with an ACL injury is initially seen for evaluation in the clinic, the doctor may order X-rays to look for any possible fractures. He or she may also order a magnetic resonance imaging (MRI) scan to evaluate the ACL and to check for evidence of injury to other knee ligaments, meniscus cartilage, or articular cartilage.

In addition to performing special tests for identifying meniscus tears and injury to other ligaments of the knee, the physician will often perform the Lachman's test to see if the ACL is intact.

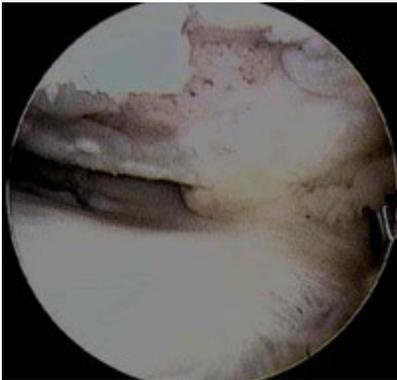
If the ACL is torn, the examiner will feel increased forward (upward or anterior) movement of the tibia in relation to the femur (especially when compared to the normal leg) and a soft, mushy endpoint (because the ACL is torn) when this movement ends.

Another test for ACL injury is the pivot shift test. In this test, if the ACL is torn, the tibia will start forward when the knee is fully straight and then will shift back into the correct position in relation to the femur when the knee is bent past 30 degrees.

The natural history of an ACL injury without surgical intervention varies from patient to patient and depends on the patient's activity level, degree of injury and instability symptoms.

The prognosis for a partially torn ACL is often favorable, with the recovery and rehabilitation period usually at least three months. However, some patients with partial ACL tears may still have instability symptoms. Close clinical follow-up and a complete course of physical therapy helps identify those patients with unstable knees due to partial ACL tears.

Complete ACL ruptures have a much less favorable outcome. After a complete ACL tear, some patients are unable to participate in cutting or pivoting-type sports, while others have instability during even normal activities, such as walking. There are some rare individuals who can participate in sports without any symptoms of instability. This variability is related to the severity of the original knee injury, as well as the physical demands of the patient.



Arthroscopic picture of damaged articular cartilage in chronically ACL-deficient knee.

About half of ACL injuries occur in combination with damage to the meniscus, articular cartilage or other ligaments. Secondary damage may occur in patients who have repeated episodes of instability due to ACL injury. With chronic instability, up to 90 percent of patients will have meniscus damage when reassessed 10 or more years after the initial injury. Similarly, the prevalence of articular cartilage lesions increases up to 70 percent in patients who have a 10-year-old ACL deficiency.

Nonsurgical Treatment

In nonsurgical treatment, progressive physical therapy and rehabilitation can restore the knee to a condition close to its pre-injury state and educate the patient on how to prevent instability. This may be supplemented with the use of a hinged knee brace. However, many people who choose not to have surgery may experience secondary injury to the knee due to repetitive instability episodes.

Surgical treatment is usually advised in dealing with combined injuries (ACL tears in combination with other injuries in the knee). However, deciding against surgery is

reasonable for select patients. Nonsurgical management of isolated ACL tears is likely to be successful or may be indicated in patients:

- With partial tears and no instability symptoms
- With complete tears and no symptoms of knee instability during low-demand sports who are willing to give up high-demand sports
- Who do light manual work or live sedentary lifestyles
- Whose growth plates are still open (children)

Surgical Treatment

ACL tears are not usually repaired using suture to sew it back together, because repaired ACLs have generally been shown to fail over time. Therefore, the torn ACL is generally replaced by a substitute graft made of tendon. The grafts commonly used to replace the ACL include:

- Patellar tendon autograft (autograft comes from the patient)
- Hamstring tendon autograft
- Quadriceps tendon autograft
- Allograft (taken from a cadaver) patellar tendon, Achilles tendon, semitendinosus, gracilis, or posterior tibialis tendon

Patients treated with surgical reconstruction of the ACL have long-term success rates of 82 percent to 95 percent. Recurrent instability and graft failure are seen in approximately 8 percent of patients.

The goal of the ACL reconstruction surgery is to prevent instability and restore the function of the torn ligament, creating a stable knee. This allows the patient to return to sports. There are certain factors that the patient must consider when deciding for or against ACL surgery.

Patient Considerations

Active adult patients involved in sports or jobs that require pivoting, turning or hard-cutting as well as heavy manual work are encouraged to consider surgical treatment. This includes older patients who have previously been excluded from consideration for ACL surgery. Activity, not age, should determine if surgical intervention should be considered.

In young children or adolescents with ACL tears, early ACL reconstruction creates a possible risk of growth plate injury, leading to bone growth problems. The surgeon can delay ACL surgery until the child is closer to skeletal maturity or the surgeon may modify the ACL surgery technique to decrease the risk of growth plate injury.

A patient with a torn ACL and significant functional instability has a high risk of developing secondary knee damage and should therefore consider ACL reconstruction.

It is common to see ACL injuries combined with damage to the menisci (50 percent), articular cartilage (30 percent), collateral ligaments (30 percent), joint capsule, or a combination of the above. The "unhappy triad," frequently seen in football players and skiers, consists of injuries to the ACL, the MCL, and the medial meniscus.

In cases of combined injuries, surgical treatment may be warranted and generally produces better outcomes. As many as 50 percent of meniscus tears may be repairable and may heal better if the repair is done in combination with the ACL reconstruction.