

ANTERIOR CRUCIATE LIGAMENT (ACL) INJURY

What is an anterior cruciate ligament (ACL) injury?

A sprain is a joint injury that causes a stretch or a tear in a ligament. Ligaments are strong bands of tissue that connect one bone to another. The anterior cruciate ligament (ACL) is one of the major ligaments in the middle of the knee. It connects the thighbone (femur) to the shin bone (tibia). This ligament, along with the posterior cruciate ligament, helps keep the knee stable and protects the femur from sliding or turning on the tibia.

Sprains are graded I, II, or III depending on their severity:

- grade I sprain: pain with minimal damage to the ligaments
- grade II sprain: more ligament damage and mild looseness of the joint
- grade III sprain: the ligament is completely torn and the joint is very loose or unstable

How does it occur?

The anterior cruciate ligament is frequently injured in forced twisting motions of the knee. It may also become injured when the knee is straightened further than it normally can straighten (hyperextended). It sometimes occurs when the thigh bone is forcefully pushed across the shin bone, such as with a sudden stop while you are running or a sudden transfer of weight while you are skiing.

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What are the symptoms?

There is usually a loud, painful pop when the joint is first injured. This is often followed by a lot of swelling of the knee within the first several hours after the injury. This swelling is called an effusion and is made up of blood in the knee joint. You may find it difficult to fully bend or straighten your knee.

If you have torn your anterior cruciate ligament in an injury that occurred months or years ago and you haven't had reconstructive surgery, you may have the feeling that the knee is giving way during twisting or pivoting movements.

How is it diagnosed?

Your healthcare provider will examine your knee and may find that your knee has become loose. If you have swelling in the joint, he or she may decide to remove the blood in your knee with a needle and syringe. You may need X-rays to see if there is an

injury to the bones in your knee. An MRI (magnetic resonance imaging) scan may also be done and should clearly show the condition of your ACL (as well as that of other ligaments and cartilage).

How is it treated?

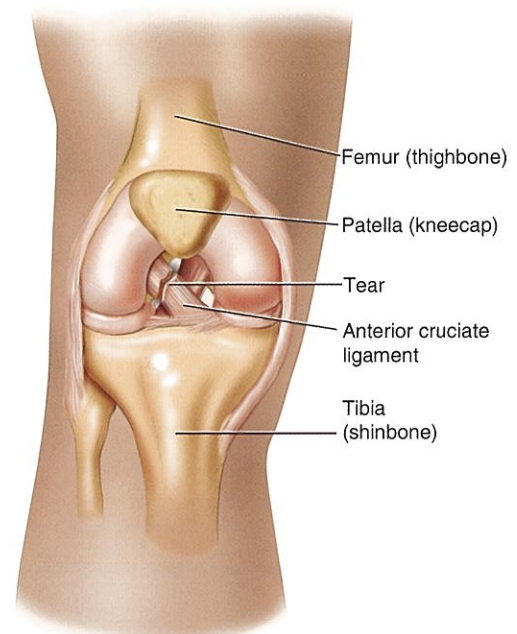
Treatment includes the following:

- Put an ice pack on your knee for 20 to 30 minutes every 3 to 4 hours for 2 or 3 days or until the pain goes away.
- Keep your knee elevated whenever possible by placing a pillow underneath it until the swelling goes away.
- Take an anti-inflammatory medicine or other drugs prescribed by your healthcare provider (adults aged 65 years and older should not take non-steroidal anti-inflammatory medicine for more than 7 days without their healthcare provider's approval).
- Do the exercises recommended by your healthcare provider or physical therapist.

Your provider may recommend that you:

- wrap an elastic bandage around your knee to keep the swelling from getting worse
- use a knee immobilizer initially to protect the knee
- use crutches

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For complete tears, you and your healthcare provider will decide if you should have intense rehabilitation or if you should have surgery followed by rehabilitation. The torn anterior cruciate ligament cannot be sewn back together. The ligament must be reconstructed by taking ligaments or tendons from another part of your leg and connecting them to the tibia and femur.

You may consider having reconstructive ACL surgery if:

- your knee is unstable and gives out during routine or athletic activity
- you are a high-level athlete and your knee could be unstable and give out during your sport (for example, basketball, football, or soccer)
- you are a younger person who is not willing to give up an athletic lifestyle
- you want to prevent further injury to your knee. An unstable knee may lead to injuries of the meniscus and arthritis

You may consider not having the surgery if:

- your knee is not unstable and is not painful and you are able to do your chosen activities without symptoms
- you are willing to give up sports that put extra stress on your knee
- you are not involved in sports

If a growing child tears an ACL, the healthcare provider may recommend that surgery be postponed until the child has stopped growing.

When can I return to my sport or activity?

The goal of rehabilitation is to return you to your sport or activity as soon as is safely possible. If you return too soon you may worsen your injury, which could lead to permanent damage. Everyone recovers from injury at a different rate. Return to your activity will be determined by how soon your knee recovers,

not by how many days or weeks it has been since your injury occurred. In general, the longer you have symptoms before you start treatment, the longer it will take to get better.

You may safely return to your sport or activity when, starting from the top of the list and progressing to the end, each of the following is true:

- your injured knee can be fully straightened and bent without pain
- your knee and leg have regained normal strength compared to the uninjured knee and leg
- your knee is not swollen
- you are able to jog straight ahead without limping
- you are able to sprint straight ahead without limping
- you are able to do 45-degree cuts
- you are able to do 90-degree cuts
- you are able to do 20-yard figure-of-eight runs
- you are able to do 10-yard figure-of-eight runs
- you are able to jump on both legs without pain and jump on the injured leg without pain

If you feel that your knee is giving way or if you develop pain or have swelling in your knee, you should see your healthcare provider. If you've had surgery, be sure that your provider has told you that you can return to your sport.

How can I prevent an anterior cruciate ligament sprain?

Unfortunately, most injuries to the anterior cruciate ligament occur during accidents that are not preventable. However, you may be able to avoid these injuries by having strong thigh and hamstring muscles and maintaining a good leg stretching routine. In activities such as skiing, make sure your ski bindings are set correctly by a trained professional so that your skis will release when you fall.

ANTERIOR CRUCIATE LIGAMENT (ACL) INJURY REHABILITATION EXERCISES

You may begin with the first 2 exercises immediately. When swelling in your knee has gone down and you are able to stand with equal weight on both legs, you may do the remaining exercises.

1. HEEL SLIDE: Sit on a firm surface with your legs straight in front of you. Slowly slide the heel of one leg toward your buttock by pulling your knee to your chest as you slide. Return to the starting position. Do 3 sets of 10.



HEEL SLIDE

2. QUAD SETS: Sitting on the floor with one leg straight and your other leg bent, press the back of your knee of your straight leg into the floor by tightening the muscles on the top of your thigh. Hold this position 10 seconds. Relax. Do 3 sets of 10.



QUAD SETS

3. PASSIVE KNEE EXTENSION: Do this exercise if you are unable to fully extend your knee. While lying on your back, place a rolled-up towel underneath the heel of your injured leg so the heel is about 6 inches off the ground. Relax your leg muscles and let gravity slowly straighten your knee. You may feel some discomfort while doing this exercise. Try to hold this position for 2 minutes. Repeat 3 times. Do this exercise several times per day. This exercise can also be done while sitting in a chair with your heel on another chair or stool.



PASSIVE KNEE EXTENSION

4. WALL SQUAT WITH A BALL: Stand with your back, shoulders, and head against a wall and look straight ahead. Keep your shoulders relaxed and your feet 2 feet away from the wall and a shoulder's width apart. Place a soccer or basketball-sized ball behind your back. Keeping your head against the wall, slowly squat down to a 45 degree angle. Your thighs will not yet be parallel to the floor. Hold this position for 10 seconds and then slowly slide back up the wall. Repeat 10 times. Build up to 3 sets of 10.

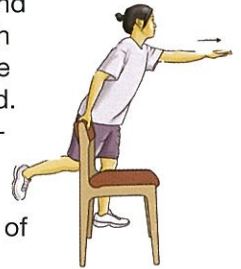


WALL SQUAT WITH A BALL

5. BALANCE AND REACH EXERCISES:

Stand upright next to a chair. This will provide you with balance if needed. Stand on the foot farthest from the chair. Try to raise the arch of your foot while keeping your toes on the floor.

A. Keep your foot in this position and reach forward in front of you with your hand farthest away from the chair, allowing your knee to bend. Repeat this 10 times while maintaining the arch height. This exercise can be made more difficult by reaching farther in front of you. Do 2 sets.



B. Stand in the same position as above. While maintaining your arch height, reach the hand farthest away from the chair across your body toward the chair. The farther you reach, the more challenging the exercise. Do 2 sets of 10.



BALANCE AND REACH EXERCISES

6. KNEE STABILIZATION: Wrap a piece of elastic tubing around the ankle of one leg. Tie a knot in the other end of the tubing and close it in a door.

A. Stand facing the door on the leg without tubing and bend your knee slightly, keeping your thigh muscles tight. While maintaining this position, move the leg with the tubing straight back behind you. Do 3 sets of 10.



KNEE STABILIZATION



B. Turn 90° so the leg without tubing is closest to the door. Move the leg with tubing away from your body. Do 3 sets of 10.

C. Turn 90° again so your back is to the door. Move the leg with tubing straight out in front of you. Do 3 sets of 10.



KNEE STABILIZATION



D. Turn your body 90° again so the leg with tubing is closest to the door. Move the leg with tubing across your body. Do 3 sets of 10.

Hold onto a chair if you need help balancing. This exercise can be made even more challenging by standing on a pillow while you move the leg with tubing.

7. RESISTED TERMINAL KNEE EXTENSION: Make a loop from a piece of elastic tubing by tying a knot in both ends, and closing both knots in a door. Step into the loop so the tubing is around the back of one leg. Lift the other foot off the ground. Hold onto a chair for balance, if needed. Bend the knee on the leg with tubing about 45 degrees. Slowly straighten your leg, keeping your thigh muscle tight as you do this. Do this 10 times. Do 3 sets. An easier way to do this is to perform this exercise while standing on both legs.



RESISTED TERMINAL KNEE EXTENSION

ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION

What is the anterior cruciate ligament (ACL)?

Ligaments are strong bands of tissue that connect one bone to another. The anterior cruciate ligament (ACL) is one of four major ligaments in the knee. It is in the center of the knee joint, connecting the thigh bone (femur) to the shin bone (tibia). The ACL helps keep the knee stable by limiting twisting and forward sliding motions of the knee.

The ACL is commonly injured in sports when there is a forced twisting motion of the knee or when the knee is hit while the foot is planted. It may also be injured during a sudden stop when the femur moves forcefully over the tibia.

What is an ACL reconstruction?

A torn ACL will not heal by itself. In the past, healthcare providers tried to repair the ACL by sewing the torn ends of the ligament together, but this did not work. The ACL must be reconstructed by using ligaments or tendons from another part of the body to replace the torn ACL. Tendons are connective tissue bands that attach muscles to bones. The replacement tissue is called a graft.

The grafts can come from several places. Most often the graft is taken from the patellar tendon, which attaches your kneecap (patella) to your shin bone (tibia). The graft is made up of the middle third of the patellar tendon and small pieces of bone from the kneecap and the shin bone. A graft may also come from your hamstring tendon. The hamstring muscles are in the back of your thigh.

If the graft comes from your own body, it is called an autograft. If the graft comes from someone who has died, it is called an allograft. Providers have tried using some types of synthetic grafts but so far these have not worked well. Research is being done to see if there are better types of grafts that can be used.

Your healthcare provider will discuss the options with you and will help you decide which procedure is best for you.

You may consider having reconstructive ACL surgery if:

- your knee is unstable and gives out during routine or athletic activity
- you are a high-level athlete and your knee could be unstable and give out during your sport (for example, basketball, football, or soccer)

- you are a younger person who is not willing to give up an athletic lifestyle
- you want to prevent further injury to your knee. An unstable knee may lead to injuries of the meniscus and arthritis

You may consider not having the surgery if:

- your knee is not unstable and is not painful and you are able to do your chosen activities without symptoms
- you are willing to give up sports that put extra stress on your knee
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How do I prepare for an ACL reconstruction?

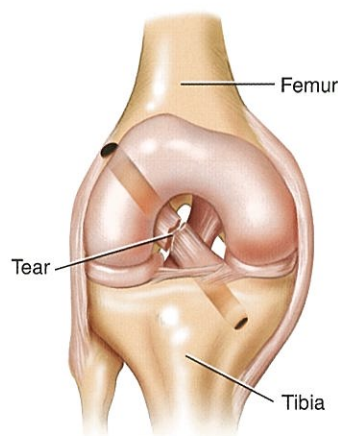
Plan for your care and recovery after surgery. Allow time to rest, and try to find people to help you for a few days.

Follow your healthcare provider's instructions. You may be asked not to take aspirin for a week or so before your surgery. Do not eat or drink anything after midnight or the morning before surgery. You may have physical therapy before surgery to begin your rehabilitation.

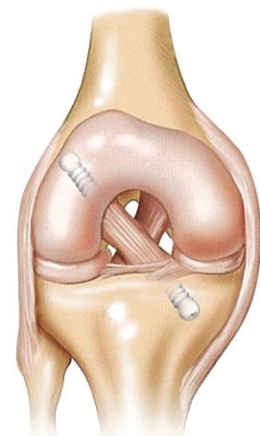
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ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION

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



2. Graft is passed through drill holes and anchored in place with screws or staples.



What happens during surgery?

You will have either general or spinal anesthesia. A general anesthetic will relax your muscles and make you feel as if you are in a deep sleep. A spinal anesthetic leaves you awake but unable to feel anything from the waist down.

Your healthcare provider will prepare the graft. If your patellar tendon is to be used, the provider will make an incision 1 to 3 inches below your kneecap. Then he or she will remove your torn ACL using an arthroscope. An arthroscope is a thin tube through which your provider can view the inside of your knee joint. Various thin, small instruments are used to perform surgery in the knee. Your provider will drill holes in your femur and tibia where the graft will be attached. The graft will be passed through the holes and anchored in place by screws or staples. The incisions from the graft site and the arthroscopy will be closed with stitches, tape, or staples.

During your surgery, your provider may also treat any other knee injuries such as torn cartilage.

What happens after the surgery?

You may be allowed to go home a few hours after surgery or you may have to spend the night in the hospital. Treatment after surgery may include:

- elevating your knee on a pillow several times a day as long as it is swollen and painful
- putting ice packs on your knee for 20 to 30 minutes 3 to 4 times a day for a few weeks
- taking medicine prescribed by your healthcare provider for pain and swelling
- having physical therapy to rehabilitate your knee

You may be on crutches for a week or two after surgery. You may not be able to drive for at least a few weeks.

What are the complications?

Complications may include:

- loss of range of motion in your knee, joint stiffness
- persistent pain
- a blood clot in the leg
- bleeding
- infection

When can I return to my normal activities?

Everyone recovers from an injury at a different rate. Return to your activity will be determined by how soon your knee recovers, not by how many days or weeks it has been since your injury has occurred. In general, the longer you have symptoms before you start treatment, the longer it will take to get better. The goal of rehabilitation is to return you to your normal activities as soon as is safely possible. If you return too soon you may worsen your injury.

Rehabilitation from ACL surgery is very complex. Your healthcare provider and therapist will watch your progress very carefully and gradually allow you to be more active. It may take 4 to 9 months of rehabilitation to get back to some activities. It may take 12 months or more for your knee to feel the way it did before your injury.

When should I call my healthcare provider?

Call your healthcare provider immediately if:

- you have a lot of bleeding or a discolored drainage from the puncture sites
- you have a lot of pain in your knee
- you get a fever
- you have swelling in your calf or thigh that does not improve when you elevate your leg

Call your healthcare provider during office hours if:

- you have questions about the surgery or its result