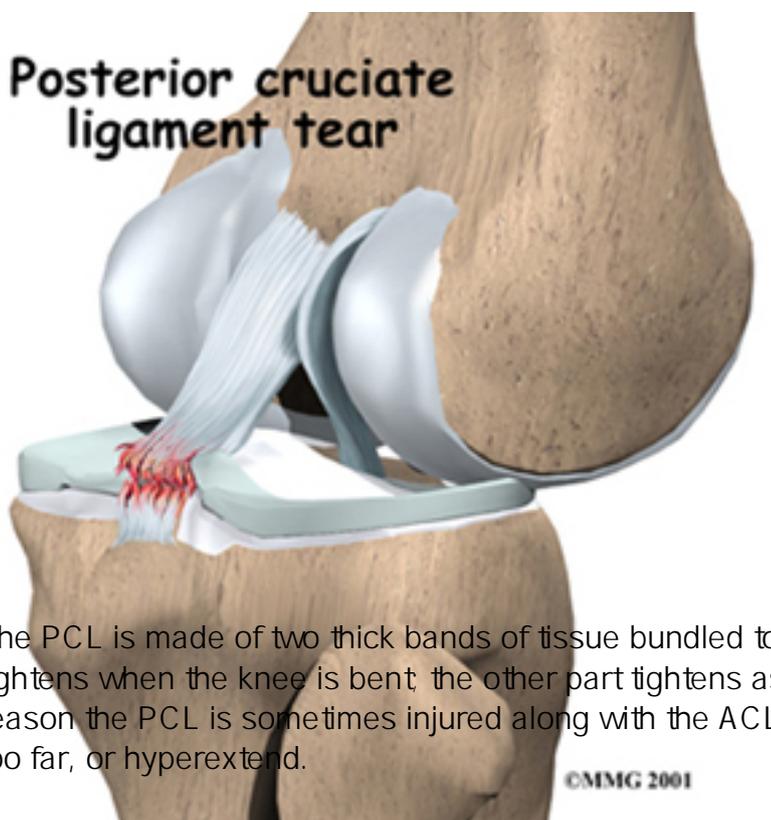


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Ligaments are tough bands of tissue that connect the ends of bones. The posterior cruciate ligament (PCL) is located in the center of the knee joint. It connects the front of the femur (thighbone) and crosses to the back of the tibia (shinbone). The PCL is the primary stabilizer of the knee and the main controller of how far back the tibia moves under the femur. If the tibia moves too far back, the PCL can rupture.



The PCL is made of two thick bands of tissue bundled together. One part of the ligament tightens when the knee is bent; the other part tightens as the knee straightens. This is the reason the PCL is sometimes injured along with the ACL when the knee is forced to straighten too far, or hyperextend.

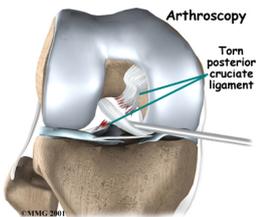
The most common way for the PCL to be injured is from a direct blow to the front of the knee while the knee is bent. The PCL controls how far backward the tibia moves in relation to the femur. If the tibia moves too far, the PCL can rupture.

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The symptoms following a PCL tear can vary. Unlike an ACL tear, swelling is minimal with PCL injuries. The knee may also feel like it is giving way.

The pain and moderate swelling from the initial injury will usually go away after two to four weeks, but the knee may still feel unstable requiring treatment. If left untreated, long-term instability can lead to arthritis of the knee.

The history of the knee and physical examination is probably the most important tool in diagnosing a ruptured or deficient PCL. During the physical examination, the surgeon will check to see if the tibia moves too far back on the femur. Tests are also done to see if other knee ligaments or joint cartilage have been injured.



The doctor may order X-rays to rule out a fracture. Ligaments and tendons do not show up on X-rays. Magnetic resonance imaging (MRI) is probably the most accurate test without actually looking into the knee. The MRI machine uses magnetic waves rather than X-rays to show the soft tissues of the body. This machine creates pictures that look like slices of the knee. The pictures show the anatomy, and any injuries, very clearly. This test does not require any needles or special dye and is painless.

In some cases, arthroscopy may be used to make the definitive diagnosis. Arthroscopy is a type of operation where a small fiber-optic TV camera is placed into the knee joint, allowing the orthopedic surgeon to look at the structures inside the joint directly. The vast majority of PCL tears are diagnosed without resorting to this type of surgery, though arthroscopy is sometimes

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used to repair a torn PCL.

### ***Non-surgical Treatment***

Initial treatment for a PCL injury focuses on decreasing pain and swelling in the knee. Rest and mild pain medications, such as acetaminophen, can help decrease these symptoms. A long-leg brace and crutches may be used initially to limit pain. Your doctor may allow you to put a normal amount of weight down while walking.

In less serious cases, PCL tears are usually treated with a progressive rehabilitation program. If you are returning to high-demand activities a knee brace may be needed. These braces are designed to replace knee stability when the PCL doesn't function properly.

You most likely will receive physical therapy treatments after a PCL injury. Therapists treat swelling and pain with the use of ice, electrical stimulation, and rest periods with your leg supported in elevation.

Exercises are used to help you regain normal movement of joints and muscles. Range of motion exercises should be started right away to help you regain full movement in your knee. This includes the use of a stationary bike, gentle stretching, and careful pressure applied to the knee by the therapist.

Exercises also improve the strength of the quadriceps muscles on the front of the thigh. As your symptoms ease and strength improves, you will be guided in specialized exercises to improve knee stability.

### ***Surgical Treatment***

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If the PCL alone is injured, conservative treatment may be all that is necessary. When other structures in the knee are injured, surgery may be necessary.

The goal of surgery is to keep the tibia from moving too far back under the femur bone and to get the knee functioning normally again. Even when surgery is needed, most doctors will have you attend physical therapy for several visits before the surgery. Physical therapy before surgery helps reduce swelling, makes sure you can straighten your knee completely and can reduce the chances of scarring inside the joint. It can also help speed up recovery time after surgery.

Most surgeons now favor reconstruction of the PCL using a piece of tendon or ligament, called a graft, to replace the torn PCL. This surgery is often done using the arthroscope. Incisions are usually required around the knee, but the surgeon does not have to open the joint. The arthroscope is used to perform the work needed on the inside of the knee joint. Most PCL surgeries are done on an outpatient basis, and normally patients stay either one night in the hospital, or they go home the same day as the surgery.

In a typical surgical reconstruction, the torn ends of the PCL must first be removed. Once this has been done, the type of graft that will be used is determined. One of the most common tendons used for the graft material is the patellar tendon. This tendon connects the kneecap (patella) to the tibia.

Another very common graft involves using two of the hamstring muscle tendons that attach to the tibia just below the knee joint--the gracilis tendon and the semitendinosus tendon. By arranging the hamstring tendon into four strips, the graft has nearly the same strength as a patellar tendon graft.

If the patellar tendon is used, about one third of it is removed, with a plug of bone at either end. The bone plugs are rounded and smoothed. Holes are drilled in each bone plug to place sutures (strong stitches) that will pull the graft into place.

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Holes are then drilled in the tibia and the femur to place the graft. These holes are placed so that the graft will run between the tibia and femur in the same direction as the original PCL. The graft is then pulled into position using sutures placed through the drill holes. Screws are used to hold the bone plugs in the drill holes.

In some cases, an allograft is used. An allograft is tissue that comes from someone else. This tissue is harvested from tissue and organ donors at the time of death and sent to a tissue bank. The tissue is checked for any type of infection, sterilized, and stored in a freezer. When needed, the tissue is ordered by the physician and used to replace the torn PCL. 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 to use as a graft. The operation usually takes less time because the graft does not need to be harvested from your knee.

Conservative treatment of an injured PCL will typically last six to eight weeks. You will be able to return to your activities when your quadriceps muscles are close to their normal strength, your knee stops swelling intermittently, and you no longer have problems with the knee giving way.

If you have surgery, you may use a continuous passive motion (CPM) machine immediately after your operation to help the knee begin to move and to alleviate joint stiffness. The machine straps to the leg and continuously bends and straightens the joint. This "continuous" motion is thought to reduce stiffness, ease pain, and keep extra scar tissue from forming inside the joint.

Your doctor may have you wear a protective knee brace for two to three weeks after surgery, in addition to using crutches to keep your knee safe. You will most likely be instructed to put a limited amount of weight down while you're walking.

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You may also take part in formal physical therapy after PCL reconstruction. The first few physical therapy treatments are designed to help control the pain and swelling from the surgery.

Therapists will begin to focus on range of motion exercises within three weeks. They take care to avoid letting the tibia sag back under the femur, as this can put strain on the healing graft.

Strengthening exercises for the quadriceps muscle are safe to begin right away. Muscle stimulation and biofeedback, which both involve placing electrodes over the quadriceps muscle, may be needed to stimulate the muscle and help retrain it.

When you regain full knee movement, reduced swelling, and improved strength, you'll gradually be able to return to your daily activities. Some doctors prescribe the use of a functional brace for athletes who intend to return quickly to their sport.

You will probably be involved in a progressive rehabilitation program for four to nine months after surgery to ensure the best result from your PCL reconstruction. In the first six weeks following surgery, expect to see the physical therapist two to three times a week. If your surgery and rehabilitation go as planned, you may only need to do a home program and see your therapist every few weeks over the four to six month period.