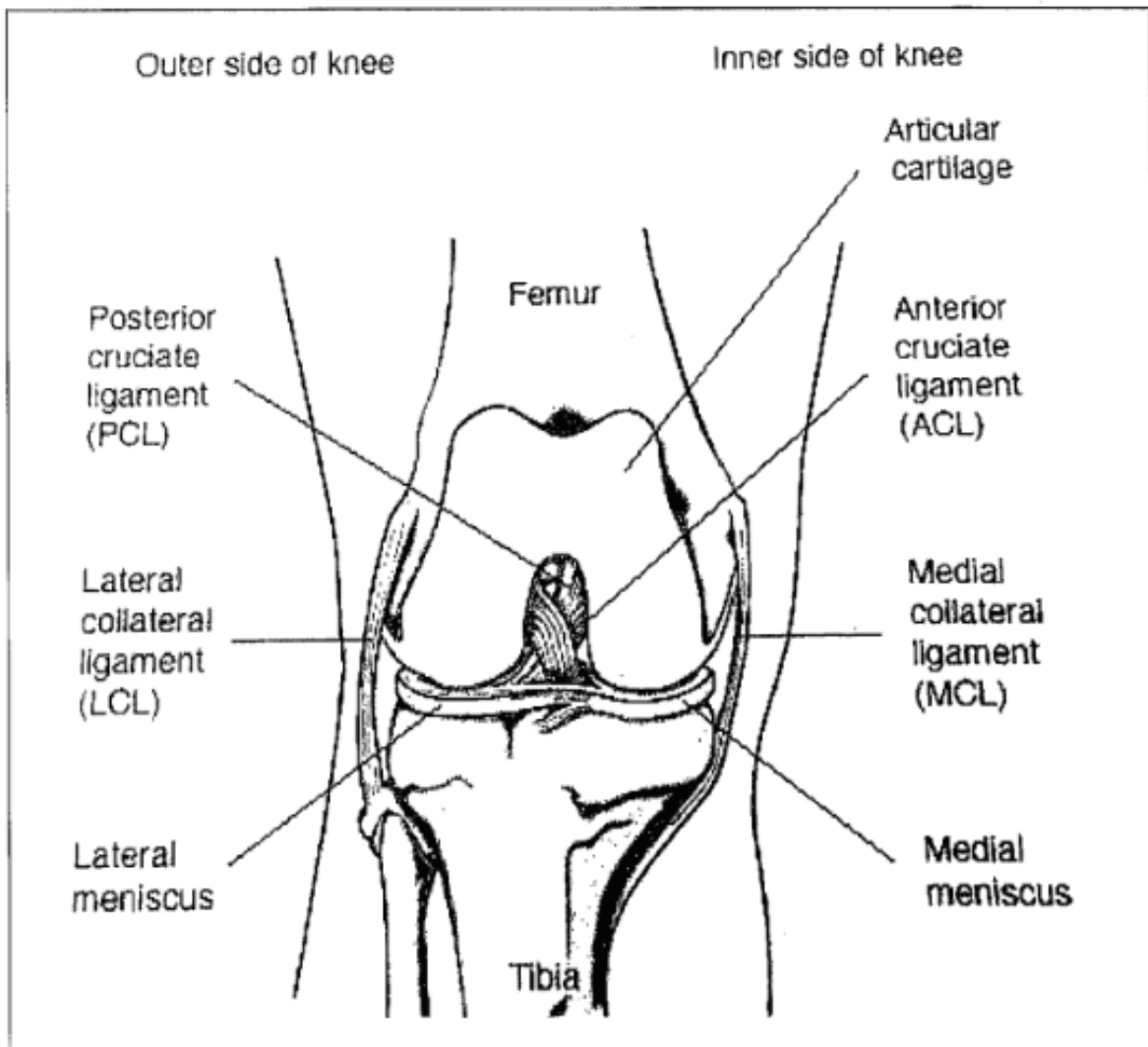


## KNEE LIGAMENT INJURIES

More than 9 million people a year visit their orthopaedic surgeon because of knee problems. The knee is the largest joint in the body and is vital to movement. Two sets of ligaments in the knee give it stability: the cruciate and the collateral ligaments.

### Cruciate Ligaments

The cruciate ligaments are located inside the knee joint and connect the thighbone (femur) and the shinbone (tibia). They are made of many strands and function like short ropes that hold the knee joint tightly in place when the leg is bent or straight. This stability is needed for proper knee joint movement.



The name cruciate derives from the word crux, meaning cross, and crucial. The cruciate ligaments not only lie inside the knee joint, they crisscross each other to form an "x". The cruciate ligament located toward the front of the knee is the anterior cruciate ligament (ACL), and the one located toward the rear of the knee is called the posterior cruciate ligament (PCL).

#### ACL INJURIES

The ACL prevents the shinbone from sliding forwards beneath the thighbone. The ACL can be injured in several ways:

- Changing direction rapidly off a planted foot
- Slowing down or decelerating abruptly when running
- Landing from a jump with an associated twisting motion
- Direct contact, such as in a football tackle or a slide tackle in soccer

#### Recognizing an ACL Injury

If you injure your ACL, you may not feel any pain immediately. However, you typically hear or feel a pop in your knee and feel it give out from under you. Within several hours, the knee will usually swell and you will feel pain when you try to stand.

If you walk or run on an injured ACL, you can damage the cushioning cartilage in the knee. For example, you may plant the foot and turn the body to pivot, only to have the shinbone stay in place as the thighbone above it moves with the body.

#### Diagnosing an ACL Injury

A diagnosis of an ACL injury is usually based on a thorough physical examination of the knee. The exam may include several tests to see if the knee stays in proper position when pressure is applied from different directions. An x-ray is almost always obtained and occasionally an MRI (magnetic resonance imaging) if the diagnosis is in question. However, most ACL tears can be diagnosed accurately by physical exam alone.

A partial tear of the ACL may or may not require surgical treatment. A complete tear is more serious. Complete tears, especially in younger athletes, usually require reconstruction.

#### ACL Tears in Females

Women have a higher chance of tearing their ACL, and orthopaedic researchers have long debated why. Female soccer players are four times more likely to suffer and ACL tear than their male counterparts, with basketball players having twice the risk.

#### Theories for this are:

- **Biomechanical.** Females tend to place more emphasis on quadriceps muscles, and this may be a significant reason for increased risk of ACL injuries. Orthopaedic researchers say females should learn to use their hamstring muscles more often. Also, females tend to land on a flat foot rather than their toes, which can contribute to increased injury rates.
- **Hormonal.** No modification of activity or restriction from sports is recommended at any time during the menstrual cycle. A woman's hormones do not increase the chance of ACL injury, but researchers say further investigation is warranted.
- **Environmental.** Functional knee braces do not prevent ACL injury. Although athletic shoes may improve performance by providing good traction on certain surfaces, they also increase injury risk.

- Anatomic. More data is needed to determine if the ACL size is related to injury risk.

Thus most experts agree that training programs that address some of these issues could prevent many of these injuries that can be devastating, not only to an athlete's season, but also to their career.

#### Treating ACL Tears

Both non-operative and operative treatment options are available.

##### Non-operative Treatment:

- May be used because of patient's age or overall low activity level
- May be recommended if the overall stability of the knee seems good
- Involves a treatment program of muscle strengthening, often with the use of a brace to provide stability

##### Operative Treatment (usually arthroscopically aided):

- Uses a strip of tendon, usually taken from the patient's knee (patellar tendon) or hamstring muscle that is passed through the inside of the joint through tunnels drilled in both the femur (thigh bone) and tibia (leg bone) and secured in the tunnels.

Is followed by an exercise and rehabilitation program to strengthen the muscles and restore full joint mobility.

Returning to many sports can be accomplished by about four months. Return to high level sports such as soccer, football, and rugby will often require six months or more following surgery. Return to play is most dependent on how strong and conditioned the thigh muscle becomes.

##### Braces:

- Braces are usually not necessary after returning to sports play. Little evidence exists in the literature supporting the use of braces after ACL reconstruction surgery. Certain high-risk sports such as soccer will warrant the use of a sports brace, but many insurance companies will not pay for this type of brace. High strength and conditioning are better predictors of outcome than is the use of a brace.

#### PCL INJURIES

The posterior cruciate ligament, or PCL, is not injured as frequently as the ACL. PCL tears usually occur because the ligament was pulled or stretched too far, a blow to the front of the knee, or a simple misstep.

PCL injuries disrupt the knee joint stability because the shinbone can sag backwards. The ends of the thighbone and shinbone rub directly against each other, causing wear and tear to the thin, smooth, joint surface cartilage (articular cartilage). This abrasion may lead to arthritis in the knee.

#### Treating PCL Injuries

Patients with PCL tears often do not have symptoms of instability in their knees, so surgery is not always needed. Many athletes return to activity without significant impairment after completing a prescribed rehabilitation program.

However, if the PCL injury pulls a piece of bone out of the top of the shinbone, surgery is often needed to reattach the ligament. Successful results from PCL surgery are less reliable than with ACL surgery.



## COLLATERAL LIGAMENTS

The collateral ligaments are located on the inner and outer side of the knee joint. The medial collateral ligament (MCL) connects the thighbone to the shinbone and provides stability to the inner side of the knee. The lateral collateral ligament (LCL) connects the thighbone to the other bone in the lower portion of your leg (fibula) and stabilizes the outer side.

Injuries to the MCL are usually caused by contact on the outside of the knee and are accompanied by sharp pain and the inside of the knee. The LCL is rarely injured.

### Treatment Choices for Collateral Ligament Injuries

If the MCL has a small, partial tear, conservative treatment usually works. Remember the acronym RICE: rest, ice, compression, and elevation.

Rest the knee to give the ligament time to heal.

Ice can be applied two or three times a day for 15 to 20 minutes each time.

Compress the injury to limit swelling. You may wear an Ace Bandage or even a brace for several weeks. Complete tears require a brace for six to twelve weeks and return to sports is usually delayed for three to four months.

Elevate the knee whenever possible.

Therapy usually follows the initial stages of treatment to assure that you regain full motion and function of your knee and extremity.

MCL tears that require surgery are quite rare. If surgery is required, repair may bring good results, with a return to good knee stability. After satisfactory rehabilitation, many people resume their previous levels of activity.

A rehabilitation plan is needed if you have a cruciate or collateral ligament injury. Most rehabilitation plans include:

- Passive range of motion exercises, designed to restore flexibility
- Braces to control joint movement during the healing phase.
- Exercises to strengthen the quadriceps muscles in the front of the thigh, (muscle strength is needed to provide the knee joint with as much support and stability as possible when weight is placed on it.)
- Additional exercises on a high-seat exercise bicycle, followed by more strenuous quadriceps exercise.

Your progress and the ability of the knee to function as a normal knee will determine how long you must use crutches and a brace.

## CONCLUSION

Major ligament tears around the knee are common in today's world of high-level sports and high-speed travel. Treatment choices will be based upon many factors such as your age, activity level, how many ligaments have





been injured, your expectations, and lifestyle. With the proper care however, most people resume an active and fulfilling lifestyle.

For additional patient education information, go to [www.orthodoc.aaos.org/drpepper/](http://www.orthodoc.aaos.org/drpepper/)

To read more about prevention programs for female athletes, go to [www.aclprevent/pepprogram.htm](http://www.aclprevent/pepprogram.htm)