

Preventing ACL Injuries in Women

In general, musculoskeletal injuries are sports-specific rather than gender specific. Injuries to the anterior cruciate ligament (ACL), for example, occur frequently in soccer, basketball, and volleyball. However, data collected since 1995 suggest that ACL injury patterns are different in men and women who participate in the same sport. The incidence of ACL injuries among women basketball players is twice that for men, and female soccer players are four times more likely to suffer an ACL tear than their male counterparts. Both women and men incur ACL injuries in non-contact situations. Nearly 60 percent of ACL injuries in female basketball players occur when landing from a jump.

What is the ACL?

The ACL is located inside the knee joint and stabilizes the joint by preventing the shinbone (tibia) from sliding forwards beneath the thighbone (femur). A hard twist or excessive pressure on the ACL can tear it, so that the knee gives out and can no longer support the body.

Unless an injured ACL is accurately diagnosed and treated, the cushioning cartilage (the menisci) in the knee could be seriously damaged. Without this cushion, the thighbone and the shinbone would rub against each other, leading to further damage.

Studies have identified several risk factors that contribute to a higher incidence of ACL injuries among women athletes. Based on these studies, training methods that could reduce the risk of injury are now being developed.

Safer jumping skills

Because women don't bend their knees as much as men do when landing from a jump, the pressure on the knee joint is increased. The knee is exposed to higher forces per pound of body weight. Learning to land safely is a skill that can and should be taught early.

Cutting maneuvers

Women also turn and pivot in a more erect position, which also strains the ACL. Learning to crouch and bend at the knees and hips could reduce the stress on the ACL. These maneuvers are motor skills that can be learned, practiced and improved, just like a golf swing or tennis stroke.

Muscle control techniques

The hamstring muscles in the back of the thigh work with the quadriceps muscles

in the front of the thigh to bend or straighten the leg. As one set contracts (shortens), the other relaxes (stretches). Muscles that are being stretched produce more force than muscles that are contracting.

Many women athletes use their quadriceps muscles when they are changing direction rapidly. This can put enough force on the shinbone to tear the ACL if the knee isn't bent enough. By strengthening and using the hamstrings rather than the quadriceps muscles, a female athlete could reduce her risk of an ACL injury.

Prevention and treatment

Women athletes can take three steps to reduce their risk of ACL injuries.

1. Training and conditioning should be a year-round program. Skill drills and strength and flexibility exercises will enhance balance and coordination so you will be ready when the season starts.
2. Make strengthening exercises for the hamstrings and quadriceps muscles a regular part of your conditioning program. To stretch the quads, stand and use a wall or table for support. Lift one leg and pull your foot towards your buttocks. Hold for five seconds, then release the foot and stand straight. Repeat six to ten times on one side, then turn and repeat on the other side. To stretch the hamstrings, sit with one knee bent and the other leg extended, toes pointing to the ceiling. Lean forward until you feel a stretch. Hold for five seconds then return to your original position. Repeat six to ten times on each leg.



3. Practice proper landing technique (from a jump) and learn to do cutting maneuvers in a crouched posture with a slight bend at the knee and the hip.

If an ACL injury does occur, it can often be successfully treated. Both operative and nonoperative treatment options are available. Nonoperative treatment can

sometimes be used if the athlete is willing to reduce her athletic participation.

An athlete who wishes to return to sports that involve jumping, cutting, and pivoting will probably need surgery to reconstruct the ligament. This stabilizes the knee, preserves the cartilage, and enables a return to sports at the same level as prior to the surgery. Outcomes after reconstruction are comparable between men and women with high satisfaction and nearly identical success rates. After surgery, exercise and rehabilitative therapy are required to strengthen the muscles and restore mobility. Most athletes can return to their chosen sport.

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Women and ACL Injuries

For more than a decade, researchers have debated various reasons why anterior cruciate ligament (ACL) injuries are occurring more often in women than men, ranging from anatomical to hormonal differences in the genders.

Recent studies show that female athletes participating in certain sports like soccer or basketball are three- to four-times more likely to injure their ACL than males. A majority of these injuries are occurring in women between the ages 15 and 25, it was reported at the meeting.

At a June 1999 consensus meeting sponsored by the American Academy of Orthopaedic Surgeons, orthopaedic researchers reported these factors can explain the increase in ACL injuries among the female athletic population.

- **Biomechanical factors.** Experts reported that females tend to place more emphasis on their quadriceps muscle than male athletes, making it a significant reason why they are at increased risk of ACL injuries. The panel agreed females should learn to use their hamstring muscles more often. The experts also concluded that females tend to land on a flat foot rather than their toes which can contribute to the increased injury rate.
- **Hormonal influences.** There should be no modification of activity or restriction from a sport at any time during the menstrual cycle, experts said. They also stated that a woman's hormones do not increase the chances of sustaining an ACL injury, but suggested that further investigation is warranted.
- **Environmental factors.** Functional knee braces do not prevent ACL injury, experts reported. They agreed that an athletic shoe's surface may improve performance because it provides good traction on certain surfaces, but at the same time increases the risk of injury.

- **Anatomic risk factors.** The experts concluded that there were insufficient data to support the theory that ACL size is related to injury risk. They also reported that no consensus could be reached on the role of the size of the femoral notch (the area within the knee that contains the cruciate ligaments) as it relates to injury occurrence.

The researchers agreed training programs that teach proper landing methods or basic injury prevention techniques should be adopted to help female athletes.

According to 1998 injury statistics from the U.S. Consumer Product Safety Commission, more than 81,600 people injured their knee playing soccer, and 225,800 sustained injuries in basketball-considered two high risk sports for ACL injury in females.

For more information on "Prevent Injuries America!®," call the American Academy of Orthopaedic Surgeons' public service telephone number 1-800-824-BONES (2663).

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Knee Ligament Injuries

In 2003 more than 9.5 million people visited orthopaedic surgeons because of knee problems. (Source: National Center for Health Statistics; Centers for Disease Control and Prevention; 2003 National Ambulatory Medical Care Survey.) 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) to 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
- Slowing down when running
- Landing from a jump
- Direct contact, such as in a football tackle

Recognizing an ACL injury

If you injure your ACL, you may not feel any pain immediately. However, you might hear a popping noise and feel your knee give out from under you. Within 2 to 12 hours, the knee will swell, and you will feel pain when you try to stand. Apply ice to control swelling and elevate your knee until you can see an orthopaedic surgeon.

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 ACL injury is based on a thorough physical examination of the knee. The exam may include several tests to see if the knee stays in the proper position when pressure is applied from different directions. Your orthopaedist may order an X-ray and MRI (magnetic resonance imaging) or, in some cases, arthroscopic inspection.

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, may require reconstruction.

Treating ACL tears

Both nonoperative and operative treatment choices are available.

Nonoperative treatment:

- May be used because of a 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 (either arthroscopic or open surgery): 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 and secured to the thighbone and shinbone.

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

PCL injuries

The posterior cruciate ligament, or PCL, is not injured as frequently as the ACL. PCL sprains 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 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 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 needed to reattach the ligament. Knee function after this surgery is often quite good.

Collateral ligaments

The collateral ligaments are located at the inner side 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 on the inside of the knee. The LCL is rarely injured.

Collateral ligament injuries

If the medial collateral ligament (MCL) has a small partial tear, conservative treatment usually works. Remember the acronym RICE: Rest, Ice, Compression, 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 have to wear a bandage or brace for a while.

Elevate the knee whenever possible.

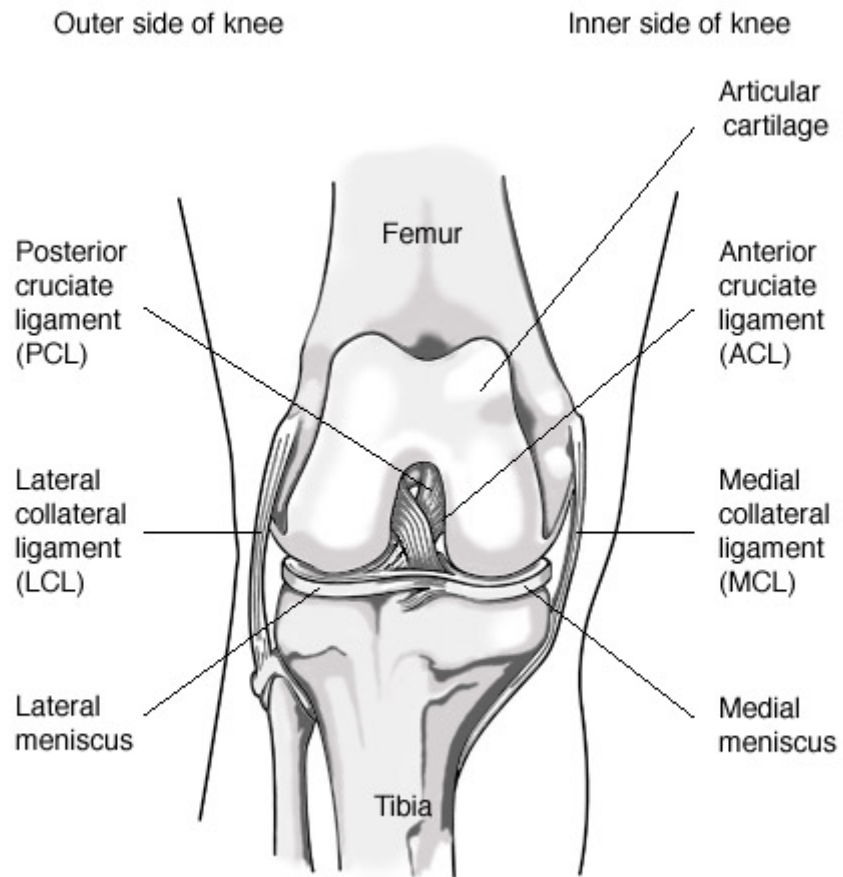
You should also consult your physician about a course of rehabilitation exercises for good healing.

If the collateral ligament is completely torn or torn in such a way that ligament fibers cannot heal, you may need surgery. 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.
- 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.



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Here's the link where this information is posted:

http://orthoinfo.aaos.org/fact/thr_report.cfm?thread_id=158&topcategory=knee