



ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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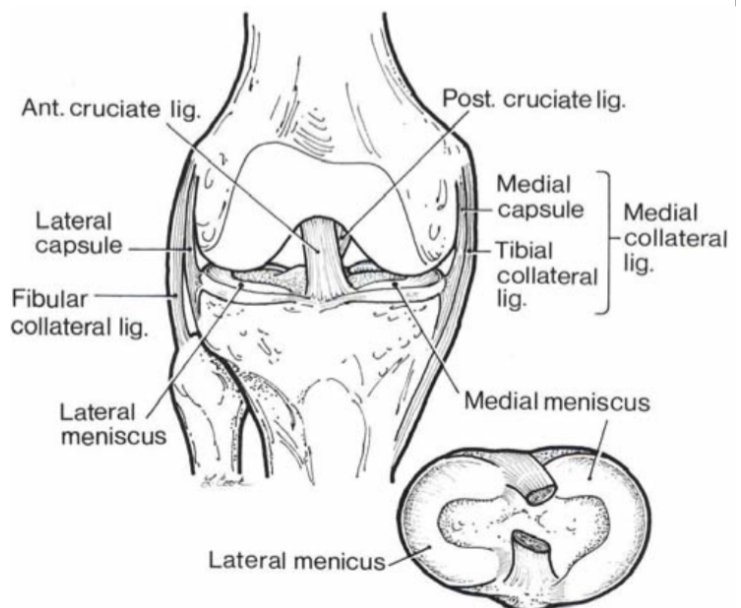
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INTRODUCTION

You have injured your knee. This is a very common problem in these times when individuals are active, estimated at 120,000/year. Most knee sports injuries are “non-contact”, meaning that the mechanism of injury was not caused by a collision. The foot twists, balance is lost, and the knee torques in a direction and position that is not compatible with the ligament’s normal loading potential. This results in a failure of the anterior cruciate ligament (ACL). You may have felt a pop, click, pain, and or tenderness, followed by swelling and painful range of motion. ACL tears are common in skiing, basketball, soccer, and football. Females have an approximate 40% greater number of ACL injuries in most sports compared to males. Many theories have been proposed, including anatomical, physiological, and motor control explanations.

WHAT IS THE ANTERIOR CRUCIATE LIGAMENT?

The anterior cruciate ligament (ACL) is one of four major ligaments that stabilizes the knee joint. A ligament is a tough band of fibrous tissue, similar to a rope, which connects the bones together at a joint. There are two ligaments on the sides of the knee (collateral ligaments) that give stability to sideways motions: the medial collateral ligament (MCL) on the inner side and the lateral collateral ligament (LCL) on the outer side of the knee. Two ligaments cross each other (therefore, called cruciate) in the center of the knee joint: The crossed ligament toward the front (anterior) is the ACL and the one toward the back of the knee (posterior) is the posterior cruciate ligament (PCL). The ACL prevents the lower bone (tibia) from sliding forward too much and stabilizes the knee to allow cutting, twisting and jumping sports. The PCL stops the tibia from moving backwards.



HOW CAN THE ACL TEAR?

The most common mechanism that tears the ACL is the combination of a sudden stopping motion on the leg while quickly twisting on the knee. This can happen in a sport such as basketball, for example, when a player lands on the leg when coming down from a rebound or is running down the court and makes an abrupt stop to pivot. In football, soccer, or lacrosse, the cleats on the shoes do not allow the foot to slip when excess force is applied. In skiing, the ACL is commonly injured when the skier sits back while falling. The modern ski boot is stiff, high, and is tilted forward. The boot thus holds the tibia forward and the weight of the body quickly shifts backwards too much force is suddenly applied to the knee. The

excess force causes the ACL to pop.

A contact injury, such as when the player is clipped in football, forces the knee into an abnormal position. This may tear the ACL, MCL and other structures.

WHAT IS THE INITIAL TREATMENT FOR A TORN ACL?

The initial treatment of the injured joint is to apply ice and gentle compression to control swelling. A knee splint and crutches are used. The knee should be evaluated by a doctor to see which ligaments are torn and to be sure other structures such as tendons, arteries, nerves, etc. have not been injured. X-rays are taken to rule out a fracture. Sometimes an MRI is needed, but usually the diagnosis can be made by physical examination.

HOW WILL THE KNEE FUNCTION IF THE ACL IS TORN?

If no structure other than the ACL is injured, the knee usually regains its range of motion and is painless after six or eight weeks. The knee will typically feel completely normal. However, it can be a “trick knee”. If a knee does not have an ACL it can give way or be unstable when the person pivots or changes direction. The athlete can usually run straight ahead without a problem but when he or she makes a quick turning motion such as when pivoting, the knee tends to give way and collapse. This abnormal motion can damage the menisci or articular cartilage and cause further knee problems.

If a person does not do sports and is relatively inactive, the knee can feel quite normal even if the ACL is torn. Thus, many patients especially over the age of thirty may not need to have the ACL reconstructed, especially if they do not participate in sports that require quick changes in direction. In young, athletic patients, however, the knee will tend to re-injure frequently and give way during activities in which the person quickly changes direction. Therefore, it is usually best to reconstruct the torn ACL.

WHEN SHOULD SURGERY BE PERFORMED FOR A TORN ACL?

It is best to wait for the pain and swelling to subside and to allow associated injuries to heal before performing surgery for the ACL. If surgery is done soon after injury, rehabilitation is difficult; the knee may get stiff and have permanent loss of motion. The athlete will usually get back to sports much more quickly if the knee is allowed to recover from initial injury and to regain its full painless range of motion (usually at least six weeks) before performing surgery.

If surgery is delayed until the joint has full painless range of motion, then an accelerated rehabilitation program can be used after surgery. With accelerated rehabilitation, continuous passive range of motion (CPM) is used for the first week following surgery. The knee heals much more quickly and better joint function results.

The best treatment following acute ACL injury is to usually protect the joint and apply ice and use crutches for several weeks. As the swelling and pain subside, and the patient can put weight on the leg; then the immobilizer and crutches are discontinued. The emphasis is on regaining knee motion. Resistive exercises to build up strength should not be done during this time to prevent damaging the knee cap and causing chondromalacia patella.

If the knee also has an injured medial collateral ligament (MCL), it is best to allow the MCL to heal

completely (usually six to eight weeks) before reconstructing the ACL. Then an arthroscopic procedure can be performed to reconstruct the ACL. The torn MCL usually does not need to be repaired surgically.

There may be instances when immediate surgery is indicated following injury. Examples are knee dislocation when multiple ligaments are torn. Tears of the outer knee ligaments (lateral collateral ligament) often do require surgical repair. Individual decisions need to be made on whether or not to reconstruct the ACL soon after injury in these instances where immediate surgery may be required.

DO ALL ACL TEARS NEED SURGERY?

No — some knees function almost normally despite having a torn ACL. Dr. Lee has three principles that direct his management and care of ACL injuries:

1. There is no rush, allow this to be an evolution and allow your judgment to surface.
2. Define for us your athletic goals. Where are you on the spectrum from low level recreational to high demand? Only you can define that for us. Remember, it is not appropriate to say, “I am not a professional athlete” to rationalize your objective. Every individual must be dealt with as a separate situation that must be personalized.
3. Timing of the injury must be matched with your agenda, season, goals, and priorities.

TREATMENT OPTIONS FOR TORN ACL

I. NON-OPERATIVE Some patients can function well even if the ACL is torn. However, it may be necessary to modify activities and avoid high-risk sports (such as basketball, soccer and football). The key to prevent the knee that has a torn ACL from giving out is to avoid quick pivoting motions. Wearing a knee brace can help prevent re-injury. The main effect of a knee brace is to be a constant reminder to be careful.

However, a brace will not completely stabilize a knee that has a torn ACL. Exercises that restore the muscle strength, power, coordination, and endurance will also improve knee function and help stabilize the knee. However, a fully rehabilitated knee that has a torn ACL can still give way if a quick change in direction is unexpected.

II. LIMITED ARTHROSCOPIC SURGERY

Many knees in which the ACL is torn have additional injuries such as torn menisci or fragments of articular cartilage that are knocked loose (creating a loose body and a defect in the articular cartilage). These associated injuries can cause symptoms of pain, swelling, and locking (in addition to symptoms of giving way due to a torn ACL). Arthroscopic surgery to remove torn menisci or to remove loose bodies can improve pain and eliminate locking. However, it would usually not eliminate symptoms of instability, i.e. giving way. Thus, correcting can improve the knee symptoms but not restore stability to the knee.

III. ACL RECONSTRUCTION

Surgical reconstruction of a torn ACL involves replacing the torn ACL with a tendon (called a graft) from another part of the knee and putting it into a position to take the place of the torn ACL. The most commonly used graft is taken from the middle third of the patellar tendon (the tendon connecting the knee cap to the tibial bone). Hamstring tendon grafts taken from the inner thigh to the back of the knee are also used. Occasionally, tendon grafts are taken from cadavers (referred to as allograft). For most of these procedures, the operation is done arthroscopically instead of making big incisions. The knee is examined arthroscopically and associated injuries such as torn menisci, loose bodies, etc. are treated.

WHAT ARE MY OPTIONS FOR GRAFT RECONSTRUCTION?

The three main options (although there are others) for ACL reconstruction are:

1) Autograft Patellar Tendon

This is the most common procedure performed for ACL reconstruction in my practice. It involves removing 9-11 mm from the middle of your patellar tendon with bone blocks on either side. 5-10% may have soreness in the front of the knee from where the graft was taken, but this is usually temporary and improves with time and physical therapy. We have found a higher percentage of donor site pain in patients over 30-40 years old and much lower rate in patients in their teens to 20's.

2) Autograft Semitendinosis

This uses your part of your hamstring muscle to reconstruct the ACL. The overall results have been similar to the patellar tendon. Potential concerns about this type of graft are both technical (no bone blocks for fixation) and donor site weakness (uncommon). However, with the recent improvement in soft-tissue fixation devices, this technique is a very good option in my opinion.

3) Allograft Achilles or Patellar Tendon (cadaver donor)

This technique is most common for patients over the age of 35, but it has been used for all ages with great success. Some studies show allograft to have a slightly higher re-rupture rate for younger patients compared to autograft. Techniques to sterilize the graft without compromising its structural properties have improved and several studies have documented its safety and efficacy.

I use allograft because it avoids graft harvest site problems, there is less pain, swelling and limitation of motion, shorter operating time, and better cosmesis (smaller incisions). We have not seen an increased failure of these grafts compared to autograft.

Anytime tissue from a cadaver is used, there is the possibility of disease transmission. The accepted probability of viral transmission is 1 in 1 million, but since the new screening techniques were developed this problem has not been reported at our outpatient center.

THE TIMING OF SURGERY:

Several studies suggest it is optimal to wait at least 3 weeks for ACL injury to prevent the risk of knee stiffness. However, with the arthroscopic technique and accelerated rehabilitation, I have found that it is safe to proceed to surgery once the knee has “quieted down” from the acute swelling and stiffness. This can be between 1-4 weeks. Two exceptions are:

1. the elite athlete in which time to return to play is critical
2. if there is a displaced meniscus tear that will not allow a full range of motion.

Studies also suggest that it is best to perform ACL reconstruction within six months. A higher rate of meniscus and cartilage injury is seen in active individuals who have an unstable knee and continue to perform high level activities. This can lead to early arthritis.

WHEN CAN I EXPECT TO RETURN TO SPORTS FOLLOWING SURGERY?

Within two or three weeks after surgery, the patient is usually walking on level surfaces without a brace or crutches. At about five or six weeks, he or she can usually go up and down stairs without support. For the next several months, exercises are done to regain motion in the knee. When the knee has full range of motion (usually at six to eight weeks), muscle-strengthening exercises are done. At six months, the patient is usually running and at nine months, participating in sports.

RETURN TO SPORTS

This is also a very individual transition and is always a progression. Each sport is different. Here are some examples:

- 1) Soccer: start field progression with box training, with and without ball
- 2) Basketball: start in gym after 6th week, walking around court, shooting free throws, followed by box progression.
- 3) Skiing: mountain progressions start after 80% of experienced skier motion and strength. Start with intermediate slopes for 1.5 hours, then progress appropriately.
- 4) Tennis: after week 6 the athlete will start to hit balls lightly against a wall to re-acquaint eye-hand coordination.
- 5) Volleyball: after week 6 the athlete will start to gentle hitting.

Full return to competitive cutting sports is often around 8-12 months, but can vary. Full return to sports is based on strength, agility, aerobic and anaerobic fitness, vertical leap, joint stability, quadriceps bulk and sport specific issues.

After your surgery, you will have a specific rehabilitation program set up for you based on these guidelines. It is important to contact us if you have any questions! The purpose of this document is to help you understand the complexities of ACL injury, reconstruction, and rehabilitation.

WHAT ARE THE RISKS OF SURGERY?

Risks are part of any surgery. For ACL reconstruction, the risks include:

- 1) anesthesia
- 2) infection (1/200-1/300)
- 3) recurrent laxity or graft failure (2-5/100)
- 4) chronic stiffness (1-2/100)
- 5) nerve and/or blood vessel injury (1/500)
- 6) blood clot (1/500)

We take precautions against all of these risks, and this lowers the complication rate. We use pre-operative antibiotics, compression stockings and blood thinners when necessary, meticulous surgical technique to enhance graft fixation, and accelerated rehabilitation.

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION SURGERY

Here are guidelines that will help you in preparing for surgery to reconstruct your torn anterior cruciate ligament.

PREOPERATIVE INSTRUCTIONS WITHIN A FEW WEEKS BEFORE SURGERY:

Your doctor will see you in the office. He will do a preoperative history and physical examination and complete the necessary paperwork. He will write preoperative hospital orders and schedule an appointment with the pre-operative test center. You will have an opportunity to speak with anesthesia and physical therapy. It is recommended that you utilize a stationary cycle to maintain your knee range of motion and improve the overall function of the knee prior to surgery.

SEVERAL DAYS PRIOR TO SURGERY:

Wash the knee several times a day to get it as clean as you can. This decreases the risk of infection. **Be careful not to get any scratches, cuts, sunburn, poison ivy, etc.** The skin has to be in very good shape to prevent problems. You do not need to shave.

THE DAY BEFORE SURGERY:

Please be in touch with your doctor's office to confirm the exact time that you should report to the hospital for surgery. **You can have nothing to eat or drink after midnight on the day before surgery.** It is very important to have a completely empty stomach prior to surgery for anesthesia safety reasons. If you have to take medication, you can do so with a sip of water early in the morning prior to surgery (but later tell the anesthesiologist you have done so). Additionally, please shower with the chlorhexidine soap given to you at your pre-operative appointment from the neck down.

DAY OF SURGERY:

- **Nothing to eat or drink.**
- Please shower with the chlorhexidine soap the morning of surgery from the neck down.
- The operation to replace the torn **anterior cruciate ligament** will be done arthroscopically. A small incision will be made on the inner side of the knee to take the graft from the middle of the patellar tendon together with a small piece of bone from the bottom of the kneecap to the upper part of the leg bone (mid-third patellar tendon graft, bone-tendon-bone). The incision leaves a small area of numbness on the outer side of the upper leg. Most of this numbness clears but it takes a year or two and is not usually bothersome. In certain circumstances, the graft is a hamstring tendon or a donor graft from a cadaver (allograft).

AFTER SURGERY:

The most important aspect is to get the knee out straight.

You will be given a **prescription** for pain medication to take home with you. If you were given oxycodone, please take 1,000 mg of Tylenol every 6 hours. In addition to this medication, you should

take one full strength aspirin (325 mg) a day to help prevent blood clots for 21 days. The pain medication has a tendency to make you constipated, so you were given a prescription for Colace, which you should take twice daily. Additionally, you were given a prescription for Zofran, which you can take for nausea as needed.

The **dressing** should be changed 2 days after surgery. The wound is sealed with steri-strips (small pieces of tape on the skin).

You **can shower** on the 5th day following surgery, but be careful standing in the shower so that you **do not fall**. It is better to have a small stool to be able to sit on. However, you can get the leg wet and wash it. Do not submerge the knee under water in a bath, hot tub or swimming pool.

To help control swelling in the lower leg, you should wear the white stockings after surgery until your first post-operative visit. **If you develop calf pain or excessive swelling in the leg, call your doctor.**

The **cryocuff** is a blue wrap that is put on the knee to keep it cold, depending again on insurance approval. You can use this as often as you want to cool down the knee to reduce swelling and pain. Check your skin every time that you remove the wrap to make sure that it is intact.

You can get up whenever you want to but it is best to get up more frequently for short periods of time. Getting up more frequently for short periods of time is better than being out for a long period of time.

If you have any questions, contact our clinic at (626) 888-3818.