

Knee Instability and Ligament Tears

ACL / PCL / MCL / LCL

Diagnosis and Treatment Options

Ligament Repair and Post-Repair Instructions

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ACL: Anterior Cruciate Ligament Tears

The **Anterior Cruciate Ligament** or **ACL** is a ligament that connects the femur (thighbone) to the tibia (shinbone). It is located in the center of your knee. It is called a “Cruciate ligament” because in the middle of your knee there are two ligaments that cross each other: the one in the front, the **Anterior Cruciate Ligament (ACL)** and the one behind it, the **Posterior Cruciate Ligament (PCL)**. There are two other main ligaments: the one on the inside edge, the **Medial Collateral Ligament (MCL)** and the one on the outside edge, the **Lateral Collateral Ligament (LCL)**. Together, the four ligaments control forward and backward motion of the knee bones on each other (ACL and PCL) and side-to-side motion (MCL and LCL).

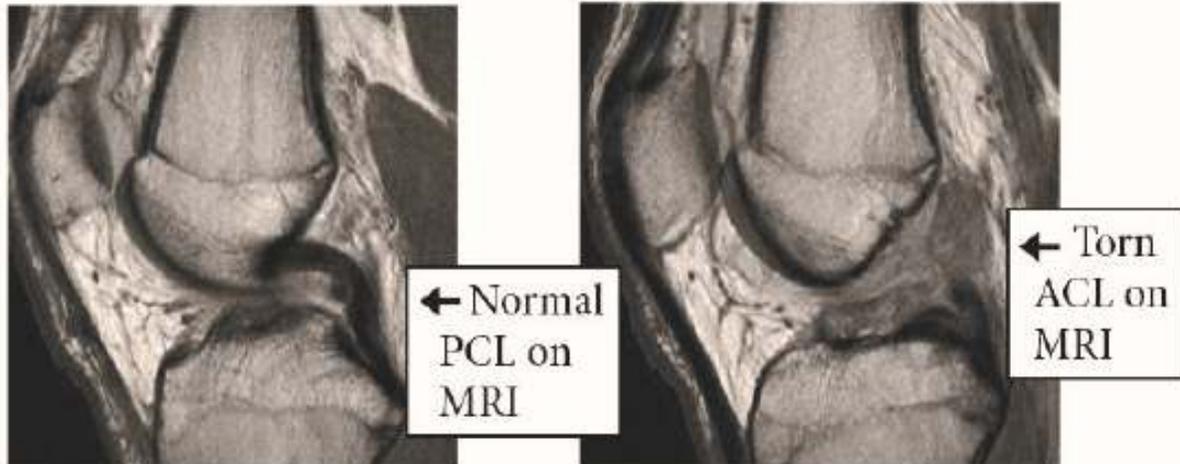


The **Anterior Cruciate Ligament** helps control **translation and rotation** of the knee and it is frequently injured in **pivoting sports** like **soccer, basketball, volleyball, skiing, lacrosse and football**. Any hyperextension injury or pivot injury with a steady onset of swelling within a few hours of the injury followed by instability of the knee with any twisting or pivoting motion is suspect for an ACL injury. The **ACL helps make the knee stable** and keeps the tibia from moving too far forward on the femur. Many times, it is injured in a fast shift in direction and often without contact with another player.

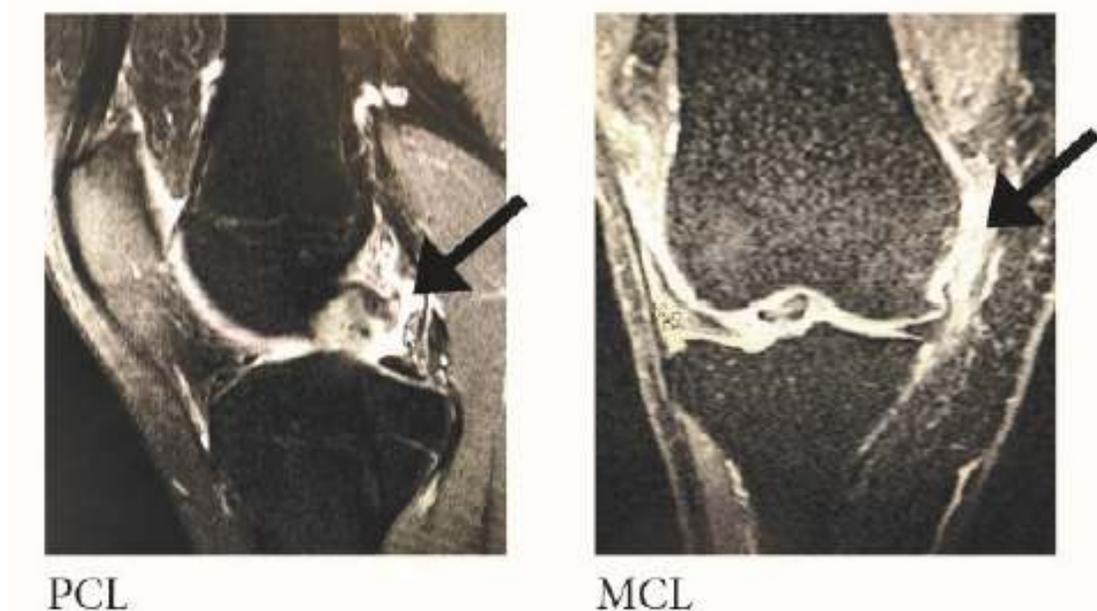
After an ACL injury, a clinical exam, knee testing with a special instrument called the KT1000 and/or an MRI can be used to make the diagnosis. You may find your knee buckles more easily. The tibia twists and shifts forward without warning. If left untreated the shifting can further damage the knee over time.

There are different levels of instability after an ACL tear. Some patients have good secondary restraints (other ligaments that help control the knee namely the PCL, LCL and MCL). Even if you have an ACL tear on an MRI the knee may be stable to examination with a knee tester called the KT1000.

In patients that have low demand for twisting and pivoting activities, non-surgical treatment may be best. Other patients, the knee has poor or weaker secondary restraints. In these patients instability can occur with most activities and they need an ACL reconstruction.



A second group may have a middle level of instability on testing. They will have difficulty with twisting, jumping, heavy work and recreational sports. **These patients need their knee repaired and ligament reconstructed** to return to sports, recreation or work activities at their prior level.



A third group will have a small amount of instability. They will not have too much difficulty with regular activity. They may however have difficulty with high level, competitive sports (varsity high school, competitive college or higher levels – semipro and pro). If they are not in higher level sports or a heavy work environment many of them do not need an ACL reconstruction.

In Dr. Reznik's practice, the ACL ligament is reconstructed with minimally invasive, arthroscopic techniques on an out-patient basis. It requires placing a tendon graft into your knee to replace the ligament since those fibers are destroyed at the time of injury.



Figure 1:
ACL tear



Figure 2: ACL
guide in place



Figure 3:
ACL tunnel



Figure 4: ACL
graft in place

Using special instruments, special bone tunnels are drilled into the tibia (shinbone), and the femur (thighbone) at the location of your natural ACL. The graft is guided through the tunnels using fine wires and sutures until it sits in the correct position. **This is very much like building a very fancy ship inside a small bottle.**



The graft is then anchored in place with a titanium screw on one side and dissolving pins on the other. The knee is also checked for damage or tears to any other structures at the time of surgery. If there are meniscus tears, cartilage tears, loose chips or other issues in the knee, they are repaired at the same time. The knee is then tested again with the **KT1000** to be sure the ligament reconstruction has recreated the stability of the other knee as closely as possible before you leave the operating room.

Once the graft is secured in place, the knee has been fully inspected and all issues have been treated, the knee is injected with local anesthetic for pain relief, the wounds are dressed and a cooling pad (to control swelling and reduce any discomfort) is placed inside the dressings. A knee immobilizer is placed over the dressing and cooling pad to protect the knee. This stays on until your first therapy appointment.

PCL Tears and other Ligament Injuries

The PCL (posterior Cruciate) is stronger and it takes a higher level of trauma to injure it. The trauma is often to upper tibia in a collision during sports, a fall on the bent knee or trauma like a car, ATV or motorcycle accident. In baseball, in the past, non-break-away bases were the primary cause of PCL injury to a bent knee while sliding. This has improved with the newer bases that “break away” when hit too hard.

When the PCL is torn by itself, the injury tends to lead to less “instability”, yet it puts a large strain on the surface of the kneecap. It can be a relatively silent destroyer of the kneecap cartilage. Over time the kneecap wears out and it becomes arthritic. Dr. Reznik can test the knee for PCL instability and pending the level of damage figure out if it will need repair or reconstruction to help prevent future damage to the knee. In many cases when instability is low, bracing and exercise may be the best treatment. In others a reconstruction is best.

Many times, it is associated with multiple other injuries and a nearly or completely dislocated knee. When with other injuries the knee can be very unstable. We evaluate each ligament



separately and often add information from an MRI to figure out the best treatment. Sometimes the ligaments need repair, other times reconstruction.

The MCL can be torn by itself—this is very common and consists of a sprain grade 1 or 2 and these heal by themselves with protection and time. Grade 3 often will heal with immobilization, and protection. Once healing has started, motion is allowed in a protective brace. **The LCL** does not heal and if completely torn it must be repaired and reconstructed. When more than one ligament is torn in the same knee and the knee is unstable, repair and reconstruction of the damaged ligaments is mandatory. Ideally, all should be fixed at the same time. If there is an **ACL and MCL** combination injury, usually fixing the ACL alone will allow the MCL to heal. In a **LCL and PCL** combination injury, the knee is very unstable and both need to be repaired/reconstructed. As one would expect, with each additional ligament and the more traumas the knee had had, the more challenging it is to get the knee put back together.

Ligament Reconstruction Recovery Plan:

ACL, PCL, MCL or LCL

Post-Surgery Instructions:

When you wake up **in the recovery room**, you will have a leg immobilizer, cotton dressing, Ace wrap and a cold pad wrapped within the dressing on the surgical leg.

The cold pad is connected to an **ice machine**. **This is for pain control and to reduce swelling**. To decrease swelling at home, elevate operative leg above your heart level using 2-3 pillows. If you are feeling throbbing in the leg while up and about or tightness in the dressing, **you are not elevating it enough** during the day. Lie back and put the leg up above the level of your heart with at least two pillows until the throbbing stops.

Using the ice machine to maximize comfort after surgery, you should follow this schedule:

Day 1 and 2: Use the ice machine on and off (even at night if needed). Disconnect from the machine to go to the bathroom. At your first therapy appointment your dressing will be changed. You then may remove your immobilizer and bandages to take a shower. Use an antimicrobial soap (Dove works well). Do not remove the small white “steri-strips”; they will be removed at your first post-op visit. Any stitches or staples will be removed then as well.

In the shower, gently bend your knee a few times. After your shower place a small bandage or Band-Aids over the incisions. ***When replacing the ice machine pad **do not place the pad**



directly on skin as this can cause frostbite. Wrap the cooling pad in a cloth or place it between layers of Ace bandages.

Crutches: Use 2 crutches for 7-10 days putting a light amount of weight on the foot with each step. Increase the weight as tolerated. When you are able to bear weight comfortably, you may then advance to one crutch for the next few days for short distances and then to no crutches. Most patients will still need crutches for longer distance and can be fully weight-bearing after 2 weeks in the knee immobilizer and then after 4 weeks while wearing the ACL brace.

Start physical therapy between day 3-5 post-op. The therapist will do your **first dressing change** for you. **Physical Therapy is vital to your recovery.** You will begin simple exercises the day of surgery. The Physical Therapist will guide you in your rehabilitation program. It is **very important** for you to start therapy when recommended.

The Cooling Pad inside your dressing: **After Day 3 use it** for one hour on, then off for at least 1/2 hour alternating on and off only as needed to help with swelling and pain control. **Day 5 and after:** Use as needed for comfort and swelling. It is also helpful after therapy sessions.

*****For the self-run machines** that you fill with ice and water yourself, change the ice and water when you are unable to maintain a temperature of 50-52 degrees. The electronic cooling units do not require a water change.

Diet: You may resume a **light diet** when you return home after surgery. Most patients start with tea or broth adding crackers or toast, then a non-spicy sandwich. If you become nauseated, check to see if one of your medications is upsetting your stomach, most narcotics can. If your stomach feels acidic, try **Tums, Zantac or Pepcid AC** to settle it and drink some clear liquids.

Lungs: After surgery it is important to do **deep breathing** exercises. Take at least **5 deep breaths** holding for **2-5 seconds** with rest in between each breath. This should be done **3-4 times daily** to prevent possible post anesthetic pneumonia.

Blood Clots: Blood clots are rare and all patients should be up and moving as soon as comfortable. Leg and foot motion (leg lifts and ankle pumps) are to be done frequently each day and they should be done every day for the first 3-6 weeks post-op to maintain blood flow and help prevent blood clots.

Still some patients have higher risks than others for clots—



Patients at higher risk for blood clots include:

- Those with long car or train commutes
- May be overweight BMI >30
- Have a history of having cancer
- History of prior blood clots or genetic clotting disorders
- Females on birth control pills
- Over the age of 40

These patients should be taking 1 baby aspirin per day for 6 weeks after surgery unless allergic to aspirin. Patients with a prior blood clot or a **family (genetic) history** of increased risk for blood clots may need a formal blood thinner. These include Coumadin or one of the newer agents like Xarelto or Eliquis.

***Some patients have prior clots, a history of genetic factors or a family history of clots including Factor V Leiden, Protein S Deficiency, and/or relative with a prior DVT or PE history. You must tell Dr. Reznik if you have these issues.

Remember - Call the physician and/or go to the ER if:

- You develop excessive, prolonged nausea or vomiting
- You develop a fever above 101
- You develop any type of rash
- You experience shortness of breath, calf pain or increased swelling in the calf and ankle
- You have excessive bleeding from the dressing (some spotting is normal)

Post-Operative Appointments: To avoid complications, keep all your post-operative follow-up appointments with your physician. These are also required to monitor your progress and help in recovery.

Stop Smoking: Smoking slows the healing process by interfering with the making of new DNA. Smoking also increases the risk of infection and pneumonia after surgery by slowing your body's white blood cells.

Driving: All Right knee patients and Left knee patients with a standard transmission car cannot drive until off all pain meds and can fully weight-bear without pain and be completely finished using the knee immobilizer.



With an automatic transmission a left knee patient can return to driving when no longer in the knee immobilizer and off of all pain meds. A right knee patient must meet all the criteria and be able to fully weight bear on the operative side without hesitation. You will be considered an impaired driver when an accident occurs if you don't follow these rules.

Returning to Work: People with light work (desk work with no squatting, kneeling or lifting) can return to work around 2 weeks post op in a knee immobilizer. Many patients are more comfortable starting with half days and adding hours when swelling and comfort allows. Remember that you will need time to elevate your leg during the day.

For people who may have long commutes: By staying still with the leg down for long periods, **you are at high risk for blood clots.** Patients with active office work, on their feet a lot during the day, or very light labor with variable tasks can sometimes go back by 6 weeks after surgery. If you have heavy work, a laborer, a lot of lifting, twisting, squatting or work at unprotected heights, you will usually need at least 6 weeks and clearance from the physical therapist before returning to work. You will return to work with the ACL brace on.

*****DENTAL WORK*****

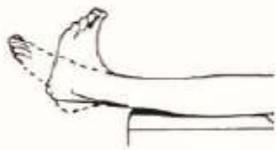
You cannot have any routine dental work (including cleaning) for at least 3 months after your surgery, or you risk infecting the tendon graft. After 3 months, you may see the dentist, but for **one year from date of surgery,** you will need to take antibiotics before and after dental work. Call our office for a prescription from Dr. Reznik.

Post-Operative Exercises and Physical Therapy

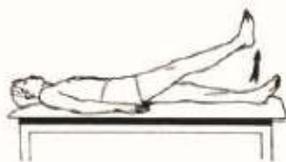
Vital to your recovery of good knee function is a graduated activity and exercise program to increase muscle strength and knee motion.

You will begin simple exercises the day of surgery. They should be done every day for the first week post-op to maintain blood flow in the surgical leg and help prevent blood clots.

Formal physical therapy will begin 3-4 days after surgery. The physical therapist will guide you in your knee rehabilitation program. It is VERY important for you to start therapy when recommended. To avoid complications, post-operative follow-up appointments with your physician are also required to monitor your progress.



Ankle Pumps: Starting in the recovery room, pump your ankle up and down (like pressing the gas pedal). At home, do this for a few minutes each hour while awake or during every TV commercial break while watching TV.



Straight Leg Raises: In the recovery room start Straight Leg Raises. Tighten your quads muscle (the front of your thigh) first, then raise your leg 8-12 inches off the bed. At home, do this at least 10-15 repetitions, 4-5 times per day.



Range of Motion: After your first Therapy session, when you will have your first dressing change (3rd or 4th day after surgery), start home Range of Motion exercises:

Sit on a chair. Place your foot on the floor, remove your immobilizer and set aside. Place the uninjured foot under the ankle of the surgical leg. Letting the uninjured side do the work, bring your leg into a straight position. Then, from a straight position, gently bring the foot down, bending at the knee. Do this for 3 sets of 5-10 repetitions, 3 times per day.

About the author of this educational booklet:



Alan M. Reznik, MD, MBA, FAAOS, specializes in sports medicine and arthroscopic surgery as well as shoulder and knee injuries. He takes care of working, casual, and competitive athletes of all ages. He has been rated Top Doc in CT 17 times and MD nationally recognized for his patient education writings. He has written two books and he received the Connecticut Press Club Award.

He volunteers his time to the American Academy of Orthopaedic Surgeons (AAOS) as a member of the AAOSNow Editorial Board, AAOS

Communications Cabinet, and the National Committee on Research and Quality. An inventor and orthopedic innovator, he holds

patents for orthopedic instruments used all over the world. Dr. Reznik is Chief Medical Officer of Connecticut Orthopaedics, Associate Professor of Orthopaedics at Yale University School of Medicine, and a consultant.

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