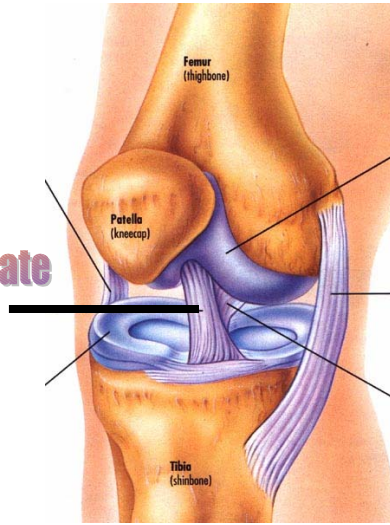


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**Anterior Cruciate  
Ligament**



METHODIST  
**Sports**  
MEDICINE CENTER  
THOMAS A. BRADY CLINIC  
INDIANAPOLIS 1-800-SPORTS-MED

ACL Reconstruction  
Pre-operative

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Dr. Peter Sallay  
Methodist Sports Medicine Center  
Indianapolis, Indiana

# The Patient's Guidebook for Knee Surgery

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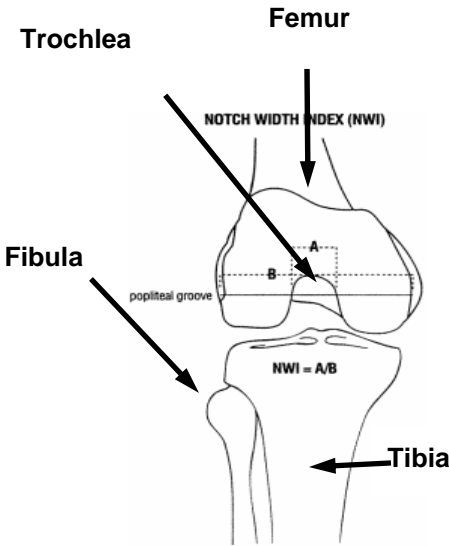
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Section 1

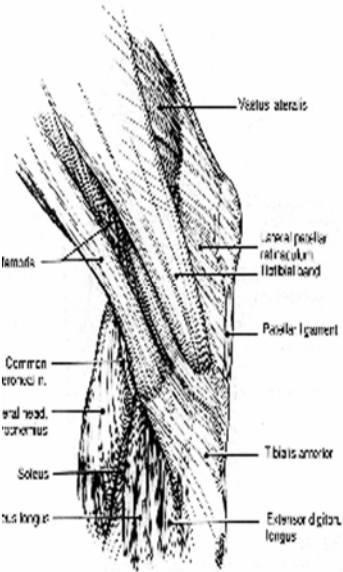
# How Does Your Knee Work?



**Figure 1: Bones of the knee joint**

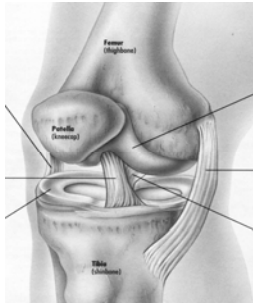
The knee is an important link in an elegant mechanism that allows humans to walk upright. The knee provides the leg with the necessary flexibility to allow locomotion. The knee also functions as sort of a shock absorber. As the foot hits the ground during walking the knee automatically bends to gently cushion the blow.

The knee joint is made up of four bones: The femur (thigh bone), patella (knee cap– not in figure), tibia (shin bone), and fibula (figure 1). The femur and the tibia are the largest bones and make up what is commonly thought of as the knee joint. The patella is a kind of floating bone that sits in front of the femur and tibia to provide protection to the joint. When you bend and straighten your leg your knee cap glides against a part of the thigh bone called the trochlea (figure 1). The fibula is the smaller of the lower leg bones and provides attachment for important muscles and ligaments of the knee.



**Figure 1: Knee muscles**

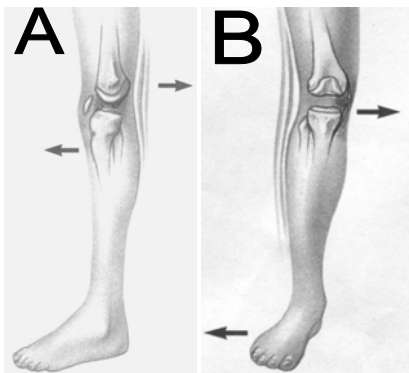
Movement is promoted by a series of powerful muscles that surround the knee. The major muscles include the quadriceps, adductors, hamstrings, and gastrocnemius (figure 1). The strength and endurance of these muscles are critical to the performance of the knee. Although the muscles are important in maintaining stability the ligaments are the primary stabilizers in the



**Figure 2: The ligaments of the knee**

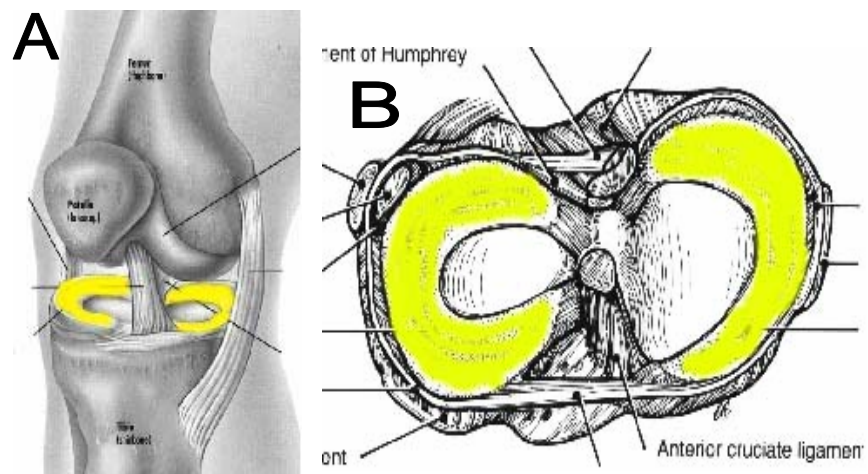
knee joint.

Ligaments are structures made of connective tissue (gristle) and connect one bone to another. There are four major ligaments in the knee: anterior (front) cruciate ligament (ACL), posterior (back) cruciate ligament (PCL), medial (inside) collateral ligament (MCL), lateral (outside) collateral ligament (LCL) (figure 2). The collateral ligaments stabilize the knee in side to side directions while the cruciate ligaments stabilize in front to back movements (figure 3).



**Figure 3: A) The cruciate ligaments keep the knee from moving front to back; B) while the collateral ligaments keep the knee from moving side to side.**

The weight bearing surfaces of the knee are made of two kinds of cartilage. The first is called hyalin cartilage which forms a smooth coating on the end of the bones. The second type is the meniscus (fibrocartilage) (figure 4). The two menisci are like gaskets between the bones. Among other things the menisci function as shock absorbers for the knee. Significant damage to either of these structures can effect the long term function of the knee. In cases of severe injury, arthritis can eventually occur.



**Figure 4: A) Menisci of the knee front view (highlighted structures. Here you can see how the menisci act as shock absorbers between the thigh bone and shin bone B) Menisci of the knee from a top view of the knee (highlighted structures)**

# What's wrong with your knee?

## Anterior Cruciate Ligament Tear

You have injured the anterior cruciate ligament (figure 5). Unfortunately the anterior cruciate ligament rarely heals by itself. The reason for this is largely unknown. Loss of the ACL can cause the knee to be unstable. This is particularly true in active, athletic individuals. Without the ACL the knee can slip out of place. This usually occurs when attempting sudden changes in direction or landing from a jump. Repetitive episodes of knee instability can lead to progressive damage to the hyalin and meniscal cartilage. Over many years some patients develop disabling arthritis as a consequence.

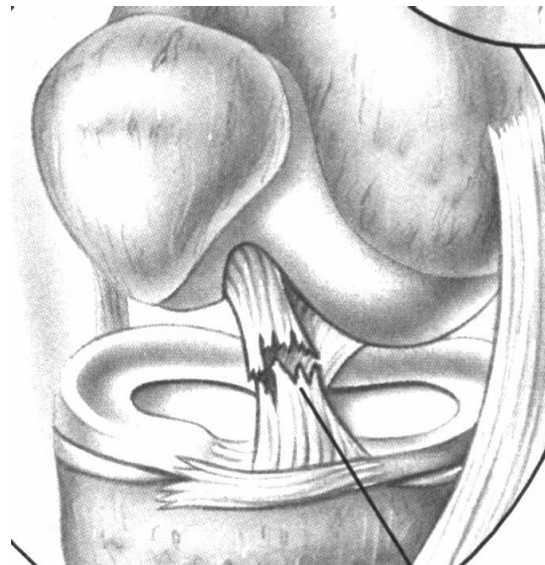


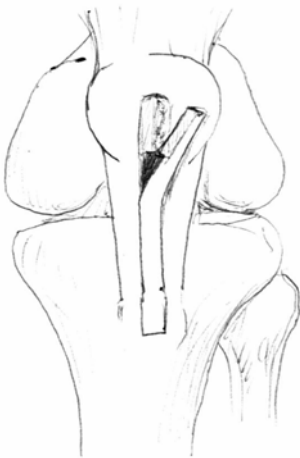
Figure 5: Rupture of the ACL

## Section 3

# How does surgery correct my knee problem?



**Figure 6: The operating room with the TV that is used to “see” the inside of your knee**



**Figure 7: Harvesting the graft from the patellar tendon of your knee**

## ACL Reconstruction

Many years ago surgeons first attempted to directly repair (sew together) the ruptured ACL.

Unfortunately the results of these surgeries were dismal. In fact these patients fared no better than patients who were left untreated. A short time later surgeons began developing techniques using other tissues to substitute for the torn ACL. Initially patients were immobilized after surgery and many patients developed stiffness and profound weakness. Most patients were unable to return to sports until a year (if at all) after surgery.

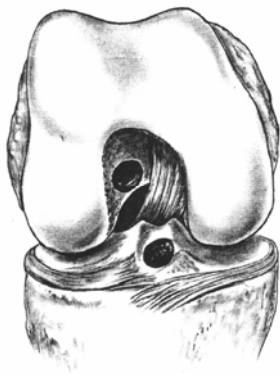
Because of continued refinements in the surgical technique, and pre-operative and post-operative rehabilitation, ACL reconstruction has become a relatively low risk and dependable operation. Currently a grafting procedure is performed to substitute the torn ACL. A graft is tissue taken from another part of the body, in this case another part of the knee. Common grafts are the patellar tendon of the injured knee (figure 7), the patellar tendon of the opposite, uninjured knee, or the hamstring tendons. Each graft has advantages and disadvantages and the graft used for



**Figure 8: The arthroscope, which is used to examine the inside of your knee**

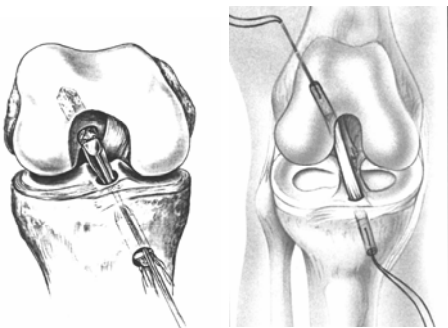
reconstruction needs to be matched to each individual's situation.

Once the graft is harvested it is prepared for implantation by placing sutures in either end to aid in later securing the graft. Interestingly the graft is truly "borrowed" as the tissue reliably regrows over a period of several months.



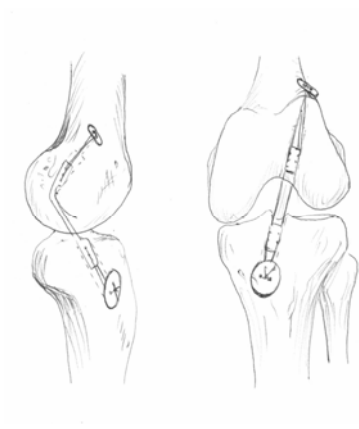
**Figure 9: Tunnels that are drilled into the bones of the knee joint where the new ACL will be placed**

The operation is facilitated by using an arthroscope. An arthroscope (arthro-joint, scope- to look) is a device that is 3/16 of an inch in diameter and 8 inches long which is linked to a video monitor via a fiber optic cable (figure 8). The arthroscope is inserted into the knee joint through a small puncture hole (portal). The arthroscope can be manipulated to see all of the contents of the knee joint. There is also an assortment of tools that can be inserted through an additional portal. These tools are used to help repair or remove injured tissue. With the aid of the arthroscope the stump of torn ACL is removed at this time and any injury to the joint surface cartilage and menisci are assessed. If one or both of the menisci are torn then either partial removal or repair of the torn meniscus is performed. If a repair is not feasible then we typically remove the injured portion of the meniscus. The remainder of the meniscus is left behind to maintain as much of its function as possible.



**Figure 10: Pulling the new ACL graft through the tunnels**

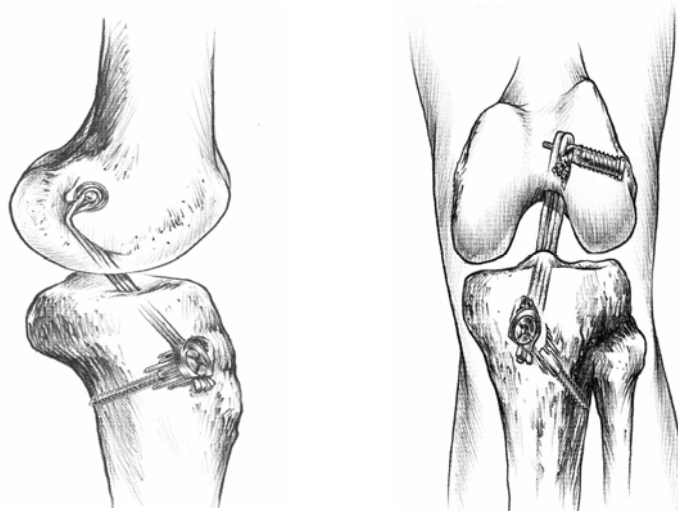
The graft must be placed into the knee so that it precisely recreates the normal position of the normal ACL. Tunnels through the tibia and the femur are carefully made according to each patient's specific



**Figure 11: Tying the patellar tendon graft with sutures over buttons**

anatomy (figure 9). The graft is then pulled into the tunnels (figure 10) and is secured on either end .

The method of securing the graft depends on the graft itself. Patellar tendon grafts are typically secured by tying the previously mentioned sutures over special “buttons” made of titanium and plastic (figure 11). Hamstring grafts have no attached bone, therefore, the graft is secured with special



**Figure 12: Securing the hamstring graft with screws.**

## Section 4

# Potential Risks of Your Surgery

Any surgery that we perform has certain documented risks. These potential problems can arise even if the surgery is carefully planned and performed. The most notable risks are outlined below. Fortunately the incidence of such complications with elective knee surgery is very low. Certain factors may slightly increase your potential risk such as previous operations on the same knee or coexisting medical conditions such as diabetes, heart ailments, etc. Our surgical team will discuss any such condition prior to surgery if it may have a potential impact on your recovery. The following risks appear in the order of frequency:

## Peri-operative risks

### 1 **Anesthetic complications**

***Sore throat***- only occurs in patients who undergo general anesthetic and is due to the breathing tube used to provide airflow to your lungs.

***Nausea***- occurs from the various drugs that are used during anesthesia. The newer drugs have a lower risk and several anti-nausea medications are available to minimize the symptoms.

***Herbal Supplements/Weight Loss Products-*** The use of any weight loss products or herbal supplements must be discontinued ***2 weeks prior to surgery***. These products can interfere with bleeding control and anesthetic medications.

***Serious complications-*** More worrisome complications such as severe drug reactions and death are fortunately extremely rare. The risk of death or serious injury as a result of anesthesia is said to be lower than the chance of being hit by a car!

## **2 Operative Risks**

***Bleeding-*** Bleeding is expected during surgery because of the generous blood supply to the knee. We use special instruments to cauterize small blood vessels which therefore minimizes bleeding. Blood loss during most knee surgeries is less than 1 to 2 ounces.

***Infection-*** rarely occurs. The risk has been estimated at roughly 1 in 300 surgeries. If an infection does occur then further surgery and antibiotics may be necessary to treat the problem.

***Nerve damage-*** to the major nerves of the knee and leg is extremely rare. **Damage to the small skin nerves around the incision is expected. This typically leaves patients with a half-dollar sized area of numbness next to their incision.** There are no functional consequences because of the numbness.

## Post-operative risks

1. **Stiffness**-This can be a result of poor effort during rehabilitation or in some cases occurs for no obvious reason. In most cases the condition is temporary and resolves with diligent rehabilitation. In less than 2% the condition is persistent and requires further surgery.
2. **Re-injury**– If you are undergoing a reparative or reconstructive procedure bear in mind that we can't make your knee better than new! If you should fail to comply with your rehab program or sustain a significant injury after surgery the result may be compromised.
3. **Failure of graft healing** - in rare cases the graft tissue fails to heal properly leading to recurrent instability.
4. **Hardware failure** - in rare cases the hardware may fail due to screw migration or material failure.

## Graft site pain

Although not a true complication, temporary graft site pain is expected. This is soreness in the area where the graft was harvested. Graft site pain is rarely limiting and in most cases resolves slowly over a period of several months as tissue re-growth occurs where the graft was taken. In a small number of patients who have a patellar tendon graft, kneeling on a hard surface may cause discomfort. This discomfort may persist indefinitely.

## Section 5

# Planning Before Your Surgery

## Special Tests

It is most likely you have already had knee X-rays by your family doctor or in our clinic. If necessary you may have to undergo other tests such as an MRI (magnetic resonance imaging ), although, **in the majority of cases an MRI is not needed to make the diagnosis.** Shortly before surgery the therapist will test your knee's stability and strength. The purpose of this is to have a baseline for comparison after surgery.

## Pre-operative Physical Therapy

Preparing your knee and body for surgery is one of the most important steps to ensuring a good result from your operation. It is important to understand that this operation is not an emergency procedure. In fact many times the time between injury and surgery ranges from 3 weeks to several months. **Several studies have clearly shown that the better your knee looks going into surgery the easier it is to achieve a rapid and full recovery.** The therapist will give you some simple but effective home exercises designed to decrease swelling, recover range of motion and strength.

## General Medical Check-up

This is only required for individuals who have a history of certain medical conditions ( eg- heart ailments, lung disease, etc ). In some cases surgery needs to be postponed while further testing or treatment is initiated.

***Herbal Supplements/Weight Loss Products-*** The use of any weight loss products or herbal supplements must be discontinued **2 weeks prior to surgery.** These products can interfere with bleeding control and anesthetic medications.

## Section 6

# The Day of Surgery

## Check-in

You will have to register at the hospital on the day of surgery. The specific time and location will be given to you during your office visit or by mail. Please be prompt! Failure to arrive on time unnecessarily delays not only your surgery but those who are having surgery after you. If you are significantly late your surgery will be canceled. You will be asked to arrive at least 2 hours before the actual surgery time. This is to allow for the registration process and pre-operative consultation with the anesthesiologist. After you have registered a nurse will check you into the surgical holding area, ask you several questions relating to your past health, and take your temperature, blood pressure, etc. You will then be asked to change into a hospital gown.

**Figure 12: Room in the surgical holding area where you will wait for your surgery**

## Anesthesia

The nurse will start an intravenous ( I.V. ) line which will be used to deliver medications to your bloodstream during and after surgery. Immediately before surgery the anesthesiologist will discuss the details of your anesthetic. Any questions you have regarding anesthesia should be addressed to the anesthesiologist at this time.

## **Surgery**

After you have been prepared the nurse from the operating room will take you to the surgery area. You will be asked to wear a surgical cap to cover your hair. After being checked in a second time you will be wheeled into the operating room ( please note that you will be asked many of the same questions on several occasions. This is merely to prevent any important information from “slipping through the cracks” . We appreciate your patience). The surgical team is composed of the surgeon, his assistant(s), 2 to 3 nurses or surgical technicians and the anesthesiologists. The temperature in the room is typically lower than normal and warm blankets will be provided. Once the anesthesiologist is prepared he will administer medicine which will make you feel relaxed. Afterward more medicine will cause you to fall asleep. Surgical time varies from case to case but we will make a time estimate for your family so they can plan appropriately. After surgery Dr. Sallay will talk to family members to update them on your surgery. Please make sure that family members are available at this time.

## **Post-Anesthesia Recovery Unit (PACU)**

When you awaken from the anesthetic you will be in the PACU. A nurse will be assigned to monitor your progress and address your needs. After you have stabilized you will be transferred to your room. It is only at this time that your family members will be able to see you. Family members are not allowed in the main recovery area because of need to maintain the privacy of the other patients.

## Section 7

# Your Hospital Stay

## Nursing Duties

A nurse will be assigned to you for your stay in the hospital. Occasionally one nurse may be responsible for several patients. The nurse is responsible for monitoring your progress, measuring your vital signs, aiding with hygiene and administering your medications. If you are experiencing any difficulties or if there are any questions the nurse can communicate with Dr. Sallay or the anesthesiologist.

## Pain Management

Remember for the first 24 to 48 hours it is wise to stay ahead of your pain. Don't be too timid or proud to take your medication regularly during this time. The following is a list of the common medications prescribed:

**Toradol ( I.V. )-** a powerful anti-inflammatory medication which is administered the first day of hospitalization.

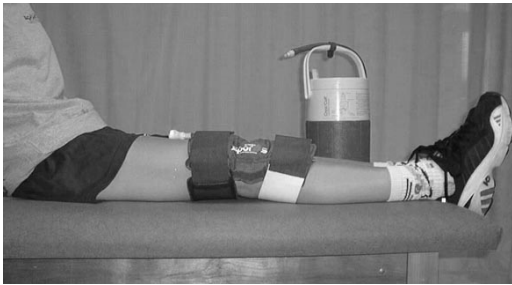
**The Painbuster™(Figure 1)(patellar tendon graft repairs only)** pain control system is designed to deliver local anesthetic into your knee in order to decrease pain. **The catheter should be removed on the morning of the 5th post-operative day.** Simply peel off the dressing and pull out the catheter and discard it. Approximately 10% of patients will



**Figure 1:**  
**Painbuster**

experience bloody drainage from the area where the catheter enters the skin. This does not mean that you have active bleeding. The fluid is left from the surgery. If the leakage is great, then you can remove the catheter early. Make sure the line is free of any kinks or obstructions.

**Lortab, Vicodin, Darvocet** - narcotic pain relievers that alter your perception of pain. These medications are only given for a specific period of time after surgery because prolonged use has been associated with addiction. All of these medications can cause nausea, particularly if taken without food. Always take these medications with food. Additionally some patients will notice constipation. To minimize this be sure to drink plenty of fluids, especially fruit juices.



**Figure 13: CryoCuff**

## **Control of Swelling**

All patients will experience some degree of swelling after surgery. Swelling is minimized by staying in bed with your leg elevated and by using the CryoCuff. The CryoCuff is a vinyl bladder filled with ice water that wraps around the knee (figure 13). You will continue wearing the CryoCuff even at home for the first week after surgery.

## **Physical Therapy**

The morning following surgery the physical therapist will visit with you. They will review or teach the necessary exercises to begin your rehabilitation. These exercises are critical in the success of your operation. Pay careful attention to the therapist and perform all of the exercises as instructed.

## **Discharge from the Hospital**

If you were admitted after surgery you will be seen by our surgical team the next morning. You will be discharged after the following conditions are met:

- Your pain is under control with oral medications
- You are able to eat and drink
- You are able to go the bathroom
- You have been visited by the surgical team
- You have seen the therapist and have learned your rehab exercises

## Section 8

# Limitations after Surgery

## Activity

One of the most important goals after your surgery is to limit swelling in your knee. Although the CryoCuff helps to minimize swelling, your activity, being up on your feet, has the most impact on swelling. For the first week after surgery you should minimize the amount of time you are on your feet. **You should only get up to go to the bathroom or to shower.** At all other times you should be laying down with your leg propped up in the CPM machine or performing your exercises. Our experience has shown that those patients who are on their feet too much experience more swelling and then struggle more with rehab.

## Work/School

In general it is ideal to be off work for two weeks. In some cases it is appropriate to return to a part-time schedule the second week after surgery. For students who are in school surgery is typically postponed until a natural break in the semester (ie- spring break, etc). Delaying surgery is **not** detrimental as long as the patient avoids high risk activities.

## Driving

You should **not** drive for at least one week after surgery. If you had surgery on your right knee it may take up to 2 weeks to drive comfortably and safely.