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## **ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**

### **Affiliations**

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### **INTRODUCTION**

The anterior cruciate ligament (ACL) is one of four ligaments in the knee. These ligaments work together to stabilize the knee during activities. Unfortunately tears of the ACL are common, occurring with twisting activities (such as skiing, basketball, tennis and soccer) and direct blow injuries (such as football).

When people tear their ACL it is usually a sudden event often accompanied by a "pop." There is swelling over the next few hours and there is difficulty walking comfortably. The knee can feel unstable. Physical examination and MRI examinations will confirm the tear. When the ACL is completely torn it has no significant capability of repair and thus the ligament function is lost. In a few months the ligament tissue is broken down and absorbed by the body.

### **NONSURGICAL TREATMENT OF ACL TEARS**

A small percentage of persons will do well after an isolated ACL tear without surgical reconstruction. These persons tend to be older and less active. They are usually not involved with pivoting and cutting type sports. Knee braces can help prevent instability episodes by "hobbling" the knee and assisting with sensory feedback. None of the knee braces however can create normal stability and most active people will continue to have instability even with the most expensive custom knee brace.

Before deciding to pursue nonsurgical treatment in a knee which is ACL deficient, it is important to make sure that there is no other damage to the meniscal cartilage pads or other ligaments. A MRI (magnetic resonance image) scan will determine with excellent accuracy whether additional damage is present. If there is significant damage to the menisci, surgery is usually recommended. If knee surgery is done for other problems, then most people decide to reconstruct the ACL at the same time.

### **SURGICAL RECONSTRUCTION OF THE ACL**

It is important to understand that most people with a torn ACL will experience instability, a feeling that the knee "gives way" or "feels loose." This instability commonly results in a reduction in activities, especially sports. More importantly the instability will usually lead to additional damage to the knee.

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Meniscal cartilage pad tears, articular surface cartilage injuries and additional ligament damage are common following untreated ACL tears. Some studies have shown during the 5 years following an untreated ACL tear 80% of persons will have suffered additional damage because of instability. This damage often results in arthritis. Arthritis is a wearing out of the articular cartilage surfaces which results in pain, stiffness and deformity. Most people with a torn ACL are unwilling to give up their sporting activities and have strong desire to prevent further damage to the knee. Therefore, most people elect to "reconstruct" the ACL.

The surgery to reconstruct the ACL involves taking a piece of tendonous tissue to replace the ACL. Tendons and ligaments share similar tissue composed primarily of collagen protein. The underlying concept behind the reconstructive surgery is that a tendon is surgically placed into the knee exactly into the position where the torn ACL was located. The tendon can be fixed to the bone with biodegradable screws. Most of the time (~95%) the human body will then reestablish the blood supply to the tendon, and over the weeks following the surgery this blood supply will bring new fibroblast cells which will repopulate the tendon, bringing the tendon back to life. As a result the "new living ACL" is seemingly just as good as the original and should last a lifetime. Evidence to support this claim comes from the multitude of follow-up studies which show maintenance of stability and active lifestyles for many years after ACL reconstruction. In some patients the body may not form a blood supply to the graft and eventually the graft will fail. Failures can be seen starting at about 3-4 months after surgery and are thought to occur in about 5% of all patients.

### **SURGICAL CHOICES FOR ACL RECONSTRUCTION AUTOGRAFT VS ALLOGRAFT**

After deciding to undergo surgical reconstruction of the ACL a decision must be made about where the reconstruction tissue should come from. When the tissue comes from the same patient it is called an autograft. When the tissue is taken from a different human donor it is called an allograft. Tendons such as the patellar tendon and hamstring tendon can be taken as autografts. The achilles tendon, patellar tendon, anterior tibialis tendon and hamstring tendon can be taken and used as allografts.

### **AUTOGRAFT RECONSTRUCTION OF THE ACL**

The first autograft reconstruction of the ACL was performed in about 1918. The more common procedures, which are now performed with the use of arthroscope, became popular in the early 1970's. The most common autograft used is the central-third-patellar-tendon graft. This graft is actually comprised of a piece of the patella bone (kneecap), the central third of the patellar tendon, and a piece of tibia bone (shinbone). The graft is usually 10 millimeters wide (3/8 inch) and 8 centimeters (4 inches) long. The patellar tendon defect created from taking this graft is usually closed with sutures and the donor site will heal during the months following surgery. The healing of the patellar tendon defect can lead to excessive scarring and sometimes pain.

Hamstring tendons from the back of the thigh can also be used to reconstruct the ACL. The most common hamstring tendon used is the semitendinosus. Often a second hamstring tendon, the gracilis, is also taken if the semitendinosus is not large enough. The donor hamstring muscles seem to tolerate the removal of their tendinous attachment but permanent hamstring weakness is expected following surgery.

The major disadvantage of autograft tendons is the additional damage to the knee from harvesting the tendon at the donor site. The donor site can become a source of pain, scarring and weakness. Excessive scarring can permanently reduce motion. The donor site can take longer to heal than the reconstructed ligament. Longer surgical times are needed with larger incisions. Early return to activities while often safe for the reconstructed ACL can cause injuries to the donor site.

The major advantages of using autograft tendons are that they have been used for the longest period of time and that because they come from the injured person, they do not have any chance of carrying organisms which may cause infectious diseases.

## **ALLOGRAFT RECONSTRUCTION OF THE ACL**

The primary advantage of allograft tissue is that there is no additional damage to the knee and stronger grafts can be used.

Allograft tissues are taken from tissue donors through tissue banks. The donors are people usually under the age of forty, often who have died from an accident. The donors are screened by tissue banks and are all tested for infectious diseases. Screening histories, blood tests and cultures are obtained during tissue processing. These screening procedures must be clear of infectious disease or the tissues are rejected by the tissue bank.

The risk of disease transmission through allografts while never nonexistent is extremely small. Allografts are poor vectors for disease transmission. The graft tissue has no living cells. It is frozen and kept in a deep freezer until used. The fact that the tissue has only a few cells and no living cells makes the donor graft tissue a poor transmitter of living bacteria or viruses that are responsible for transmitting most diseases. Also because this tissue has no living cells it is not necessary to "match" the donor and recipient, nor is it necessary to give anti-rejection drugs.

## **SURGERY**

You will be in the outpatient surgical facility approximately 90 minutes but your surgery often only takes about 20-60 minutes. It is performed as an arthroscopically assisted procedure. Two to four skin incisions or "portals" are placed in different areas in the front of the knee, dependent on tissue choice used. Through one of these portals the arthroscope is placed into the knee. The arthroscope is a small TV camera the size of a pencil. With the magnification of the arthroscope we can visualize any damage which has occurred. Through the other portals instruments are placed into the joint to remove, smooth or repair the tissues. All additional damage is corrected. Water is infused

through the arthroscope throughout the procedure and the tissues around the knee will absorb some of this water. There is no significant risk of bleeding. I do not use any tourniquet device. The ACL graft is placed into the knee through the small portals and placed into bone tunnels. The ACL graft will then be fixed with the newer biodegradable screws. These screws are MRI compatible and do not show up on x-rays. The small incisions are closed with absorbable sutures and skin tape so that there are no stitches to remove. An ice machine is often recommended post op. Most people go home a few hours after surgery. Crutches and a brace are used. At home a CPM (continuous passive motion) machine is used 4-6 hours a day to assist with motion.

After surgery some water mixed with small amounts of blood will often leak out of the portals and look like blood on the bandages. The drainage on the bandages is mostly water and is normal.

Surgery is not without risks. Common risks include but are not limited to possible nerve injury, infection, bleeding, allergic reaction, and very rarely death.

## **POST OPERATION**

After surgery you will be asked to stay in the outpatient surgical facility for a period of time (1-2 hours) to recover from any drugs you may have been given. You will also be allowed to sip some water and maybe even eat some crackers. These will be great tasting crackers after not eating for such a long time! You will have a large bandage on your knee and a brace. You will need someone else to drive you home, as well as to be with you during the first 12 to 24 hours after the procedure.

At home it is important to do only what is necessary. It will be ok to go to the bathroom, get something to eat or answer the phone but otherwise you should try to lie down with the leg elevated above the heart as much as possible. Pain pills and anti-inflammatory medication should be taken immediately and regularly to help control pain. It is usually better to start taking the pain pills before the pain comes, so as not get "behind" the pain. Also, any medicines you normally take should be resumed.

## **FIRST POST-OP DAY**

The day following surgery may be a lot tougher than the day of surgery. The numbing medicines used during surgery will wear off, and there may be more pain. Try to use the CPM machine as much as possible while increasing the CPM range of motion as pain dictates. Ice bags or the ice machine should be used continuously. The leg should be elevated as much as possible above the heart. Try to do as little activity as possible and take your pain medication regularly. Don't get behind your pain or it may get quite severe.

If bloody drainage appears on the outer bandages, remember that this is normal. The drainage is mostly absorbed water mixed with small amounts of blood. The bandage should be shifted slightly so that dry bandage covers the draining portal. Alternatively, new bandages can be placed around the knee.



## **FOLLOW-UP APPOINTMENT**

Please make sure you have a post op appointment prior to your surgery; if not, call the office at (650) 853-2943 to make your follow-up appointment to be seen 1-4 days after surgery. At this appointment we will discuss your surgery and check your wounds. Physical therapy will be started after this first appointment. Please bring your operative pictures and diagrams that were given to you in the hospital so that we may discuss them.

## **THINGS TO WATCH OUT FOR**

Remember that surgery is not painless. Try to take your pain pills as directed even before the pain comes. Nausea and vomiting are very common post-op problems. If you start to get nauseated you should try and minimize the use of the codeine pain medication (hydrocodone, "vicodin") and use Tylenol and Motrin for pain control. All codeine products can make you nauseated. Diet should be advanced slowly, beginning with soup and crackers. If you believe nausea is likely ask for anti-nausea medicines prior to surgery.

## **POST OP RISKS**

### **WOUND INFECTION:**

Signs of infection are redness around the incision area, discharge of pus from the wound, increased pain and association of high fever > 101 degrees with chills/sweating. For treatment, call the office at 650-853-2943 during the day or after hours the clinic operator at 650-321-4121 to locate Dr. King or Laurel.

### **BLOOD CLOTS:**

Blood clots – thrombophlebitis, can occur post knee arthroscopy. Usually they occur in individuals with risks such as > 50 yrs. of age, smoker, or overweight, but not always. Signs of blood clots are increased calf pain and inability to weight bear due to pain, plus calf redness and swelling.

### **URGENT SIGNS:**

Pain in your chest or shortness of breath. If either of these symptoms occurs, call 911 immediately. If concerned please call the office at or after hours the clinic operator at 650-321-4121.

### **LOSS OF MOTION:**

Post operatively it is very important to maintain and obtain full extension. Getting the leg straight and equal to the non-surgical leg is important during the first several weeks post op.

## **RECOVERY PERIOD**

The weeks following ACL reconstruction surgery will be somewhat difficult but usually rewarding. It is important to follow instructions. In general it is very important to listen to your body. Your first goal is to get all your extension (knee straight) and prevent post-operative complications such as infection, blood clots and stiffness. Commonly you can progress with weight bearing in the brace on crutches until you are stable walking without them. Generally it is best to get off the crutches first walking peg leg in the brace. The brace can be removed when you know you will not slip or fall. Usually the only way to hurt an ACL graft is to slip suddenly or fall. Most patients go to physical therapy three times per week but exercises should be performed daily. The more you work without increasing your pain or swelling the quicker you will recover. Some patients are off their crutches in a few days and out of the brace within a few weeks, biking in ten days and able to jog in six weeks. You will be able to return to all sports brace free in most cases.

## **USEFUL PHONE NUMBERS**

<b>FREMONT SURGERY CENTER</b>	<b>510-546-4600</b>
<b>RAMONA SANTO (Surgical Coordinator)</b>	<b>650-853-2068</b>

## **EMERGENCY #**

<b>PALO ALTO MEDICAL CLINIC</b>	<b>650-321-4121</b>
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## **CHECK LIST**

### **BEFORE SURGERY**

\_\_\_\_\_ I KNOW WHERE TO GO

\_\_\_\_\_ I KNOW WHEN TO GO THERE

\_\_\_\_\_ I HAVE CHECKED WITH MY INSURANCE COMPANY

### **DAY BEFORE SURGERY**

\_\_\_\_\_ I CONFIRMED MY SURGICAL TIME BY CALLING THE SURGICENTER

\_\_\_\_\_ I GAVE THE SURGICENTER A PHONE NUMBER WHERE I CAN BE REACHED THE DAY OF THE SURGERY

\_\_\_\_\_ I **STOPPED** DRINKING LIQUIDS AND EATING AT MIDNIGHT PRIOR TO SURGERY

### **SURGERY DAY**

\_\_\_\_\_ I AM WEARING LOOSE CLOTHING

\_\_\_\_\_ I AM TOTALLY RELAXED ABOUT SURGERY, AND I AM EXCITED ABOUT THE PROSPECT OF GETTING BETTER!

### **POST -OP DAY NUMBER ONE**

\_\_\_\_\_ I WILL MAKE A POST-OP APPOINTMENT WITH DR. KING 1-4 DAYS AFTER SURGERY IF NOT DONE ALREADY

\_\_\_\_\_ I AM STILL EXCITED ABOUT GETTING BETTER AND RELIEVED THAT THE SURGERY IS OVER!