

Hamstring Tendon Graft Reconstruction of the ACL



Introduction

When the *anterior cruciate ligament* (ACL) in the knee is torn or injured, surgery may be needed to replace it. There are many different ways to do this operation. One is to take a piece of the hamstring tendon from behind the knee and use it in place of the torn ligament. When arranged into three or four strips, the hamstring graft has nearly the same strength as other available grafts used to reconstruct the ACL.

[Related Document: A Patient's Guide to Anterior Cruciate Ligament Injuries](#)

Anatomy

What parts of the knee are involved?

Ligaments are tough bands of tissue that connect the ends of bones together. The *ACL* is located in the center of the knee joint where it runs from the backside of the *femur* (thighbone) to the front of the *tibia* (shinbone).

The ACL runs through a special notch in the femur called the *intercondylar notch* and attaches to a special area of the tibia called the *tibial spine*.

Anatomy continue...

The *hamstrings* make up the bulk of the muscles in back of the thigh. The hamstrings are formed by three muscles and their tendons: the *semitendinosus*, *semimembranosus*, and *biceps femoris*. The top of the hamstrings connects to the *ischial tuberosity*, the small bony projection on the bottom of the pelvis, just below the buttocks. (There is one ischial tuberosity on the left and one on the right.)

The hamstring muscles run down the back of the thigh. Their tendons cross the knee joint and connect on each side of the tibia. The graft used in ACL reconstruction is taken from the hamstring tendon (*semitendinosus*) along the inside part of the thigh and knee. Surgeons also commonly include a tendon just next to the *semitendinosus*, called the *gracilis*.

The hamstrings function by pulling the leg backward and by propelling the body forward while walking or running. This movement is called *hip extension*. The hamstrings also bend the knees, a motion called *knee flexion*.

[Related Document: A Patient's Guide to Knee Anatomy](#)

Rationale

What does the surgeon hope to accomplish?

The main goal of ACL surgery is to keep the tibia from moving too far forward under the femur bone and to get the knee functioning normally again.

There are two grafts commonly used to repair a torn ACL. One is a strip of the patellar tendon below the kneecap. The other is the *hamstring tendon graft*. For a long time, the patellar tendon was the preferred choice because it is easy to get to, holds well in its new location, and heals fast. One big drawback to grafting the patellar tendon is pain at the front of the knee after surgery. This can be severe enough to prevent any pressure on the knee, such as kneeling.

For this reason, a growing number of surgeons are using grafted tissue from the hamstring tendon. There are no major differences in the final results of these two methods. When it comes to symptoms after surgery, joint strength and stability, and ability to use the knee, either method is good. However, with the hamstring tendon graft, there are generally no problems kneeling and no pain in the front of the knee.

[Related Document: A Patient's Guide to Patellar Tendon Graft Reconstruction of the ACL](#)

Preparation

What do I need to know before surgery?

You and your surgeon should make the decision to proceed with surgery together. You need to understand as much about the procedure as possible. If you have concerns or questions, you should talk to your surgeon.

Once you decide on surgery, you need to take several steps. Your surgeon may suggest a complete physical examination by your regular doctor. This exam helps ensure that you are in the best possible condition to undergo the operation.

Preparation continue...

You may also need to spend time with the physical therapist who will be managing your rehabilitation after surgery. This allows you to get a head start on your recovery. One purpose of this preoperative visit is to record a baseline of information. Your therapist will check your current pain levels, your ability to do your activities, and the movement and strength of each knee.

A second purpose of the preoperative visit is to prepare you for surgery. Your therapist will teach you how to walk safely using crutches or a walker. And you'll begin learning some of the exercises you'll use during your recovery.

On the day of your surgery, you will probably be admitted to the surgery center early in the morning. You shouldn't eat or drink anything after midnight the night before.

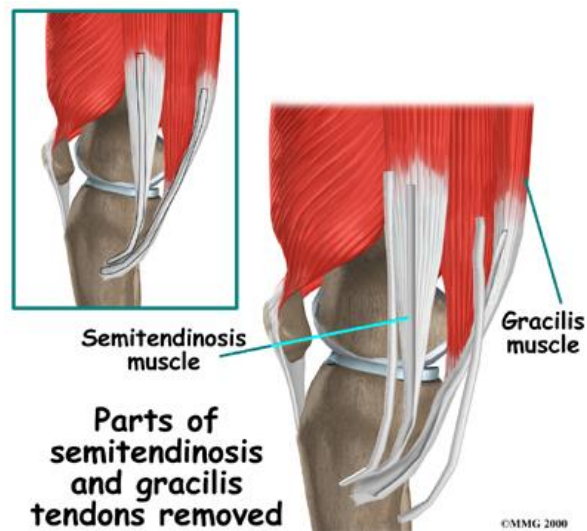
Surgical Procedure

What happens during the operation?

Most surgeons perform this surgery using an *arthroscope*, a small fiber-optic TV camera that is used to see and operate inside the joint. Only small incisions are needed during arthroscopy for this procedure. The surgery doesn't require the surgeon to open the knee joint.

Before surgery you will be placed under either general anesthesia or a type of spinal anesthesia. The surgeon begins the operation by making two small openings into the knee, called *portals*. These portals are where the arthroscope and surgical tools are placed into the knee. Care is taken to protect the nearby nerves and blood vessels.

An incision is also made along the inside edge of the knee, just over where the hamstring tendons attach to the tibia. Working through this incision, the surgeon takes out the semitendinosus and gracilis tendons. Some surgeons prefer to use only the semitendinosus tendon and do not disrupt the gracilis tendon.



Surgical Procedure continue...

The tendons are arranged into three or four strips, which increases the strength of the graft. The surgeon stitches the strips together to hold them in place.

Next, the surgeon prepares the knee to place the graft. The remnants of the original ligament are removed. The intercondylar notch (mentioned earlier) is enlarged so that nothing will rub on the graft. This part of the surgery is referred to as a *notchplasty*.

Once this is done, holes are drilled in the tibia and the femur to place the graft. These holes are placed so that the graft will run between the tibia and femur in the same direction as the original ACL.

The graft is then pulled into position through the drill holes. Screws or staples are used to hold the graft inside the drill holes.

To keep fluid from building up in your knee, the surgeon may place a tube in your knee joint. The portals and skin incisions are then stitched together, completing the surgery.

After Surgery

What should I expect after surgery?

You may use a *continuous passive motion* (CPM) machine immediately afterward to help the knee begin moving and to alleviate joint stiffness. The machine straps to the leg and continuously bends and straightens the joint. This continuous motion is thought to reduce stiffness, ease pain, and keep extra scar tissue from forming inside the joint. The CPM is often used with a form of cold treatment that circulates cold water through hoses and pads around your knee.

Most ACL surgeries are now done on an outpatient basis. Many patients go home the same day as the surgery. Some patients stay one to two nights in the hospital if necessary. The tube placed in your knee at the end of the surgery is usually removed after 24 hours.

Your surgeon may also have you wear a protective knee brace for a few weeks after surgery. You'll use crutches for two to four weeks in order to keep your knee safe, but you'll probably be allowed to put a comfortable amount of weight down while you're up and walking.

Rehabilitation / Recovery

What will my recovery be like?

Patients usually take part in formal physical therapy after ACL reconstruction. The first few physical therapy treatments are designed to help control the pain and swelling from the surgery. The goal is to help you regain full knee extension as soon as possible.

The physical therapist will choose treatments to get the thigh muscles toned and active again. Patients are cautioned about overworking their hamstrings in the first six weeks after surgery. They are often shown how to do *isometric exercises* for the hamstrings. Isometrics work the muscles but keep the joint in one position. As the rehabilitation program evolves, more challenging exercises are chosen to safely advance the knee's strength and function. Specialized balance exercises are used to help the muscles respond quickly and without thinking. This part of treatment is called *neuromuscular training*. If you need to stop suddenly, your muscles must react with just the right amount of speed, control, and direction. After ACL surgery, this ability doesn't come back completely without exercise.

Neuromuscular training includes exercises to improve balance, joint control, muscle strength and power, and agility. Agility makes it possible to change directions quickly, go faster or slower, and improve starting and stopping. These are important skills for walking, running, and jumping, and especially for sports performance. When you get full knee movement, your knee isn't swelling, and your strength and muscle control are improving, you'll be able to gradually go back to your work and sport activities. Some surgeons prescribe a functional brace for athletes who intend to return quickly to their sports.

Ideally, you'll be able to resume your previous lifestyle activities. However, athletes are usually advised to wait at least six months before returning to their sports. Most patients are encouraged to modify their activity choices. You will probably be involved in a progressive rehabilitation program for four to six months after surgery to ensure the best result from your ACL reconstruction. In the first six weeks following surgery, expect to see the physical therapist two to three times a week. If your surgery and rehabilitation go as planned, you may only need to do a home program and see your therapist every few weeks over the four to six month period.