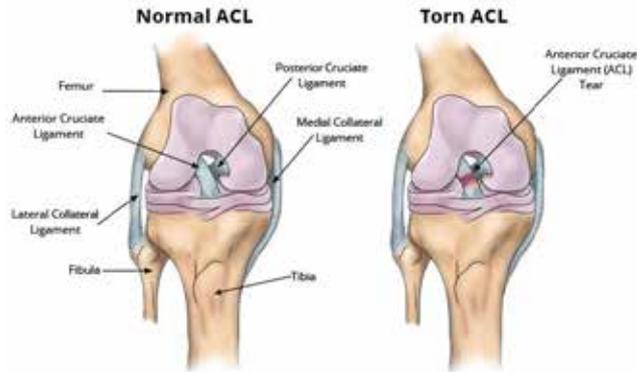


# Anterior Cruciate Ligament (ACL) Reconstruction Surgery

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ACL reconstruction is surgery to replace the ligament in the center of the knee connecting the Femur and Tibia (the anterior cruciate ligament or ACL) with a new ligament. The ligaments prevent the knee joint from moving sideways and thus provide stability.



## The ligament can be injured in several ways:

- Changing direction rapidly
- Stopping suddenly
- Slowing down while running
- Landing from a jump incorrectly
- Direct contact or collision resulting to a blow to the outside of the knee, rupturing the medial collateral ligament and ACL

## Symptoms

When the ligament ruptures, you might hear a popping noise or your knee may give out from under you. Within 24 hours your knee will swell. This usually resolves on its own over the ensuing weeks. Ongoing symptoms include pain, loss of full range and instability.

Only 10% of patients who have injured their ACL can return to pivotal sports without an ACL reconstruction. Also, with each re-injury, there is risk of further damage to the meniscus and articular cartilage.



ACL reconstruction is a very successful operation. A tear of the ACL used to be a career-ending injury for many athletes, but improvements in the surgery and rehabilitation have led to greatly improved results.

The aim of surgery is to provide you with a stable knee which in turn prevents further internal damage to the joint. This may protect you from developing degenerative arthritis in the long term.

A successful ACL reconstruction will help you recover full function of your knee, allowing you to return to cutting, pivoting and jumping sports with reduced risk of further injuries to your knee.

Reconstruction of the ACL involves an operation to place a new graft (usually made from two hamstring tendons) in place of the torn ligament.

Just repairing the ligament does not succeed unless it has been pulled off with a small piece of bone.

There are several choices of tissue (Graft) to use for the new ligament, including tissue from your own body (autograft) or tissue from another person (allograft). Another alternative is to use an artificial ligament (Lars ligament).

The most common autografts use part of the tendon in the front of the knee (patella tendon) or in the hamstring.

The procedure is usually done by knee arthroscopy. Other small incisions are made around the knee to place the new ligament.

About half of all injuries to the ACL occur along with damage to other knee structures such as articular cartilage, meniscus, and other ligaments. This can be addressed during surgery to reconstruct the ligament.

Bone tunnels will be made in the femur and tibia to place the new ligament in the knee at the site of the old ACL.



The new ligament is then fixed to the bone using screws or other devices to hold it in place.

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# Complications of ACL Reconstruction

## What can go wrong?

No procedure is ever completely free of risks. As with all major surgical procedures, complications can happen. This document doesn't provide a complete list of the possible complications, but it does highlight some of the most common complications following hamstring tendon graft reconstruction of the ACL.

**Anaesthesia Complications:** Most surgical procedures require that some type of anaesthesia be done before surgery. A very small number of patients have problems with anaesthesia. These problems can be reactions to the drugs used, problems related to other medical complications, and problems due to the anaesthesia. Be sure to discuss the risks and your concerns with your anaesthetist.

**DVT/PE (Blood Clots):** Deep venous thrombosis (DVT), can occur after any operation, but is more likely to occur following surgery on the hip, pelvis, or knee. DVT occurs when blood clots form in the large veins of the leg. This may cause the leg to swell and become painful.

If the blood clots in the veins break apart, they can travel and lodge in the lung. This is called a pulmonary embolism which requires urgent treatment. There are many ways to reduce the risk of DVT, but probably the most effective is getting you moving as soon as possible after surgery. Two other commonly used preventative measures include pressure stockings to keep the blood in the legs moving and medications that thin the blood and prevent blood clots from forming.

**Infection:** After surgery, it is possible that the surgical incision can become infected. This will require antibiotics and possibly another surgical procedure to drain the infection. (1 in 200)

**Problems with the Graft:** After surgery, the body attempts to develop a network of blood vessels in the new graft. This process, of revascularization, takes about 12 weeks. The graft is weakest during this time, which means it has a greater chance of stretching or rupturing. A stretched or torn graft can occur if you push yourself too hard during this period of recovery. When revascularization is complete, strength in the graft gradually builds.

**Recurrence of instability and graft failure (Rate 10-30%)**

**Problems at the Donor Site:** Problems can occur at the donor site (the area behind the leg where the hamstring graft was taken from the thigh). The main function of the hamstrings is to bend the knee. A potential drawback of taking out a piece of the hamstring tendon is a slightly reduced hamstring muscle strength. This is usually mild and often not noticeable except in athletes involved in sports that require deep knee bending e.g. judo, wrestling and gymnastics. Some studies, however, indicate that overall strength is not lost because the rest of the hamstring muscle takes over for the weakened area.

## Neurovascular Injuries

### Numbness around the incision

**Arthrofibrosis (Knee stiffness).** This is caused by proliferation of scar tissue in the knee after surgery: This usually occurs if the reconstruction is done in the acute post injury phase before the swelling and stiffness have resolved or as a result of infection in the knee after surgery. Prevention of arthrofibrosis is best accomplished with early motion after surgery.

**Fixed Flexion Deformity:** Loss of full extension is the most common complication after an ACL reconstruction. This can be minimised during the surgery by correctly positioning the graft tunnels and by appropriately tensioning the graft.

## Fractures

**Anterior knee pain:** less common if the hamstring tendons are used as a graft.

**Other rare and improbable diseases:** (eg. RSO)

# ACL Hamstring Tendon Autograft Reconstruction Rehabilitation Protocol

Adapted from Clinics in Sports Medicine: 2012. Rehabilitation and Return to Play after Anatomic Anterior Cruciate Ligament Reconstruction

## General Guidelines

- Focus on protection of graft during primary revascularization (8 weeks) and graft fixation (8 -12 weeks)
- Early range of movement
- No Bracing
- Can weight bear as tolerated straight after surgery
- No bathing/showering (sponge bath only) until after suture removal.
- Driving: 1 week for automatic cars, left leg surgery. 2-4 weeks for standard cars or right leg surgery
- Use of crutches for ambulation for 4 weeks with adequate quad function
- Return to full sporting activities takes up to 9 months

## Phase I: Early post-operative phase (1-6 weeks)

### Goals:

Control pain and swelling.

Wean off crutches and correction of gait on level surfaces.

Obtain full active range of movement of the knee

Maintain full extension, avoid hyperextension of the knee

- Rest Ice and compression to control swelling
- Wall slides/Heel slides
- Stationary bike (resistance free)
- Straight leg raises knee extension until quadriceps strength is regained to prevent extension lag
- Weight shifting exercises: One leg balance, stand on the operated leg with it slightly bent. Balance for 30 sec.

- Sit to stand
- Hamstring stretching
- Gait retraining(normal heel-toe gait with knee in full extension)



## Phase II: Strengthening and neuromuscular control (weeks 6-12 after surgery)

### Goals:

Preparation to return to activities and sports

Restore normal gait with stair climbing

Increase proprioception, full active range of motion

Adequate quadriceps control with no extensor lag,

Progress to the proprioceptive stage of rehabilitation.

- Closed chain weight bearing exercises such as wall slides, partial squats, step-ups, low resistance leg press (initially at 90-30, progressing to terminal extension leg press).
- Weight bearing terminal knee extension with theraband. Progress from double leg to single leg squats and extension.
- Rocker board, single leg balance, 360 degree wobble board, double/single leg Trampet.

- Can commence low impact straight line aerobic activities towards the end of phase II.(exercise bike with resistance,cycling,swimming and jogging on flat).
- Avoid open chain exercises until 12 weeks after surgery



# ACL Hamstring Tendon Autograft Reconstruction Rehabilitation Protocol

## Phase III: 3-6 months after surgery

### Goals:

Aim to achieve a quadriceps index of 85% or greater  
Improve strength, ROM, endurance, and proprioception of the lower extremity to prepare for sport activities  
Normalise running mechanics

Commence sports specific exercises:

- Initiate jogging on level surfaces in a straight line or in long curves (starting at about 12 weeks)
- Cycling outdoors, and pool workouts (eg. jogging in water)
- Return to golf starting with the driving range at about 4 months after the reconstruction
- Solo, non-competitive sports activity is permitted (eg: hitting a ball against a wall)
- Gym Activities/muscle strengthening: Exercise bike with resistance, leg press/leg curls, squatting with resistance, cross trainer. Progress to light jogging on treadmill at approx 4 months
- Avoid sudden deceleration
- Initiate open kinetic chain leg extension
- Continued proprioceptive training: Wobble board, Mini trampoline and single leg squats
- Commence agility test (i.e., figure eight, circles, forward, backward, changing direction, zig-zag);
- Commence polymetric activities: one leg jumping and two legs jumping, hopping-straight line and lateral

## Phase IV: 6-9 months after surgery

### Goals:

Graded return to sports

Increase proprioceptive training

Agility progression including

- Side steps
- Crossovers
- Figure 8 running
- Shuttle running
- One leg and two leg jumping
- Cutting
- Acceleration/deceleration/sprints
- Agility ladder drills
- Commence light sport specific training (Football drills, Rugby drills)

## 7-9 months after surgery

Return to full contact sports

