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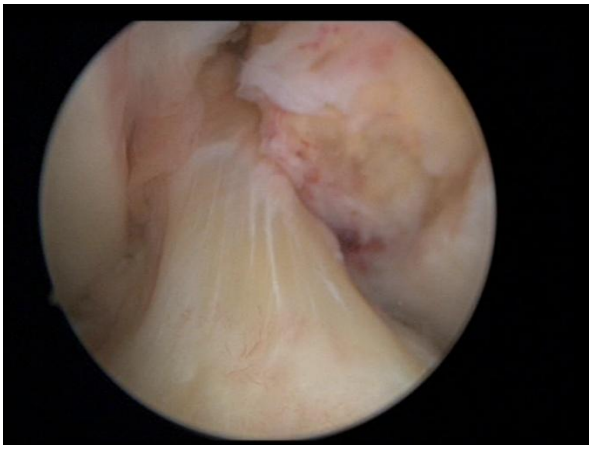
Anterior Cruciate Ligament (ACL) Reconstruction +/- Lateral tenodesis (LET)

Patient Information

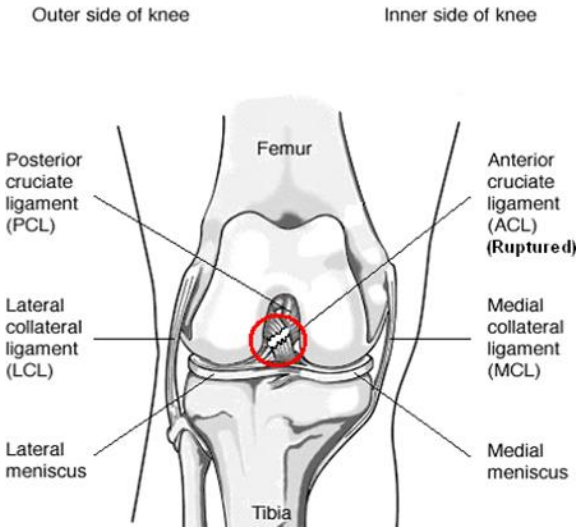
Introduction

The Anterior Cruciate Ligament (ACL) is most commonly injured playing sport. The number of ACL injuries has steadily increased over the past few decades with approximately 52,000 every year in the UK, about half of which undergo reconstruction. This particular injury has received a great deal of attention over the past 20 years and operations to reconstruct a 'torn ACL' have been significantly improved over this time, as have the rehabilitation regimens.
Pre-operative and post-operative rehabilitation is a major factor in the success of ACL reconstruction.
Following surgery, you will be involved in a progressive rehabilitation programme for at least 6 months with a return to pivoting sports at 9-12 months. This booklet contains some guidelines for this rehabilitation according to my protocol although each programme should be tailored to the individual.

What is the Anterior Cruciate Ligament (ACL)?

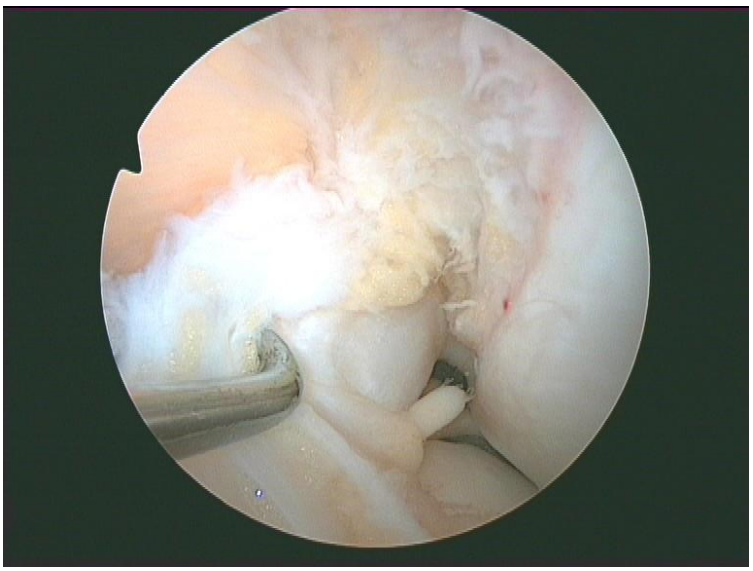


A normal ACL in a right knee



The knee is a 'complex hinge' joint supported by four main ligaments. A ligament being a structure that holds bones together and helps to stop excessive joint movement. The ligaments on either side of the knee are called the collateral ligaments - medial (inside) / lateral (outside). The two ligaments that cross deep in the centre of the knee are called the anterior (ACL) and posterior (PCL) cruciate ligaments.
During activity the ACL controls how far forward the tibia can "slide" and "rotate" relative to the femur. While some degree of motion or sliding is normal - and is essential for normal knee function - too much movement in any particular direction can damage structures within the knee.

If the tibia rotates excessively or is forcibly over straightened ('hyperextends') the ACL can rupture or tear from its bony attachment. Damage to the ligament can result in a feeling of instability or looseness. The ACL may not be the only ligament injured when the knee is twisted and it is not uncommon to see both the medial collateral ligament (MCL) and the ACL injured together.



A lax (torn) left ACL, being pulled to the side by a metal probe. Note the scar tissue above the probe

One of the problems of damaging the ACL is that the small nerve endings in the ligament - which provide feedback about knee position - are torn as well. These nerves provide the brain with information about the knee's position in 3D space (proprioception). A joint relies on these nerves to fine tune the muscles' action which allows the joint to function properly. Following an ACL rupture, *proprioception* is reduced but can be compensated for (to some extent) by specific exercises to strengthen the muscles across the knee. After ACL reconstruction and rehabilitation, proprioception has been found to be significantly improved.

How is the ACL injured?

The ACL can be injured or torn in a number of different ways. The usual mechanism occurs whilst pivoting or a 'cutting' manoeuvre during sport e.g. in football, rugby or basketball. Other causes include:

Coming to a sudden stop, especially when running
Landing from a jump
Excessive stretching of the knee joint to right or left
Blows to the side of the knee

At the time of the injury a "pop" or "snap" can sometimes be felt or heard. The amount of pain experienced at the time of the injury is somewhat variable and can be quite severe. Typically, the person is unable to continue 'playing on' and has the impression that a significant injury has occurred. Typically, the knee swells significantly within the first few hours, but the extent of swelling can be limited if the knee is immediately iced or splinted. In major giving way incidents, it is possible to damage other structures in the knee such as the joint cartilage (articular cartilage), mobile shock absorbing cartilages (menisci) and/or collateral ligaments.

How is a tear of the ACL diagnosed?

A tear of the ACL can be diagnosed by a doctor – usually a knee surgeon - with a thorough history and physical examination. The examination assesses the amount of knee laxity present and determines if the ACL is torn as well as checking for any other associated injuries.

X-rays are taken to look for the presence of any bony injury/fracture. In most patients a *magnetic resonance imaging* scan (MRI) of the knee will be ordered. The MRI can usually clarify the question of an ACL tear if the history and examination are inconclusive. The MRI is also useful for evaluating the articular cartilage (joint surface) and mobile shock absorbing meniscal cartilages. This additional information is necessary to make a decision regarding the best treatment (and timing) for each patient. The vast majority of ACL tears are diagnosed without resorting to surgery.

What are my options if I have an ACL tear?

The treatment options following an ACL tear are tailored for each patient depending on age, activity level, and the presence or absence of injury to other structures within the knee. In general, surgery is recommended for younger patients who are active and for those in whom the ACL tear is associated with injury to other structures in the knee. Conservative (non-surgical) treatment is sometimes recommended in older, more sedentary patients but the main deciding factor is the presence of ongoing instability.

The other – and perhaps more important reason - is to protect the articular cartilage and menisci in the knee from being further damaged, especially if they have been repaired. It is known that 30/40% of 'ACL injured' patients will develop some degenerative changes (arthritis) in later life and the aim of 'restorative' surgery is to minimize this risk.

Non-operative treatment and 'pre-hab'

ACL reconstruction is not an emergency operation and surgery is not always required. Proprioception ('confidence') in the knee can improve significantly in the 3 months following injury. Some patients do not require surgery and are able to achieve satisfactory stability with rehabilitation exercises (strengthening), activity modification and possibly use of a brace. Activity modification can be very successful. Sports which do not involve cutting or pivoting movements (such as jogging, cycling, or swimming) can often be done without difficulty. In addition to physiotherapy and activity modification, the use of a specific sports brace may allow some more dynamic sports. These braces must be fitted by a physiotherapist, orthotist or physician. *They are NOT the type you can buy at the pharmacy.*

Surgical Treatment

Following an ACL rupture, surgical ‘repair’ has not been shown to be effective in the longer term.

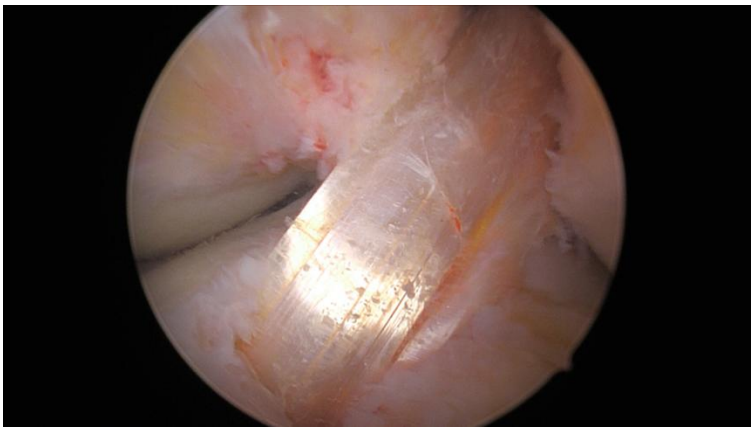
Far better results are obtained if the ACL is replaced (‘reconstructed’) using a ‘graft’ (usually another tendon) either harvested from an area around the knee or an allograft (dead donor tissue). There are a number of potential grafts – patella tendon, hamstring, quadriceps tendon - and also different methods of fixing the graft to the bones. The exact procedure done may vary depending on the surgeon's experience and preference, as well as factors unique to the individual patient. One of the common tendons used for the graft is the middle part of the patellar tendon. This tendon connects the kneecap (patella) to the lower leg bone (tibia). Another common graft is to combine two of the hamstring muscle tendons that attach to the tibia just below the knee joint. Studies have shown that these two tendons can be removed without significantly affecting the strength of the leg. There are other, much bigger and stronger hamstring muscles that take over the function of the two tendons that are removed.

Please feel free to discuss the graft option with Mr O’Leary. The surgeon will usually harvest the graft from same leg that is being operated on. However, if the quality of the graft is poor, he may use your other leg for the graft.

It is not possible to replicate the normal anatomy of the ACL completely but, the surgery along with intensive physiotherapy rehabilitation will produce a functionally stable knee for both activities of daily life and sport.

Following anaesthesia a tight inflatable band (tourniquet) is wrapped around your thigh which restricts bleeding into and around the knee during the operation. An arthroscope (telescope) is then introduced into your knee through 2 small anterior incisions. In the typical surgical reconstruction, the remnant of the torn ACL is removed and any meniscal tears addressed. A torn meniscus can be either repaired or trimmed (*meniscectomy*). Once this has been done, the type of graft to be used is ‘harvested’.

Tunnels are drilled into both the tibia and femur using specialized jigs and the graft is threaded through these tunnels, across the knee in the position of the original ACL. The graft is then secured in this position, most commonly by "wedging" a screw between the side of the graft and the tunnel. Alternatively, the graft can be secured by other techniques (staples, sutures, buttons, etc.). These screws and/or staples are left in place permanently. The skin is closed with stitches.

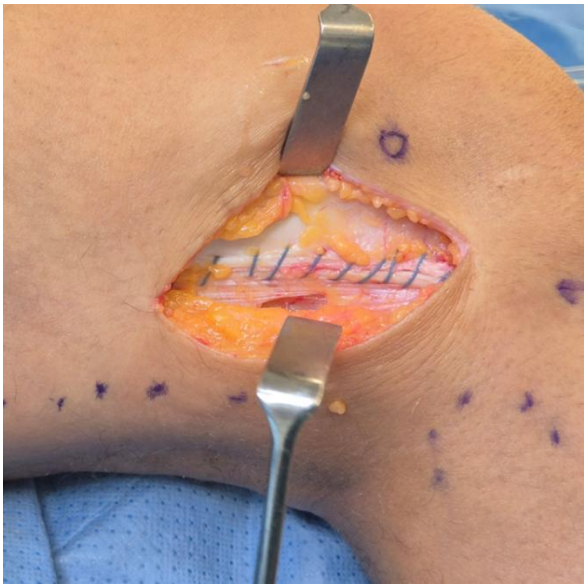


A right knee ACL graft, just inserted into the knee

Lateral Extraarticular Tenodesis (LET)

Early surgical procedures to stabilize the knee involved procedures on the outer aspect of the knee to tighten up the tissues on this side of the joint. They were 'superseded' in the 1980s by a direct replacement of the ligament. Recent evidence has confirmed that if a surgeon undertakes an extra procedure on the lateral (outer) side of the knee in patients who are younger and perform pivoting sports (football/netball) the results are significantly better. The knees tend to feel more stable and the re rupture rate is lower. But it is a procedure that may be uncomfortable and has a risk of bleeding/bruising. It does slow up the initial rehabilitation a little but this may not be a bad thing!!

There are some variants to the LET but Mr O'Leary makes an incision through the skin then cuts a 1cm strip of the iliotibial band (ITB) which is left attached to the insertion point on the tibia. This band of tissue is then passed around the lateral collateral ligament and stitched to itself. The gap in the ITB is then closed with suture.



What should I expect from the surgery?

The aim of the surgery is to prevent the knee giving way and allow individuals to return to sports with a stable knee. However, sometimes the patients sporting aspirations have changed by the end of the rehabilitation and they return to their particular sport at a lower level or a different sport. Only 60% of patients return to sport at the same level.

The new ligament is no weaker than the original but there is a chance of re-rupture of the graft which is the same as rupture of the other knee cruciate ligament. A good or excellent result can be expected in 80-90% of cases. This is dependent on the rehabilitation following surgery and partly dependent on the time elapsed since the initial injury. Those that have their knee reconstructed within about a year of the initial injury appear to do better than those who have struggled for years with an unstable knee.

The long-term outcome in terms of the risk of degenerative arthritis and the factors which predispose to it are still being clarified.

Risks and potential complications of ACL surgery

Common (1-5%)

- Pain

Some discomfort is to be expected following every type of surgery. You will be given medication to control the pain both post-operatively and on discharge.

- Blood clots (Deep Vein Thrombosis)

These can occur in the lower legs following such surgery - although are unusual in the younger, more athletic patients. If such a clot forms, it can occasionally enlarge and move through the blood stream to the lungs (pulmonary embolus) making it difficult to breath (rare). The risk of clotting may be reduced by 'blood thinning' medication but this must be balanced by the risk of bleeding (and bruising) from the bony surfaces post operatively.

- Swelling / Bleeding into the knee

Post operatively blood can collect in the knee joint. In most cases it will be absorbed by the joint itself. Occasionally excess fluid / blood may require an operation to drain the joint.

- Numbness

You may experience some mild numbness on the anterior of your shin close to your scars following surgery.

- Infection

The tibial wound sites may become infected but this usually settles with antibiotics. Very occasionally a further operation may be needed. Antibiotics are given at the time of the surgery and 'deep' infection within the knee joint is rare. If this occurs a further operation will be required to wash out the joint.

- Anterior knee pain

Patients occasionally complain of some pain at the front of the knee on kneeling, squatting etc. This may be more commonly seen with a 'patella tendon graft'. Your physiotherapist will try techniques to reduce this pain which should not affect your participation in sport.

Rare (<1%)

- Unsightly scarring of the skin

Most wounds heal to a neat scar but thickened, red and painful scars may occur especially in patients with darker skin tones.

- Difficulty passing urine

If this persists you may be given a catheter until you are more mobile.

- Damage to the skin under the tourniquet

There may also be numbness of the skin which is usually temporary.

- Compartment syndrome

This is a build up of pressure with the lower leg due to bleeding. It causes significant pain, muscle damage, nerve damage and interruption to the blood supply. If this occurs it requires an emergency operation to release the pressure and prevent further damage.

- Loss of balance / proprioception

Despite it being functionally stable, the knee may feel different for quite sometime. Regular balance exercises and a tubigrip may reduce this feeling.

- Stiff Knee

Stiffness may occur following surgery - especially if performed in the early days following the initial injury. In some patients a manipulation and arthroscopy may be required to break down scar tissue and restore knee movement.

- Severe pain

Pain, stiffness and loss of use of the knee (complex regional pain syndrome) is rare and the cause is unknown. If this happens you may need further treatment including painkillers and physiotherapy. The knee can take months or years to fully recover.

Post-operative procedure / rehabilitation

Day 1 (Day of surgery)

You will return to the ward with a wool/crepe bandage on the knee. Whilst in the recovery area you will usually have a cold compression device fitted to the knee, which helps with pain and prevents early swelling.

You will be visited by your physiotherapist and taught some exercises.

Regular icing will reduce pain and swelling and you should take regular painkillers in order to complete your initial exercises. The physio will get you up on crutches and you will also be issued with a tubigrip bandage to take home.

Prior to discharge from hospital you should:

Have adequate pain control
Be able to achieve a straight leg raise
Have a home exercise programme to continue with until seen in the outpatients department.
Be able to walk competently with 2 crutches (manage stairs if required)
Have an appointment for outpatient physiotherapy later in the week and an appointment with your consultant (6 weeks post-operatively)

Outpatient physiotherapy

Should commence approx. 10 days / 2 weeks post operatively. You should be seen twice a week for the first 6 weeks. Thereafter you will be given home/gym exercises and you will be reviewed weekly/twice weekly dependent on your progress.

You are expected to actively participate in your rehabilitation. The home exercises you are given are performed several times a day and will take up a large portion of your day.

Guidelines for recovery

These ‘timelines’ are not absolute. Progression through rehabilitation will be guided by your performance at each stage. Do not start any of the exercises discussed until shown by your physiotherapist.

At 12 days / 2 weeks

- Removal of stitches by practice nurse

2-4 weeks

- Be able to bend the knee to at least 90 degrees
- Straighten the knee as much as your other leg
- Start work on the static bike (no resistance) or cross trainer
- Start walking without your crutches if you have a good straight leg raise (SLR)
- Possibly return to a sedentary job
- You may take short haul flights if essential
- Start to practice kneeling
- Start gentle weight-bearing exercises

At 4 weeks

- Minimum bend of 100 degrees
- Full hyperextension of the knee equal to the other side
- Minimal swelling

4- 6 weeks

- Can return to light duties if physical job (limited walking)
- May start golf at a driving range (15 minutes initially)
- Start swimming (not breaststroke until 3 months). If knee swells you are over doing it

6 weeks

- Clinic appointment with Mr O'Leary
- You may return to gym under physiotherapist's guidance (no use of leg extension machine)

6-12 weeks

- Restore full range of flexion (equal to opposite leg)
- Jogging on the mini trampoline under supervision
- Single leg strengthening exercises
- Can start free cycling (not off road and initially low gears) and return to golf (10-12 weeks)
- May start resisted exercises for all muscle groups under guidance from your physiotherapist

At 12 weeks

- Clinic appointment

12-16 weeks

- Gentle sport specific training to retrieve skill level and regain confidence. May be started with guidance from your physiotherapist.

At 24 weeks

- Clinic appointment : Assess timing of return to specific sport

Week 20 +

Increase sports specific training-changes in direction etc

? Discharge from physiotherapy Criteria for discharge: No knee swelling
Full mobility
Full muscle strength / function
Full proprioception (equal or better than the other leg)
Able to perform sport specific exercise

At 1 year

Clinic appointment

Return to work

As a guide you can expect to return to office work about 2/3 weeks after surgery when discomfort and travel to and from work allows. If you have a physical job but are able to carry out light duties that involve limited walking, you may return to work at 4-6 weeks. If your job is more physically active than this, it may take anything up to 3 months to return to work, particularly if it involves squatting or heavy lifting.

Return to Sport

It should be remembered that full return to unrestricted sporting activity is progressive with your rehabilitation, not an isolated event. It is advisable to complete 3 to 4 months of training to rebuild skill acquisition prior to your first competitive game. This training period will allow you to gradually rebuild your confidence in returning to sporting activities.

Return to contact sports is dictated by type of sport, ability, fitness and confidence. Minimum of 9 months off.

Driving

You can begin driving short distances between 2-4 weeks provided your rehabilitation is progressing well. Discuss this with your surgeon. You must be able to perform an emergency stop. Also it is advised to check that you are covered by your insurance before starting to drive again.

ACL reconstruction websites

These sites have been chosen to help further understand the extent of your injury and the surgical techniques which are frequently used in repair and reconstruction. They are the less 'commercial' sites and are hopefully easy to navigate around.

www.orthoassociates.com/ACL_Page.htm

www.arthroscopy.com/sp05000.htm

www.genufix.com/ACL_inform.htm

www.wheelessonline.com/ortho/anterior_cruciate_ligament

This site is more relevant to surgeons and health professionals but should still be an interesting read with related articles!