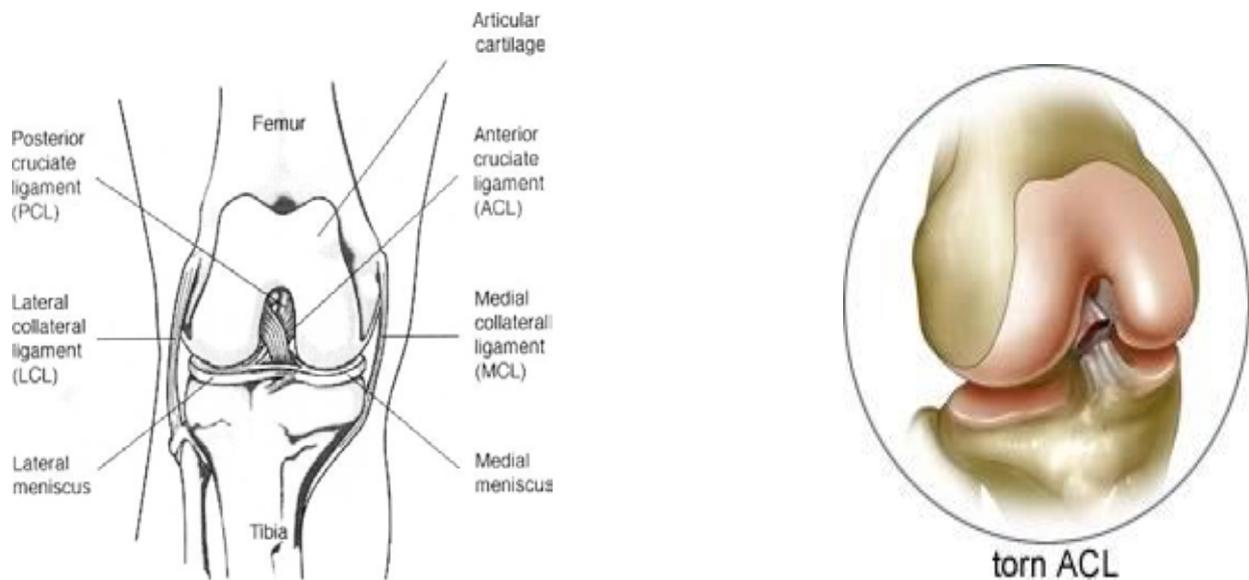


# Anterior cruciate ligament (ACL) reconstruction

## Introduction

Anterior cruciate ligament reconstruction is an operation to replace your torn anterior cruciate ligament (ACL) and restore stability to your knee joint.



The ACL is one of the main stabilising ligaments of the knee and is commonly torn in sporting activities, particularly football, netball and skiing. It also provides significant feedback information to the muscles surrounding the knee allowing coordinated activities. Your ACL cannot repair itself, so when it has been torn (ruptured) it often leaves you with a permanently loose and unstable knee. Sometimes patients may experience pain or an ongoing lack of confidence (proprioception) in their knee.

Not everyone who has an ACL rupture ends up with a problem. The older and less sporty you are, the less likely it is to go on causing trouble. Nevertheless, the majority of people with a rupture of their ligament will notice looseness and will probably wish to have something done about it.

The operation is recommended to overcome clear episodes of giving way which should allow a return to work and sport. There is increasing evidence that by stabilising the knee after such ligament injury, we can protect it from further damage - such as cartilage trouble and possibly osteoarthritis in the future. This is particularly so in children and teenagers but less certain in later adulthood.

### Reasons for not operating

An operation is not recommended if there is any active infection in or around the knee or when there is a lot of other disease such as arthritis within the joint. In such cases any benefit from an operation might be slight. Reconstructing the ACL is not going to cure arthritis or necessarily make it feel more comfortable, unless there is a very pronounced instability component to the problem.

Although the operation can be done on the day of the initial injury, if it is performed in the 'early' weeks following the accident it can, in some cases, lead to pain and stiffness. So we often recommend letting the joint "settle down" for at least six or eight weeks after the accident before going ahead with the procedure. This period of 'pre-operative rehabilitation' can often benefit from a course of physiotherapy which can help to restore a full range of movement and restore some muscle strength and confidence.

### Alternatives to surgery

Stability of the knee can be improved with intensive physiotherapy exercises - not just for strengthening the muscles but more importantly for improving balance and the ability to "hold on to your knee". Some people seem to gain more benefit from physiotherapy than others and in many cases we will have tried this non-operative treatment before recommending the operation.

Bracing is another way of stabilising the knee without surgery and there are purpose made ACL braces which protect the joint and can be very valuable during certain sports. The braces are rather too cumbersome to wear day to day and in some contact sports the braces are banned for obvious reasons. But in sports such as tennis and squash and for skiing and snowboarding, they can be particularly useful if these are the occasions that the knee tends to give out. Wearing a brace does not appear to weaken the knee.

The use of slim Neoprene sleeves appears to improve patients balancing skills very slightly and some people use them but their benefit is very difficult to actually measure.

Leaving a knee unstable and taking part in a lot of twisting and turning sport will increase the risk of further damage to the knee - with cartilage injuries being the commonest problem - and this in turn will probably hasten osteoarthritis. Nevertheless, it has never been proven that surgery protects the joint from arthritis and even with an operation the long-term outlook for the knee is guarded.

### Success rates of surgery

Reconstruction with the techniques described below is well tried and tested now. 90% of patients have a successful reconstruction in that their instability symptoms will be reduced and their ability to get back to more vigorous activities enhanced. However, only 10% of our patients actually say that the knee feels "as good as new". It is therefore common that although there will be an improvement, it may not feel quite as good as it was before the injury. 10% of people fail to get significant benefit from the operation for a variety of reasons. Sometimes, this is due to a complication such as infection or other problems that lead to stiffening of the knee, although this is extremely unusual. Some patients' grafts fail to "take" for reasons which are not immediately clear to us and they just remain unstable. A few

patients have a nicely 'stabilised' knee but lose confidence despite lengthy rehabilitation. They sometimes do not actually feel as if they have been benefited and have not got back to levels of activity they might have wished.

Not everyone with a stable knee gets back to the level of sport they did before and indeed a lot of patients find the injury followed by a reconstruction puts them off going back to the original sport that they injured the joint in.

More specific complications are outlined below:

### The operation

The operation takes approximately one hour and is done with the aid of the arthroscope (keyhole surgery).

In bone-patellar-bone reconstruction, a 1cm wide strip of tendon with a little bit of bone at each end is taken from your kneecap tendon and fashioned into a suitable graft which is passed through the knee and fixed with screws top and bottom to exactly match the original position of the ruptured ligament. There are occasionally remnants of the original ligament still there, some of which can be preserved, but they make little contribution to the procedure and on most occasions most of the remnants have to be removed in order to see the correct positions for the new graft.

The scar required for the middle third patellar tendon is approximately 4 inches long and is vertical, running straight up the centre of the kneecap tendon.

In hamstring reconstruction, a 1½ inch incision (cut) is made over the upper inner part of the shin and two hamstring tendons are retrieved and folded over to form a four strand graft. This is then threaded through in the same way as described above, across the joint and fixed in place with a variety of screws, pins and/or staples to provide a secure fix.

In both cases the keyhole camera (arthroscope) is used to check the rest of the joint for signs of wear and tear and attend to any cartilage trouble either with a stitch or removing a torn fragment.

The wounds are normally closed with stitches and the leg bandaged with simple dressings, wool and crepe bandage. A lightweight cricket pad splint is occasionally used to help stabilise the joint until your muscle function comes back.

### After the operation

In the first day or two after surgery the knee will be sore and you will require some form of regular painkiller, which will be advised and dispensed for you. Pain varies and some people find the procedure more troublesome than others but during this time you will be encouraged to get mobile with the physiotherapists and start your rehab programme.

You will be able to weight bear on your leg and will be mobilised as soon as you are safe and usually discharged from hospital the day after the operation. If performed early in the morning, you may be discharged the same day i.e. as a day case procedure.

Further physiotherapy and post-operative issues are dealt with below.

## Side effects

We define a side effect as an inevitable consequence of the operation but not necessarily of any benefit to you - the obvious example being the scar. Other common side effects that occur after knee ligament surgery are:

- Sensory disturbance around the scar on the inner side of the knee which can be permanent. A slight numbness typically in a “D” shaped area which may stretch for several inches below the scar on the inner side of the leg. It does not lead to any long-term weakness or progressive damage but can be a permanent feature.
- Scar tenderness is not uncommon, particularly in patellar tendon reconstructions, which can lead to long-term difficulty in prolonged kneeling. If your job involves kneeling we would probably have encouraged you not to have this particular variety of the operation.
- It is normal for the knee to be slightly swollen and stiff for several weeks afterwards. Kneecap clicking and crunching is not an uncommon complaint for weeks, if not months, after the procedure before the muscle tone has recovered fully.
- Proprioception. Despite functional stability the operated knee may not ‘feel right’ for a long time. Regular balance exercises and wearing a tubigrip occasionally may help this.

## Complications

Fortunately, serious complications are rare. Infection can occur (less than 1 in 100) and although this potentially could damage the result of the procedure, we have had very few incidents of this occurring. What is a little more common is superficial infection in the wound. If it becomes pink, inflamed and sore it will normally respond to antibiotics either delivered by ourselves or your GP. This complication tends to occur in the first two weeks after the operation and is unusual (less than 5%) but normally fully responds to treatment.

### • Deep Vein Thrombosis – ‘clot in the leg’

‘Blood thinning agents’ are not actually recommended routinely but we do use compression stockings and recommend early active mobilisation following your operation. The most important issues are to tell us beforehand if you are on any medication like the Contraceptive pill or even more importantly, if you have ever had a clot before - which puts you at particular risk. Even with all the treatment clots cannot be absolutely guaranteed not to occur. The usual problem is a painful, swollen calf within a few days to a few weeks after your operation. It is a potentially fatal condition because the clot, if left untreated, can move into the lungs. We have never had a case of fatal embolus but we have had cases of thrombosis which have required patients to come back for assessment, diagnosis and treatment with blood thinning medication. In these rare cases, the result of the operation has not been affected, but of course recovery has been slower and rehabilitation has been interfered with for several weeks.

If you do get a painful, swollen calf in the weeks following your surgery please contact us as an emergency or attend the Emergency Department, rather than wait for the next outpatient appointment.

- Pain

Persistent pain can occur after any knee operation. Most post-operative pain settles down in 48 hours and then an ache continues for a few weeks after exertion. Some people seem to struggle with pain for a little longer for reasons which are not always associated with infection or other obvious cause. There are very rare abnormal pain responses (regional pain syndrome) which can cause this and these have their own specific treatments. If pain becomes a problem, please let us know, in the vast majority of cases, the pain is manageable with simple medication alone.

- Early graft failure

The graft is at its weakest in the first few weeks after your surgery - just as you are beginning to gain your confidence on the leg - and there have been cases when accidents have caused the new graft to rupture. This is very unusual and probably in most cases unavoidable in the circumstances, but it is important to take the advice that we are giving you regarding gradual progression and follow the advice of the physiotherapists. Do not get back to football at a few weeks even if it feels up to it!

- Very rare and extreme risks

All surgery is potentially fatal although the incidence of a serious rare anaesthetic complication leading to death is probably one in tens of thousands and we have never had a fatality in our unit in 15 years of knee ligament surgery. However, it is beyond the scope of this document to identify all the most extreme (less than one in a thousand) risks that you might be prone to but we will be very happy to discuss any worries about specific concerns and also about any family history or your own personal history of problems in the past which are much more relevant.

## Outpatient physiotherapy

This usually starts within the first 1 - 2 weeks following surgery and should be arranged before discharge. You will be given exercises to do for this period between discharge and physiotherapy starting. Typical progress / targets:

### Week 1

#### Goals

- Protect fixation and surrounding soft tissues.
- Diminish swelling/ inflammation.
- Regain active quadriceps and VMO (inner part of quadriceps muscle) control.
- Be able to perform straight leg raise with no lag.
- Restore patella mobility.
- Maintain full knee extension/ hyperextension.
- At least 45° knee flexion.
- Restore normal gait pattern.

## **Weeks 2 – 4**

### **Goals**

- Wean off crutches if good straight leg raise.
- Maintain full knee extension/ hyperextension.
- Gradual increase in range of movement (within limits of pain).
- At least 90° flexion by end of week 2.
- Start kneeling (on padded surface initially).
- Restore proprioception / neuromuscular control.
- Return to sedentary jobs and driving when 'safe'.
- Short haul flights allowed if essential.

## **Weeks 4 – 6**

### **Goals**

- Discard crutches when confident.
- Eliminate any joint swelling.
- Prevent any scar or graft site adhesions (scars sticking down in area where the hamstring graft was taken from).
- At least 120° flexion by end of week 4.
- Full range of movement equal to other side.
- Increase fitness.
- Restore lower limb confidence and function.
- Return to physical work (light duties) at 4 weeks.
- Golf at the driving range and chipping/putting permitted.

## **Week 6: Knee Injury clinic appointment - with x-ray on arrival**

## **Weeks 6 – 12**

### **Goals**

- Swimming but no breaststroke (8 weeks). Can re-introduce breaststroke at 10-12 weeks.
- Jogging on a trampete and running with no pain or swelling.
- Hopping without pain and swelling.
- Maximise strength in a safe manner which does not overstress the graft.
- Improve proprioception / balance reactions.
- Enhance muscular power and endurance.
- Maintain flexibility.
- Can begin cycling on road bike (12 weeks) , use low gears and avoid rugged terrain.
- Able to fly short and long haul as necessary.
- Able to return to the gym (with guidance from physiotherapist but strictly no leg extension machine).
- Can return to golf (10-12 weeks).
- Can return to physically active job (12 weeks).

NB: Exercise will progress during this stage but the graft is at its greatest risk of failure during this stage as it is going through the process of repairing/rebuilding the blood vessels and ligaments.

**Week 12: Knee Injury clinic appointment** – check appropriate progress being made.

### **Weeks 12 – 16**

#### Goals

- Enhance lower limb confidence and function.
- Start agility exercises.
- Start running and gentle sport specific training.
- Increase functional activities and endurance/ general fitness.
- Maintain motivation.
- Functional hop tests (single hop, triple hop and crossover triple hop) to be 75% of other leg. (This may alter if graft taken from this leg.)

### **Weeks 16 – 20**

#### Goals

- Able to hop and jump with good control and no worsening of symptoms.
- Increase speed of balance reactions and improve co-ordination.
- Neuromuscular and strength exercises without difficulty.
- Advice given about returning to your chosen sport and exercises to continue with.
- Functional hop tests (single hop, triple hop and crossover triple hop) to be classified as “normal” i.e. more than 90% of other leg. (This may alter if graft taken from this leg.)
- Prepare physical and psychological ability for complete return to sporting activity.
- Discharge from treatment if appropriate.

**N.B.** Symmetry and good control on landing is essential to try to avoid re-injury to the graft.

**Week 24: ACL clinic appointment** – with KOOS questionnaire / functional scores and discussion regarding return to sport

### **Week 24 onwards**

#### Goals

- Returned to training for chosen sport and may have started to integrate into competitive game dependent on sport and confidence.
- Quadriceps strength 80% of contra lateral limb.
- Enhance physical and psychological ability for complete return to sporting activity.
- Unrestricted confident function.

**Week 52: ACL clinic appointment** – with KOOS questionnaire / functional scores, discussion re outcome and future

**Goal**

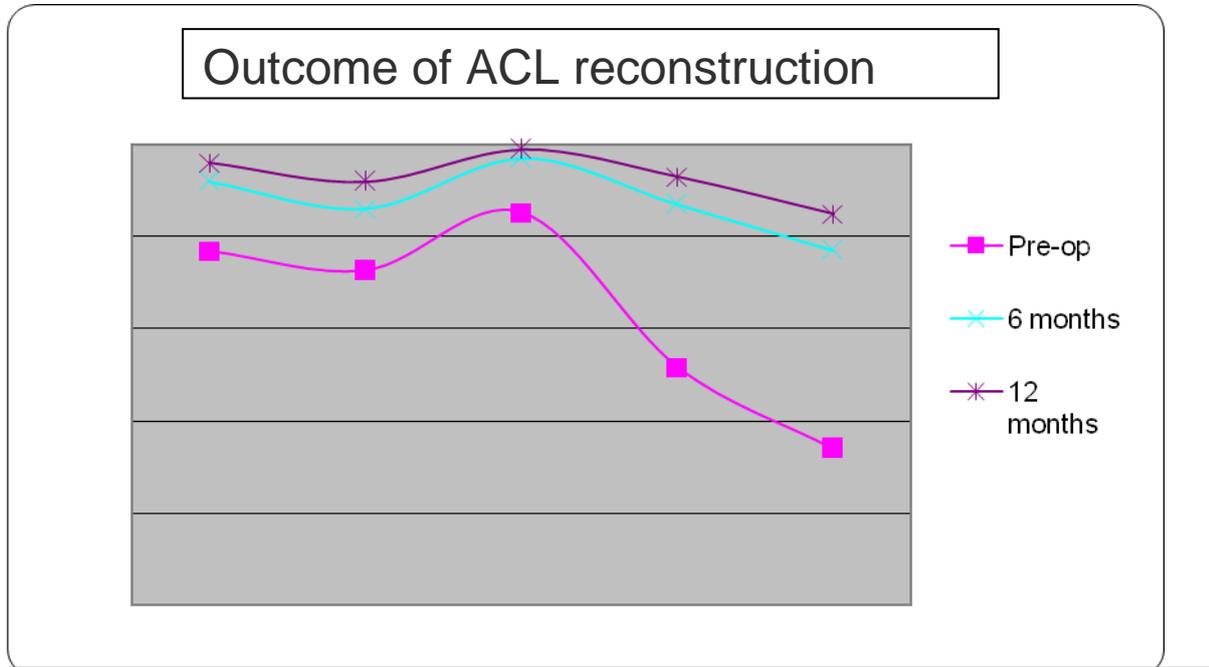
- Return to full sporting activity without problems.

**N.B.** Return to full sporting activity is not generally advised before one year post operatively due to the increased risk of re-rupture of the graft prior to this (unless advised otherwise). 3 months training is advised prior to return to full competition to retrieve skill levels, fitness and confidence.

**Post-operative progress**

As listed above you will be reviewed at regular intervals in the ‘Knee Injury Clinic’ at the Royal Berkshire Hospital by a specialist physiotherapist, who will assess your progress. The most important component of your recovery is your regular attendance at physiotherapy classes where you will be given strict instructions regarding appropriate exercises and the ‘dos and don’ts’.

At certain points before and after your surgery we will be going through one or two questionnaires with you to provide us with information about your functional improvement not only to make sure you are getting better but also to ensure that our surgery has been successful for our own records. A typical pattern of recovery for all patients operated on is shown in the graph below. This illustrates that a ‘full recovery’ may take up to 12 months.



**Long term outlook**

As previously stated, 90% of people get benefit from the operation and are back doing the activities they wish between six and twelve months from the time of the operation - depending on their commitment and their level of sporting activity. The long-term stability of the knee once achieved, seems to last indefinitely with graft failure being unusual unless another

specific injury occurs. Re-rupture of the original graft is relatively unusual. The normal reason for people coming back to the clinic is either a similar injury to the other knee (some people seem to be more prone to anterior cruciate ligament rupture than others) or over 10-15 years after surgery it is not unusual for the development of some osteoarthritis to occur. We are not sure whether this is inevitable in everyone who has had a ligament injury or whether surgery can delay this somewhat but even with a successful stabilising operation, it is possible wear and tear arthritis will ensue at some point in the future.

### Further information sources

An immense amount of information is available on the Internet, but if you find something that is of interest or controversial and you wish to discuss it, we will be delighted to see it and add it to the list if we thought it was useful.

Here are a few you might find useful:

[www.orthoassociates.com/ACL-Page.htm](http://www.orthoassociates.com/ACL-Page.htm)

[www.yourmedicalsource.com/library/acltears/ACL-whatish.html](http://www.yourmedicalsource.com/library/acltears/ACL-whatish.html)

[www.arthroscopy.com/sp5000.htm](http://www.arthroscopy.com/sp5000.htm)

[www.genufix.com/ACL-inform.htm](http://www.genufix.com/ACL-inform.htm)

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Approved by the Knee Research and Audit Group (KRAG), Royal Berkshire Hospital, Reading. In accordance with "Best practice for primary isolated ACL reconstruction", British Orthopaedic Association 2009

For more information about the Trust, visit our website [www.royalberkshire.nhs.uk](http://www.royalberkshire.nhs.uk)

**This document can be made available in other languages and formats upon request.**

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