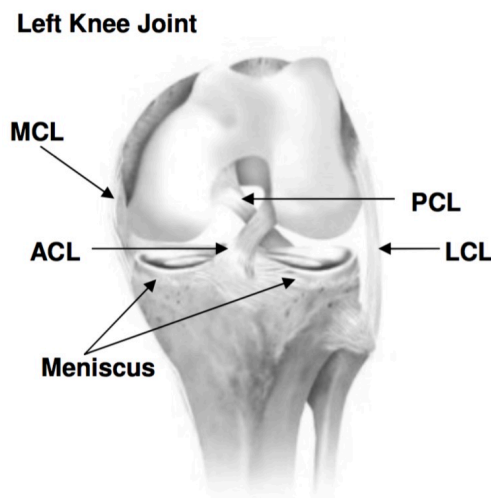


# Patient Information And Rehabilitation Guidelines Following Revision Anterior Cruciate Ligament Reconstruction

This booklet aims to improve your understanding of the procedure of revision reconstruction anterior cruciate ligament (ACL) and the rehabilitation afterwards.

## Anatomy



The knee joint lies between the femur (thighbone) and the tibia (shinbone). The ACL runs from the front of the tibia to the back of the femur.

It is one of the main restraining ligaments in the knee and acts to prevent excessive forward movement of the tibia.

Its main function is to give the knee stability during rotational movements like twisting, turning and sidestepping.

Initial ACL injury is most likely to be a mechanical injury caused by a non-contact twisting movement. However, failure of the initial reconstruction graft may have other contributing causes in addition to the mechanical trauma.

These include infection, malposition of the graft at time of first operation or biological failure which can be simply described as rejection of the implanted graft (like what happens in organ transplantation)

For traumatic causes of graft failure, a tearing or popping sensation is frequently reported at the time of injury and immediate swelling is common.

Other causes (eg infection and biological failure), can present as recurrence of the initial pre-operative symptoms like giving way of the knee.

Injuries to the joint surfaces (articular cartilage) or menisci (footballer's cartilage) can also occur at the same time.

The ACL also plays an important role in balance. When it has been torn, it is unable to heal and the balance information it carries is also lost. Sometimes, these balance mechanisms can be improved with specific exercises that will stop the knee giving way.

However, when the exercises are not enough, then revision (repeat) reconstruction of the ACL may become necessary.

## Aim of the Operation

Surgery is designed to allow individuals to return to their normal function and, possibly, sporting activities. It should help stabilise the knee and stop the knee from buckling or giving way. However, the results can be unpredictable.

Outcomes of repeat reconstruction procedure are not as promising as first reconstruction. All published reports showed higher incidence of complications in patients with repeat ACL reconstruction procedure when compared to patients having their first reconstruction procedure.

Our previous patients experienced improvement in their quality of life, activities of daily living, knee function and stability. Those who presented with pain only as an indication for repeat reconstruction did not have marked pain relief after the procedure.

Some athletes were able to get back to sports while others opted for less aggressive sports for fear of a third re-rupture.

Reconstructed ligaments can never totally replace the function of the original ligament and therefore **at least 6 months of rehabilitation is needed following surgery.**

'Wear and tear' arthritis is associated with ligament injuries and is not necessarily prevented by ligament reconstruction surgery.

## The Procedure

This operation involves removal of the previous tendon graft, preparation of the joint for and implantation of a new graft which is usually taken from tissues around the knee.

The middle third of the patella tendon (the tendon between your knee cap and the shin bone) and the hamstring tendons are most common. These are equally strong and give similar long-term results.

The patella tendon incision is on the front of the knee and is around 10cms in length. Hamstring grafts tend to be used for those who have to kneel in their job or sport, or have existing pain at the front of their knee.

The incision is on the upper and inner side of the tibia and is around 5cm in length. Having a previous reconstruction will leave your knee lacking one of the graft options.

Alternative graft options include Quadriceps tendon which is the tendon of quadriceps muscle as it gains attachment to the upper pole of the Patella (Knee cap).

This is usually harvested from the muscle without affecting the quadriceps muscle power.

After a quadriceps tendon graft you may notice some loss in size of your quadriceps muscle which is regained in most of the patients with exercise and physiotherapy.

Quadriceps tendon graft can be as strong as the previous 2 graft options and incision will be on the front of the knee in a higher position than the patella tendon graft.

Another graft option is using Allograft tendon which is a tendon harvested from a dead organ donor.

The Achilles tendon (at the back of the ankle) is most commonly used. These are usually the last resort for the operating surgeon as there might be slightly higher risk of rupture or failure of graft incorporation as an immune graft rejection by the patient's body.

An example of graft options is; for a knee with hamstring graft used in the previous reconstruction and your job requires kneeling, harvesting a hamstring tendon graft from the other knee might be the best option for you.

Patients with previous problems affecting both knees may require an allograft. The graft option will be thoroughly discussed with you before the procedure.

The surgery itself is done under general anaesthesia and takes around 2 hours. If any other structure has been damaged, for example, a meniscal cartilage, then it is usually dealt with at the same time. This, however, may only be apparent at the time of surgery.

If the knee is very inflamed, during examination, in theatre, the ligament reconstruction may need to be delayed to avoid excessive knee stiffness afterwards. This would mean a second surgery would be required when the knee is less inflamed.

The tendon graft is held in place to the femur and tibia by screws or buttons.

Screws from initial reconstruction (or their tunnels) might hinder placement of screws to fix the new graft. In this case old screws are removed and tunnels filled with bone graft. This might be another cause of a two stage procedure with the second surgery performed once the bone graft is healed with normal bone.

Tunnels are made in the tibia and femur and the tendon graft is passed into the knee. It is held in place with either screws or buttons.

These materials do not usually need to be removed unless they are causing problems. This could be done at a minimum of 12 months after surgery.

## Complications

Complications do occur. Some are minor but others may require further surgery. Risk of complications with repeat reconstruction operation is higher than that with the initial (primary) operation (29.16% vs. 13.5%). It is important you understand this before undertaking surgery. Examples include:

Complication	Recorded in literature	Professor McNicholas' cases
Anaesthetic risks (discussed with your anaesthetist)	6.4%	Not recorded
Deep Vein Thrombosis (clot in the calf)	1-5%	0.5%
Pulmonary embolism (clot in the lung)	0.2%	0.5%
Graft failure	12.5%	2.3-3%
Superficial wound infection	4.16%	1.6%
Septic arthritis (infection in joint)	0.25%-1.7%	1.2%
Complex regional pain syndrome (an abnormal pain reaction to surgery)	1-2%	0.5%
Inability to return to full sporting activities	5-15%	7%
Arthrofibrosis (knee joint stiffness)	1-4%	1%
Further surgery to cartilage	12.5%	7.8%
Removal of metalwork	1.3%	5%

Any surgical intervention can theoretically result in mortality (death), it is extremely rare for this to happen for this procedure but recent legal rulings have mandated this be mentioned.

## 'Pre'-habilitation

Rehabilitation can begin **before your surgery**. It is important that you have full knee range of motion and good quadriceps and hamstrings strength.

It is your responsibility to work alongside the Physiotherapists to rehabilitate your knee.

The Physiotherapy Dept. at University Hospital Aintree typically provides treatment for ACL patients within their gymnasium. Morning, afternoon and evening appointments are available.

Exercises at this stage are similar to those prescribed after ACL reconstruction surgery.

## Rehabilitation

The **surgery will be unsuccessful without a properly supervised exercise programme**. It is important that you are aware of this and prepared to follow a programme for **6-12 months** in order to obtain the best results from the surgery. It may take 9-12 months before you are able to return to sports.

Initially, exercises are aimed at increasing movement of the knee joint, reducing pain and swelling and gentle strengthening. This progresses to training muscular endurance, functional strength and balance. Later in the programme the exercises are tailored towards a return to your chosen sport(s).

## Pre-operative Assessment

An assessment of your fitness to undergo surgery including a detailed medical history, height, weight, blood pressure and pulse will be performed before surgery. Blood tests and a heart trace (ECG) may also be needed.

## The Day of the Operation

You are asked not to drink or eat anything for at least 6 hours before your operation.

You will be seen by your Anaesthetist and a member of the surgical team before your operation.

In the anaesthetic room, you will have a needle put into your arm and will be placed on an anaesthetic machine.

Surgery usually takes around 1 hour.

You will wake-up in the theatre recovery room. On return to the ward you will have the following:

- Dressings – wool and crepe bandage on the knee and a brace to limit knee movement.
- Drips and drains – there may be small tubes in the back of your hand. You might also have a tube into your bladder (catheter).
- Analgesia – this may be oral medication or patient controlled analgesia (PCA), which looks similar to a drip.

Exercises are to commence as soon as you are able to as this aids circulation and helps reduce blood clot formation.

Exercises include vigorous movement of toes and ankles, quadriceps and hamstring tightening and gentle knee bends.

Your leg may be placed on a machine that helps to bend and straighten your knee for you (CPM).

Mobilise with crutches taking as much weight through your operated leg as pain allows.

You can be **discharged from hospital if progressing well, managing exercises, and safe on the stairs.**

## Discharge Instructions

The wound is to be kept dry until healed and the dressing is not to be disturbed unless soiled and a clean one applied. Regular ice application (10-15mins every 1-2 hours).

You will be given pain relieving medications to take home with you, please take these as prescribed to prevent pain from building up to a level that is hard to control.

Physiotherapy appointment arranged. Expect bruising in the thigh and lower leg.

Remember your scar is highly susceptible to the sun, and use of a higher factor sun block is advised.

## General Advice

**Return to work** will depend greatly on the job that you do (desk-based jobs 2-4 weeks; manual jobs 6-12 weeks; jobs requiring ladders etc. 3-4 months).

**Return to driving** at 6 weeks for manual geared cars and automatic cars if it is the right leg that has been operated on. If it is the left leg that has been operated on, you may drive an automatic car once the wounds are healed at 2 weeks.

You should notify your insurance company of the procedure that has been undertaken to ensure that your cover is valid. For further information follow this web link: <https://www.gov.uk/driving-medical-conditions>

**Flying** is not permitted for 8 weeks following surgery due to a higher risk of developing a blood clot. For further information follow the web link below: <http://www.nhs.uk/chq/Pages/2615.aspx?C%20ategoryID=69>

## Long-term follow up

You will be seen regularly post-operatively (3, 6, 12 months, 2, 5, 10 and 15 years). Your knee will be examined and questionnaires completed. This data will be provided to the National Ligament Registry: <http://www.uknlr.co.uk/patient-information/>

We monitor results of this surgery to provide information on our performance. We would be grateful for your co-operation to enable us to further improve our knee service.

If you change address in the future could you please inform us so that we can continue your post surgery follow-up.

## Rehabilitation (Physiotherapy) Programme

It is difficult to predict how an individual revision ACL patient's rehab will be, until the procedure has been performed. The following is how most revisions can be rehabilitated, but some programs may need to be quite different.

If a second ligament reconstruction has been required (for example a posterolateral corner reconstruction) then the rehab program of that procedure may take precedence.

It can be useful to put ice on your knee for 10-15 minutes at the end of exercise sessions.

The following basic exercises can be performed daily. They have been split into stages depending on the length of time from your operation. All exercises should be pain free or uncomfortable (at the most) when performed. If you have any problems with them please consult your Physiotherapist.

### 0-2 weeks

The aim of this phase is to regain range of movement and start balance re-education.

Knee swelling should start to settle and pain and swelling are used as a guide to how much activity the knee can tolerate.

Continue with pain medication as required and keep the leg elevated at home.

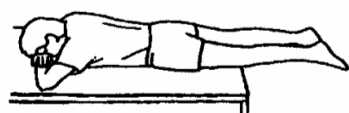
Don't do too much walking for long periods as this will make your knee swell and it will be harder for you to maintain your knee bending and straightening.

### The goals that you should aim to achieve by 2 weeks are:

- Healed surgical wounds
- Minimal swelling
- Walking without a limp
- Knee fully straight and bend to 110°

### Exercises - 0-2 weeks

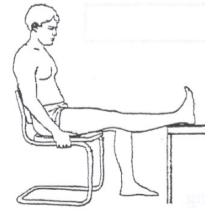
1. Long sitting. Put a band around your foot. Bend your knee as far as possible. Pull the band to bend your knee more. Hold 5 secs. Repeat 10 times.



2. Lying face down on a bed with your feet over the edge. Let the weight of your feet straighten your knees. Hold 15 seconds. Repeat 10 times.

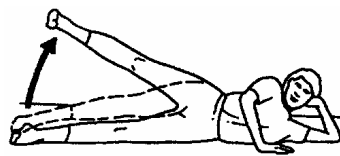


3. Sitting on a chair, with your leg supported on a chair. Let your leg straighten in this position. Hold 15 seconds. Repeat 10 times.



4. Sit with leg straight and relaxed. Push your kneecap from side to side. Hold 5 seconds. Repeat 10 times.

5. In lying with leg straight. Lift your leg 2-3 inches only keeping knee straight. Hold 5 secs. Repeat 10 times.



6. Lying on your side supporting yourself on your elbow. Use top arm to support yourself. Keeping top leg straight and lift it up towards the ceiling. Make sure the leg stays in line with your body and toes point forwards. Repeat 20 times.

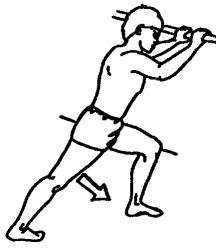
7. Lying on your back with knees bent and feet on the floor. Lift your pelvis and lower back off the floor. Hold the position. Lower down slowly returning to starting position. Repeat 20 times.



8. Lying on your side with top leg bent in front of lower leg and the foot on the floor. Use top arm to support yourself in front. Lift lower leg from the floor keeping toes pointed forwards. Return to starting position. Repeat 20 times.

9. Stand. Push up on your toes. Repeat 30 times.





10. Stand in a walking position with the leg to be stretched straight behind you and the other leg bent in front of you. Take support from a wall or chair. Lean your body forwards until you feel the stretching in the calf of the straight leg. Hold approx 15 seconds. Repeat 5 times.

11. Stand on your operated leg. Use light fingertip support if needed. Aim to repeat for 30-60 secs.



## 2-6 weeks

The aim of this phase is to begin balance activities and light strength and endurance training. At this stage, knee control is more important than strength.

**The goals that you should aim to achieve by 6 weeks are:**

- Full range of movement
- Balancing on one leg equal to other side
- Able to squat on one leg and step up with control
- Minimal activity related swelling

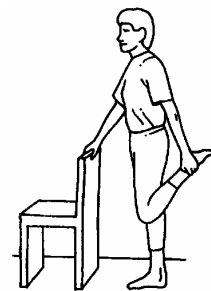
## Exercises - 2-6 weeks

12. Lying face down with your hips straight and knees together. Bend your knee keeping ankle flexed. You can do this exercise with a weight or a rubber exercise band around your ankle. **Hamstring grafts should begin this exercise at 6 weeks post-op.**



13. Stand with the leg to be stretched on a step/stool. Bend your ankle up and keep your knee straight. Then bend your upper body forwards from your hips keeping your back straight. Feel the stretching behind your knee and thigh. Hold approx 15 seconds. Repeat 5 times.

14. Stand holding on to a support. Bend one knee and take hold of the ankle. Do not lock the knee of the leg you are standing on. Draw your heel towards your buttock. Tilt your hip forwards so that your knee points towards the floor. Feel the stretch in the front of your thigh. Hold 15 seconds. Repeat 5 times





15. Sitting with your arms at your hips. Stand up and then sit down slowly on a chair. Repeat 20 times.



16. Stand in front of a 20-40cm step. Step up 20 times. Keep the operated leg on step. Repeat 3 times.



17. Stand leaning with your back against a wall and your feet about 20cm from the wall. Slowly slide down the wall until your hips and knees are at right angles. Return to starting position. Repeat 10 times.

## 6-12 Weeks

At 6 weeks the graft fixation will be more secure within the femur and tibia enabling more vigorous strength training to begin.

Hamstring graft patients can start hamstring curls with weight as comfort allows.

Balance exercises can be progressed (trampet, cushion and wobble board).

You can now use the rower, stepper and begin road cycling. You can return to your own gym to increase strength and endurance.

## The goals that you should aim to achieve by 3 months are:

- More equal strength and endurance in all leg muscles.

18. Stand sideways on a step with non-operated leg hanging over the edge of the step. Slowly bend your operated knee allowing your other foot to brush the floor. Repeat 10 times x 3.



19. Stand on one leg on a step facing down. Slowly lower yourself by bending your knee to 30 degrees. Return to starting position. Repeat 10 times x 3.

20. Lying on your back with operated knee bent, other leg straight. Lift your hips up and hold. Repeat 10 times and repeat x 3.



### **3-6 months**

Running and twisting manoeuvres are now introduced gradually, building up to light sports.

Attendance at a gym is encouraged until leg strength is equal. Physiotherapy becomes more specific to your occupation and/or sports.

Manual work should be possible within the restraints of the occupation.

### **The goals that you should aim to achieve by 6 months are:**

- Leg now returning to near normal function
- Return to non-contact sport/training. Return to contact sport is recommended when the leg has at least 85% the strength of the other leg

## **VTE (blood clots)**

VTE is a collective term for two conditions:

- **DVT** (deep vein thrombosis) – this is a blood clot most commonly found in a deep vein that blocks the flow of blood.
- **PE** (pulmonary embolism) – a potential fatal complication where a blood clot breaks free and travels to the lungs.

Whilst you are less mobile, especially during the first few weeks following your procedure, the risk of VTE is higher because of your immobility.

Professor McNicholas may prescribe you a daily injection of Clexane to help thin your blood and these should last approximately 14 days. If this is needed, you will be shown how to inject this drug yourself.

### **Symptoms:**

- Swelling – you will have some swelling due to your surgery but if you have any concerns please call for advice
- Pain – any new pain we want to know about
- Calf tenderness
- Heat and redness compared with the other leg
- Shortness of breath
- Chest pain when breathing in

## **Things you can do to prevent VTE**

- Move around as much as possible. Be sensible though, short and regular movement is best
- Drink plenty of water to keep yourself hydrated
- We strongly advise you not to smoke – this will have been discussed in pre op but we can also refer you to our smoking cessation team within the Hospital.
- Move your ankle around as much as possible to keep your calf muscle pumping

**Small preventative measures can have a huge impact on your recovery.**

Written by: Mr Samer Mahmoud, Orthopaedic Physiotherapist Specialist  
Mr P Ellison, Orthopaedic Physiotherapist Specialist  
Mr Richard Norris, Orthopaedic Physiotherapist Specialist  
Professor MJ McNicholas, Consultant Orthopaedic Surgeon

Edited by: Miss F Rashid, Orthopaedic Registrar

Date last reviewed: April 2016