

Patient Information And Rehabilitation Guidelines Following Anterior Cruciate Ligament Reconstruction Performed By Professor McNicholas

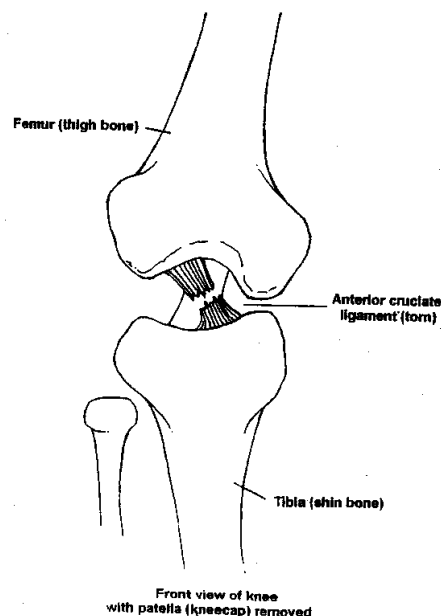
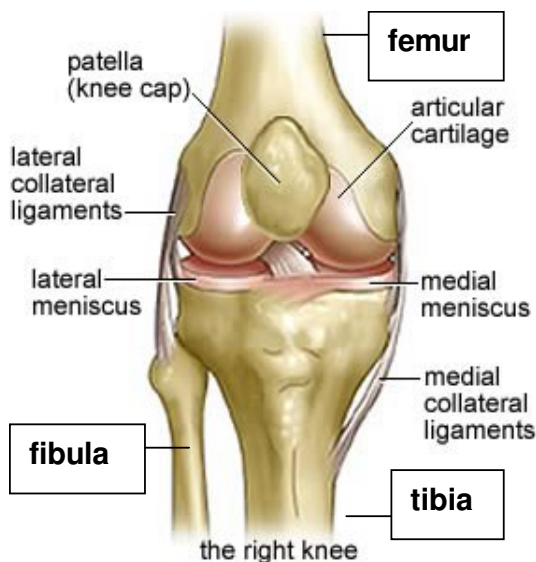
This booklet aims to improve knowledge and understanding of the rehabilitation involved after anterior cruciate ligament reconstruction. It includes basic anatomy and information about the operation itself.

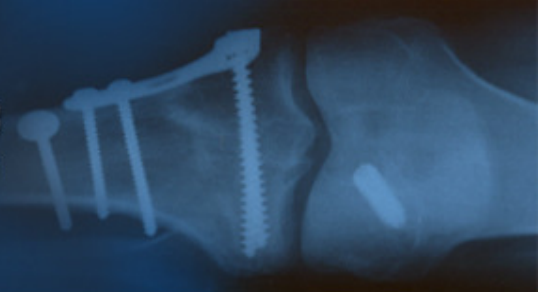
Background Anatomy

The knee is a complicated joint between the femur (thighbone) and the tibia (shinbone). The anterior cruciate ligament (ACL) runs from the back of the femur to the front of the tibia. 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.

The ACL is most likely to be injured in a non-contact twisting movement. A tearing or popping sensation is frequently reported at the time of injury and immediate swelling is common due to bleeding from the ruptured ligament. Injuries to the joint surfaces (articular cartilage) or menisci (footballer's cartilage) can also occur at the same time.

The ACL also provides important information about balance to the joint and surrounding muscles. 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 and stop the knee giving way. However, when the exercises are not enough, then reconstruction of the ACL may become necessary. It must be said that reconstructed ligaments can never totally replace the function of the original ligament.





The Operation

The Aim of Surgery

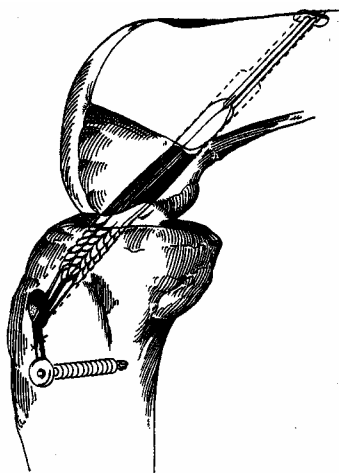
The surgery is designed to allow individuals to return to their normal function and sporting activities. It should stabilise the knee and stop the knee buckling or giving way. However, the results can be unpredictable.

Published reports indicate 85 – 90% of people consider their knee to be functioning normally or near normal after surgery.

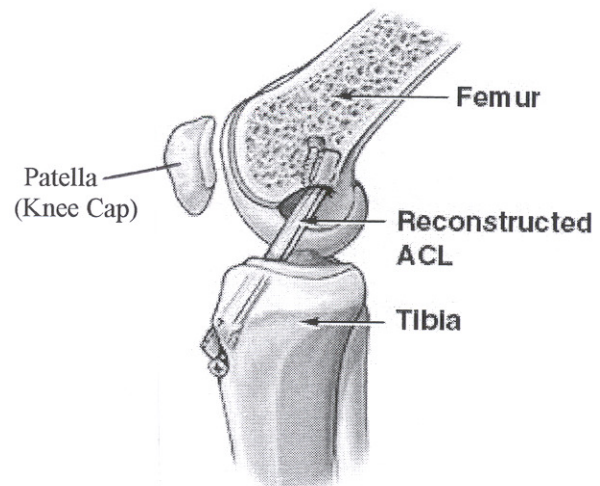
The reconstructed ligament is not the same as the original but appears to give satisfactory results. Wear and tear arthritis is associated with ligament injuries and is not necessarily prevented by ligament reconstruction surgery.

The Procedure

The operation to reconstruct the ligament involves replacing it with a graft taken from tissues around the knee. The two commonly used are the middle third of the patella tendon or the hamstring tendons.



Hamstring Graft



Patella Tendon Graft

Both are equally strong and give similar long-term results, but the patella tendon graft is the more traditional. The incision for this procedure is down the front of the knee and 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 front and inside of the knee and is around 5cm in length.

Ultimately, the decision on graft selection is made by you, the patient, based upon advice from Mr McNicholas.

Patient Information

The surgery itself is done under general anaesthesia and takes around 1-2 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 was less inflamed.

Tunnels are made in the tibia and femur and the 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. It is important you understand this before undertaking surgery. Examples include:

Complication	Recorded in Literature	Recorded at Warrington Hospital
Anaesthetic risks – will be discussed with you by your Anaesthetist.	Not reported	Not reported
Failure to provide sufficient stability to be able to return to full sporting activities.	5%	Not reported
Deep vein thrombosis – ‘clot in the calf’.	3%	0%
Pulmonary Embolism – ‘clot in the lung’.	Not reported	0.5%
Graft failure.	2%	5%
Superficial wound infection.	1%	5%
Infection in joint (septic arthritis).	0.1%	1%
Reflex Sympathetic Dystrophy (RSD). (An abnormal pain reaction to any surgery, which may need prolonged physiotherapy or pain clinic).	1%	0.5%
Arthrofibrosis (knee joint stiffness)	1%	1%
Further surgery to cartilage.	Not reported	11%
Removal of metalwork.	Not reported	3%

Rehabilitation

The rehabilitation following surgery is of great importance.

The surgery will be unsuccessful without a proper supervised exercise programme.

It is important that you are aware of this and prepared to follow a programme for at least 6 months in order to obtain the best results from the surgery. It may take 9 months before you are able to return to sports. Initially, exercises are aimed at



Patient Information

increasing movement at the knee joint, normalising walking patterns, reducing pain and swelling and starting balance exercises.

The graft needs time to heal and the exercises are designed to strengthen the leg muscles without placing unnecessary stresses on the healing graft. Exercises are generally performed with the foot in contact with the floor or weights machine. As knee control improves, the exercises are progressed.

Many factors influence the success of surgery and it is hoped that this information will help towards optimising results.

ACL Rehabilitation Pre-operatively

Rehabilitation begins before surgery to ensure you and your knee are ready for an operation. It is important to have full range of movement and good quadriceps and hamstring strength. Usually, you will have attended an ACL Deficient Class but continue to have problems with instability.

You will have been examined by Mr McNicholas and had an opportunity to ask questions. You will attend a pre-operative assessment to determine fitness for anaesthesia including a general health check and blood tests.

You will complete questionnaires and documentation so that outcomes can be monitored.

The Day of the Operation

You will be seen by the Anaesthetist to ensure you are still fit for anaesthesia. Post-operative pain management will be discussed. On return to the ward, you will have the following:

Dressings – wool and crepe bandage on the knee and a splint to keep the knee straight.

Drips and drains – there will be small tubes in your knee and into the back of your hand. You might also have a tube into your bladder (catheter).

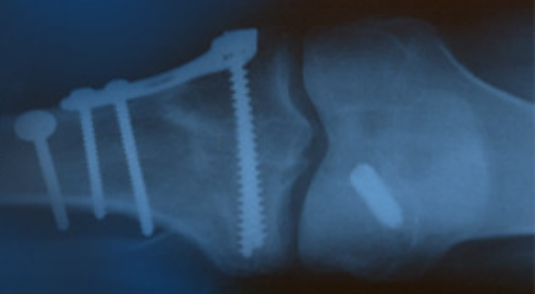
Cryo-cuff – an iced water compression cuff on the knee to help reduce pain and swelling.

Analgesia – this may be oral medication or patient controlled analgesia (PCA), which looks similar to a drip. You can, within limits, give yourself painkillers.

Exercises – to commence as soon as you are able to aid circulation and help reduce blood clot formation. These include vigorous movement of toes and ankles, quadriceps and hamstring tightening and gentle knee bends.

Post-op – Day 1

- Dressings removed and clean ones applied.
- Drain removed.
- PCA removed, usually in the morning. Alternative painkillers to be prescribed.
- Cryo-cuff use continued.
- Continue with exercises and increase knee bending with the aid of a sliding board. Add straight leg raise and knee straightening (heel on towel).
- Mobilise with crutches and take as much weight through the operated leg as is tolerated unless instructed otherwise.
- Avoid active exercise with the leg off the floor from 30° knee bend to fully straight for the first 6 weeks.



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- Can be discharged from hospital is progressing well, managing exercises and safe on stairs.
- You will go home in a knee splint if unable to straight leg raise.
- You should attend for outpatient physiotherapy 5-7 days after discharge and be able to flex the knee 60-90° at this first appointment.

Discharge Instructions

- The wound is to be kept dry until healed and the dressing can be changed if soiled. A District Nurse may be organised by the Ward if needed.
- Regular ice application.
- Physiotherapy appointment arranged.
- Return to work:
- Sedentary jobs 2-4 weeks
- Manual jobs 6-12 weeks
- 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.
- Expect bruising in thigh and lower leg.
- Remember you scar is highly susceptible to the sun and use of a high factor sun block is advised.

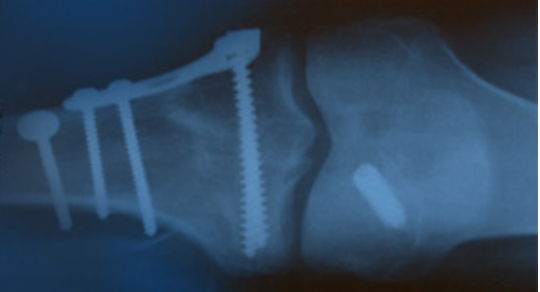
Discharge Goals

- Knee fully straight and able to straight leg raise (if unable to SLR, wear knee splint).
- Aim for 90° of flexion (knee bend).
- Independent on crutches and safe on the stairs.
- Discomfort controlled with medication.

Out-Patient Exercise Programme

After attending individual physiotherapy sessions, you may be transferred to an ACL class in the gym. This is usually somewhere between 2-6 weeks post-operatively depending on your progress. The classes **will be hard work**. To enable you to monitor your progress, you should keep a record of repetitions and weights and always aim to beat your previous scores (unless advised otherwise).

The classes are based on a timed circuit and exercises are progressed, as they become easier to perform. Most of the exercises can be modified so they can be performed at home. You will attend the gym once a week, but it is important you continue with **daily rehabilitation exercises**. It can be useful to put ice on your knee for 10-15 minutes at the end of exercise sessions.



Patient Information

The above is based on having had a routine ACL reconstruction. Modification of these guidelines may be necessary if your surgery is more complex and this will be done via your Physiotherapist under the instruction of Mr McNicholas.

All the following exercises are to be performed daily. They have been split into different stages depending on the time from your operation. All exercises should be pain free when performed. If you have any problems with them please consult the Physiotherapist who is looking after you.

WEEKS 0-2

Aims

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.

As a general rule, you should stay house bound for the first week and concentrate on range of motion and reduction of swelling. Exercises 1, 2, 5 and 8.

Example Exercises

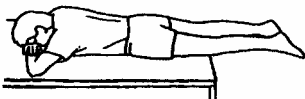
- Patella mobilisations.
- Balance training.
- Static bike as knee bend permits.
- Exercises 1-12.

2 Week Goals

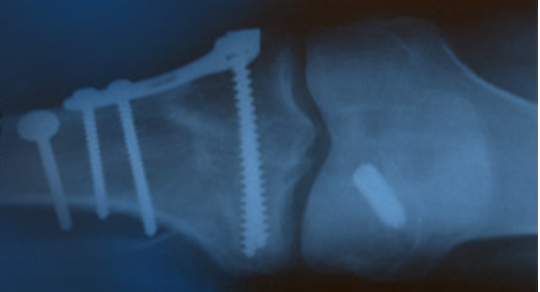
- Wound healed.
- Minimal swelling.
- Walking without limp.
- Flexion - 110°.
- Reviewed in clinic. Clips out in clinic at 10-14 days. When puncture wounds have healed, massage with a moisturising cream 3 times per day until scar is mobile.

Exercises – 0-2 weeks

1.



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.



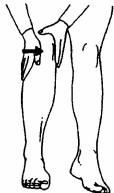
Patient Information

2.



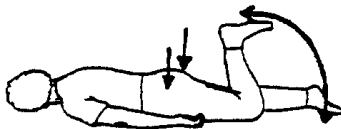
In lying/sitting with leg straight. Lift your leg 2-3 inches only keeping knee straight. Hold 5 seconds. Repeat 10 times.

3.



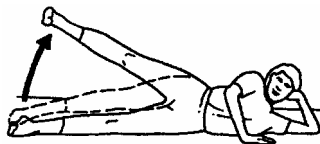
Sit with leg straight. Push your kneecap towards your opposite leg. Hold 5 seconds. Repeat 10 times.

4.



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 (not hamstring graft). Hamstring grafts need to keep this exercise comfortable and reduce the range of movement.

5.



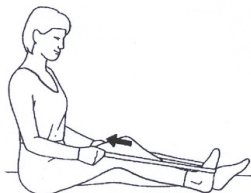
Lying on your side supporting yourself on your elbow. Roll top hip slightly forward, use top arm to support yourself in front. Keeping top leg straight lift it up towards the ceiling. Make sure the leg stays in line with your body and toes point forwards. Repeat 20 times.

6.



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.

7.



Long sitting. Put a band around your foot. Bend your knee as far as possible. Gently pull the band to bend your knee a little more. Hold 5 seconds. Repeat 20 times.

8.

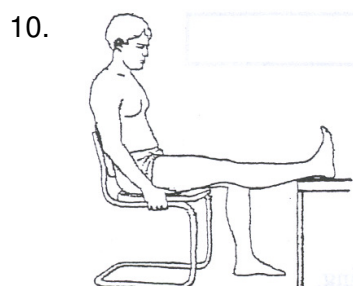


Lying on your side with top leg bent in front of lower leg and the foot on the floor. Roll top hip slightly forwards, use top arm to support you in front. Lift lower leg 10cm from the floor keeping toes pointed forwards. Return to starting position. Repeat 20 times.

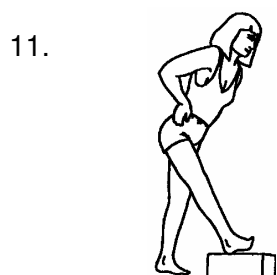
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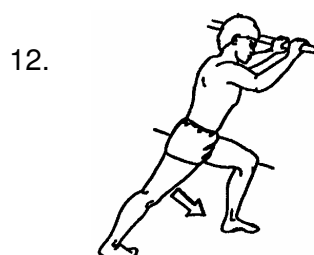
Stand.
Push up on your toes.
Repeat 30 times.



Sitting on a chair, with the leg to be exercised supported on a chair as shown.
Let your leg straighten in this position.
Hold 15 seconds.
Repeat 10 times.



Stand with the leg to be stretched on a step/footstool.
Flex your ankle and push the heel towards the footstool keeping your knee straight.
Then bend your upper body forwards from your hips keeping your back straight. You should feel the stretching behind your knee and thigh.
Hold approx 15 seconds – then relax.
Repeat 10 times.

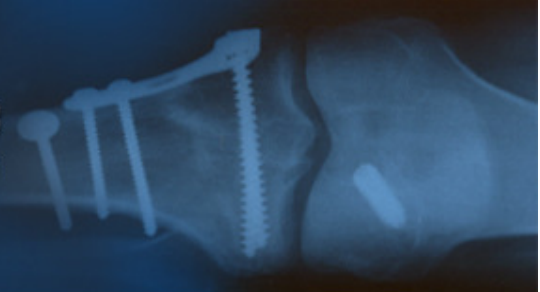


Stand in a walking position with the leg to be stretched straight behind you and the other leg bent in front of you.
Take support from a wall or chair.
Lean your body forwards and down until you feel the stretching in the calf of the straight leg. Hold approx 15 seconds – relax. Stretch the other leg.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

WEEKS 2-6

Aims

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



Patient Information

Example Exercises

- Enter class when you can perform the necessary exercises.
- Progress balance training.
- Leg press.
- Hamstring curls with weight (patella tendon grafts only).
- Step downs.
- Swimming, avoiding breaststroke for 3 months.

Goals

- Full range of movement.
- Balancing on one leg equal.
- Single leg squat and step up can be performed.
- Minimal activity related swelling.
- Reviewed in clinic at 2 and 6 weeks.

Exercises – 2-6 weeks.

13.



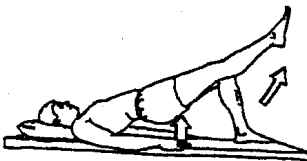
Stand holding on to a support. Bend one knee and take hold of the ankle. Do not lock the knee of the leg you are standing on.

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 10 times.

14.



Lying on your back with operated knee bent, other leg straight.

Lift your hips up and hold.

Repeat 20 times.

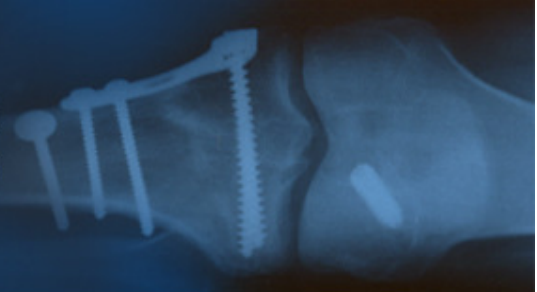
15.



Sitting with your arms crossed.

Stand up and then sit down slowly on a chair. (This can be made easier and more difficult by changing the height of the chair.)

Repeat 20 times.



Patient Information

16.



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

17.



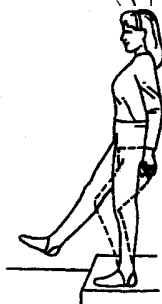
Stand leaning with your back against a wall and your feet about 20cm from the wall.
Slowly slide down the wall until your hips and knees are at right angles. Return to starting position.
Repeat 10 times.

18.



Stand sideways on a step with unoperated leg hanging over the edge of the step.
Slowly bend your operated knee allowing your other foot to brush the floor.
Repeat 20 times.

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 20 times.

WEEKS 6-12

Aims

At 6 weeks quadriceps/hamstrings tone and definition will be poor. The graft fixation, however, will be more secure within the femur and tibia enabling more vigorous strength training to commence.

Example Exercises

- Hamstring grafts to start hamstring curls with weight as comfort allows.
- Progress balance standing on one leg on trampet, cushion and wobble board.
- Walking on treadmill backwards and sideways.



Patient Information

- Can now use rower, stepper and road cycling.
- Commence at own gym to increase strength and endurance.

Goals

- More equal strength in all leg muscles.
- Reviewed in clinic at 3 months.

3-6 MONTHS

Aims

Running and twisting manoeuvres are introduced gradually, building up to light sports. Attendance at a gym is encouraged until leg strength is equal. Manual work should be possible within the restraints of the occupation.

If returning to sports activities, you can attend an advanced class when the first class has been completed.

Example Exercises – Months 3-6

- Running activities can commence.
- Leg extensions.
- Skipping.
- Progress into advanced class.
- Figure of 8 running.
- Shuttle runs.
- Hopping.
- Vertical jumps.
- Return to sports specific training.

6 Month Goals

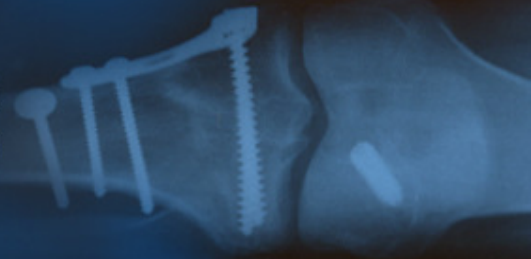
- Leg now returning to near normal function.
- Return to non-contact sport/training.
- Reviewed in clinic.

Sport training is progressed to provide a baseline of strength and endurance for return to full sporting activities. Return to contact sport is recommended when the leg is at least 85% the strength of the other.

Long-Term Follow-Up

We monitor results of this surgery to provide information on our performance. You will be seen post-operatively at:

- 3 months.
- 6 months.
- 12 months.
- 2, 5, 10 & 15 years.



Patient Information

Your knee will be examined at each visit. At the 12 month stage, your knee will be x-rayed and questionnaires completed, which help to gauge your progress. We would be grateful for your co-operation to enable us to achieve our long-term follow-up plans, which will help 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.

Written by: Mrs A Hatcher, Orthopaedic Physiotherapy Specialist
Mr M J McNicholas, Consultant Orthopaedic Surgeon

Date last reviewed: December 2006