

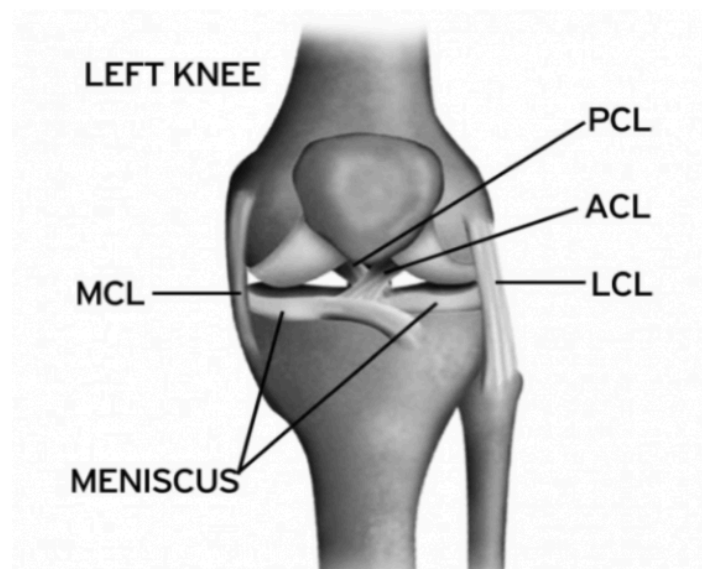
Patient Information And Rehabilitation Guidelines Following Anterior Cruciate Ligament Reconstruction and Postero-Lateral Corner Reconstruction

The aim of this information is to improve your understanding of the reconstruction of your Anterior Cruciate Ligament (ACL) and Postero-Lateral Corner (PLC) and the rehabilitation involved.

Anatomy

The knee joint lies between your femur (thighbone) and tibia (shinbone). There are four main ligaments around the knee:

- Medial Collateral Ligament (MCL) on the inside of your knee and Lateral Collateral Ligament (LCL) on the outside of your knee both prevent excessive sideways movement of the knee.
- The Anterior Cruciate Ligament (ACL) and Posterior Cruciate Ligament (PCL) lie deep inside the knee and limit excessive forwards and backwards movement of the knee. The main function is to stabilise the knee during rotational movements such as, twisting, turning and sidestepping.



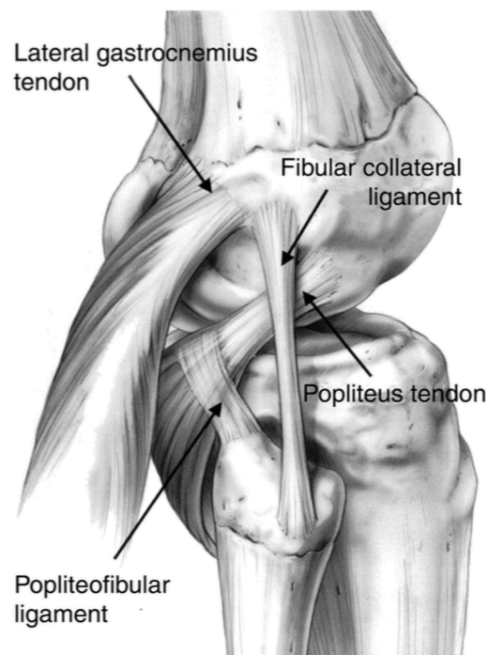
Out of all the ligaments in the knee the ACL is most likely to be injured in a non-contact twisting movement.

A tearing or popping sensation is frequently reported at the time of injury and immediate swelling is common. The ACL plays an important role in balance.

When it is torn, it is unable to heal and the information it carries is lost. Research has found that balance can be improved with specific exercises. However, when these exercises are inadequate, reconstruction of the ACL may become necessary.

There are 2 smaller ligamentous structures which act as reinforcements to the joint capsule and restrict rotational forces. These are:

- The postero-lateral corner (PLC)
- The postero-medial corner (PMC)



The PLC is made up of multiple ligaments which help to stabilise the knee and stop excessive rotation.

Injuries to the PLC are often associated with other knee ligament injuries, especially the posterior cruciate ligament or anterior cruciate ligament (ACL).

The most common way of injuring the PLC is from either twisting or a direct blow from the front of the knee. In some cases, damage to the nerve (Common Peroneal Nerve) may occur as a result of the injury (16%-40% in literature).

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

Whilst it is very common to injure one of the four major ligaments, it is less common to injure multiple ligaments during the same incident.

When this occurs it is called knee dislocation and may require extensive surgery to reconstruct the damaged ligaments.

Aim of the Operation

The surgery is designed to help patients return to their normal functional activities and, possibly, sporting activities.

It should help to stabilise your knee and stop the knee from buckling or giving way. However, results can be unpredictable, especially when more ligaments are involved.

A recently published report showed all patients returned to pre-injury employment and 23 out of 25 (92%) returned to sports, although not necessarily to the same level.

Reconstructed ligaments can never totally replace the full function of the original ligament, and therefore, approximately 12 months of rehabilitation is needed following surgery to get the best possible outcome.

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

The Procedure

The operation to reconstruct the ligaments involves replacing them with grafts taken from tissues around the knee. In severe cases, grafts from both legs may be required.

The ones commonly used are the patella tendon and/or the hamstring tendons. Both sets of tendons are equally strong and give similar long-term results.

The incisions will be either 5cm at the front on the inside of the knee and 10cm at the back on the outside of the knee or 15cm at the front of the knee. A scar on the opposite knee may be made if grafts are needed from that side also.

The surgery is done under general anaesthetic and can take between 1.5-2 hours. If any other structures have been damaged, for example, meniscal cartilage, then it is usually dealt with at the same time. This may however, only be apparent at the time of surgery.

Tunnels are made in the tibia and femur and the grafts are passed into the knee. They are secured with screws or buttons. These materials do not usually need to be removed unless causing problems. This could be done at a minimum of 12 months after surgery.

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

Complications

Complications can occur. Some are minor but others may require further surgery. It is important you understand the risks before undertaking the surgery. Examples include:

Complication	Recorded in literature	Mr McNicholas' cases
Deep Vein Thrombosis (clot in the calf)	10%	1.5%
Graft failure of the PLC	Not recorded	1%
Graft failure of the ACL	Not recorded	2.5%
Septic arthritis (infection in joint)	5 - 7%	0%
Superficial wound infection	5-17%	8%
Complex regional pain syndrome (an abnormal pain reaction to surgery)	0%	3%
Arthrofibrosis (knee joint stiffness)	5-15%	5%
Further surgery to cartilage	6%	8%
Removal of metal work	15-18%	16%
Other surgery	4.5%	8%
Joint replacement	Not recorded	3%
Patella fracture	Not recorded	1.5%
Heterotopic ossification (abnormal bone growth)	17%	0%
Nerve injury during surgery (common peroneal)	6%	0%
Skin flap necrosis	Not recorded	1%

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.

Rehabilitation

Rehabilitation can begin before surgery. It is important you have full range of movement and good quadriceps and hamstring strength.

It is important you work alongside the physiotherapist to rehabilitate your knee. The surgery will be unsuccessful without a properly supervised exercise programme.

It is important you are aware of your contribution to rehabilitation and prepared to follow a programme up to 12 months after the surgery in order to obtain the best results. It may take up to 12 months to return to sport.

There are restrictions in the amount of weight that can be put through your leg and a degree of bend and straightening you can perform after the operation. Initially, exercises will aim to gradually increase the range of movement in the knee joint and reduce pain and swelling.

This progresses to training muscular endurance, functional strength and balance. The exercises are designed to maintain muscle strength as much as possible without placing unnecessary stresses on the healing grafts which require time to heal. Later on in the programme, the exercises are tailored towards a return to your chosen sport(s).

Timescales

0-6 weeks

After surgery your leg will be placed in a splint, replaced later by a long lever brace which needs to be worn 24 hours a day. It is only to be removed for bathing (when the wounds have healed). When bathing, a support must be placed under the knee to stop it from fully straightening.

Great care must be taken when getting in and out of the bath and the brace must be the last thing to be taken off and the first thing to be put back on after your bath.

This brace will restrict your leg bend between 10 and 90 degrees. You will not be able to straighten your knee fully. This will help the ligaments heal and reduces the stress on the metal work that is holding the grafts in place.

For the same reasons, you are not allowed to put any weight through the leg.

6-12 weeks

The brace will be opened to 0°-120°. Your knee will be stiff and it is hard work to get the knee to fully bend and straighten.

The brace must still be worn 24 hours a day but can be removed for exercises, only when it starts to limit the knee bending. It is then replaced for all other knee exercises.

You are now allowed to put some, but not all, of your weight through the leg whilst using the crutches.

12 weeks onwards

Your leg will probably look thinner when compared with the other leg. This is due to the lack of use which causes muscle wasting.

You can now walk without the crutches but you must still wear the brace until your muscles get stronger.

At night, the brace does not need to be worn and you can slowly wean yourself off the brace over the coming weeks. This will happen gradually as your leg gets stronger and you become more confident with your daily activities.

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 1.5 - 2 hours.

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.

Post-op – Day 1

- Dressings removed and clean ones applied
- Drains removed
- Blood thinning injection (Clexane, Deltaparin or other) for 14 days
- Your leg may be placed on a machine which helps to bend and straighten your knee (CPM)
- Continue with exercises and increase knee bending within the brace by using a slide board/towel and a band around foot. Add straight leg raise and knee straightening as brace allows
- Mobilise with crutches taking no weight through the operated leg
- You must avoid active exercises with the leg off the floor from 30° knee bend to fully straight for the first 6 weeks
- You should be given a physiotherapy outpatient appointment
- You can be discharged from hospital if progressing well, managing the exercises, following the precautions and safe on the stairs

Discharge Instructions

- The wound must be kept dry until healed and the dressing is not to be disturbed unless soiled and a clean one applied
- You will be given pain relieving medications to take home with you. Please take these as prescribed to prevent pain building up to a level that is hard to control
- Regular ice application (10-15 minutes every 1-2 hours). Place the ice in a cold, wet flannel to reduce the risk of skin irritation
- Physiotherapy appointment is arranged
- Expect bruising in the thigh and lower leg
- Remember your scar is highly susceptible to the sun, and use of high factor sun block is advised

General Advice

Return to work will depend greatly on the job that you do (desk-based jobs 6 weeks; manual jobs 6 months; jobs requiring ladders etc. 9-12 months).

Return to driving at 12-16 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

Day 1 post-operatively, you will be given a physiotherapy appointment which you should attend in order to get the best possible outcome and a list of exercises that can be done in the first 6 weeks.

After attending your individual physiotherapy training programme, you will be transferred to the Lower Limb Gym. This usually takes place between 8-12 weeks post-operatively depending on your progression. The gym sessions are individually tailored and will be hard work.

Most of the exercises given to you can be performed at home. You will attend the gym session once a week but it is important you continue with these daily exercises.

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

The following exercises are to be performed daily. They have been split into stages depending on the length of time since your operation. When performed, all exercises should be pain free or uncomfortable (at the most).

Unless instructed by your physiotherapist, all exercises should be performed with the knee brace in place. If you have any problems, please consult your physiotherapist.

0-6 Weeks

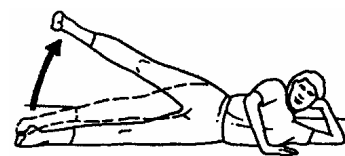
The aim of this phase is to regain range of movement **as the brace allows**. Knee swelling should start to reduce a little but can remain until the brace is no longer required.

Pain and swelling can be 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.

Do not spend too much time on your crutches as this can make the leg swell which makes bending and straightening more difficult. You should attend your physiotherapy appointments regularly. All exercises at this stage should be done non- weight bearing (bed or chair exercises).

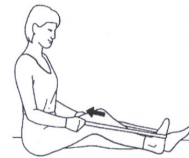
Exercises 0-6 weeks

1. 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.



2. 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 cm from the floor keeping toes pointed forwards. Return to starting position. Repeat 20 times.

3. 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. Aim to reach the 90° allowed by the brace. Hold 5 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. Lying. Tense your thigh muscles within your brace (quads and hamstrings). Hold for 10 seconds. Repeat 10 times.



6. Lying with non-operated leg bent. Straighten your operated leg as much as possible within the brace. Raise the leg 10cm and hold for 5-10 secs. Repeat 10 times.

Goals that you should aim to achieve:

- Improve swelling
- Pain-free range of movement within the brace
- Post-operative pain settling
- Safely walk with the appropriate walking aid, obeying the recommended weight bearing status
- Understand your self-management/ monitoring e.g. skin colour, swelling, temperature
- Manage home exercise programme independently

6-12 weeks

The aim of this stage is to gradually start weight bearing and strengthening the whole leg. Balance exercises will also be started. Expect your leg to look much thinner and be very weak.

You should still be wearing the knee brace which will be restricting your movements between 0-120 degrees.

7. Stand with the leg to be stretched on a stool. Flex your ankle and push the heel towards the stool keeping your knee straight. Hold for 30 seconds. Then bend your upper body forwards from your hips keeping your back straight. You should feel the stretching behind your knee and thigh. Repeat 5 times.



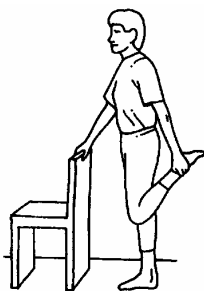
8. Sitting on a chair, with the leg to be exercised supported on a chair. **With brace on**, let your leg straighten in this position. Hold 10 seconds. Repeat x5.

9. 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.



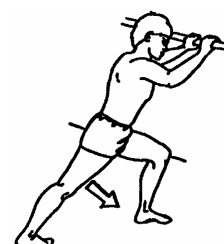
10. Lying face down with your hips straight and knees together. Bend your knee keeping your ankle flexed. You can do this with an exercise band around your ankle. Repeat 20 times.

11. Stand with a chair for support. Push up on your toes. Repeat 20 times.



12. Standing. 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. The brace will allow 120° of bend which should be enough to allow this thigh stretch. Hold 30 seconds. Repeat 5 times.

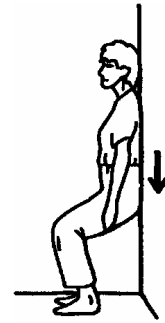
13. Stand in a walking position with your operated leg straight behind you and resting on the floor. The other leg is bent in front of you and takes all the weight. Take support from a wall or chair. Lean your body forwards and down until you feel the stretching in the calf of the straight leg. Hold approximately 30 seconds. Repeat 5 times.





14. Sitting with your arms at your hips. Stand up and then sit down slowly on a chair. Repeat 10-20 times.

15. 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.



16. Stand on your operated leg using light fingertip support if needed. Aim to hold your balance for 30-60 seconds.

17. Stand in front of a 20-40cm step. Step up 10 times with the operated leg leading. Repeat for 3 sets.



The goals that you should aim to achieve by the end of 12 weeks (3 months) include:

- Knee bending and straightening getting closer to the other leg
- Muscle tone returning and swelling less
- Fully weight bear as comfortable on operated leg
- Mobilise with appropriate walking aid obeying the recommended weight-bearing status
- Reciprocal pattern when using the stairs

3-6 Months

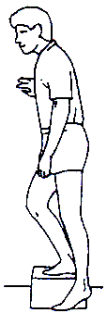
During this phase, muscle strengthening becomes very important, as well as balance and control activities. Your muscles will get bigger and stronger the more you use it and the knee brace is gradually reduced.

You can use the following cardiovascular machines at the gym: Rower, bike, stepper and cross-trainer. Swimming is allowed, but avoid breaststroke initially.



18. Lying face down on a bed with your feet over the edge. Let the weight of your feet straighten your knees. Hold 10 seconds. Repeat 5 times.

19. Lying on your back with operated knee bent, other leg straight. Lift your hips up and hold. Repeat 5-10 times.



20. Stand sideways on a step with one foot hanging over the edge of the step. Slowly bend your knee allowing your other foot to brush the floor. Repeat 5 times and repeat for 3 sets.

21. Stand on one leg on a step facing down. Slowly lower yourself by bending your knee to 30 degrees. Return to starting position. Repeat 5 times for 3 sets.



The goals to achieve by the end of the 6 months include:

- Mobilise without the use of the brace
- Equal strength in all leg muscles
- Weaned off brace as balance improves and allow equal knee control

6-12 months

Aims

Running and twisting movements are introduced gradually, building up to light sports if appropriate. Attendance at a gym is encouraged until leg strength is equal.

Manual work should be possible in the limitations of the occupation – check on this in your clinical appointment.

The goals that you should aim to achieve by the end of the 12 months are:

- Leg now returned to near normal function
- Return to non-contact sport/training if appropriate

- 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. This may take as long as 12 months after surgery.

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.

Mr 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.

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