

POSTERIOR CRUCIATE LIGAMENT RECONSTRUCTION **PATIENT INFORMATION SHEET**

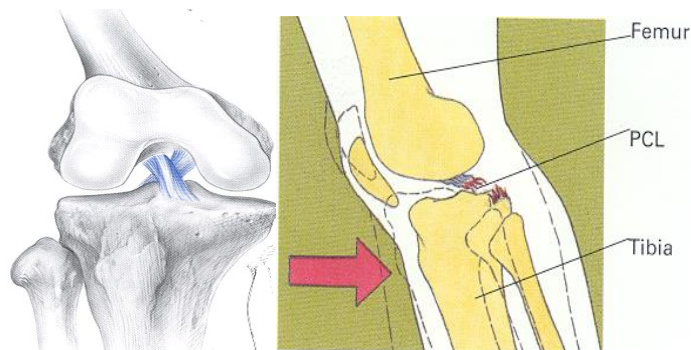
Introduction

It has recommended that you undergo an operation to reconstruct your posterior cruciate ligament (PCL). This leaflet aims to give you information on the PCL structure and function, what the operation entails and the post operative rehabilitation. After reading this leaflet if you have any further questions please contact your Consultant.

Please be aware that this information sheet deals primarily with PCL reconstruction. The operation is commonly performed alongside reconstruction of other knee ligaments e.g. the posterolateral complex. The rehabilitation protocol in such a circumstance would differ from a "pure" PCL reconstruction. There are other information sheets relating to the posterolateral complex.

What is the Posterior Cruciate Ligament?

The cruciate ligaments are a pair of extremely strong, thick ligaments in the centre of the knee joint. There is an anterior cruciate ligament (ACL) and a posterior one (PCL) and they form a cross (this is where the name cruciate is derived from). The PCL lies behind the ACL on the outer aspect at the back of the tibia (shin bone) and runs upwards and forwards to the inner aspect of the femur (thigh). The PCL is significantly stronger than the ACL.



Intact ACL and PCL

Ruptured PCL

Function of the Posterior Cruciate Ligament

The primary functions of the PCL are;

- To prevent backwards movement of the tibia (shin) on femur (thigh)
- To prevent hyperextension of the knee, bending backwards on itself

- Stabilises the knee on rotational movements acting as a central axis of rotation

Posterior Cruciate Ligament Injury

The PCL is most commonly injured by a direct blow onto the front of the lower leg when the knee is in a flexed position. This is most often a fall onto the flexed knee, a tackle in contact sports or a dashboard injury in a car accident. The knee may give way if the PCL is damaged especially on descending stairs or walking down hill.

If the PCL is damaged it results in excessive movement backwards of the tibia on the femur. This causes the tibia to sit in a slightly subluxed backward position. As well as the problems with instability (giving way) this subluxation is known to lead to secondary problems with the under surface of the kneecap (patella) and the medial (inner) aspect of the knee joint, as there is increased load on these surfaces. Over time this may lead to early degenerative changes (osteoarthritis).

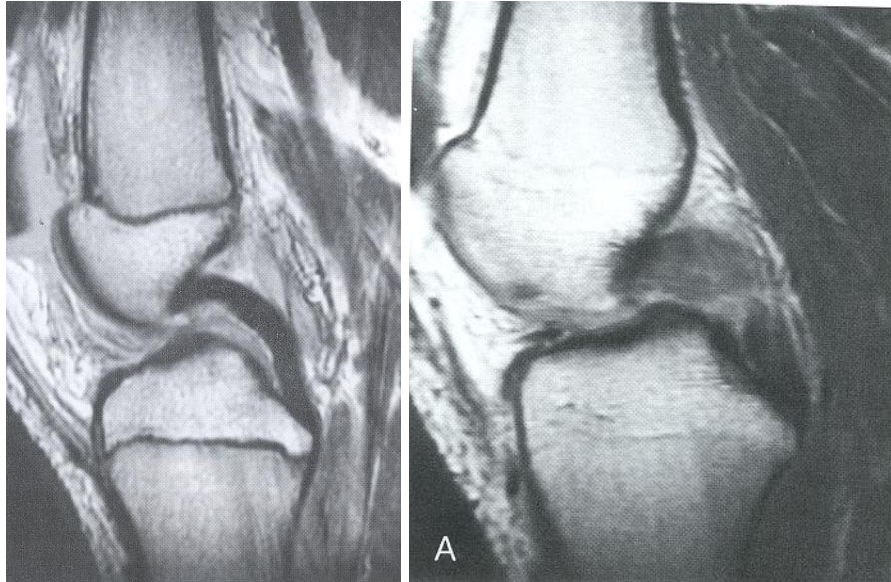
If the PCL is damaged in isolation it is often possible to function relatively normally without the need for reconstruction. However, if other ligaments are damaged, especially what is known as the posterolateral complex, this leads to additional rotational instability. If this “double damage” occurs it is usually not possible to function normally or participate in sports without significant instability and the resultant risk of further damage to the knee. If you have sustained other damage within the joint, such as to the meniscus or articular cartilage, it may lead to a less optimal outcome.

No matter how successful the operation, it is important to understand that surgery to reconstruct the PCL cannot give you a normal knee as it can never truly replicate the PCL that was previously present either anatomically and physiologically. However, surgical reconstruction can allow the knee to function relatively normally and a return to sports with no instability or risk of further damage to structures inside the knee, although the results of the surgery depend on damage to other structures within and around the knee as well.

Diagnosis

An MRI (magnetic resonance imaging) scan is not essential to diagnose an acute PCL tear as an accurate and detailed history and clinical examination is more reliable. MRI can confirm the diagnosis and give additional information which may aid in planning intervention in certain circumstances e.g. in multiple injuries. On MRI the PCL appears as an uninterrupted curved dark band. If damaged there is disruption of this or complete absence. Although there is good

correlation for diagnosis it is not 100% accurate and therefore diagnosis depends on a combination of both the history / clinical examination and the scan.



Intact PCL on MRI

Rupture of the PCL

Surgical procedure

The PCL may not heal completely, but it can retain some stability. This may be satisfactory for some patients and they may even return to full activity. If, however, there is residual instability a reconstruction may be necessary. Therefore, an alternative tissue must be used to replace it.

There are 3 main types of grafts available to replace the PCL;

- Using the patient's own tissues (autograft) – preferred method
- Using another person's tissue (allograft)
- Using artificial material (largely discontinued)

There are two principal choices of autograft used to reconstruct the PLC. If possible, it is probably best to use the hamstring tendons from either the leg which is undergoing the surgery or alternatively the hamstrings from the other leg if the first set are needed for another ligament to be reconstructed (e.g. the posterolateral corner).

The choice of graft will be discussed with you in detail with your Consultant and please feel free to ask any questions at any stage about this topic, which understandably may be very important to you.

These are the most commonly used types of grafts:

- Hamstring tendon graft (gracilis and semitendinosus tendons)
- Kneecap (patella) tendon graft
- Quadriceps graft – less frequently used

Hamstring tendon graft has a number of advantages over patellar tendon graft and will usually be suggested to you as the graft of choice. It tends to be equally effective as patellar tendon graft with a lesser risk of pain at the front of the knee after surgery. It is also easier to rehabilitate after a hamstring graft.

The hamstring tendons that will be used can be felt on the inner aspect of the thigh at the back of the knee. You will manage perfectly well without them, and in fact research now shows that they grow back to some extent.

The surgical procedure is mainly carried out arthroscopically (i.e. by “keyhole surgery”), although other small incisions may also be needed.

Please also be aware that if the PCL reconstruction is to be carried out in conjunction with other ligament surgery (e.g. to the posterolateral corner or the anterior cruciate ligament) then additional incisions may be required for those procedures. Please see the relevant information sheet applying to that procedure.

Timing of reconstruction

The best results from PCL surgery are gained only with full rehabilitation of the knee prior to surgery, aiming to regain a full range of motion and good quadriceps and hamstring strength. This will minimize the potential risk of post-operative stiffness. The optimum time from injury (or arthroscopy) to reconstructive surgery is 4-6 weeks. This time may be longer if other structures are damaged.

Day of surgery

You will be admitted on the day of your surgery having starved (i.e. no food or liquids) for approximately 6 hours prior to your anticipated surgery time. The nursing staff will admit you and prepare you for theatre. At some point, either before or after your surgery, you will be assessed by a physiotherapist.

Your Surgeon will examine your knee to ensure it is ready for surgery. He will also mark the leg to be operated on. This is also your chance to ask any last minute questions.

The anaesthetist will visit you to explain the anaesthetic and post-operative pain control.

The immediate period after surgery

You will wake up from the anaesthetic in the recovery area of the operating theatre. The knee will be in a white stocking with padding covering the operation sites. This stocking and the padding provide compression over the knee to prevent swelling and bleeding. On return to the ward, you will rest until the following day.

The physiotherapy and bracing regime may vary from patient to patient, and in large part depends upon whether posterolateral corner or another ligament reconstruction has been necessary. The description below is the usual one employed but your Consultant will specifically outline the exact protocol to you prior to surgery.

The physiotherapist will normally place the knee in a brace which will limit your ability to fully straighten your knee (to 20 degrees) but will allow a full range of flexion. You are requested to not actively flex the knee as contracting the hamstrings to flex may place the new ligament under too much strain. However the knee can be passively flexed and this will be encouraged. Quadriceps exercises will be utilised to strengthen the thigh. Crutches are usually necessary for six weeks non-weight bearing through the operated leg, but your Consultant will specifically explain this to you as each case is different and this may not be necessary. Cold therapy may also be used.

You are normally in hospital for 1-3 days and discharged when you are safe with crutches. In the early two week phase you should continue with the exercises you were shown in hospital. These exercises are very important for the best possible results post-operatively. You will benefit from continued usage of ice packs at home until you return to clinic approximately 1 week after surgery. You will be referred to outpatient physiotherapy after your first appointment.

In the initial period after surgery it is quite common to experience bruising and swelling in the calf, the front of the shin or inner thigh from the site of your hamstring graft. This can appear quite alarming but is not serious. You may also experience some numbness over the front of the shin or around the scar; this is normal and sensation will usually return over a period of time.

Rehabilitation and physiotherapy

Physiotherapy is vitally important if there is to be a successful outcome of the PCL reconstruction. It takes a great deal of effort, commitment and time. If you

do not feel you can commit yourself fully, it is probably best not to undergo the operation as you will have less favourable result.

In general, a brief outline of stages and goals after the reconstruction are;

- Protected movement within a brace for 6 weeks
- Gym activities and swimming for weeks 6-12
- Light jog and golf at 3-4 months
- Non-contact sports training at 6 months
- Full return to contact sports at 9 months

You will also be given a guide to your rehabilitation protocol which you can give to your physiotherapist. Progress after the reconstruction is based on the time involved in the formation and maturation of the new ligament and on functional goals. All patients advance at different rates but the time factors are the average basis upon which progression is made. Progression too early may jeopardise your new ligament and cause it to rupture. At all stages you should be guided by your Consultant or Physiotherapist. If you have any specific queries about your rehabilitation please contact either your Consultant or your Physiotherapist.

Please be aware that this protocol relates only to a standard "isolated" PCL reconstruction. If there is other ligament or cartilage damage, the rehabilitation may vary from this protocol..

Brief Rehabilitation Protocol

As indicated above, associated with this document is a detailed protocol relating to PCL reconstruction. For this protocol it is assumed that a posterolateral corner reconstruction has also been performed. However if the PCL has been reconstructed in isolation, the brace and the period of non weight-bearing may not be necessary. A précis of the protocol is as follows;

Stage 0 – Prior to Surgery

It is crucial that prior to a PCL reconstruction the knee is fully rehabilitated. There should be no significant effusion (swelling of the knee), the muscle tone should be good and there should be a full range of movement including full hyperextension and flexion.

Stage 1 (0-6 weeks)

Over the first six weeks the new PCL graft needs to be protected to some extent, and this is reflected in the rehabilitation protocol.

The knee is held within a brace with a range of movement of 20 degrees of extension (straightening) to full flexion (bending). Although the knee can be passively flexed, active flexion is avoided as the hamstrings, when activated, can damage the fixation of the new graft.

For the PCL graft itself there is no need to non-weight bear after surgery. However as many PCL reconstructions are associated with a reconstruction of the posterolateral ligament as well, a period of non-weight bearing is necessary for 6 weeks, thus using crutches over this time.

The main objective of the first six weeks after surgery, in addition to the above, is to reduce swelling and regain muscle control. Use of a Cryocuff for cold compression is very useful and beneficial. Aim to achieve short regular periods of exercises (“little and often”) rather than exercise in one period only during the day.

Stage 2 (6-12 weeks)

At 6 weeks post-surgery, the brace can now usually be discarded. In addition the knee can be actively as well as passively flexed. The crutches used for non-weight bearing (posterolateral complex reconstruction) can also be discarded at this stage.

Up to now the knee has only been bent, straightened and the swelling reduced. The graft fixation has now begun to occur biologically and is thus a little stronger than in the initial six weeks. You will now be able to progress to *proprioceptive training* to help improve balance and co-ordination. Proprioception effectively means co-ordination. At this stage the exercises will include wobble boards and the mini-trampet. At the gym you can swim, use a static bicycle and the leg press. At the same time progressive quadriceps and hamstring strengthening will continue.

Stage 4 (3-6 months)

You can continue in the gym, gradually stepping up intensity. Continue with proprioception and agility skills i.e. hopping in several directions. Start light jogging on a treadmill when sufficient strength and control of the knee has been achieved. Return to golf starting with the driving range at about 4 months after the reconstruction.

Stage 5 (6-9 months)

If appropriate, return to sport specific training in a **non-contact** fashion. Use the 3 months to increase your level of fitness and be in good condition to compete when you, ordinarily, will be able to return to sporting activity after 9 months.

Stage 6 (9-24 months)

Although you should normally be able to return to sporting activities at 9 months after your reconstruction, it is important to continue with the exercises as outlined above, especially the proprioceptive work. Many professional sports persons note that although they can return to sport at 9 months, they do not feel fully rehabilitated until 24 months have passed as they “learn to use the knee” again.

A question often asked by patients is why do they have to wait 9 months before returning to contact sport when professional sports persons return at about 5-6 months. The answer is that the professionals, quite reasonably, are taking a risk as they need to return to their sport as soon as possible for financial or other reasons. Most UK orthopaedic surgeons would agree that it is safest to wait approximately 9 months before returning to contact sport to minimise the risk of re-rupture of the graft, which does not “mature” sufficiently until approximately the 9 month mark. If sport is not your livelihood it is probably wise to wait until 9 months to minimise the risk of a further rupture and starting from day one again.

Naturally the above is only a guide. It is advisable for you to be supervised through your rehabilitation by a physiotherapist. If you have any other questions relating to your surgery, progress or rehabilitation please contact your Consultant of physiotherapist.

Possible risks and complications

There is no surgical procedure that is free from potential complications. PCL reconstruction, especially recently, has a good record of safety and success, but complications can occur. Such complications can include;

1. **Stiffness of the knee.** The knee may have difficulty gaining full extension or flexion. This is minimised by early physiotherapy and in addition a great deal of effort on the part of the patient. Sometimes it may be necessary to manipulate the knee under anaesthetic or carry out an arthroscopy to break down adhesions if the knee does become stiff.
2. **Persistent pain over the front of the knee.** There may be persistent numbness on the inner aspect of the leg, or the front of the leg, and rarely an area develops tiny ‘shocks’ when lightly touched.
3. **Persistent swelling of the knee.**

4. **Deep venous thrombosis (DVT)** or 'blood clots in the veins'. Every attempt is made to minimise this complication, although heparin is not given routinely. Unless the procedure is an emergency, patients should not be taking the oral contraceptive pill for 6 weeks prior to surgery. Finish your current pack and take other contraceptive precautions until after your operation. It is also advisable not to be taking HRT at the time of surgery. Please ask for advice if necessary.

IT IS ALSO RECOMMENDED THAT YOU DO NOT UNDERTAKE ANY AIR TRAVEL FOR 6 WEEKS FOLLOWING YOUR SURGERY. PLEASE DISCUSS ANY TRAVEL PLANS WITH ME.

5. **Infection of the knee.** This is a rare but extremely serious complication. Antibiotics are given during and shortly after the operation to minimise the risk.
6. **Failure of the graft.** The knee may start to give way again. This may occur within a short time of operation or after a considerable period. The 5 year success rate in preventing instability is approximately 80% (this figure has increased considerably in recent years).
7. **Damage to the popliteal artery or vein.** These large blood vessels lie at the back of the knee. During the PCL reconstruction, when one of the "tunnels" is made in the tibia to allow passage of the graft, damage can rarely occur to these vessels. The operation is always performed under image intensification so that the drills etc. should not violate these vessels but all patients should be aware of the risk of damage to these blood vessels during the operation. The consequences of damage to these structures is very significant and would demand vascular surgical intervention. In very rare cases amputation of the limb may be necessary.
8. **Swelling of the calf.** The calf can swell during and after surgery, and on occasional episodes the surgery may have to be postponed due to unacceptable swelling during surgery.

Please contact your consultant if you are at all concerned that there is a problem. In particular, act immediately if you develop a fever, severe pain or significant wound problems. If you develop a problem after your surgery you do not need to contact your GP (unless you wish to do so).

Conclusion

I hope that this guide has been of use to you. You will have been recommended surgery only if the potential benefits of the operation outweigh the risks. If you have any questions relating to this please ask me.

If you would like the arthroscopic part of the operation to be recorded for your viewing “pleasure” please bring a flashstick with you to the hospital. I recommend you do this, even if you won’t want to watch it. It is good to keep records.

A handwritten signature in black ink, appearing to read 'Glen Vardi', written in a cursive style.

**Glen Vardi FCS.SA.ORTH
Consultant Orthopaedic Surgeon**