

# The Knee Foundation

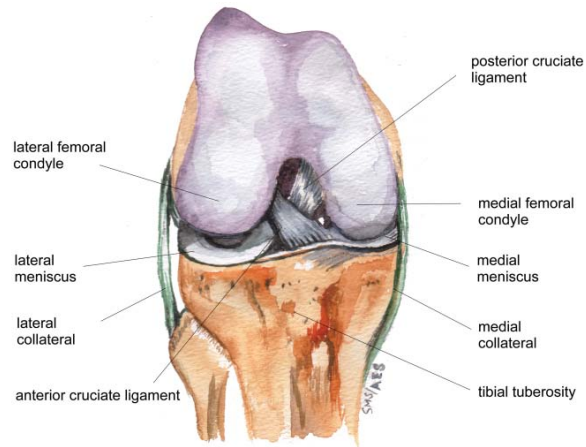


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## RECONSTRUCTION OF THE ACL

The knee is a complex joint that depends on bones, ligaments and muscles for its stability. There are four major ligaments in the knee - the medial and lateral collateral ligaments, supporting either side of the joint, and two cruciate ligaments which are situated in the centre of the joint. These ligaments control forward and backward glide, and rotation in the joint; the anterior cruciate ligament is the one most commonly requiring surgical reconstruction.



It is possible to replace the damaged ligament with an artificial one made of polyester and/or carbon, or to use a graft of natural tissue usually taken from either the patellar tendon, (on the front of the knee) or the hamstrings tendons, (on the back of the knee). The artificial grafts were commonly used in the 1980s' but now it is generally accepted that a natural graft is preferable.

#### The Four Strand Hamstring Graft

The hamstring muscles/tendons pass down the back of the thigh, cross the back of the knee and attach to the lower leg bones. On the inside there are two small

to your other leg and that you are developing good strength and co-ordination. Providing you have reached these goals you will be allowed to start running and begin open – chain quads exercises (low weight, lots of reps. to start with). The period between 3 -6 months is the time for serious strength, endurance and balance training. How quickly you return to sport will depend on how much effort you put in at this stage.

**At six months:** You will have another assessment to check the ligament and will also be asked to complete functional tests, some questionnaires about your symptoms and current activity level and an isokinetic muscle strength and endurance test. If you have reached an appropriate level of recovery you will now be advised on return to more sports specific training.

You should not return to full sporting activity until the isokinetic and functional tests show that muscular activity in the affected leg is equivalent to the unaffected side (taking limb dominance into consideration).

**Eight to twelve months:** Return to non-contact sport, Begin contact sports-specific training, Gradual return to contact sport.

**Twelve months:** Final assessment to check the ligament, your function and that you have reached your pre-operative goals.

These time scales are a guide only - obviously each patient is different and will progress at varying rates. The physiotherapist will guide you through the various stages and tell you when you are ready to move on to the next stage.

## APPROXIMATE TIMETABLE FOR REHABILITATION

The post-operative schedule out-lined below enables strength, mobility and flexibility to be regained as early as possible without compromising the new ligament. The graft acts as a framework for new natural tissue growth, but this process is gradual. Full maturation of the tissue goes on for about eighteen months or more.

If you are very physically fit before the reconstruction, your progress through the rehabilitation programme will probably be quicker than the average individual.

**Second week onwards:** Progressive closed kinetic chain exercises to strengthen the quadriceps (on the front of the thigh) and hamstrings (on the back of the thigh), and to improve balance and co-ordination.

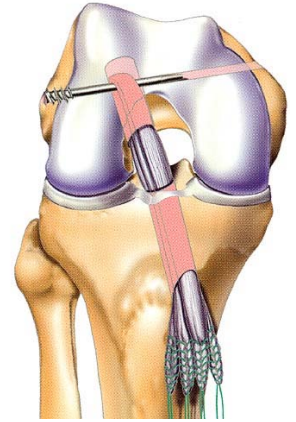
We would expect return to normal every day activities within three weeks and full range of movement by six weeks maximum.

Swimming and cycling are encouraged as soon as the physiotherapist thinks you are ready, (usually by three weeks), these are ideal forms of exercise as they put little stress the healing tissues. There is no reason why open chain exercises for the hip and hamstring muscles should not be commenced.

By 4 weeks many gymnasium type exercises can be introduced. The physiotherapist will advise on the suitability of each piece of apparatus before starting a programme. By six weeks you should be ready to attend the local gym – NO open-chain quads (quads bench) and no running yet, but brisk walking on the treadmill is good (6km/hr).

**At three months:** You will have an assessment to check the integrity of the new ligament (KT2000), that you have regained full range of movement equal

muscles which have long tendons and one large muscle which has a short tendon. The two long tendons are used for the ACL graft, the short tendon is undisturbed so that the hamstring function not impaired too much in the early days. The two long tendons are doubled over and stitched together to make a very strong graft of four strands. Special tools are used to drill accurate tunnels in the tibia and femur and the graft is pulled through so that the tendon is situated as close to the original ACL position as possible. The ends of the graft are fixed securely within the tunnels, this is all done through a small incision of approximately 3-4cms on the inner side of the upper shin, and is monitored arthroscopically (through keyholes into the joint).



## PRIOR TO SURGERY

### How long will I wait for my operation?

It is now generally accepted that it is not ideal to operate on an acutely inflamed knee – this can make post-op recovery more difficult and in extreme cases lead to a complication called ‘arthrofibrosis’.

If you and your consultant have made the decision to go ahead with surgery at the first opportunity, then it is usual at least to wait until swelling from the initial injury has settled, you have regained maximum possible range of movement and have good muscle control. The average length of time for this is approximately 4 -6 weeks from injury, however a planned date may be postponed if you have not reached the appropriate goals.

During this period you should prepare fully for your operation, not only physically but also socially and psychologically. You are about to undertake a lengthy period of recovery, the success of which is dependant on good surgery but also on a conscientious approach from you. You must be willing to put in time and effort and to follow instructions at various stages. Everyone wants you to get the best possible outcome but it is very much a co-operative team effort of which you are the main player. The physiotherapist will help you during this stage, will explain the post-operative treatment plan and will answer any queries you have.

### **Will I have any tests prior to surgery?**

You may already have had X'rays, an MRI scan and a KT2000 ligament laxity test to confirm or aid the original diagnosis.

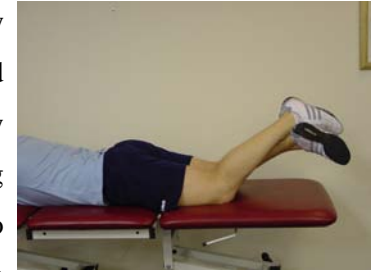
You will be asked to see the physiotherapist who will complete objective pre-operative assessments as a baseline with which to compare post-operative results. Commonly you may be asked to complete questionnaires about your symptoms and activity level; you may have to try various functional tests such as jumping or hopping (you will only do these if considered realistic – inability to do a test is a significant result in itself!); you may be asked to complete an isokinetic muscle strength and endurance test if appropriate (depending on length of time since injury and condition of knee).

### **How long will I be in hospital?**

You will stay a minimum of one but probably two nights and must attain an appropriate level of mobility and safety before discharge.

The physiotherapist will get you up and walking (you may be required to use crutches initially – they are for comfort and safety only – you should not hop), once confident you will be instructed how to negotiate stairs. You will also be

**Assisted flexion** – Lie on your front. Gently bend your knee, bringing your foot up behind you. Use the opposite leg to assist in the early stages, particularly if you have had a hamstring graft. You may find that you need to assist to initiate the movement but once started you can manage. The aim is to gradually increase the amount of bend, but also to encourage the hamstring muscles to work.



**Extension stretch** – you have already done this in sitting, this is another method which is effective. Lie on your front with your legs overhanging the end of the bed, so that your knees are just over the edge. Relax in this position for 5-10 minutes. If you have a very soft bed, you can place a small rolled-up towel under your thigh to support it.



### **After The First Week:**

You will normally be expected to attend the physiotherapy department on about the sixth to eighth day. Your dressings and wounds will be checked, and providing the swelling has settled, you will be shown more progressive exercises.

It is important to realise that the role of the physiotherapist is largely advisory and supervisory, - it is up to you to practise exercises regularly so that muscle strength and range of movement return quickly.

Everyday activities, such as walking, and going up and down stairs etc., should become easy fairly quickly, but you should not be tempted to return to any strenuous or sporting activity without discussion and advice from the physiotherapist.

**Knee flexion** – use a strap around the foot and gently pull to increase the bend.

You can also use an elastic exercise band to push against, to straighten the knee.



**Bridging** – lie with your knees bent and your feet flat. Keeping your stomach muscles tight, lift your hips clear of the floor, hold for a few seconds and gently lower. Begin with 10 repetitions.



**Adduction** – Lie on your operated side with the opposite leg flexed and behind.

Keeping your ankle flexed and your knee straight, lift the operated leg 6” off the floor, hold and lower, repeat 5 times then rest. Build up to 6 sets of 5.



**Abduction** – Lie on your side with your operated leg uppermost. Bend the lower leg so that you are balanced.

Keeping your ankle, hip and shoulder in line (do not let your hip roll back or bring your leg forwards), lift your leg and lower – repeat 10 times then rest the leg and repeat. Build up to 5 sets of 10.



shown exercises and will be expected to practice these regularly throughout the day and to continue with them when you get home.

Comfortable loose clothing is recommended - shorts are ideal if you prefer to be dressed.

### **How long will I be off work?**

Obviously this depends on your job but, even if you are fairly sedentary you would be wise to arrange at least two weeks off work. The biggest factor which slows recovery is excessive swelling in the joint and this is often directly proportional to how much time you spend on your feet.

The first week out of hospital should be one of almost complete rest apart from your exercise programme. You should not be on your feet unnecessarily.

During the second week you should gradually increase your activities around the house, but if you get any increase in swelling you should rest.

If you have an active job or one which involves driving you should discuss this with your surgeon, it may be 3 - 6 months before you can return to full duties.

### **How long before I can drive?**

This really is dependant on whether it is your right or left leg affected and whether you drive an automatic.

Left leg: You must wait at least 48 hours after an anaesthetic, even if you drive an automatic. After this time you must be able to easily get in and out of the car and be able to control the clutch – we’re probably looking at 1–2 weeks.

Right leg: There is evidence to show that it is 3 – 4 weeks before your normal reflex reaction time returns, therefore driving prior to this is inadvisable. It is important you have good reaction speed in case of an emergency stop.

## IN HOSPITAL

### The Day Of Your Operation:

You will wake up from the operation with an absorbent dressing and white “T.E.D.” stockings on your leg. The dressing will be changed the next day, but you will continue with the stockings, they have a twofold purpose:

1. To reduce the risk of post-operative thrombosis.
2. To control swelling in the leg and around the joint.

It is advisable to wear the stockings until you are walking normally without crutches, and until the swelling around the joint has settled.

In some cases a small drain is inserted into the wound at the time of operation, to remove any excess fluid from the knee. This is usually removed the next day, with minimal discomfort.

Control of pain and swelling are the priorities immediately after surgery.

You must inform the medical/nursing staff if your pain relief is not adequate. It is important to take prescribed medication regularly to keep on top of pain, do not let it get out of control. Having said that, pain is not usually a big issue following ACL reconstruction, immediate post-operative discomfort is usually felt at the donor site more than the graft site.

Excessive swelling in the joint inhibits both movement and muscle activity. You should keep the leg elevated at all times when resting and may use cold therapy (ice packs or cryocuff). On return to the ward after surgery, your leg may be placed on a C.P.M machine, (continuous passive movement). This machine will slowly bend and straighten the knee and will remain in situ until the next morning. Most patients find it very comfortable and the movement can be beneficial in reducing swelling and preventing stiffness.

Crushed ice wrapped in a **damp** towel is the best. If you use gel packs make sure your skin is protected, wrap these also in a **damp** towel. (Gel packs can be frozen to well below zero so do be careful). Leave pack in situ for 15 -20 minutes maximum and do not re-apply for at least 2 hours.

**Stairs:** You will need to go up and down stairs one stair at a time initially. Going up, lead with the un-operated leg and bring the operated leg up to it. Going down, lead with the operated leg. This method ensures that your good leg is doing all the lifting and lowering.

### Early Exercise Progressions at Home:

During the first week at home it is important that you gradually put more weight through your leg and begin to wean off the crutches however, do not walk with a bent knee or severe limp. You will probably find that you will drop to one crutch around the house but take two if you go out, then use none at home but continue to take one out until you feel confident and can walk without a limp. If you are only using one crutch or a stick you should hold it on the unoperated side. As you become more confident moving around you can add to your exercises but be aware of any increase in swelling.

**Wall-slides** – lie with your bottom approx 12” from the wall and your legs up the wall. Gradually let your knee bend and your heel slide down the wall. Initially you may put your other foot under your leg for support and, when able, use your other leg to add to the stretch. Take the knee to its maximum bend, hold for a few seconds and then straighten.



### **Your Wounds:**

You are likely to have three or four portals (keyholes), which will be covered with small adhesive dressings and heal very quickly.

You will also have one or two small incisions through which the graft will have been harvested, these are superficial and do not enter the joint itself. These wounds are often stitched below the skin with soluble thread, the skin is then closed with Steristrips; In this case you will not have any stitches to be removed. Alternatively you may have traditional stitches or staples, these are removed after 11-14 days with minimal discomfort.

### **AFTER DISCHARGE**

It is important to find a balance between activity and rest, during the first week at home. You are encouraged to walk and put weight through the leg,- you may discard one or both crutches, providing you are “safe”. Restrict your exercises to those which the physiotherapist has taught you in hospital, and do rest in between to allow inflammation and swelling to settle down.

### **General advice:**

- Initially support your operated leg whilst getting on and off the bed or lifting your leg up onto a foot-stool.
- Do not do repetitive leg extensions as an exercise.
- Do not be on your feet unnecessarily in the first 7-10 days, this will aggravate swelling. Short walks to the bathroom, bedroom and lounge only – no standing making food or drinks!!

**Ice:** If you still have swelling once you are at home then you can apply ice packs regularly throughout the day.

### **Rehabilitation:**

The next morning the physiotherapist will get you out of bed and teach you to walk with crutches. It is important at this early stage to begin to put some weight through the joint, but the crutches will give you confidence and help with balance. You will also be shown exercises which you are expected to practise regularly while in hospital and when you get home.

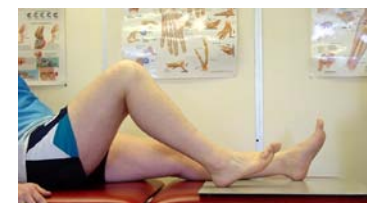
### **Exercises:**

- Quadriceps bracing – with your legs straight out in front of you, pull your toes up towards you from the ankle and tighten the thigh muscle as hard as you can. Hold for a count of 10 and gently relax.



Static quadriceps exercises

- Knee flexion – with your legs out in front of you, gently bend your knee, sliding your heel up towards you. You can hold under your thigh and lift to assist the movement initially if you wish but do not lift the heel. There is no restriction to the amount of bend and the sooner it bends fully the better, aim for 90° by the end of the first full day after surgery.



knee flexion

- Extension stretch - sit or lie with your leg elevated and rest your heel on something at least the same height or preferably higher than your chair (a footstool, coffee table or the arm of the settee!). Let your leg relax so that gravity will help to bring the knee back fully straight. You may only be able to tolerate this position for a couple of minutes initially, (especially if you have had a hamstring graft) that is OK, it will get slightly easier each time you do it. Gradually build up to 10 minutes and repeat this 5/6 times a day.

Once you can do this for the full 10 minutes, it is a good idea to do the quadriceps bracing while in this position. Let the leg relax for a few minutes then do 10 braces, then relax for the rest of the stretch time.



extension stretch

- Foot pumps – alternately point your toes and then pull them up towards you from the ankle. This should be done briskly and regularly to keep your circulation moving.

These exercises should be done regularly throughout the day – every hour if possible – little and often is best while the knee is inflamed.

Once you are up and mobile you will be able to do some simple closed chain exercises while standing. Hold a support for balance.

- Keep your knees straight and your feet a few inches apart, lift up onto your toes and gently lower back down. Try to keep your weight even over each leg, repeat 10 times.



heel raises



mini dips

- Again keeping your weight even and your feet flat on the floor, gently bend both knees, hold for a few seconds, straighten and brace back. Repeat 5 times but build up to 10 gradually. The aim of this exercise is control – not to see how far you can bend; keeping the heels flat on the floor will naturally restrict how far you bend.

Again these exercises should be done regularly throughout the day.

By the second day you will be independent and confident walking, should have 90° of knee bend and will be shown how to negotiate stairs, before you are discharged.

You should find a reputable chartered physiotherapist nearby, before your surgery.