

Oxford Knee Service

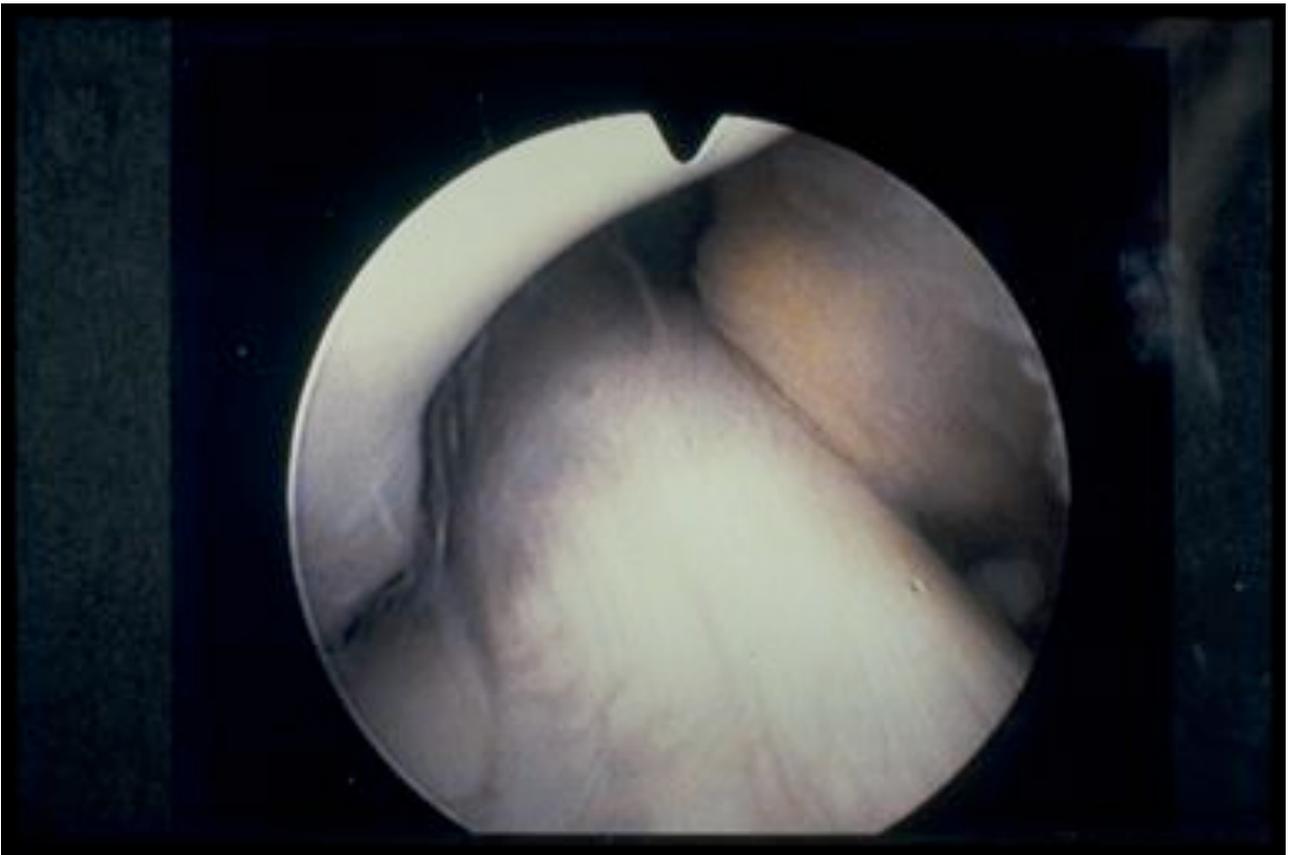
A Patient's guide to

ACL RECONSTRUCTION

The anterior cruciate ligament (ACL) is a 3-4cm long band of fibrous tissue that connects the femur (thigh bone) to the tibia (shin bone). It helps stabilise the knee joint when performing twisting actions. The cruciate ligament is usually not required for normal daily living activities, however, it is essential in controlling the rotation forces developed during side stepping, pivoting and landing from a jump.

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Intra-operative arthroscopic (keyhole surgery) view showing a normal ACL in the knee

THE CLASSIC INJURY

The ACL is commonly injured whilst playing running ball sports or skiing. Whilst playing ball sports momentum is developed and upon attempting a pivot, landing from a jump or side step manoeuvre, the knee gives way. When skiing, rupture may occur at low or high speeds. Commonly the binding fails to release as the ski twists the leg resulting in a tearing sensation. Patients frequently hear or feel a snap, or crack accompanied by pain. Swelling commonly occurs within the hour, but is modified by ice or compression. Frequently pain is felt on the outer aspect of the knee as the joint dislocates. This dislocation may be felt to reduce with a clunk. Initial treatment of any knee ligament injury should consist of ice packs, compression bandages and crutches. It is difficult to weight bear for several days, however, after seven to ten days the swelling settles and walking is possible with the joint gradually returning to full movement. By four weeks following injury the knee becomes almost normal. Patients who return to sport following injury usually notice a weakness or instability. Further episodes of instability result in multiple injuries to the cartilages and the joint surfaces. Damage to these structures eventually leads to osteoarthritis.

WHY DOES THE ANTERIOR CRUCIATE LIGAMENT FAIL TO HEAL?

Unlike other ligaments about the joint, the ACL passes through the joint and is surrounded by joint fluid. Other ligaments heal by scar formation, however due to the unique location of the ACL the bleeding is uncontained, filling the joint, causing pain and swelling. The blood irritates the knee joint's lining to produce synovial fluid. This fluid is designed to dissolve and prevent blood clotting within the joint. Without blood clot, scar tissue does not form. The result is that the ACL rarely heals in continuity.

RATIONALE FOR TREATMENT

The goal of treatment of an injured knee is to return the patient to their desired level of activity without risk of further injury to the joint. Each patient's functional requirements are different. Treatment may be without surgery (conservative treatment) or with surgery (surgical treatment). Those patients who have a ruptured ACL and are content with activities that require little in the way of side stepping (running in straight lines, cycling & swimming) may opt for conservative treatment.

Those patients who wish to pursue competitive ball sports, or who are involved in an occupation that demands a stable knee are at risk of repeated injury resulting in tears to the menisci, damage to the articular surface leading to degenerative arthritis and further disability. In these patients, surgical reconstruction is recommended.

TREATMENT OPTIONS

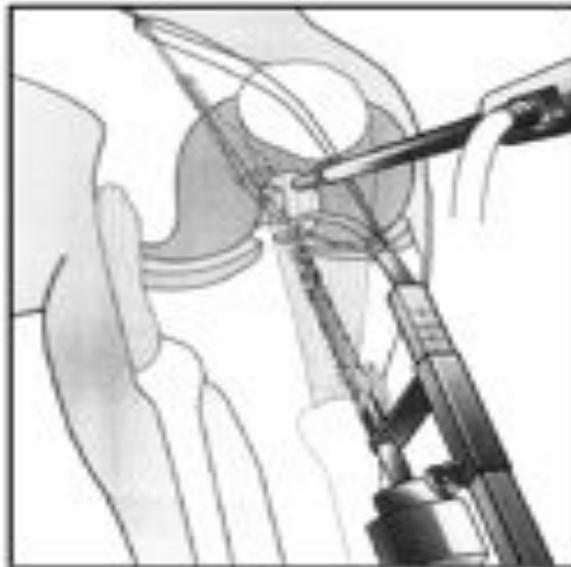
Conservative Treatment

Conservative treatment is by physical therapy aimed at reducing swelling, restoring the range of motion of the knee joint and restoring full muscle power. Proprioceptive training to develop the necessary protective reflexes are required to protect the joint for normal daily living activities. As the cruciate ligament controls the joint during changes of direction, it is important to alter your sports to the ones involving straight line activity only. Social (non-competitive) sport may still be possible without instability as long as one does not change direction suddenly.

Surgical Treatment

Patients who are unable (generally young adults) or those unwilling to lower their level of activity, are at risk of causing further damage to their knee should they return to sporting activity and are advised to undergo surgical reconstruction.

Reconstruction involves placing a graft inside the knee by arthroscopic surgery (keyhole). A >90% success rate is normal with some deterioration over time depending upon other damage within the joint. Although ACL reconstruction surgery has a high probability of returning the knee joint to near normal stability and function, the end result for the patient depends largely upon a satisfactory rehabilitation and the presence of other damage within the joint. Advice will be given regarding the return to sporting activity, dependant on the amount of joint damage found at the time of reconstructive surgery. It is important to preserve damaged joint surfaces by restricting impact loading activity to delay the onset of degenerative osteoarthritis later in life.



In the surgery a graft will be harvested to use to reconstruct the torn ligament. Usually 2 of the hamstring tendons are taken, but sometimes other suitable graft choices are used. This will be discussed with you prior to the operation. The remnants of the torn ACL are removed with keyhole surgery and tunnels are made in the tibia (shin bone) and femur (thigh bone) to allow the graft to be positioned across the knee. The new reconstructed ligament is then fixed at both ends to secure it in place.



WHAT IS INVOLVED FOR YOU AS THE PATIENT

- Prehabilitation. Before surgery you must have a nearly normal comfortable range of movement. For the weeks leading up to the surgery you should start some exercises that will help your recovery. These are explained in more detail in the rehabilitation section.
- Healthy patients are admitted on the morning of their surgery. You should inform your surgeon and anaesthetist, of any medical conditions or previous medical treatment as this may affect your operation.
- It is extremely important that there are no cuts, scratches or pimples on your lower limb as this greatly increases the risk of infection. Your surgery will be postponed until the skin lesions have healed. You should not shave or wax your legs for one week prior to surgery.
- Patients should cease smoking and taking the oral contraceptive pill 6 weeks prior to surgery as this increases the risk of thrombo-embolism (life threatening blood clots).
- After the operation you may be required to stay in hospital for one night. Some patients may be able to go home the evening of their surgery.
- Physiotherapy is commenced immediately post operatively and should continue for 4-6 weeks. By 7-10 days following surgery you should be able to walk without crutches. Sedentary and office workers may return to work approximately 3-5 days following surgery. Most patients should be walking normally 14 days following surgery although there is considerable variation.
- Should the left knee be involved then driving an automatic car is possible as soon as pain allows. You must not drive a motor vehicle whilst taking severe pain killing medications. Should the right knee be involved driving is permitted when you are able to walk without crutches.
- Rehabilitation exercises should be continued intensively until 4 to 6 weeks when jogging under controlled conditions is commenced.
- Solo sport as part of a comprehensive rehabilitation programme commences at approximately 6-10 weeks. Ideal solo sports are shooting basket balls, solo squash or hitting a tennis ball against a wall.
- Playing sport non-competitively or training is possible at 4 to 6 months. Training may commence when an adequate rehabilitation of the thigh musculature has occurred. A return to competitive sport is permitted at 9-12 months following surgery, again provided that there has been a complete rehabilitation and the joint is demonstrated to be stable.

Complications

General complications related to surgery

- **Deep vein thrombosis and pulmonary embolus:** Although this complication is rare following arthroscopic surgery, a combination of knee injury, prolonged transport and immobilisation of the limb, smoking and the oral contraceptive pill or hormonal replacement therapy all multiply to increase the risk. Any past history of thrombosis should be brought to the attention of the surgeon prior to your operation. The oral contraceptive pill, hormonal replacement therapy and smoking should cease 6 weeks prior to surgery.
- **Pneumonia:** Patients with a viral respiratory tract infection (common cold or flu) should inform the surgeon as soon as possible and will have their surgery postponed until their chest is clear. Patients with a history of asthma should bring their inhalers to hospital.

Complications specifically related to your knee reconstruction surgery.

- **Infection** is a serious but rare complication. Surgery is carried out under strict germ free conditions in an operating theatre. Antibiotics are administered intravenously at the time of your surgery. *Any allergy to known antibiotics should be brought to the attention of your surgeon or anaesthetist.* Despite these measures, following arthroscopic ACL reconstructive surgery there is about a 0.5% chance of developing an infection within the joint. This may require treatment with antibiotics or may require hospitalisation and arthroscopic washout of the joint. Subsequent to such procedures prolonged periods of antibiotics are required and the post operative recovery is slowed.
- **Postoperative bleeding** & marrow exuding from the bony tunnel may track down the shin causing red inflamed painful areas. Characteristically when standing up the blood rushes to the inflamed area causing throbbing this should ease with elevation and ice packs. This may end with a bruise and slight swelling around the ankle usually lasting about 1 week. This is a normal postoperative reaction and only delays short term recovery. Excessive bleeding resulting in a haematoma is known to occur with patients taking aspirin or on steroidal anti-inflammatory drugs. They should be stopped at least one week prior to surgery and probably should not be taken at all.
- **Nerve injury.** Due to the skin incision patients may notice a numb patch on the outer aspect of their leg past the skin incision. This is of no functional significance and is unavoidable. The numb patch tends to shrink with the passage of time and does not affect the result of the reconstructed ligament.
- **Hamstring tears.** Your hamstring musculature will recover quickly and tendon regrowth may be felt at 14 days following surgery. However scar tissue forms around the reformed tendons. This may tear and is felt as a pop or tear behind the knee on the inner side. This will usually set your rehabilitation back a few days only. Scar tissue may tear more than once but does not usually occur after 6-8 weeks post operative.
- **Graft failure** due to poorly understood biologic reasons occurs in approximately 1% of grafts and a further 1% of grafts rupture during the rehabilitation programme. After 2 years if you return to normal activities the risk of further ACL injury returns to near normal (about 1% each year for patients returning to high intensity sports), the risk of rupturing the reconstruction is similar to that of rupturing the ACL in the other knee.
- **Pain and stiffness.** Rarely patients develop pain and stiffness in the knee after ACL reconstruction. This can normally be resolved with intensive physiotherapy. Occasionally further surgery may be required.

AFTER THE OPERATION

You will wake up in recovery with the knee bandaged. You may have a small drain coming from the knee to help drain any excess bleeding and reduce the swelling. You will be given pain medications if required. It is safe to move the knee, but you will be encouraged when resting to keep the knee straight.

It is safe to fully weight bear through the knee straight away, but often it is more comfortable to start walking with some elbow crutches. Most patients will only use these for the first few days. By 1-2 weeks you should be walking normally. It is normally safe to drive when you are walking normally and putting all your weight through the leg (you can perform an emergency stop).

Please check with your insurance company that you are covered before starting to drive again. The knee will have a tendency to swell in the first 6 weeks. It is important to ice the knee between exercises and when resting to keep it elevated.

You will be given some exercises to help rehabilitate the knee. The rehabilitation is split into 3 phases

PREHABILITATION / REHABILITATION

Pre-operative exercises

Before the operation it is important that you have as near to full pain free movement as possible.

Ideally a few weeks before the surgery you should start exercises building up your quadriceps and hamstring strength. This trains the muscles up and makes it easier to get going after the surgery.

Phase1. (0-1weeks following surgery)

This phase involves regaining a full range of movement (especially full extension).

It is important that these exercises are performed for short periods but regularly (rather than 1 longer period)

1. Calf exercises

Move the foot up and down from the ankle to maintain good circulation



2. Extension exercises

Sit on a firm surface and fully straighten your knee. To help the knee go straighter tighten the front thigh muscles (quadriceps). Pull your toes up towards your face and at the same time push your knee back into the floor. Hold for 10 seconds and repeat.



3. knee bends

Slide your heel up and down a firm surface bending and straightening your knee.



4. static hamstrings

With the knee bent to about 30° from fully straight push the heel into the floor and hold for 10 seconds.

5. knee bends in standing

Standing upright bend your operated knee bringing your heel to your bottom. Lower the foot slowly back into a straight position.



Phase 2 (1-8weeks following surgery)

This phase is about improving muscle strength and continuing to improve movement back to full.

It is important to perform these exercises regularly and we recommend at least twice a day. The more effort that is put into the rehabilitation the better the recovery and quicker the return to full activities.

1. Straight leg raise

Lie on your front. Lift the the leg straight up in the air and lower. Try and stop the downward fall of the leg by “quickly” contracting your muscles. As you progress you can add weight to your ankle.



2. Leg raise in side lying

Lie on your side with your operated leg uppermost. Lift and lower the leg using your outer thigh muscles. Change sides so the operated leg is at the bottom. Lift the operated leg up and down using the innermost thigh muscles.



3. Bridging

With your knees bent push your heels into the floor and lift your bottom clear. Progress to just using your operated leg.



4. Sit to Stand

Slowly stand up from a chair. As you progress put the un-operated leg forward so more of the work is done by the operated leg.



5. One leg balance

Stand on the operated leg with it slightly bent. Try to balance for 30 seconds. As you progress try closing your eyes.



6. Hamstring catches

Stand on your un-operated leg. Bring your other heel to your bottom. Then lower your foot, try and stop the downward movement by “quickly” contracting your hamstring muscles.



7. Rope walk

Place a skipping rope along the floor. Walk along it carefully keeping your balance



8. Calf stretch

Feet pointing forward, operated leg behind you with knee straight and heel down. Lean in towards the wall, hold for 20 seconds



9. Hamstring stretch

Stand with operated leg straight out in front of you, heel on the floor. Bend forwards from the hips and rest your hands on your bent un-operated leg keeping your back straight. Hold for 20 seconds.



Phase 3 (8-16 weeks following surgery)

At this stage phase 2 exercises can be progressed at increased speed, weight and number of repetitions. You can now start building in some exercises to help proprioception (joint stability coordination).

1. Skipping
2. Step-ups and downs
3. Quadriceps stretch
4. Jogging
5. Cycling
6. Swimming
7. Gym work.
8. Wobble board
9. single leg squats



Phase 4 (16 weeks following surgery)

Rehabilitation can now be directed at graded return to sports. Solo sports such as hitting a tennis ball against a wall, or shooting some baskets helps build up proprioceptive reflexes in a controlled environment. When jogging you can start to build in some direction changes initially running long curves, but as you progress making the direction changes more acute. At 6 months following surgery if the musculature is sufficient sport specific training exercises can be started. We would not recommend return to competitive sport until at least 9 months following surgery.



Contact Details

As with all operations if at any stage anything seems amiss it is better to call for advice rather than wait and worry. A fever, or redness or swelling around the line of the wound, an unexplained increase in pain should all be brought to the attention of your doctor.

Manor Hospital:
Oxford Clinic:

