Mr David Houlihan-Burne, MB BS, BSc, MRCS, FRCS (Orth)
Consultant Knee Surgeon

A Patient's Guide to ACL Reconstruction Surgery

Fortius Cinic
Fitzhardinge Street
London
W1H 6EQ

Bishops Wood Hospital
Rickmansworth Road
Northwood
Middlesex
HA6 2JW

The Chiltern Hospital
London Road
Great Missenden
Buckinghamshire
HP16 0EN

Private Secretary : Jessica 020 3 693 2127

Three Rivers
knee and sports
injury clinic

Updated Oct 2020

Understanding Your ACL Reconstruction Surgery

Mr D G Houlihan-Burne FRCS (Orth)
Consultant Orthopaedic Surgeon

INTRODUCTION

Having seen me in clinic I will have been explained to you the fact that you have sustained an injury to one of the major ligaments within your knee, the anterior cruciate ligament (ACL).

This information leaflet is designed to inform you of this condition and the surgical treatment that I have recommended. It will also give you insight into the rehabilitation that will be required in order to achieve an excellent outcome and a return to full sporting activity.

Anterior cruciate ligament surgery and rehabilitation have undergone dramatic changes over the past decade largely due to extensive clinical experience, improved surgical techniques and a better understanding of rehabilitation. Pre and post-operative rehabilitation is a major factor in the success of ACL reconstruction. Early restoration of full joint movement and weight-bearing are of paramount importance for successful rehabilitation.

My aim is to ensure you have a complete understanding of the basic principles of the ACL reconstruction, to help you restore a full range of motion, regain near normal strength and to prepare you for the operation and the rehabilitation.

The major goals of ACL surgery and rehabilitation are:

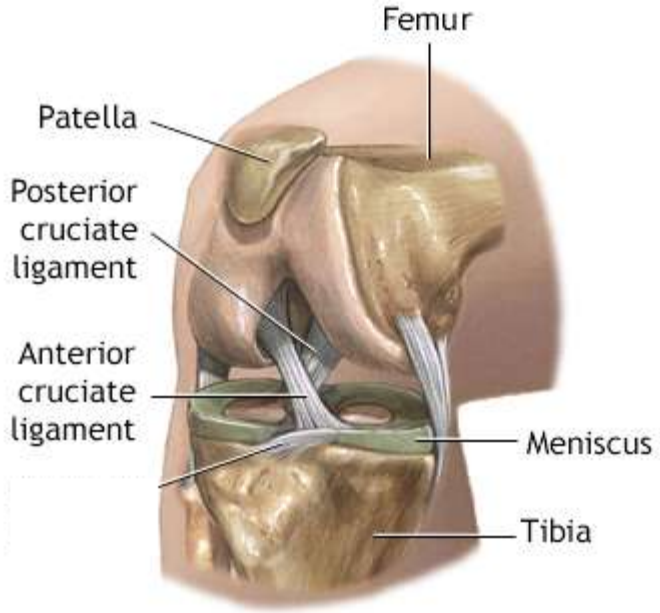
- to restore normal joint anatomy
- to provide static and dynamic knee stability
- to return to work and sport as soon as possible.

It is very important that you, the patient, takes an active part in the rehabilitation, both before and after the operation. My goal is to guide you through the rehabilitation without unnecessary restrictions. Please note this is not an absolute protocol or a strict regime, but an overall guide to be used alongside your physiotherapists instructions.

Remember, if you have any questions or are confused about any part of this, it is better to ask now, so that you are clear in your goals.

ABOUT THE ANTERIOR CRUCIATE LIGAMENT

The knee is a complex joint, which has the ability to bend and rotate slightly. Knee ligaments help control motion by connecting the bones and bracing the joint against abnormal types of motion. The ACL links the back of the **femur** (thighbone) to the centre of **tibia** (shinbone), stabilising the knee, mainly in the forwards and backwards direction.



In addition to its mechanical restraining function, the ACL provides important neurological feedback that directly affects perception of joint position, and reflex muscular stabilisation of the joint **(proprioception)**. Proprioception is an important concept to understand in order that you rehabilitate successfully. Conscious and subconscious proprioception is essential for normal joint function in daily activities, occupational tasks and sports. Proprioception diminishes following ACL injury, but is significantly restored following surgical ACL reconstruction and rehabilitation.

The typical mechanism of an ACL injury is a non-contact twisting movement, usually due to stopping, landing and/or changing direction. Side-stepping (cutting), pivoting and landing from a jump are examples of events that may cause an ACL tear. An audible pop or crack and pain, are typical initial signs, followed by almost immediate swelling, due to bleeding inside the joint. Associated damage to other important joint structures, such as meniscal cartilages, collateral ligaments and articular cartilage is very frequent.

A few patients will achieve satisfactory stability and function with non-operative treatment and they will need extensive rehabilitation and adjustments to their daily activities and sports. Chronic ACL deficiency with instability of the knee results in gradual damage to the menisci and articular cartilage (joint lining) and consequent early joint wear.

A complete tear of the ACL has limited ability to heal and often requires surgical reconstruction. Surgery is occasionally followed by an overnight stay in but usually performed as a day case procedure. Then follows several months of intensive rehabilitation to restore normal range of motion, strength, flexibility and proprioception.

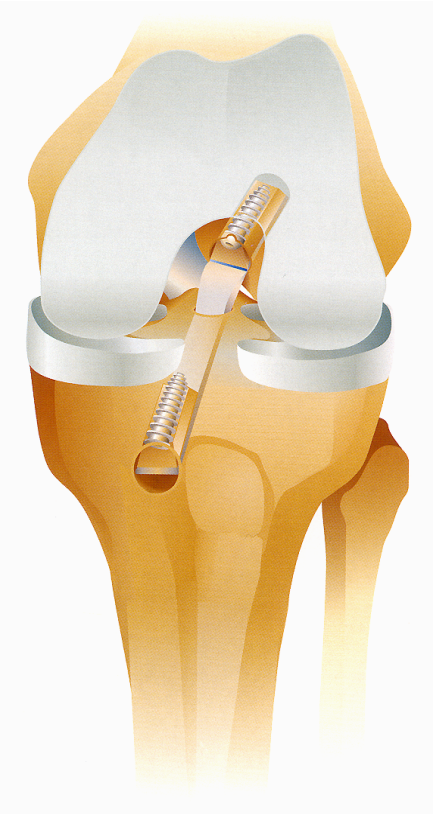
ACL reconstruction is not an emergency operation. Delaying surgery until a full range of motion is obtained, and muscle strength regained, significantly reduces the chance of having problems post-operatively. Delaying acute surgery also allows you to better prepare for surgery and gives you time to learn, fully understand and practise adequate exercise as well as building your quadriceps muscle

PRE-OPERATIVE REHABILITATION

Pre-operative rehabilitation is extremely important for the successful outcome of ACL reconstruction. Patients with an ACL deficiency, suitable for reconstructive surgery, should begin physical therapy as soon as the acute pain from the knee allows. They should also, if possible, visit a physiotherapist, prior to the operation. The early aims are to regain a full range of motion, maintain quadriceps muscle strength and joint proprioception before the operation.

BEFORE THE OPERATION

- **Skin problems with your knee (wounds and cuts in any stage of healing) are not compatible with ACL surgery as they increase the infection risk. They must be healed prior to surgery.**
- **Please do not shave your legs before surgery as this may increase the risk of wound infection.**
- **Do not forget to tell us if you have any allergies or any relevant medical problems.**
- You should have a full range of knee movement and ideally good leg muscle strength
- You should be familiar with the full range of postoperative exercises.
- **On admission to the hospital:** bring your regular medication, relevant medical records and x-ray films and scans.
- You are allowed to eat solid food **up to 6 hours** and drink clear fluids **up to 2 hours** before the operation. Details will be confirmed in the pre-assessment clinic.



THE OPERATION

ACL reconstruction involves replacing the torn ligament, either with tissue from the hamstring muscles (semitendinosus-gracilis autograft) or sometimes with the middle third of the patella tendon (bone-patella tendon-bone autograft). Fixing the graft into tunnels drilled in the bone with screws provides secure fixation which enables early accelerated progressive rehabilitation to take place.

The procedure is performed using keyhole surgery and takes approximately one hour. You will have three scars over your knee following the procedure. Two puncture wounds either side of the kneecap and a 5cm wound over your tibia (shinbone). You will have stitches to close the wounds and I will remove these between 10 days to 2 weeks after the surgery

AFTER THE OPERATION

Day 1

- ❒ **Knee is not braced or immobilised**, unless specifically agreed preoperatively
- ❒ **Pre-emptive and postoperative pain management with tablets** *(Co-dydramol and Diclofenac)* will be supplied.
- ❒ **DVT prophylaxis:** early foot and leg exercises and mobilisation are encouraged.
- ❒ **Swelling control:** Gameready / Aircast Cryocuff or cold pacs may be applied in the on the ward. **Use cold packs most of the time.** These are very good at reducing swelling.
- ❒ When you return to your room from recovery unit, start moving your operated knee gently *(bending and straightening)*.
- ❒ **Weight-bear as able**, aided with elbow crutches. Aim to progress to full weight bearing by the following day (once you have satisfactory quadriceps control, gait and knee extension).
- ❒ **Discharge from the hospital, if progressing well, is usually on evening of, or the morning after operation.**

2 to 14 days

- ❒ You will develop bruising in your shin and ankle, and some tightness of your calf. Some people experience numbness in the skin of your knee and shin – this is all normal
- ❒ **Start with basic *proprioceptive exercises* as soon as you start weight-bearing**: Briefly shift weight on the operated leg and try to balance on one leg *(this may initially be painful and difficult !)* whilst supporting yourself.
- ❒ As you gain confidence try this when holding on to a solid object *(washbasin)* and progress, when supervised, to the same with eyes closed. You should be able to do this by the tenth day post-operatively.
- ❒ Reduce **dressings** to skin cover and tubigrip bandage only, 48 hours post-operatively.
- ❒ Do not wear the tubigrip bandage at night as it increases the risk of blood clots
- ❒ **Progress to adapting to activities of daily life to one legged proprioceptive exercises** (balance on operated leg when brushing teeth, combing hair, using the phone) by 2 weeks.
- ❒ **Active knee bending** in side lying, or on sliding board.
- ❒ **Static quads** in full extension *(active extension from 40 to 0 degrees is contraindicated).*
- ❒ **Patella mobilisation / glides**: teach self-treatment exercises and how to relax quads when doing this.

- ❒ **Discontinue any exercise that causes unexpected pain and discuss it with your physiotherapist or surgeon.**

- ❒ Continue to **regain full extension** with **straight leg** and **closed kinetic chain exercises** *(always exercising with full weight through the leg).* **This is the most important target for now!**
- ❒ **Flexion exercises:** wall and heel slides. Aim for 90 degrees by the end of second week post-operatively.
- ❒ **Normalise gait:** walk in front of mirror.
- ❒ **Discard crutches** once walking well and confident in activities of daily living.
- ❒ Contact your physiotherapist if you have problems with your knee or exercises.
- ❒ **At 10 days to 2 weeks postoperatively you should have an appointment to see me in the outpatient clinic for a review**

PROPRIOCEPTIVE EXERCISES

Balance and proprioceptive training are very important components of this rehabilitation program. A quick and easy way of doing daily proprioception and balance exercises is to stand on one leg while brushing your teeth. This gives you regular opportunities to exercise proprioception for several minutes, a couple of times each day. Even if you have poor balance and proprioception initially, you can do your exercises whilst holding on to the sink with the opposite hand. As your skill level improves you can progress to "no hands" exercises. The next skill level involves the same exercise but with closed eyes, which may feel strange and will require some practice. Once these exercises become too easy, try to lean in different directions (while standing on one leg and brushing teeth), and then stabilise yourself without losing balance. This will enable you not only to master the skill of standing in one spot, but also to fine-tune the ability to balance once the centre of gravity has moved. Also, remember, that brushing teeth up and down and sideways are very different proprioceptive exercises !

2 to 6 weeks

- ❒ **You need to be guided by a physiotherapist at this time**
- ❒ **At 2-4 weeks: *usually* ready for driving and return to work.**
- ❒ **Continue to progress according to your abilities.**
- ❒ **Progress with closed kinetic chain exercises**.
- ❒ **Progress** unilateral exercises: sitting to standing, dips, exercise bike and step machines.
- ❒ **Progress with resisted hamstrings** exercises.
- ❒ **Progress with** dynamic proprioceptive exercises.
- ❒ Carefully resume **gym work** at week 4 -6
- ❒ **Swimming**: straight leg kick only, and pool exercises.
- ❒ **If you have patella problems** (clicking, grinding, pain) try taping patella medially. Pain at the front of the knee at this stage is **very common** and is due to your thigh muscles catching up with your level of activity. It will settle with time.
- ❒ **You should have a full range of movement** *(symmetrical full extension to full flexion)* **by the end of this period.**

Recommended exercises :

a) Squats
b) Seated toe drags
c) Toe raises
d) Treadmill walking
e) Biking with toe clips
f) Pilates
h) Elliptical Trainer

DRIVING

Very little information exists in current literature about the ability of ACL injured or reconstructed knees to respond to situation-specific stimuli, such as braking quickly while driving a car. It is difficult to determine when it is safe to return to driving following surgery. A recent study from Australia seems to indicate that following a right ACL reconstruction patients should wait at least six weeks before driving again. However, this could take place at two weeks for patients with left ACL reconstruction (or when they are able to operate the clutch if they are driving a manual car).

FLYING

There is no universal agreement as to when it is safe to travel by plane after an ACL reconstruction. It seems that most Orthopaedic Surgeons advise their patients not to fly for 4 to 6 weeks following the ACL reconstruction. Short flights do not seem to be a problem. However, long intercontinental flights are a potential problem as there is an increased incidence of spontaneous DVT (deep venous thrombosis), even in the young and healthy passengers. It is possible that sitting for long period of time, in a confined space could predispose to the development of deep venous blood clots, especially in people following recent knee surgery. If you have to travel by plane, between 2 and 4 weeks after your ACL reconstruction, it would be wise to contact your airline's Medical Department and ask them for advice. Also, please discuss this issue with your GP, as you may have to take prophylactic Aspirin (as anticoagulant) for several weeks.

6 to 12 weeks

- ❒ **At 6 weeks: I will review you again in the outpatient clinic and assess the graft healing.**
- ❒ **Usual milestones includes 0-130 degrees movement in the knee**
- ❒ **Continue to progress:** increase gym workouts, step ups and step downs.
- ❒ **Continue to improve your confidence, gait and proprioceptive aptitude**
- ❒ **Swimming:** continue regularly *(no breaststroke)*.
- ❒ **Cycling** on normal cycle.
- ❒ **Start jogging**, on the treadmill.

3 to 6 months

- ❒ Isokinetic testing (the involved quadriceps strength should be 70% of the non-involved, at three months).
- ❒ **Introduce sport specific exercises but no cutting activities.**
- ❒ Progression of strength work.
- ❒ **Agility work:** catching a ball, sideways running, 2 leg jumping, skipping rope etc.

6 to 9 months

- ❒ Isokinetic testing (the involved quadriceps strength should be 80% of the non-involved, at six months).
- ❒ Participating in skill exercises as well as improving power and endurance.
- ❒ **Plyometric exercises**
- ❒ **Earliest return to competitive contact sports** is at six months (provided: no swelling, no ligament laxity, full mobility, full muscle strength and proprioception, equal or better than the opposite leg).
- ❒ **Your outpatient review will be at 6 months . As long as your physiotherapist and I are happy with your outcome you will be discharged at this stage to return to full contact sport within the next 3-4 months.**

POSTOPERATIVE PROBLEMS

SUCCESS

Success of reconstructive ACL surgery depends upon many factors of which rehabilitation is of utmost importance. The most perfectly performed surgery can be quickly undone by too much rehabilitation but equally, insufficient rehabilitation can lead to joint stiffness, muscle wasting and a poor functional result.

COMPLICATIONS

These are uncommon, but may occur occasionally:

Calf and hamstring pain and swelling are common and will settle within a week or two
Bleeding (2 in 100 patients) into the knee joint may require draining in the immediate postoperative period.
Infection (1%) may result in redness / heat in the skin or knee joint. DO NOT TREAT WITH ANTIBIOTICS until you have contacted your surgeon.
Bruising around your graft harvest site, in the thigh or even appearing at your ankle is common and not of great significance.
Patch of numbness just next to your scar or on your shin is not serious and usually recovers.
Joint-line pain : Pain at the front of the knee during rehabilitation is almost universal and will settle with time and muscle building.
Proprioception loss may mean the knee does not feel right for a long time. Regular proprioceptive exercises and a simple **compressive knee sleeve** (elastic bandage, neoprene sleeve or double tubigrip) worn intermittently, is known to help with this problem by applying skin pressure, which indirectly makes the knee feel more secure.
Functional failure rate: The average (international) failure rate, which means an inability to return to pre-injury level of activities, with this particular graft and technique, is up to 15% (1 person in 7) in competitive and contact sports, and up to 5% (1 person in 20) in activities of daily living and fitness training. This is unfortunately higher in younger patients and those with hypermobility. In these patients, it is likely you will have a concomitant "lateral tenodesis" procedure to supplement the reconstruction and reduce the re-rupture rate

QUESTIONS

If you have questions about your rehabilitation please contact your **physiotherapist**. If you have any problems, especially if you experience any excessive skin redness, persistent wound discharge, excessive swelling, or severe pain during or after exercise, call Mr Houlihan-Burne's secretary on the numbers given on the front of this pack.

Call your **GP** if you develop calf pain and tightness, shortness of breath, or if you develop a fever and feel unwell.

This rehabilitation guide is based on combined experience from a number of sports injury clinics performing ACL reconstructions and rehabilitation. It has been developed according to contemporary high standards of leading national and international ACL surgical and rehabilitation centres. The main aim of ACL rehabilitation programme is to follow carefully all patients preoperatively and postoperatively and advance the program to minimise postoperative complications, maintain ACL stability and allow a faster return to daily activities while progressing to full work ability and sporting activities.

Mr David Houlihan-Burne FRCS Orth
Consultant Orthopaedic Surgeon