ACL KNEE INJURY & SURGERY

PATIENT GUIDE



Dear patient,

Please take a few minutes to carefully read the following information regarding your knee surgery.

This patient guide has been written to answer many frequently asked questions and to assist you to prepare for your pre- and post-surgery needs.

Thank you and all the best with your recovery!

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ACL Knee Injury & Surgery Patient Guide | version 3.0

ACL Knee Injury & Surgery (Anterior Cruciate Ligament)

Ligament injuries to the knee are common in sports that involve twisting, jumping and decelerating.

THE KNEE - HOW DOES IT WORK?

The knee consists of THREE BONES

- 1. Femur (thigh bone)
- 2. Tibia (shin bone)
- 3. Patella (knee cap)

These are covered by a cushioned surface (articular cartilage) – this is a "shiny" and well-lubricated surface.

It is the wearing down or damage to this layer that is (or leads to) osteoarthritis.

The cartilages or menisci (medial and lateral) are discs of gristle sitting between the bones and acting as cushions and lubricants (like washers between the bones).

The bones are held together by a capsule that surrounds the knee. This is strengthened and supported by ligaments, particularly the medial (inner side) and lateral (outer side) ligaments, as well as by the tendons and muscles (hamstrings and quadriceps).

The cruciate ligaments – Anterior (ACL) and Posterior (PCL) – are two strong rope-like structures that cross each other in the centre of the joint (hence the name cruciate).

The anterior cruciate ligament is a very important ligament. It controls the forward movement of the tibia on the femur, but most importantly it controls rotation of the knee. Damage to this results in "rotational instability" of the knee.

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SO WHAT HAPPENED? THE COMPONENTS OF INJURY

- a. The mechanism of injury is usually by:
 - landing awkwardly from a jump or leap,
 - pivoting, twisting or sudden deceleration,
 - being tackled or struck from the side, or
 - forced hyperextension of the knee.
- b. **Sensation:** feeling or hearing a pop snap tear often occurs. This may be associated with a feeling of "movement" of the bones of the knee.
- c. Disability: is variable. Usually associated with severe initial pain, that may settle quickly or in a few days (unless you have damaged other ligaments or cartilage). One usually needs assistance off the playing field. If you attempt to twist it may give way or feel insecure.



- d. **Swelling:** is variable, usually occurring soon afterwards or within 4 to 6 hours. Often tight and painful, but on occasions there may be very little swelling.
- e. **Pain:** usually "severe" initial pain may last for some minutes and then settle, unless you have bleeding into the joint or damage to other ligaments or cartilages (when pain can continue, along with tightness and stiffness).

WARNING: A common story is that of an initial injury that settles relatively quickly, so that over a few weeks the knee feels fine to walk, even run, and train for sport. However, with a further twist, stop or landing, the knee may give-way. These episodes may settle in a few days, until significant damage occurs to the articular surface and/or to a meniscus.

EXAMINATION: WHAT NEEDS TO BE CHECKED?

Examination may be difficult initially because of pain and swelling, but is very important. Suspicion of anterior cruciate ligament injury in most people, but particularly in a young athletic individual; usually requires further investigation, if they are keen to continue their sporting activities.

X-rays do not show the ligaments or the cartilages, but are important to exclude fractures or other bone problems.

MRI (magnetic resonance imaging) is like a special x-ray, yet more expensive (costing between \$180 and \$300 "out of pocket").

A high quality MRI <u>may assist</u> in making a more definitive diagnosis, as they can show images of the ligaments, menisci and articular surface; but are still only "shadows of the truth".

(Differential and/or associated injuries are: patellar dislocation/subluxation, isolated meniscus/cartilage; chondral injury; +/- other ligament damage).

KNEE INJURY is often complex, and comprises:

- a. Damage to the knee structures (e.g. ACL/menisci/articular surfaces)
- b. Haemorrhage bleeding into the knee and often into the surrounding soft-tissues
- c. Response (or "reaction") to this ligament damage and bleeding

This is recognised as:

pain, anxiety, limited movement, muscle inhibition (particularly quadriceps inhibition) and disability.

Failure to recognise and treat all these factors, leads to increased problems and complications such as stiffness, muscle wasting, kneecap problems or possible DVT (deep vein thrombosis = blood clots in the calf).

Note: All knee injuries are different, requiring individual assessment and treatment.

PREPARATION FOR DEFINITIVE TREATMENT

We need to be aware of the specific tissues and ligaments that have been injured, but concentrate on preventing the "secondary problems" such as anxiety, quadriceps inhibition and wasting, knee stiffness, and blood clots (DVT).

Following any knee injury it is most important to initially undertake the "RICE" regime – rest, ice, compression, and elevation. **The patient must also move** his/her foot and ankle so as to maintain calf circulation. Almost immediately (within 2 to 3 hours) compressive bandages must be removed and some movement of the knee and quadriceps ("tensing") encouraged. Crutches should be used to allow some mobility and progressive weight bearing – if the x-rays show no bone injury. Explanation of the problem, and logical courses of action, will reduce the anxiety and fear associated with knee injury; and the worry of doing more damage.

ACL RECONSTRUCTION IS "ELECTIVE SURGERY"

It is undertaken only when the patient "as a whole" is adequately prepared, and only if indicated.

If the knee is painful and stiff, and the muscles are not working, then further "insult" by premature surgery can be detrimental.

Attention is therefore directed towards the **knee**, **muscles**, **mind** and the **other factors**. This includes our work, studies, families and other social factors. These need to be organised so that appropriate time for surgery and rehabilitation is considered.

WHAT ARE MY OPTIONS?

These are "life-style" decisions and depend on:

- a. the degree of your damage and laxity/looseness of your knee
- b. your activity demands (sport and/or work)
- c. your ability and dedication to rehabilitate

Your OPTIONS are therefore to:

- 1. **Give away** all hard rotational activities including contact sports (unpredictable twisting and decelerating activities)
- The degree of restriction will depend on the degree of instability/laxity of your knee. Put simply – the less twist/rotational activity, the less the problem. Conversely - the more vigorous the activity in a more lax knee, the greater the problem.

| Grade I | slight laxity |
|-----------|-----------------|
| Grade II | moderate laxity |
| Grade III | severe laxity |

(Likened to a cliff face)



With anterior cruciate ligament deficiency, you can generally cope with day-to-day activities and are able to walk, swim, cycle or play golf. However if you attempt to jump, twist, pivot or play contact sports, you run a high risk of the knee giving-way. With these instability or "giving-way" episodes, further irreversible damage may occur to the menisci and articular cartilage – and thereby initiate the onset of arthritis.

Unfortunately, once you have damaged the ACL, you have a greater chance of developing arthritis in the future. This is significantly accelerated the more damage you do to the "cartilages" – ie menisci and joint surface.

- 1. **Maintaining muscle tone** and, when appropriate, muscle strengthening; this being important no matter what you intend to do. This will enable you to do more "general activities" with security (but not unpredictable rotational sports); and needing caution when stepping down activities of daily living.
- 2. **Bracing (large hinged type)** is usually inadequate, except in special circumstances. These braces may be used some older patients who can tolerate a large and costly brace so they can play social tennis or ski, or at times enabling to continue work. They are usually not adequate or tolerated by young active individuals.
- Operation consideration of an operation is warranted to stabilise the knee in the form of LIGAMENT RECONSTRUCTION if your ACL is <u>damaged</u> and the knee has significant rotational laxity. This procedure has been refined to become far less problematic and painful than 5 to10 years ago. Nevertheless, the principles remain the same.

DEFINITIVE TREATMENT



HOW DO YOU PREPARE FOR SURGERY?

It is not "the operation that fixes you". You must:

- 1. Prepare for the operation by:
 - a. Knee motion: it is vital to gain almost full knee extension and flexion well beyond 90° prior to surgery
 - b. **Muscle activity:** you must practise and be able to contract your quadriceps muscle and see your "kneecap move upwards". Practise walking between crutches.
 - c. **The mind (mental preparation):** done through familiarisation with the program and taking a positive attitude to the task at hand.
 - d. **Organise:** work, studies, family and social life. If you are thinking of undergoing surgery you must set aside time and organise your life. You may need to put off travel or other plans.
 - e. Stop all anti-inflammatory or blood thinning medication at least 5 days before surgery, including those containing aspirin, and also garlic tablets. These medications thin the blood and may therefore cause bleeding at surgery. Be cautious with respect to herbal and natural therapies.
- 2. Post-op initially to "grit your teeth" and move the knee especially straightening.
- 3. Progress from simple movement and muscle control.
- 4. You will need an exercise bike at home beginning approximately three weeks after surgery and an outside cycle after 2 to 3months. An alternative to an exercise bike is placing your conventional bicycle on a "trainer"/frame.
- 5. For the first 2 to 3 months (the "irritable—biologically active—chewing gum" stage) you must be cautious relative to sudden and twisting movements. Nevertheless, pay attention to gaining range of movement, particularly "straightness" – concentrate on your walking pattern. Be disciplined with regular pool exercises, swimming and exercise cycle (ensure the seat remains high!).
- 6. Following the initial 10 to 12 weeks, you must be committed to then getting fitter than ever (!?) using the outside cycle and circuit work at the gym. This must continue regularly for 12 to 18 months. If you do not, the whole process is a waste of time, and you could be worse **off than not doing anything!!**

ARTHROSCOPIC EXAMINATION UNDER ANAESTHETIC (AND/OR MRI)

For an active individual, such an examination may be done to determine the extent of the damage, particularly the rotational laxity. It is this rotational laxity that will determine the ability to play rotational sports or continue risky occupations in the future. This can be difficult to determine in a non-relaxed, awake patient.

If there is significant instability, then reconstruction of the anterior cruciate ligament would be carried out (with the patient's prior consent). If there is less significant laxity, or the individual is less active; then the arthroscopy would enable your surgeon to tidy up any associated meniscus/cartilage and chondral damage; and then institute an appropriate exercise program that would be organised with initial protection of the other ligaments and capsule in mind. This is to facilitate any possible healing, followed by a progressive muscle strengthening program.

If you have damaged, torn or ruptured your cruciate ligament (**primary restraint**), this cannot heal itself adequately. It is often associated with damage to collateral ligaments, the menisci and articular surface (**associated lesions**). With the passage of time and continued rotational activities, the other ligaments and capsule (**secondary restraints**) may stretch, leading to increasing laxity and instability.

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

(SURGERY for "rotational instability")

The instability that occurs with ACL insufficiency (from a tear, rupture, or strain of the ACL) is the result of a sudden movement on the outer or lateral side of the knee. The lateral femoral condyle slips suddenly on the "fixed" tibia, causing "giving way" or insecurity.

Because the anterior cruciate ligament cannot heal itself, and suture or attempted repair rarely works; we use a tendon as a substitute (hamstring tendon, part of the patellar tendon, or lateral fascia). This is placed or routed through the knee, and fixed with sutures, metal staples, cross-bolts, buttons, screws, or other devices depending on the individual surgeon's preference. The purpose of this is to anchor the tendon firmly to the bone in its anatomical position until biological fixation occurs (2 to 3 months).

My preference is to use the hamstring tendons fixed in a groove "over the top" by a staple, but there are a multiplicity of techniques.

This graft (substitute) is basically a piece of tendon that acts as a scaffold so the body can attempt to make a "new" anterior cruciate ligament. Its ultimate strength is never the same as the original ligament, however this is a lot better than nothing at all. This, combined with capsular "scarring" and the muscle retraining, results in functional stability of the knee.

The body lays down "**new**" collagen fibres into, onto and around the tendon graft. These new collagen fibres are of variable quality and quantity, depending on all sorts of factors. During this time the ligaments of the knee can be likened to chewing gum – it is not elastic and so it stays stretched (creep). During this period, care is needed to avoid sudden or twisting activities, and adherence to the program organised for you is important.

If you do nothing the knee will remain stiff and the muscles will waste.

If you do too much; particularly standing, or walking, or loading; the knee may swell and be painful, usually after the activity.

This is known as the **"irritable period"**; approximately the first 3 months post-surgery.

Emphasis at this time is on:

1. gaining range of movement, both extension and flexion

- 2. muscle function and control
- 3. controlling the swelling

Persisting joint swelling may affect the quality of the "new" ligament, and the integrity of the articular (cushion) surfaces.

The graft and the "fibrous response" will be "moulded" by a physiological appropriate rhythmic exercise load (Wolff's law forces) with resulting tissue functional adaptation; and so form a functional ACL (composite of hamstring graft + scar adaptation).

Lateral (outer side) Tightening

(Modified Ellison tenodesis)

If in a young active sports person (when examined under anaesthesia) there is a large pivot shift/jerk test (i.e. a very lax knee) then a tightening of the lateral capsule may also be required to prevent the rotation movement that happens on that side of the knee. This lateral procedure, or modified "Ellison tenodesis", acts as a sling and reinforces the stretched/damaged lateral complex. In this way, it decreases the risk of further rotational instability. If this is required, the scar on the lateral/outer side of your knee will be longer, and there will initially be a feeling of tightness.

| L | LATELAL TENODUSIS |
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| ACL TEMPO | 7 Ar |

IN-HOSPITAL EXERCISES

i. **Calf exercises** – are commenced immediately as you awaken, or as soon as the feeling returns. These should be done slowly and carefully by moving the toes and ankles whenever you think of it. This is done to pump more blood through the calf to prevent DVTs (blood clots).

Each hour or so during the day, spend a few minutes quietly doing 3 or 4 repetitions of the exercises outlined below:

Note: It is the "quality" (i.e. the way you do the exercises) not the "quantity" that is important.

- Quadriceps exercises tighten the muscle so that you feel and see the kneecap move.
 Do these slowly, hold for a few seconds, and then relax. Do not force this or produce hamstring pain.
- iii. **Straightening/extending** the knee. Do so in a graduated stretching fashion, feeling tightness, not pain.
- iv. **Straight leg lifts** –tighten/contract your quadriceps muscle; raise your whole leg slowly, keeping it as straight as possible, then slowly lower. Do 3 or 4 lifts each hour.

Once the drain tubes are out, and you have muscle control (ability to lift your leg), the physiotherapist will get you out of bed, on crutches and with a splint. This takes place the day after surgery. Do not walk unaided on the injured leg until directed. You may "shadow walk"/part weight bear (ie steady yourself between crutches). Whenever you get out of bed – wobble your feet and toes, and do gentle forward lifts of the leg. You will gradually become more mobile and competent on crutches.







DISCHARGE FROM HOSPITAL

Usually after 1 night – when you are comfortable, safe on crutches, and have muscle control.

Wound care; anti-inflammatory; antibiotics; and analgesic medication will be organised and outlined appropriately by your treating surgeon.

Ice packs: it is recommended that you cover the knee with plastic so as to keep the wounds dry. Apply ice packs to the knee for 30 minutes. Repeat this every 2 to 3 hours during the first week or so. This helps to reduce any swelling and also any aching/pain/discomfort in the knee.

Positioning of leg: at home in the first week, it is best to be sitting with 2 to 3 pillows **across the bed** or couch and resting your legs on that. Keep your toes pointed towards the sky, and try not to sit at odd angles. Ensure your foot/ankle is higher than your knee and hip.

Splint: we find a simple splint (like a "cricket pad" with foam and Velcro) to be useful for protection in the first 2 to 3 weeks following surgery. Use the splint whenever you are up on crutches (in case of slips and jolts), and when sleeping at night (to protect those who normally sleep on their stomach or in a foetal position). This splint should be taken off at all other times. It is more comfortable and does not slip down if you wear it over the top of tracksuit pants.

Crutches: you can steady yourself and take a little weight on the leg progressively and as directed. You need to become mobile at home – getting up to the toilet, refrigerator, and a little "wander" in the house – however only in short bursts. Keep the leg elevated at all other times.

EXERCISES AT HOME

Each hour or so, you need to continue gently but purposefully doing 3 or 4 repetitions of the exercises you commenced in hospital.

Quadriceps setting

Place a rolled towel or pillow under the knee and press down. Tightening the quadriceps so that you feel and see the kneecap "move upwards." Hold for 2 to 3 seconds, then relax – repeat these slowly. Do not raise the heel off the couch or bed, or force and produce hamstring pain. Progressively decrease the height of the towel/pillow, until flat.

Motion is vital

Both flexion and extension are encouraged. It is particularly important to gain extension (straightening). Movement is gradual and progressive, in both directions, rather than quickly or suddenly.

Standing (using gravity to assist)

Without the splint, 3 or 4 times per day, do 3 or 4 repetitions of:

- a. Straight leg raises tighten the thigh/quadriceps muscles and lift the leg forwards, keeping the knee as straight as possible.
- b. Lifting at the hip and thigh but allowing the knee to bend.
- c. Start by attempting to bend your knee slightly, then slowly straighten. Move the knee with gravity assisting the quadriceps and hamstring muscle. Do this slowly as a swinging action in that upright position, but not forcibly.
- d. With your foot resting on the floor, tighten your quadriceps muscle and straighten your knee.
- e. Leg slide sitting on a sturdy table with sock on the foot, flex the knee using your hands under the thigh, then allow the knee to straighten (i.e. come down flat).







After 5 – 10 Days

If your surgeon is happy with your wounds and swelling, you will continue the previous exercises, and include additional exercises with the guidance of your physiotherapist:

Sitting on a table – with the thigh well supported, use the good leg/foot to support the injured leg. Gradually lower the leg – allow progressive flexion/bend – then straighten /extend with the assistance of the good leg.

When you are able to flex to 90°, use the good leg as resistance for the operated leg. With the knee flexed and near 90° - isometric exercises are done:

- (i) Resist knee flexion tighten the hamstring.
- (ii) Resist knee extension quadriceps. Tense your knee and hold for a second or two, but do not force or make painful. Hold at 90° do not straighten.

Do these exercises gently 3 to 4 times a day. DO NOT exercise quickly, jerkily or forcibly.

Weight bearing

Weight bearing must be gradual; initially rest the foot on the ground when standing, or to steady you. Then walk in a shadow fashion. If you have good muscle control and your knee straightens – then you can walk without crutches (with the splint on) in the bathroom, kitchen and the like after the first 5 to 10 days. Then with physiotherapist guidance, you will progressively increase the weight attempting to gain a walking pattern as normal as possible.

The aim is to be off crutches within approximately two to three weeks, but this is dependent on:

- a. wound healing
- b. range of movement particularly your ability to straighten the knee
- c. joint swelling
- d. muscle tone and control with no "quadriceps lag" ie ability to perform a straight leg lift

Walking

The aim is to gain as normal a walking pattern and gait as possible. To begin with do only what you need to in the house or office. Only increase as you gain knee strength, co-ordination and a better walking pattern – with no swelling. Every time you stand and before you walk, think "straighten your knee".

Do not stand for long periods or walk any distance for exercise; otherwise the knee tends to swell and become sore. This is particularly the case in the first 6 weeks. Concentrate on your slow, deliberate, but normal walk pattern.

Brace

A simple wet-suit type brace with metal hinges (Polly Farmer type) may be used as soon as the wounds are healed. This brace can be comfortably worn (from around the 2½ to 3 week mark). This is only to be worn when walking outside the house to provide support and protection. The cotton "Tubigrip" should be worn under the brace to reduce sweating and sticking.

Exercise bike or bike on a trainer (turbo-trainer)

Approximately 3 weeks after surgery, once you have gained approximately 100° of knee flexion, commence using the exercise bike. Ensure the seat is high and there is minimal pedal resistance.

(Do not use the exercise bike to gain movement)



Begin doing only 4 or 5 minutes per day and gradually increase as is comfortable to do so. Increase from five minutes once per day, then twice per day – incrementally increase to 10 minutes, 15 minutes, and so on. Resistance is used when you are comfortable and have no increasing fluid in the knee. (Remember to not lower the seat height).

Pool exercises and swimming

Pool exercises and swimming is commenced as soon as you can walk from your car to the pool without crutches and the wounds are healed well. When at the pool, walk/wade slowly in the water and do some slow exercises, eg cycle movements, then part squats. If comfortable, use a noodle or suspension vest to perform suspension walk/cycle/run movements.

If you are, or have been, a good or reasonable swimmer; then initially swim freestyle or backstroke using a "pool buoy" or floatation board between your thighs/knees. Start using your arms only, and use the legs only enough to keep afloat. Start doing a few laps, gradually increasing each time you swim. As your swimming improves, reduce the use of the "pool buoy".

DO NOT do vigorous leg exercise in the water or on the edge.

DO NOT use a kickboard or do breaststroke.

Range of movement

It is vitally important to regain your full range of movement. This is done gradually, with initial emphasis on extension (straightening) and also flexion. Every time you stand up, straighten your knee. Each time you have a coffee, put your heel/foot on the desk/coffee table. Do so only for short duration/small amounts, but often.

Bend /flex your knee to a tight stretch feeling – hold then relax.

You are not stretching your graft by gaining movement – only stretching unwanted scar and adhesions (provided this is done without twisting or sudden movement).

The aim by the 6 to 8 week mark is to have your knee straight, bending to over 100°, walking with a normal pattern, swimming and pool exercising, and using the exercise bike regularly – without producing pain or swelling. If all is progressing well, these activities are gradually increased.

As you continue your daily exercise program, further quadriceps and hamstring resistance exercises are added by using elastics/rubber bands, along with balance and co-ordination activities. Squat only to a third – combined with calf raises.

Step up and down on a telephone book.

DO NOT use foot weights, leg extension machines or squat deeply/fully.

Braces

The simple "Polly Farmer" type hinged brace may be worn only when you are walking outside the house, but taken off to swim, cycle and exercise. Inside the house or office the brace is not necessary, as you need to concentrate on your walking pattern. As you gain confidence, the brace should only be used at times of risk – for example when it is wet or slippery outside, on public transport, at shopping centres, or on uneven surfaces.

Outside bicycle (usually start at around 9 to 12 weeks).

If you have been steadily using the exercise bike for 15 to 20 minutes with moderate resistance; then in a flat area with a geared bicycle and with the seat high, you can commence quietly on the outside cycle. Start by going just around the block and progressing steadily up as tolerated (1-2 km, 5,10,15,20 km). This activity is encouraged above all others, as it does not stress the joint surface or the ligament, but works the muscles. Do this on alternate days if possible.

Around 12 weeks (10 to 14) following the surgery, the puffy swelling starts to resolve and your knee begins to look more like a knee. The joint loses its "irritability", so that we can increase the exercise routine to include an appropriate-circuit gym program.

Gym program

Your gym program will be designed by your orthopaedic surgeon; your physiotherapist; and gym instructor. **The program** will depend on your individual needs and taking into account your particular knee problems.

In general, this is a gradual and progressive process. It will utilise the exercise bike, rowing machine (do not bend beyond 90°), leg press, stepper machine (no higher than 20cm), mini trampoline, elliptical trainer and wobble board, etc. **Do not** do deep squats, use foot weights, or use the leg extension machines (not before the 6 month review); or the treadmill.

Emphasis is placed on outdoor cycling and gym work to build up strength, endurance and co-ordination. The next stage includes using the cross-trainer/elliptical trainer; wading and running in water.

Then some light skipping and hopping. Once you have developed a good equal hop; you would then be directed towards running on the spot; then onto grass (wearing good shoes); and performing light 30 metre to 40 metre "run throughs".

The point in time you are able to run longer distances or commence turning/twisting activities will be determined by this progress, in consultation with your orthopaedic surgeon and your physiotherapist.

If you start these activities before they are happy with your hopping and co-ordination; you may develop kneecap problems, or stir up any articular cartilage problems you might have.

Knee cap taping, including McConnell exercises

VMO exercises, lateral patellar stretching, massage and McConnell taping are used either throughout or at different stages of the program (by your physiotherapist) according to your muscle tone and patellar tracking.

Pilates/core stability work

Rate of Progress

The rate of progress will depend on your pain, wound healing, joint swelling, muscle tone, co-ordination, and joint stability. You need to progress from one stage to the next without attempting to skip phases. We are more interested in the direction of your progress.

Co-ordination and "proprioceptive" activities, along with your sport specific "skills and drills", will be added into your program. These must be in addition to your cycle and gym activity – not in place of.

THE FINAL OUTCOME

Approximately 80% return to rotational sports and activities.

This is dependent on:

- the degree or severity of the initial injury
- whether there was damage to the joint surface or cartilages
- whether your muscles can regain their quick reflexes and responses; as well as their strength and endurance
- your tissue response or healing ability

We cannot tell for at least six months (and often not until 12 months or so) the final result or your ability to play rotational sports or pursue demanding work activities.

WE DO KNOW THAT, IN **ALL BIOLOGICAL SYSTEMS**, when we damage part of the musculoskeletal system (such as the ligaments of your knee), there is a **variable response to healing**, as represented by a normal histogram curve:

Group I – fortunately, 80% of people form a reasonable quality and quantity of scar or fibrous tissue that, with a physiological load, forms a **good anterior cruciate ligament-like structure.** This, along with the tightening of the lateral capsule, results in a **functional and stable** knee.

Group II – approximately 10% of people form very little scar tissue, or tissue that is very stretchable and loose. In this group the knee may become sloppy and lax again despite the surgery. Occasionally they need further surgery or they cannot return to rotational sports and demanding occupations.

 $Group \parallel \parallel -$ approximately 5 to 10%, are to the other extreme. This group form lots of scar, often through the whole knee. This happens more often if the individual does not – or cannot – get their muscles working in the first few



weeks post-operation. This can lead to "kneecap problems" later on (pain and crepitus).

Some patients (approximately 1%) may require manipulation under anaesthesia, plus arthroscopy, to break the adhesions and improve their movement.

Group IV – this group, because of their meniscus and articular cartilage damage to the knee, when they start to load the joint, the cushioning will not take it – either with bent knee loads (lunge/squat/leg extensions) or with impact loads (running/jumping). This results in pain and/or swelling during or after the activity.

They may be advised not to return to hard impact sports and activities such as long(er) distance running, basketball, netball, and squash, because the surfaces "cannot take it". This damage leads to early arthritis.

A "reconstructed" knee cannot be as good as the original, but it allows the return to activities in the majority of athletes and workers. As illustrated, there is a spectrum of results. The more slack or lax your knee is, and the weaker or less

trained your muscles are, the more likely you are to have some persisting instability (and therefore inability to return to hard rotational sports and work activities).

On the other hand, the more stable (without being stiff) and better your muscle control and strength, the greater your chances of returning to full activities.

Work at it in a gradual and consistent manner.

PROBLEMS POST-OPERATIVELY AND DURING REHABILITATION

Everybody is different, all progressing at different rates, with various irritating symptoms and problems. Most of these can be overcome with appropriate action. However you need to be aware that all surgery does involve a degree of risk and possible significant complications. This is to inform you, rather than alarm.

General anaesthesia

General anaesthesia does have a low, but definite risk. Nerve blocks or spinal anaesthesia can (rarely) cause nerve damage.

Headache – (spinal anaesthesia)

Occasionally, within the first 2 to 5 days following surgery, a headache that occurs when you stand up, yet settles if you are lying, may occur. If this happens, stop the Naprosyn, or other anti-inflammatory medication and stay lying down, resting as much as possible. If not settling within 24 to 48 hours, contact your surgeon. This results from a small leak of spinal fluid, and may require a blood patch,

Calf pain/swelling

Calf pain/swelling may indicate your failure to elevate the leg adequately in the early post-operative period, or the lack of muscle pump action to move the fluid. You may simply have too tight a bandage.

It may however indicate a deep venous thrombosis (DVT or blood clot) in the calf. Let your surgeon know; as there is a need to check with a simple test (Doppler ultrasound). These are treated with some form of blood thinning medication, organised for you by a consultant vascular physician.

Pulmonary embolism

Very occasionally, a blood clot may break away from the leg vein and travel to the lung. Therefore if you develop acute chest pain or shortness of breath, you should be seen urgently at a large hospital emergency department. Death can result from a large lung clot.

Bleeding

Bleeding into the knee or soft tissues is always a small risk with all surgery; having increased pain and swelling postoperation. If this occurs it may require, in some situations, further surgical drainage.

Damage to major blood vessels or nerves is extremely rare, but always possible due to tourniquet pressure or sharp instruments.

Infection

Infection is a risk with all surgery. If this occurs in the knee joint, it may have deleterious consequences if it is not controlled. This may mean further surgical drainage, arthroscopy, and washout of the knee, plus a prolonged course of antibiotics taken intravenously and orally.

If you develop increasing pain with a high temperature, do not hesitate in calling your surgeon.

Most infections are superficial, involving the skin, and occasionally the deeper soft tissues. These will usually be resolved by a course of appropriate oral antibiotics (these need to be of suitable duration).

Wounds

The stitches (or sutures) used are "absorbable", and run beneath the surface of the skin. They do not need to be removed. Occasionally the bacteria from your skin will get into the wound and cause a reaction and infection. <u>If this occurs</u> please notify your surgeon, as it is usually easily controlled by an early or further course of appropriate antibiotics.

Small skin nerve damage

Numbness or altered sensation in the skin around the knee and/or leg – This may occur whenever an incision is made in the skin and deeper layers, as there is a network of small nerves that cannot be seen. Some of these may be bruised and others cut at the time of surgery. The bruise will recover with the passage of time, but even with the cut nerves there is a gradual reduction in area and degree of numbness, as other nerves may contribute to a return of feeling. Commonly you may be left with roughly a 50 cent coin-size area of altered sensation somewhere around the front of the knee or leg.

Clicks

"Clicks" are common early on, though they generally decrease with time. Avoid exercises causing the click, and continue other exercises that do not. If they persist, cause catching, pain or swelling then, in a small number of patients, there may be a need to do a further arthroscopy to clean out excessive scar tissue that your knee may have formed (Cyclops lesion); or to tidy up any unstable "cartilage" that has failed to heal/seal.

Swelling

Swelling is variable.

- The knee/leg usually looks "funny", initially with wasting of muscles and thickness of the operated knee this gradually returns to normal over 2 to 4 months.
- "Fluid" in the knee means inflammation or irritation. If this occurs you need to use ice or washing soda packs, anti-inflammatory medication and take all exercises quietly. Reduce walking and the like until it settles. Persisting joint swelling and inflammation does not allow your body to lay down good strong collagen to the graft, and keeps it as a soft (more spongy) stretchable band. It can also affect the cushion "articular" surfaces of the knee, making them more vulnerable to break down. Care needs to be exercised.

Stiffness (tightness)

- Do not be afraid to move the knee. Problems arise because the lining of the joint tends to stick together. The "tightness" you feel is these "adhesions" sticking together. You **must stretch** these out before they become too firm.
- NB: Normal movement does not stretch or affect the graft, except in a beneficial way.
- Full knee extension/straightness is vital "work at it" in a gradual fashion.

Hamstring strain

Hamstring strain may occur in the first 6 weeks if you do a sudden movement, or suddenly rise out of a chair. A "pulling/sharp" pain may occur at the back of the knee/thigh. If this happens then the area should be iced, rested, and then gradually "stretched" – as you would for any hamstring tear. Then massage and stretch – be aware!

During the operation the tendon of the hamstring is taken, to become the *graft*. The muscle part then needs to "stick" and attach to the muscle beside it. This is vulnerable to tearing, particularly in the first 4 to 6 weeks. Caution is needed so as to avoid repeated episodes that can lead to persisting problems. 90% of patients, with time, regain their full strength. 10% are aware of a tightness requiring adequate stretching before activity, and 2% may remain with more significant restriction.

Pain beneath or around the "kneecap"

Pain beneath or around the "kneecap" is not uncommon; **it is the most common problem following any knee injury, with or without surgery**. Nevertheless you need to be cautious if it occurs. Reduce or stop any exercise that tends to load the bent knee, eg lunge, stepper or part squat; or running if at any stage it produces pain. Massage and stretch the outer (lateral) side of your kneecap. See the physiotherapist for McConnell taping. As the inner part (VMO) of your quadriceps muscle builds up, the irritation generally settles. Continue cycling with low load with the seat high.

Patellar crepitus or grating

This is more common if there was some pre-existing damage (often patients are not aware until an injury exacerbates the problem). This also occurs if you have problems getting your quadriceps muscle working early on, have significant quadriceps/VMO wasting, persisting knee effusion, or fail to gain extension. This may require modification of your exercise program. If it is a significant problem, it may require an arthroscopy to "shave and tidy up" your kneecap. We cannot give you a *new* kneecap.

Many of the problems following injury and/or surgery relate to:

- 1. **the damage you have done to the knee**, particularly to the articular surfaces and menisci (either pre-existing or as the result of a recent injury/episode)
- 2. a big factor is the way you can get your quadriceps muscle to work following injury and in the early post-op period. Failure at this time leads to problems that become more prominent later with stiffness, significant quadriceps wasting, and kneecap pain and/or crepitus.
- 3. your "biological response" to the surgery and exercises
 - a. Some patients have minimal pain and a very rapid return of movement. These patients need to be cautioned not to twist, do sudden activities, or overload but to gain muscle co-ordination as their tissues can be more stretchable.
 - b. Others tend to swell easily or persistently. They are at risk of chondral damage and of poor tissue healing.
 - c. Another group have a tight and stiff response. This is okay if they can "bite the bullet" and stretch while gaining quadriceps control. In apprehensive patients who are scared to stretch and fail to gain extension and early quadriceps function problems may ensue.
- 4. Everyone is different we look at the goals and direction, rather than the rate of progress.

Further Surgery

Further surgery is possible in 5% to 10% of patients (in the first 5 years) following a significant knee injury and ACL reconstructive surgery. This procedure does not give you a 'normal knee'. The aim is to regain a functionally stable joint with as minimal problems as possible. However, your body cannot regrow or regenerate the damaged structures. We rely on the formation of scars at the sites of injury and surgery, and subsequently a process of **"functional adaptation"** to seal, heal and **stabilise** these tissues.

1. Early post-op period

- a. Arthroscopy, wash out, and drain if knee joint is bleeding or infection is suspected
- b. Re-open a wound, for haematoma, infection, or a retained/stuck drain tube

2. Intermediate period

- a. Arthroscopy and manipulation for stiffness and failure to gain adequate movement
- b. Arthroscopy for persisting swelling, clicking, grating, and associated pain

3. Late period – after 6 months

- a. Arthroscopy for failed healing or further tearing of a meniscus
- b. Failed healing or further breakdown of the articular cartilage [particularly of the knee cap], or the groove the kneecap runs in (*femoral trochlear groove*).
- c. Excessive scar-formation around the graft at the front of the knee causing a block to straightening, clicking and swelling (Cyclops lesion).
- d. Removal of a staple/screw etc if this became loose or caused friction to overlying tendons or fascia.
- e. Exploration excision of a *pes ganglion*. This is a lump/cyst that can form under the front scar.
- f. Revision ACL reconstruction if your scar/collagen tissues stretches-out with the passage of time, or reinjury occurs before you have adequately rehabilitated.
- g. Progressive degeneration/arthritis leading to re-alignment surgery, etc (in the older age group)

Time off work

This will depend on your joint pathology and your work demands.

Speak to your boss before the operation to see if light sedentary work is available and organise a lift/transport to work.

Students and clerical workers – can generally return after approximately 2 to 3 weeks, but may be initially on crutches, and will need to sit with the leg/foot elevated.

Work involving being on your feet or walking a lot – return after 6 to 12 weeks. This depends on your progress, particularly related to swelling, knee extension, muscle tone, and how you can modify or adjust your work patterns.

Heavier work/manual/trades – can be anywhere between 3 and 6 months, depending on the demands of your work and the progress of your knee.

Driving a car

Usually after around 3 to 4 weeks depending on whether it is a manual car, whether your right or left leg is involved, and on the type of vehicle.

Your capacity to drive basically depends on your ability to "slam the brakes on" if you need to !!

Time off sports

This will depend on your joint pathology (cartilage and surface damage), ligament stability, how well you have rehabilitated your muscles (to regain at least 90% of the strength and endurance), regained the co-ordination (proprioception), and have confidence with the sport-specific training.

This of course will reflect the time and effort you have put in over the whole period, and not just on a forced or "crash" program.

The time is not dependent purely on the time from surgery, it also depends on your initial or "perioperative problems" (of quadriceps inhibition, etc) and on your biological "repair response".

Rotational sports = 8 to 18 months

Most professional sports people return to sports in 8 to 12 months, but most recreational athletes 8 to 18 months.

FOLLOW UP

Following surgery you will be reviewed by your treating orthopaedic surgeon; then having communication with your physiotherapist.

This will vary according to your progress; through until completion of rehabilitation at anywhere between 8 to 18 months.

PLEASE NOTE

It is not just the operation that determines your progress or future problems.

There is a combination of factors to consider – your knee, your pathology, and your biological response. You must "bite the bullet" from day one, and not think you can catch up later.

We encourage you to work with a mixture of patience, caution, and persistence. Dedicate time to your progressive, but individual, exercise program. Emphasis is on the exercise cycle from around 3 weeks to 3 months, and then on the outside cycle, along with other appropriate exercises. **You may need to get fitter than you have ever been,** otherwise the whole thing will have been a waste of time, and you could end up being worse off than if you had not undergone the surgery.

As stated previously, we cannot predict before the operation what your results will be. Nevertheless, 80% do return to high level sports and work activities; so long as they keep working conscientiously to the interesting and diverse program throughout rehabilitation.

Good luck with your recovery

Please visit <u>www.iainmclean.com.au</u> for further information and links to reputable online orthopaedic resources.

NOTE: No warranty, liability or responsibility can be claimed whatsoever in relation to the information provided, its use or application. Any information, advice or recommendations must be considered in accordance with, and conducted under, expert medical supervision.