

Day Case Anterior Cruciate Reconstruction

What is an ACL injury?

The anterior cruciate ligament is a structure in the knee joint responsible for the joint to move smoothly whilst pivoting on the knee. (Figure 1) This function is essential for twisting and pivoting sports such as football and netball, but can even be a factor in daily activities such as working in a kitchen or building site.

The injury usually occurs with a “pivot” injury, typically abruptly, often a last moment change in direction. The other mechanism is a “hyperextension” injury, almost forcing the knee to straighten further than it usually would. Either way – most often a “pop” is felt by the injured player, and they may need help from the ground. The knee usually swells dramatically in the next hour or so.

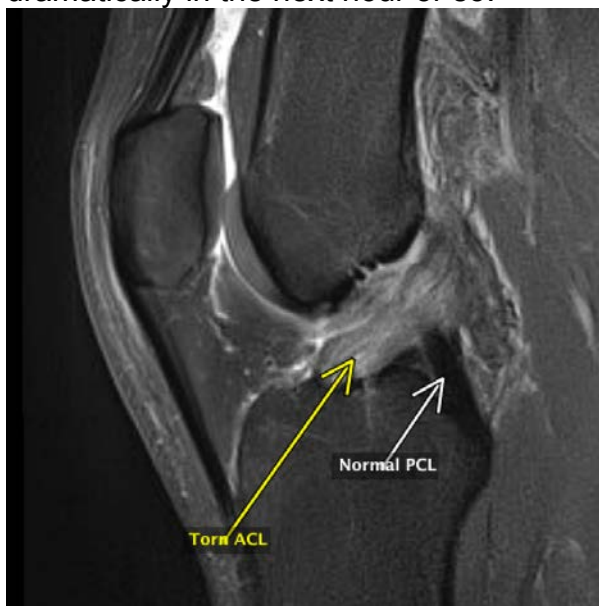


Figure 1. This MRI image looking at the knee side on shows the femur at the top, tibia at the bottom, and the patella on the left side. The yellow arrow indicates the torn anterior cruciate ligament with “high signal” and the fibres are no longer straight or taut.

Why have surgery?

Not everyone sustaining the injury requires a reconstruction, some people have no symptoms of instability. Some

knees are very unstable after cruciate injury; repeatedly give way after only minor twisting thus causing further damage, and inevitable swelling.

Three strong indications for surgery exist. **Twisting & pivoting** sports & activities bring out instability. Some people find the knee is so unstable it gives way just turning at work, or in the kitchen. So depending on your requirements – you might be obliged to get it fixed.

Secondly, the knee may have **other damaged structures** – eg a torn cartilage – which can be repaired if the stability is rectified, but results are poor if the knee is still unstable.

Thirdly – the knee might have the torn cruciate **jamming or locking the knee** and preventing it going out straight. (figure 2)



Figure 2. An MRI image demonstrating the anterior cruciate to be missing from its normal location, but with a good eye, it is possible to see a rolled up cruciate where it joins the tibia preventing full extension

How is the reconstruction done?

The cruciate ligament runs from the front of the tibia to the back of the femur, through the knee joint (see below). The damaged cruciate ligament is usually removed, and the knee assessed for other injury. The hamstring tendons typically are used for the reconstruction, retrieved through a 5cm incision at the top of the shin. The graft is secured in place with an interference screw in the femur and a screw +/- staple in the tibia.



Figure 3. X-ray after a cruciate reconstruction. The RCI screws above are an Australian invention successfully used for the last 20 years. They even have a reverse thread to use in the right femur to improve fibre alignment. Some surgeons prefer Endo-button fixation on the femoral side. Sometimes a staple is not required. XR invisible screws are available.

Why day surgery?

Day surgery is reasonable, as the majority of patients do not require injections or nursing care after the first few hours. At home you can have your own bed, and have more independence than is possible in hospital.

The knee will be safe in the bandaging, and one of the nurses from the hospital will phone you the day after surgery to check on you. Especially in major surgery, the shorter time in hospital seems to have less things going wrong!

To be done as day surgery requires:

- A short distance to travel home
- A recovery friendly house
- Assistance - a spouse or parent can provide ice packs, sustenance, drinks
- A good pain management plan

Are hamstrings the best option?

Hamstrings have been our "go-to" graft for the last decade or more. Previously we'd used the patella tendon - which was strong and stable, but had a high incidence of ongoing pain around the front of the knee, and difficulty kneeling.

John Orchard (Sport Medicine Physician) published on the higher ACL reconstruction failure rate in the AFL in 2014. The cause is unknown – possibly the higher interchange rate.

But, there is a 1% lower re-rupture rate for patella tendon grafts in the Danish ACL registry. Against this is more pain after the surgery, a 5% incidence of being unable to kneel, and a higher rate of arthritis after **patella tendon** reconstruction.

There is evidence coming out that the quadriceps tendon might be a good as patella tendon, but without the pain with kneeling.

LARS are not recommended by the Australian Knee Society.

Allograft reconstruction (using some tendon from another person) seems to have a higher failure rate in the long term, but are commonly used in the United States of America. We tend to use these where multiple ligaments need reconstruction.

When is the surgery performed?

The surgery is done after the swelling from the injury has subsided and the range of movement has been restored. The worst time to do the reconstruction is when the knee is stiff – doing it at this stage is usually associated with a slow recovery occurs – so only done if meniscal tear requires repair or multiple ligaments are involved. Otherwise the preference is to wait until FULL range of movement and an ability to squat.

What is the process?

WELL before surgery

Any other health issues (medications, allergies, previous surgery or anaesthetics) should be discussed with your surgeon. Usually physiotherapy work starts prior to surgery. When your knee is ready, and at a time determined by you and your surgeon, the surgery can be performed. Generally the intention is for the swelling to have gone, the knee to have a full range of movement, and you can do squats.

Day before surgery

Make your house ready to be on crutches.

- Remove floor rugs
- Widen furniture paths
- Arrange commonly used items
- Arrange bedding to ease movement
- Assistance from family or friend

Day of surgery – usually don't eat

We require you to have an empty stomach at the time of surgery. Assuming the surgery is in the morning, eat nothing from midnight. A drink of Powerade two hours before surgery improves the recovery.

What to bring to the hospital?

Bring a magazine/book, crutches and organise a driver. The exact time of surgery depends on many factors. You may not be able to put your full weight on the leg immediately after surgery, and will need the crutches to get out to the waiting car. Obviously you will not be able to drive yourself home.

Anaesthetic

The surgery is **usually** done under a general anaesthetic supplemented by local anaesthetic around the wounds.

After surgery at home - Icing the knee

Like sports injuries, "RICE" is a good idea.

- Rest
- Ice
- Compression
- Elevation

The value of this is most apparent during the first three days after surgery. On returning home from surgery, we recommend lying down and applying an icepack to the knee for twenty minutes. The ice should be reapplied hourly for the first day, and to a lesser extent during the next two days.

Care of incision

The large bandage is removed after the first day and replaced with Tubigrip. The "Cutifilm" dressing is left intact – it keeps the wound clean and dry. Wounds vary but common signs of healing are:

- Warmth
- Mild swelling
- Slightly pink wound edges

To shower, first remove the bandage or Tubigrip, leaving the Cutifilm intact. After showering, pat the dressing dry and carefully reapply the Tubigrip.

Medications

Follow directions for medications, and call your surgeon if there is a problem. Usually paracetamol and anti-inflammatories provide background analgesia. Tramal or Endone is also prescribed to give you a strong painkiller in case the need arises. Eating a well balanced diet & plenty of fruit also helps recovery.

Getting out of a seat

Preferably use high seats with armrests.

- First, move towards edge of seat
- Use armrests to push up with
- Stand up on good leg
- Rely on crutches only when properly standing

Stairs

If you are to use stairs, you must use the handrail and in the first two weeks, keeping your operated leg straight. Go up stairs leading with good leg (keeping your operated leg straight), and to go down stairs lead with operated leg first, keeping it straight.

Exercises & physiotherapy

Directed by your surgeon and physiotherapist but initially we aim for:

- Ankle pumps
- Quadriceps / gluteal squeeze for 10s
- Straight leg raises

Active assisted knee flexion exercises are started once the bulky bandage is removed, and replaced with Tubigrip.

Most people are off the crutches at 5-7 days. An exercise bike is useful once 90 degrees of knee flexion has been achieved, typically around two weeks to four weeks. Straight line running can recommence at four weeks, and at two months swerving can be added to the running.

Return to work timeframe

To return to a desk job, 12 days is often sufficient, more physical jobs will take 4 weeks. Ladders will take 6 weeks. Driving an automatic vehicle if you had a left knee reconstruction takes 10 days, otherwise 3-6 weeks.

Long term recovery

The full strength of a cruciate reconstruction does not occur until two years. It is close to normal at one year, and "just acceptable" at nine months. Preferentially, twisting, pivoting activities and sports are not to be performed until 12 months from surgery.

Some bizarre circumstances have seen AFL footballers back at sport at six months. It is a risk which might be considered in a final season of professional football. The risk-benefit ratio in non professional athletes requiring a completely stable knee in their employment is less obvious.

Should you return to sport????

Knee injuries ultimately cause knee arthritis, repeat operations, and knee replacements in the long term.

Particularly male adolescents with a high tibial slope angle or hyper-extension of the opposite knee should seriously consider changing sport as their re-injury rate is eleven times higher than adults. Overall - the re-injury rate in returning to sport is 5-15% on the same side, and at least 5% on the opposite.

Decision on returning to sport should include muscles strength, physiotherapy scoring, and confirmation from the surgeon your knee is stable.

Special surgical cases

Extra-articular procedure

Sometimes in a cruciate injury, structures on the periphery of the knee are also injured. Sometimes this is visible on the XR - a "Segond fracture" - but more often it is a soft tissue injury not visible on the imaging. The problem groups are the younger patients with more instability, and patients who have re-injured a previous cruciate reconstruction.

Solutions are to perform an anterolateral ligament reconstruction, do an Ellison procedure, or repair the Segond fracture. All of these require an additional incision over the outer aspect of the knee.

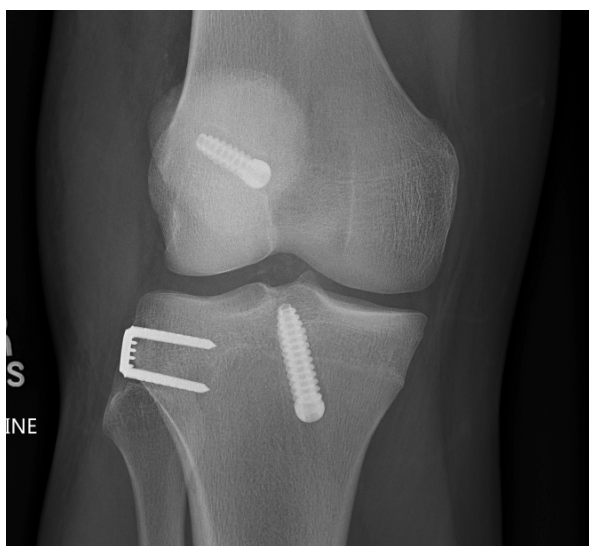


Figure 4. In this image with RCI screws in the tibial & femoral tunnels, the staple has been used to repair a band of ITB passed under the lateral collateral ligament (the Ellison procedure) - similar to the anterolateral ligament.

Meniscal Repair

The cartilage shock absorbers in the knee have real functions including spreading the load more evenly through the joint surface. If a cartilage is completely removed, arthritis probably will develop eventually, and the knee may never feel quite normal (even though it may feel more stable). If the tear in the cartilage is near the edge and has healing capacity, repairing it may be the best plan.

A number of problems occur with repairing the cartilage. It may need protection with a limited range of movement knee brace for up to 3 months, it may require additional incisions to repair, and sometimes it fails to heal, requiring further surgery.



Figure 5. In this arthroscopic image - the two stitches are holding the meniscal repair.

Childhood growth plates

Reconstruction in childhood creates some special scenarios. In principle, the growth plates near the joint could be damaged by the surgery. Avoid bone across the growth plate - and in very young, use a "all-epiphyseal" technique.

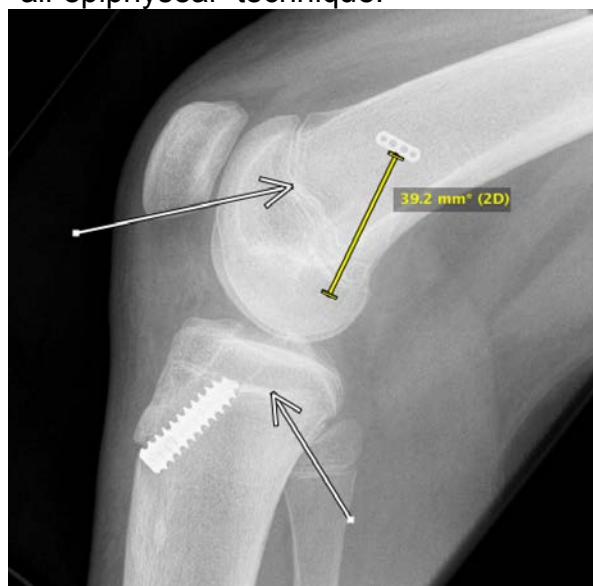


Figure 6. Adolescent ACL reconstruction with Endobutton

Realignment osteotomy

If the knee has both symptoms of instability and early arthritis (usually medial sided pain and bow-legged deformity), then surgery may include realigning the leg. Although people may return to sport afterwards, this surgery is usually aimed to improve the knee function with day-to-day living.

Pain Management after Orthopaedic Surgery

Our intention

Pain management after ACL reconstruction should be sufficient that the surgery feels a bit stiff & sore, somewhat like a sporting injury. Our expectation is to have our patients comfortable enough to put weight through the leg, although crutches are usually required for 1-2 weeks, it is better to be able to put the foot down on the floor, and move the foot up and down.

Local Infiltration Analgesia

During cruciate reconstruction operations, local anaesthetic is infiltrated around the wound by the surgeon. This is mixed with ketorolac, dexamethasone and adrenaline. The injection is placed across the quadriceps muscle, around the nerves of the subsartorial canal, adjacent to the hamstrings before harvesting them, around the wounds and some in the joint. We have worked on this technique for 10 years now.

Background tablets

Mobic is used twice a day for three weeks. For those that have a history of stomach ulcer, we ask you take an extra anti-ulcer tablet (eg Nexium/Somac) the night before and morning of surgery. Panadol should be used four times a day for the first three days, then as needed, possibly a few weeks.

Pain Patch.

Rarely we use a Norspan patch applied to the skin, gradually releasing analgesia. Try to keep the patch out of hot water, it increases the drug release and may make you feel sick. If your joint is sore you can warm up the patch by giving it a rub, or put on a jumper.

Pain scores

Nurses in recovery may ask you whether you have any pain, and to score it out of ten. It is important that you tell them if the pain is somewhere different than where the operation was!. If you report 1-3, usually tablets are given, at 5/10 injections of morphine are administered with a risk of causing nausea or vomiting. Rarely do we see 7/10 pain - which has outward signs – teeth clenched, pale appearance, sweaty brow. 10/10 pain is rarely seen and described as “screaming pain”.

Top up medications

Tramal is my preferred drug to top up. Typically the order is 1-2 tablets, 4 hourly as required. Tramal is not always perfect, it can cause nausea or hallucinations, and can't be used with high doses of some anti-depressants. Usually we have had an opportunity of trying them in hospital before you go home.

Swelling control reduces pain

Everyone who has sporting injuries knows Rest, Ice, Compression, and Elevation.

Rest means not bending it too much in first two days. It is still permissible to walk and exercise your feet up and down.

Ice packs are first applied in recovery, or as soon as possible after the surgery. Be a little careful with areas that have local anaesthetic that you may not be able to feel how cold it is. Do NOT apply ice directly to the skin, and apply it only 20 minutes at a time.

Compression is initially a bulky bandage extending to the foot. This stays on for a minimum of one day. It is then replaced with Tubigrip, and a Venosan stocking.

Elevation. In the first two weeks, put your leg up when you can. Lying on the couch is better than sitting and swelling the knee.

Avoiding nausea and vomiting

Our aim is to have you drinking fluid as soon as possible after the surgery, and start eating food by two hours. We generally try to avoid fruit juices.

Risks of Surgery

Surgery is not always perfect. It sometimes exchanges one symptom for another!

General Risks

Any surgery represents risks to the body from minor annoyances through to life threatening problems. We continually work to reduce the risks of surgery. It is not possible to list all risks, and if you have a specific concern, you should raise it with your surgeon prior to surgery. As an example - a **deep infection** would require readmission, multiple operations, antibiotics, lost time from work and probably an imperfect outcome. If you are concerned something is going wrong after the surgery, please contact your surgeon.

Anaesthetic Risks

A sore throat is common, broken teeth are rare, serious drug reactions extremely rare. Bleeding or infection within the spine after a spinal anaesthetic is extremely rare.

Day Surgery Risks

Rarely someone will need re-admission to hospital – this could be for pain control, rarely for bleeding. Typically a hospital with overnight beds is required.

Numbness

An area of numbness beside the scar is normal and the area gets smaller in time. Occasionally the numbness can be a larger area extending down to the ankle if the saphenous nerve is in an unusual position. The saphenous nerve runs adjacent to the hamstring tendons used in the reconstruction and is at risk, but not possible to see during the surgery.

Reoperation

A small number of patients will need further surgery either arthroscopically or other.

Stiffness

Sometimes the knee fails to regain a full range of movement – particular getting the knee out straight. It will have been out straight at the time of surgery – this is the position the graft length & tightness is determined. If physiotherapy fails to fix the problem, further surgery will be required.

Locking

A “Cyclops” lesion can also contribute to the knee not fully extending, and can cause “locking” sensations. This is caused by a ball of scar tissue developing at the front of the knee, or can even be part of the old cruciate ligament. Relatively minor surgery rectifies this.

Instability

Stability is achieved in 95%. Reasons for inadequate stability include: the original injury also damaged structures outside of the joint that contributed to stability; screws could loosen before the graft is fully healed; or further injury during the healing phase may damage the reconstruction.

Failure to return to previous sport

In the AFL the return to previous level of sport is 71%. More patients than this return to sport, but not necessarily to the same level.

Kneeling

Kneeling is a capacity of normal knees in normal people. After knee surgery, even thin people may find it difficult to kneel. The concept of using a hamstring graft is to minimize the kneeling problems seen in patella tendon grafts.

Allograft complications

Instead of using your hamstring tendons, or part of your patella tendon, sometimes surgeons use an “allograft”. The Victorian Bone & Tissue Bank provide a range of grafts from organ & tissue donors. Specific consent from the patient is obtained by the surgeon if there is a need to use allograft.

What's included in the cost of ACL Reconstruction?

Insurance generally pays most of the hospital expense, but only covers a fraction of the doctors' fees. This is because Medicare hasn't adjusted their schedule to match CPI since 1983, or at all since 2014, Medicare is now worth less than one third of the real value of 1983. There will be out of pocket expenses for doctors. We will provide a separate written quote, and if you are not covered by insurance, a quote for the hospital expenses. Outpatient physiotherapy is not included in these figures. Most club level sports insurance policies do not cover surgery, but **do** cover physiotherapy.

Included in the surgeon's fee is performing the surgery, follow-up in the hospital and consulting rooms for three months, to take responsibility for the whole process, and to solve whatever problems occur. The surgeon takes personal responsibility for the post-operative pain control – including extensive local anaesthetic infiltration around the wounds. For patients off track, the surgeon intervenes, or supervises interventions. The surgeon takes personal responsibility for achieving a low infection rate. If an infection does occur, aggressive surgical and antibiotic treatment is required.

Following the AMA fee recommendations, the surgeon's fee for cruciate reconstruction is \$4090 (Item number 49542). If meniscal repair or extra-articular procedure is required, the AMA fee will be used. Otherwise, we try to keep the surgeons out of pocket expense to \$500. Most insurance policies do not reflect the AMA fee, even when they are called "top cover". This table assume you have a hospital excess to pay of \$300, but it might be different. The total estimate includes hospital, anaesthetist, surgeon, assistant, prosthetic implants, but some meniscal sutures more expensive...)

ESTIMATED COSTS	Insured Patients	Medicare Only	No Medicare
Straight forward cases			
Surgeon's fee	\$ 500	\$ 1,700	\$ 2,920
Total	\$ 1,600	\$ 6,000	\$ 7,050
Complex cases - meniscal repair or extra-articular procedure			
Surgeon's fee	\$ 2,770	\$ 2,950	\$ 3,950
Total	\$ 3,900	\$ 9,700	\$11,300

Included in the package of estimated fees are:

- Hospital, surgeon, assistants, anaesthetist, prosthetic implants
- post operative ward rounds, usual blood tests and XRs
- follow-up phone call(s) after discharge, access to Ballarat OSM nurses for advice
- 2 & 6 week appointment at rooms

Excluded:

- Physiotherapy
- Unrelated orthopaedic or surgical problems

If you are experiencing personal financial hardship, please discuss this well prior to the surgery so an amicable arrangement can be made. The out of pocket expenses will be required to be paid two weeks prior to surgery to avoid cancellation.



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