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 common 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, a third of 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 “bailed up” cruciate where it joins the tibia, jamming the knee with a so called “Cyclops lesion”.

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 removed, and holes drilled in the tibia and femur to allow fixation of the new graft to bone. I usually use the hamstring tendons for the reconstruction to minimize tenderness around the front of the knee. The graft is secured in place with an interference screw in the femur and a screw +/- staple in the tibia. The intention of this construct is to achieve 1700N of strength. This technique requires typically a 5cm scar over the upper part of the tibia (shin bone), and two much smaller cuts at the front of the knee.
Are hamstrings the best option?
John Orchard (Sport Medicine Physician) has identified a higher ACL reconstruction failure rate in the AFL in 2014. The cause is unknown – possibly the higher interchange rate. There is a 1% lower re-rupture rate for patella tendon in the Danish ACL registry. In professional sports people, it should be considered. 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. LARS allows a faster return to sport. But, the Australian Knee Society recommends against these where biological reconstruction is possible. Allograft reconstruction seems to have a higher failure rate in the long term. We are currently investigating whether Quadriceps Tendon grafts perform better.

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
• Have commonly used items easy to reach
• 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 – it is also required the day before surgery you eat moderately and consume not more than a glass of alcohol. Gatorade 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 ice pack 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
• Bear weight on good leg (non operated leg)
• Do not rely on crutches until 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 10 secs
• 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. Exceptional circumstances should be discussed with your surgeon.

**Special surgical cases**

**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. In this last circumstance, a subsequent operation may be necessary to remove to unhealed portion of the cartilage.

**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. Typically these patients are on crutches for four weeks.

**Childhood growth plates**
Reconstruction in childhood creates some special scenarios. In principle, the growth plates near the joint could be damaged by the surgery. The solutions are to either drill fairly centrally through the growth plate avoid bone graft (patella tendon grafts) across the growth plate, and in very young, use a "all-epiphyseal " technique.

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**Figure 4.** The strength of different parts of the reconstruction using hamstrings or patella tendon (with bone at either end). The graft is well fixed at three months, but is weak in its midsubstance between 4 & nine months. For rare circumstances there may be an opportunity between 3 & 4 months for career highlights using patella tendon or even allograft, but for most people, they are better to return to sport about a year after surgery.
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 feel able to 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 an anti-inflammatory – ketorolac 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.

Pain Patch.
This is only sometimes required for cruciate surgery. Norspan, a narcotic patch, is applied to the skin and gradually releases analgesia. If the patch is too hot, you may become nauseous or drowsy – typically in the shower. Try to keep the patch out of hot water. If your joint is sore you can warm up the patch by giving it a rub, or put on a jumper. The Norspan patch is typically changed 6-7 days after surgery.

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 need be, possibly a few weeks.

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. For comparison – 7/10 has visible signs of pain – 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 for the first day as these sweet & acidic drinks can make you vomit. It is easier to control nausea early, rather than allowing to progress to vomiting.
**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 but serious.

**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 one of the hamstring tendons (gracilis) – 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”. Put more plainly, it is taken from someone who has died typically from a motor vehicle accident. Specific consent from the patient is obtained by the surgeon, we rarely use them.

Allografts carry an extremely, and as so far unrealised, risk of undetected infections (eg HIV or hepatitis). The advantage of an allograft is it avoids any graft site morbidity. It is most commonly used if both the anterior and posterior cruciate need reconstruction, but could be considered in elite athletes aiming to use the “window of opportunity” between 12 weeks & 4 months to attend a specific event (eg Alisa Camplin, Winter Olympic, 2006). Note however Michelle Yeoh was back on the set of Crouching Tiger, Hidden Dragon three weeks after her reconstruction using patella tendon. Presumably no kicking at that time!