

ACL Reconstruction - Rehabilitation

These notes have been prepared to help guide you through your recovery following your anterior cruciate ligament reconstruction. There are now many rehabilitation protocols available. Most are suitable, but there is some variation, particularly with regard to rate of progression. You can use our notes as a reference point for comparison and a guide as to what we feel is a reasonable rate of progression. At each postoperative appointment your progress will be reviewed and further suggestions made regarding your exercise program.

Your progress should essentially be guided by pain and swelling. Both should continue to gradually decrease although short term increases of less than 48 hours duration are not uncommon following introduction of a new exercise or activity. The use of the Tubigrip compression sleeve and regular icing should continue for as long as swelling is present (usually 6-8 weeks). Even after the swelling has resolved, it is worth icing the knee after each exercise session during the first four months.

For simplicity, the rehabilitation program has been divided into approximate time periods. These are not meant to be strict and your progress may be faster or slower depending on the response of your knee, as well as additional surgery that may have been performed during your operation.

0 to 3 weeks

Key goals

- Reduce swelling
- Restore knee extension (straightening)
- Restore quadriceps function
- Full weight bearing

Reduce the swelling (R.I.C.E.)

- **REST:** Recovery will be aided by taking things easily, especially during the first week. You should basically be resting at home and keeping your leg up most of the day during the first week. During the second week you can gradually come off the crutches, but will be mostly housebound.
- **ICE:** Any kind of ice pack will do. Devices such as CryoCuff or Game Ready make icing easier but are not essential. A cheaper alternative is a large bag of frozen peas (you will probably need two, so that one can be re-frozen while the other one is in use).
 - For the first 2 weeks use icing/cooling for 20 minutes at least 3 times a day. After 2 weeks ice the knee at least twice a day, typically after exercise and at the end of the day.
- **COMPRESSION:** Wear the compression bandage (Tubigrip) provided for at least 6 weeks to minimise your swelling. After the first two weeks you do not need to wear it at night.
- **ELEVATION:** Resting in bed or on a couch with your foot and leg elevated on a couple of pillows will help the swelling settle.

Control your pain

Take regular painkillers which you can reduce as your pain subsides. Normal paracetamol (2 tablets every 6 hours as required) is usually adequate, provided it is taken regularly. Ice also reduces your pain.

An increase in pain in the shin and calf at about four or five days following surgery is quite common and is usually associated with the appearance of bruising a few days later. This can be quite dramatic. Ice, compression and elevation will all help reduce your symptoms.

It is common to have patches of numbness around the knee or shin. The exact location varies according to the type of tendon graft used and where the cuts have been made. This is due to small nerves in the skin being cut as part of the incision for surgery. The area involved varies a lot but usually decreases with time. While you may always have some numbness, it does not usually cause any problems and tends to be forgotten.

Try to walk normally

Take as much weight as is comfortable, but use the crutches for as long as you feel you need them. This varies from one person to another and may be as little as a few days or as long as three weeks. It is better to walk well with crutches than badly without them. You might find it easier to go from two crutches to one crutch in the opposite hand, before getting rid of the crutches altogether.

To start with, the pattern of walking is "crutches, operated leg, good leg" but as soon as you are comfortable the crutches and operated leg are moved together.

To manage steps with crutches use the following principles:

- **UP:** good leg, bad leg, crutches.
- **DOWN:** crutches, bad leg, good leg.

To walk normally, try to heel strike and lock your knee when you step. Most people are off their crutches by 2 weeks. You may find that a good transition is to use just one crutch in the OPPOSITE hand.

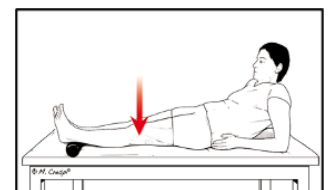
Do your exercises

You should do your exercise program 2 or 3 times a day. Your progress through these exercises should be gradual and guided by your pain and swelling. Take painkillers one hour prior to exercising if necessary.

Knee locking

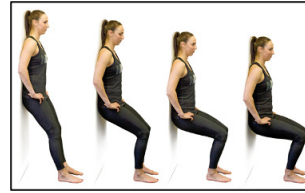
It is very important to be able to lock your knee out straight and you should work on this regularly from the start (at least 4 times a day). It is uncomfortable but steady and regular progress is what we are aiming for. Forcing things and making the knee more painful and swollen is counterproductive. The challenge is trying to find the right balance. However, if you are not able to lock your knee out straight (it doesn't need to get to the same hyperextension as the opposite knee, although there is no harm in this) by three weeks, this does increase the chances of having ongoing problems with your range of movement and the possibility of needing an arthroscopy at a later date to restore full extension.

With a rolled towel under your heel, tighten the quadriceps muscle at the front of your thigh and push your knee into the bed. Hold for 5 seconds. Repeat 10 times.





Sitting at the front of a chair with your legs out straight, feel the quadriceps muscle of the good knee contract as you lock the knee out straight and then do this with the operated knee. Do both together, trying to make the operated knee feel like the other knee. Repeat 10 times.

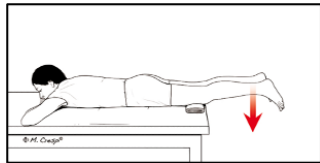


Wall squats (hold for 5 secs)



Forward lunges (repeat every 5 secs)

Prone leg hang



This exercise straightens your knee and can be added after two weeks. Lie on your stomach with your lower legs hanging over the end of a bed (knee caps off). Try to relax and hang there for up to 2 minutes. You can rest the foot of your good leg on

the back of the heel of the operated leg if you feel you need a bit more pressure.



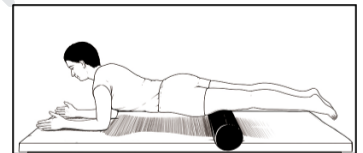
Straight leg raises (repeat every 5 secs)

Knee bending

Sit on a chair on a slippery floor (e.g. tiles) with socks on. Slide your heel back on the floor, bending the knee as far as comfortable and hold for 3 seconds. Then slide it forwards and relax. Repeat 10 times.



If pain is limiting your ability to activate your quadriceps muscle, it may be helpful to roll the middle and lower parts of your quadriceps on a foam roller once a day (wait for the wounds to be healed, especially if you have had a quadriceps tendon graft). This helps to reduce tension throughout the muscle. Rolling the quads also acts as a prone leg hang exercise to assist with regaining full extension.



Stationary bike

You can start as soon as you are comfortable. This usually in the third or fourth week after surgery but can be earlier if you feel ready. You will need to be able to bend your knee past a right angle to about 105 degrees and may have to start with the seat raised higher than normal. Start with minimal resistance and for short periods (5 to 10 minutes).

3 to 8 weeks

Once again, progress should be guided by pain and swelling. If these persist or are increasing, you are probably overdoing things. It is better to be patient and reduce the load on your knee until the swelling settles, but at the same time don't forget about extension and be sure that you are able to lock your knee out straight. It may help to take some over the counter anti-inflammatories for 1 -2 weeks.

During this period you should gradually add the exercises outlined below. You should continue to use regular icing and the compression stocking. You can get into a swimming pool provided the surgical wound is clean but avoid kicking until the 6-week mark. Use a pull buoy if you want to do lap work for fitness.

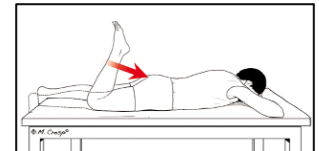
Quadriceps strengthening

You should start doing wall squats, forward lunges and straight leg raises as described in the pictures below. You should do 2-3 sets per day, building up to 10-20 repetitions per set. Where applicable, exercise each leg separately.

Hamstring strengthening

Hamstring curls

These can initially be quite difficult if you have had a hamstring tendon graft. Be patient and build up gradually to 2-3 sets per day, working up to 10 repetitions per set. Exercise each leg separately.



Double leg bridges (hold for 5 secs)

Start with double leg bridges. These help your gluteal muscles as well as your hamstrings. As with hamstring curls, be patient and build up gradually to 2-3 sets per day, working up to 10 repetitions per set.



Once you are comfortable with double leg bridges, you can commence single leg bridges. Exercise each leg separately.



If you have had a hamstring graft, it is very common to experience a sensation of pulling or tearing your hamstring in the first few months following surgery. This is probably just stretching of some of the scar tissue that has been laid down where the hamstring tendon was taken from. The sensation at the back of the knee may be quite a sharp and followed by difficulty extending the knee. Sometimes there can be some bruising at the back of the thigh and knee as well. This will usually settle over a few days. Some people experience this two or three times during their recovery. It rarely persists as a problem.

Stationary bike

As outlined above, you can start as soon as you are comfortable. Gradually build up to 20 to 25 minutes, 3-4 times per week. Once you can ride for 15 minutes you can alternatively increase the resistance and the time you spend on the bike.

Spin classes are a good way of keeping up the stationary bike component of your rehabilitation, but it may be 2-3 months before you are up to these.

If you feel confident you can start riding a road bike from about 8 weeks, but be careful. There is a small risk of having a fall before you have adequate control of the quadriceps muscle and therefore not being able to protect your knee from re-injury.

Balance work & core exercises

There are many exercises that you can do to improve your balance and postural control. Strengthening the gluteal muscles around your hip is a key component. Pilates classes can be a useful addition to your rehabilitation.

A simple way to start is to stand on one leg and do ½ squats. Do them in front of a mirror to make sure your knee is not collapsing inwards – this requires good control at the level of the hip. You can make it more challenging by standing on a pillow. You can then progress to using something like a wobble board, Bosu ball or DuraDisc.

Step-downs are a simple exercise for both quadriceps strength and balance and can be done at any time of day. They are useful if you are time-poor. Aim to build up to 30 per day on each leg.



Once you have mastered shallow squats you can start with “arabesque” type exercises. If standing on your right leg, you should start with your right arm straight and pointing upwards and forwards and your left leg straight and point backwards. Then tilt forwards, keeping your trunk straight. Lean forwards until your right arm and leg are parallel with the floor and then straighten up again.



You can make this more challenging by picking up an object from the floor.



Gym program

From about 6 weeks you will probably be able to start a gym program. Ideally you should continue with a program 3 times a week for at least 3-4 months.

Programs vary and should be tailored to your individual needs. In general, there are no specific limitations related to graft type, although some exercises may be more or less difficult depending on which graft was used for your reconstruction. Get your physiotherapist, a gym instructor, strength and conditioning coach or exercise physiologist to design a program for you including the following exercises:

- Leg press including single leg work, both concentric and eccentric (a challenging, but not unrealistic goal is to be able to push your own body weight in a single leg press, aiming for 3 sets of 5 repetitions)
- Squats, including single leg squats
- Stationary bike, rowing machine, cross trainer and stepper
- Romanian dead lifts
- Hamstring curls (these need to be very light if you have had a hamstring graft)
- Bridging, both double and single leg
- Calf raises
- Exercise ball drills for core control
- Leg / knee extensions should be avoided until the 3-month mark.

10 to 16 weeks

During this phase you should continue with your gym program and keep an eye out for swelling. Think of swelling as being your knee's way of saying it isn't happy. If swelling is an issue, go back to basics (R.I.C.E.) and consider over the counter anti-inflammatories, but you should discuss persistent swelling with your surgeon.

Hopping & landing

Hopping and landing drills should initially be done with both legs together (i.e. jumping) and as you gain confidence you can do the same exercises for each leg separately (i.e. hopping). The exercises should be done with the weight on the balls of your feet and your knees slightly bent. Start with small hops and gradually increase the distance. Initially start with forwards and backwards movements and then progress to side-to-side and diagonal movements. You should build up to 10 repetitions on each leg. Once you can hop comfortably on a flat surface, you can start hopping down from a small step and then up on to a small step. Gradually increase the height of the step.

Jogging/running (Do not run on a swollen knee!)

Most people are keen to get back to running. It is important NOT to start running while your knee is still swollen or painful, or before you have good gluteal and quadriceps strength. Provided you meet these criteria, you can often start jogging from about 12 weeks. It often feels very awkward to start with. You might find it easier on a treadmill. Gradually build up to 10 minutes.

Once you can manage 10 minutes comfortably, you can commence a running program. It is generally easier to do run-throughs rather than distance running as they keep you more up on your toes. The specifics of your program will depend on your previous experience and the sport you are aiming for.

Despite what a lot of people think, change of direction running, e.g.

around cones or shuttle running, does not really put the graft at risk as the movement patterns are all planned and anticipated. Once you can do run throughs at 60% of your top speed, you can introduce this sort of work.

Russian/Nordic hamstring curls



These are really good exercises to reduce hamstring injuries, particularly if you have

had a hamstring graft. There are good online videos available showing just how far you can progress. Using an exercise ball in front of you to control your movement is a good way to introduce them. They do require someone to hold your feet.

4 to 6 months

This is a period of return to sports specific drills and activities.

Once you are running confidently you can start changing direction more sharply and quickly.

Sports-specific drills include kicking/dribbling a football, dribbling a basketball and doing lay-ups, hitting tennis balls etc. Use your common sense and progress gradually. Don't do competitive or contact drills at this stage unless cleared by your surgeon. You may feel more comfortable wearing an elasticized or neoprene knee support.

There are many useful programs that have been designed to reduce the risk of anterior cruciate ligament injuries. It is unclear whether they help reduce graft ruptures, but they probably help your preparation for return to sport.. These include:

- Prep To Play
<https://resources.afl.com.au/afl/document/2021/09/02/106535ea-a1b8-4d19-b82d-edcfed9a693c/AFLW-Prep-To-Play-Manual.pdf>ESSKA
- ACL prevention program
https://www.esska.org/mpage/ACL_PreventionforAll
- The FIFA 11+ program
https://www.footballvictoria.com.au/sites/ffv/files/2019-05/11plus_workbook_e.pdf
- The netball knee program
<https://knee.netball.com.au/>
- The PEP program
<https://health.usf.edu/medicine/orthopaedic/smart/pep/>

6 to 12 months

During this period you gradually increase your training, progressing to full training and eventually return to play. Timing of return to play is controversial and is something to discuss with your treating surgeon.

Although there is a lot of information about return to sport testing, there is still very little evidence to show that meeting specific criteria reduces your risk of re-injury. At this stage, return to sport testing should probably best be regarded as a guide to things that you can work on to improve your function.

Basic criteria that need to be met for progressions to return to sport are no swelling, full knee movement, a stable knee, good quadriceps strength and control of a single leg step down and a sense of confidence in your knee. You need to be doing full unrestricted training for at least a month (preferably more) before you resume competition.

These notes have been prepared by orthopaedic surgeons at OrthoSport Victoria. They are a general overview and do not constitute medical advice. The contents are provided for information and education purposes only and not for the purpose of rendering medical advice. Please seek the advice of your surgeon or other health care provider with any questions regarding medical conditions and treatment.