



Anterior Cruciate Ligament (ACL) Reconstruction **Rehabilitation Program**

Introduction

ACL reconstruction has become one of the most common surgical procedures performed on the injured knee, and has undergone considerable changes over the last ten years.

The rationale for treatment is to stabilise an unstable joint, or a potentially unstable joint. Joint stabilisation has been shown to decrease meniscal and articular cartilage injury. This should, in turn, decrease the incidence of later osteoarthritic change. It will also allow return to activities that were difficult secondary to joint instability.

Rehabilitation following ACL reconstruction is an essential part of full recovery. Ideally this rehabilitation should be carried out under the guidance of a physiotherapist.

This Rehab program has been designed to guide your physiotherapist through your rehabilitation as I think it should be done. All rehabilitation programs are flexible. Individual progress varies greatly, and this will require some modifications of the program at the discretion of your physiotherapist. Different techniques may also be used by your physio depending on available equipment, and your individual needs to meet the described aims.

Surgical Procedure

The anterior cruciate ligament is an intraarticular ligament, and as such heals poorly. For this reason, it is almost always reconstructed with a substitute ligament, rather than being repaired.

In my practice the hamstring tendons are used almost exclusively. There remains argument as to whether the patella tendon or hamstring tendon repair is best, however, on review of the latest literature, there would seem to be little difference in outcome. Hamstring reconstructions allow for an easier post operative rehabilitation for the patient.

At the time of surgery, the ruptured ACL is removed and the autologous hamstring graft is placed anatomically and held with screws and occasionally a staple.

Aims of Physiotherapy

Physiotherapy should ideally commence preoperatively. Patients who have a pain-free, mobile, healthy joint recover far quicker post operatively than those patients with acutely painful joints. It is ideal to learn the required exercises pre-operatively. The treatment goals are:

1. Diminish post-operative pain and swelling
2. Restore full range of motion
3. Restore muscle tone and strength
4. Maintain and develop aerobic conditioning
5. Proprioceptive retraining allowing a safe return to work and sport as soon as possible

Rationale of this program's design:

- Early mobilisation has advantages in maintaining articular cartilage nutrition, and helps to prevent “arthrofibrosis”
- The new graft needs some stimulus to encourage collagen healing and regeneration.
- The graft complex is actually at its weakest at around the 6 week post operative mark.
- Kinematic research has shown that open chain exercises cause significantly more anterior tibial displacement and hence more strain on the graft than closed chain exercises.
- The native anterior cruciate ligament has a significant number of mechanoreceptors which are lost at the time of injury. For this reason a large emphasis is placed on proprioceptive training prior to return to unrestricted sporting activities.

Brief Timeline:

Day 1	Begin physiotherapy
Day 10-14	Wounds usually healed enough to remain uncovered Can start swimming Can usually return to work for “light duties” if available Usually walking reasonably comfortably
Week 6	Can commence running in a straight line
Week 12	Commence sport specific training. Can start to jump.
Week 25 (6 months)	Return to contact sport

The Rehabilitation Program

Stage 1 **Wound Healing phase**

Day 1- Day 14

Aims

- Adequate pain relief
- Progressively stop using crutches
- Decrease leg and joint swelling
- Restore full extension
- Establish muscle control and aim for normal gait

Treatment Guidelines

- Weight bearing as tolerated, decreasing dependence on crutches
- Pain and swelling reduction techniques including
 - Ice
 - Elevation
 - Co-contraction
 - Pressure pump
 - Biofeedback and selective muscle stimulation if necessary
- Range of motion exercises aiming for full extension at 14 days
 - Stationary bike- start with seat high, low resistance
 - Prone leg hangs
 - Patella mobilizations
 - Gait retraining with full extension at heel strike
 - Gentle hamstring stretching
- Strengthening program
 - Static Quads co-contraction emphasizing VMO control and various angles of knee flexion progressing to weight bearing positions.
 - Progress to active free hamstring contractions by day 14
- Balance and proprioception training
 - Single leg stance with eyes open / closed

Stage 2 ***Hamstrings and Quadriceps Control***

Week 2- week 6

Aims

- Obtain a full unrestricted range of motion
- Develop good muscle control and early proprioceptive skills
- Maintain cardiovascular fitness

Treatment guidelines

- Use active and passive techniques to aim for full range of motion
Include hamstring stretching
- Can commence swimming once wounds healed (no whip kick)
- Gym equipment can be introduced once the effusion is decreasing
 - Stepper
 - Leg Press
 - Mini Trampoline
- Progress Co-contraction for muscle control
Increase reps / length of contraction
 - 2 leg quarter squats
 - Lunges
 - Stepping
 - Elastic cords
- Progress with hamstring strengthening
Progress to eccentric hamstring strengthen as pain allows
Hamstring curl equipment can also be introduced as pain allows

Watch for other problems

- E.g. Gluteal control
 - Tight ITB
 - Gastroc and soleus etc

NB: Resisted hamstring strengthening should be avoided for 6 weeks

Stage 3

Proprioception

Weeks 6-12

Although the patient may feel good, it is important to note that the ACL graft complex is now at its weakest

Absolutely no Open Kinetic Chain Quadriceps exercises

Aims

Improve neuromuscular control and proprioception

Continue working on cardio fitness

Improve endurance capacity of muscles

Improve patient confidence

Treatment Guidelines

- Progress with resistance on gym equipment
 - Leg press
 - Hamstring curls
 - Stairmaster
 - Treadmill power walking
 - Progress with strength training
 - Progress co-contractions to dynamic
 - Step lunges
 - Half squats
 - Wall squats
 - Can begin jogging in straight lines on the flat
 - Start cycling on a normal bicycle
- Progress with proprioceptive work
- Lateral stepping
 - Slide board
 - Wobble board
 - Trampoline balance

Stage 4

Sport specific

Weeks 12-20

Aims

Prepare to return to sport

Incorporate more sport specific activities

Introduce agility and reaction time into proprioceptive work

Increase leg strength

Develop patient confidence

Treatment Guidelines

- General strength work
 - Half squats with resistance
 - Leg press
 - Leg curls
 - Wall squats
 - Step work on progressively higher steps
 - Stepper and rowing machine
- Sport specific
 - Shuttle runs
 - Ball skills
 - Sideways running
 - Skipping rope
- Low impact step aerobics class
- Swimming can include using flippers

NB: Quadriceps exercises are to be closed chain for the first 5 months

Stage 5

Return to sport

Months 5-6 (20-25 weeks)

Aims

Return to sport safely with confidence

Treatment Guidelines

- Can now do open chain quadriceps work
- Continue with progression of plyometrics and sport specific drills
 - Zigzag running
 - Figure 8's gradually decreasing in size
 - Cross over stepping
 - Backwards with cutting
 - Stop and go drills
- Continue with power and endurance training
- Return to training in running shoes for skills exercises

Month 6

Return to contact sport if limb strength and neuromuscular control adequate.

Strength usually 90% contralateral limb on Cybex testing if available

Possible Complications

Infection

The patient complains of a constant, severe pain. The patient may be sweaty, ill, have a temperature and often a tense effusion.

Post operative haemorrhage into the donor graft site

Results in a hot tender area over the posteromedial thigh. May be difficult to distinguish from infection. Knee motion is usually not restricted.

Hamstring strain or pain

Hamstring tears with the patient reporting a “pop” about the posteromedial thigh are common within the first 2 and even up to 6 weeks.

Deep Venous Thrombosis

The patient has calf, popliteal, thigh or groin pain and tenderness associated with swelling. Should have a venous duplex performed if this concern exists

Stiffness

May occur at any stage of the rehabilitation. The causes include:

Arthrofibrosis

Complex regional pain syndrome

Misplacement of the graft

Graft Failure

May occur at any stage, but usually between the 6-12 week mark

The graft may remain intact, but stretch

Patellofemoral irritability

Less common with hamstring reconstruction

If any concerns please contact the rooms, the private hospital, or the orthopaedic registrar through the public hospital ASAP