Posterior Cruciate Ligament (PCL) Reconstruction
Rehabilitation Program

Introduction

The Posterior Cruciate Ligament (PCL) is the strongest ligament in the knee. It is injured less commonly than the others. Injury to the PCL can often be managed with non-operative treatment. Partial injuries of the PCL are seen commonly, and these may leave the knee with an acceptable function after appropriate rehabilitation. PCL reconstruction surgery has become more common, particularly for complete ruptures, when a return to an active lifestyle is desired. It has undergone considerable changes over the last ten years, however function of the knee is rarely returned to pre injury levels.

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 PCL 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 posterior 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 most commonly, however if multiple ligaments need to be reconstructed as part of a severe ligamentous injury to the knee, other grafts may be used and include patella tendon, Quadriceps tendon, and donor (allograft) tendons.

At the time of surgery, the ruptured PCL 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”
- Early weight bearing decreases in muscle atrophy, improved proprioception, and decreases loss of bone mineral density.
- 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.
- Accelerated rehab helps prevent loss of knee extension, and long term knee stiffness.
- Active hamstring contraction (particularly open chain) will stress the graft.

Brief Timeline:

Day 1  Begin physiotherapy

Day 10-14  Wounds usually healed enough to remain uncovered

Can start swimming (walking in pool etc)

Can usually return to work for “light duties” if available

Usually walking reasonably comfortably

Wean off crutchers

Week 6  Can commence running in a straight line on the flat

Brace removed

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
  - Aim to achieve 0-70 degrees by 14 days
- Strengthening program
  - Static Quads co-contraction emphasizing VMO control and various angles of knee flexion (up to 60 degrees) progressing to weight bearing positions.
  - Begin quad sets, straight leg raises, knee extension 70-0 degrees
- Balance and proprioception training
  - Single leg stance with eyes open / closed
Stage 2 Hamstrings and Quadriceps Control

Week 2- week 6

Aims

Obtain a 0-90 degrees ROM

Develop good muscle control and early proprioceptive skills

Maintain cardiovascular fitness

Treatment guidelines

• Use active and passive extension techniques to aim for full range of motion

• Passive knee flexion (prone)
  
  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

• Avoid active hamstring contraction until 6 weeks

Watch for other problems

E.g.  Gluteal control

  Tight ITB

  Gastroc and soleus etc

  McConnell taping if necessary
Stage 3  

**Proprioception**

**Weeks 6-12**

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

**Aims**

- Improve neuromuscular control and proprioception
- Continue working on cardio fitness
- Improve endurance capacity of muscles
- Improve patient confidence
- Regain full Range of Motion

**Treatment Guidelines**

- Progress with resistance on gym equipment
  - Leg press
  - Stairmaster
  - Treadmill power walking
- Progress with strength training
  - Progress co-contractions to dynamic
  - Step lunges
  - Half squats
  - Wall squats
- Can commence active knee flexion to 70 degrees
- 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

- **Active knee flexion through full range**
  - Can commence leg curls initially with low weight

- **Sport specific**
  - Shuttle runs
  - Ball skills
  - Sideways running
  - Skipping rope

- **Low impact step aerobics class**

- **Swimming can include using flippers**
Stage 5  
**Return to sport**

**Months 5-6 (20-25 weeks)**

**Aims**

Return to sport safely with confidence

**Treatment Guidelines**

- 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