



## Salford Hip Knee Anterior Cruciate Ligament (Hamstring) Rehabilitation

### General Rehabilitation Guidelines

#### Preoperative Rehabilitation

Prior rehab is essential for improved outcomes following ACL reconstruction. After suffering an ACL injury, there is a decrease in strength proprioception (feeling required to maintain balance) and gait. If you undergo physiotherapy before the surgery, it can reduce episodes of giving way and reduce chances of injury in the ACL injured knee. In addition, pre-operative rehabilitation restores full range of motion, strengthening and neuromuscular control, which will improve post-operative rehabilitation following surgery.

#### Post op Rehabilitation

After surgery a physiotherapist will guide you through a comprehensive rehabilitation programme to allow you to return to sport and activities. I will now present some general aspects of post-operative rehabilitation and goals before presenting the actual rehabilitation protocol itself.

1. **Range of motion (ROM)** – Restoring pre injury range of motion improves surgical outcomes and minimises the chance of scarring within the knee. Getting full extension back minimises the risk of anterior knee pain and restores the normal walking pattern.
2. **Gait** – Muscle imbalance is common after the surgery has first been completed. Your stride length will be shorter and your leg will not swing as normal. Early aims are to restore this and normalise joint motion.
3. **Muscle strengthening and endurance training** – Muscle contains two types of fibre, endurance (type I) and fast twitch (type II). After surgery both types of muscle fibres need to be worked on to restore strength and endurance.
4. **Open chain and closed chain exercises** – This depends on whether the foot is supported (closed) or unsupported (open). For example, squatting is a type of closed chain activity and knee extension whilst sitting is an open chain activity. Initially, closed chain activities are used more, but later on in rehabilitation open chain activities will be used.  
You must focus on exercise quality, rather than concentrating on time following surgery alone. If correct techniques are not used and you start to compensate for muscle weakness, you can learn poor techniques which are difficult to correct later and can result in risk of re-injury.  
After hamstring graft the donor site in the back of the thigh needs to heal and this takes approximately six weeks.
5. **Neuromuscular control needs to be regained** – Certain exercises will help regain this and therefore, stabilise the knee after surgery. These activities are commenced early following surgery. Specifically, exercises such as static balancing (supported one leg stance) and wobble board exercises will help regain your balance.



SALFORD HIP & KNEE CLINIC  
*For Hips, Knees & Sports Injuries*

## **Salford Hip & Knee Clinic Rehabilitation Protocol**

### **Week 0-2**

#### **Goals**

- Pain and post-operative swelling management
- To establish 0-90 degrees range of motion, with full extension being the main priority
- Patient education regarding gait, balance and wound management

#### **ROM**

- Exercise to establish 0-90 degrees of motion with heel slides
- Calf and hamstring passive stretches
- Exercise bike with low resistance

#### **Muscles**

- Quadriceps - Static quads exercises, any wall squats with 30 degree bends, static lunges and sitting to standing position
- Hamstrings - static and cocontraction with quadriceps
- Gluteals – isometric and eccentric hip flexion, extension and abduction in both standing and lying positions
- Calves – standing single and double heel raises with or without support

#### **Proprioception**

- Single leg stance for 30-60 seconds

#### **Gait**

- Start full weight bearing with crutches and progress to one crutch until gait is normal with one crutch
- Weight shifting exercises, side to side and forward and backward

#### **Methods**

- Icepacks for 20-30 minutes at a time allowing two hours in between icing
- Analgesics (Use of paracetamol and non-steroidal anti-inflammatories such as ibuprofen)
- Muscle stimulation



## **Week 2-6**

### **Goals**

- Progress to full knee extension and flexion
- Achieve normal gait pattern
- Strengthen the opposite limb
- Improve proprioception

### **ROM**

- Prone assisted knee flexion and extension
- Standing calf and hamstring stretches
- Assisted quads stretching exercises in standing position
- Heel slides and exercise bike doing full circles forwards and backwards

### **Muscles**

- Quadriceps – Assisted squats with increasing range and resistance as tolerated. Commence leg press machine allowing the maximum of 70% of body weight, wall squats allowing a maximum of 60 degrees and forward and lateral step ups ensuring body weight passes through the heel (to promote knee extension).
- Hamstrings – Prone assisted hamstrings using the opposite limb and bridging exercises (lying supine on the floor with a leg on a ball being pulled towards the buttock).
- Gluteals – Hip strengthening in all directions with an ankle weight both concentric and eccentric exercises
- Calves – Progress to single heel raises with or without support

### **Proprioception**

- Double/single leg stance with eyes forward, looking away and closed
- Standing on half foam roller and maintaining balance

### **Gait**

- Progress to assisted full weight bearing
- Exaggerate hip and knee flexion during swing phase of gait

### **Cardiovascular**

- Exercise bike
- Start elliptical trainer



## **Week 6-9**

### **Goals**

- To achieve full, pain free range of motion
- Begin limited specific isokinetic quadriceps exercises

### **ROM**

- Achieve full knee extension and flexion
- Continue hamstring and calf stretches

### **Muscles**

- Quadriceps – Full and inner range squats, with increasing resistance as tolerated, static lunges progressing to dynamic lunges, step ups (up to 8 inch steps), eccentric lateral step downs (slow, controlled knee flexion), full wall squats (up to 90 degrees). Initiate isokinetic quadriceps rehabilitation programme.
- Hamstrings – Bridging (supine on floor with legs on a ball), active low resistance hamstring curls in prone, standing and sitting positions
- Gluteals – Advance on all directions strengthening with ankle weights and resistance cables
- Calves – Advance on all directions strengthening with ankle weights and resistance cables

### **Proprioception**

- Single leg stance on mini trampoline
- Upper body work such as throwing
- Floor disc squatting and throwing
- Wobble board for balance

### **Gait**

- Hydrotherapy session with knee range of motion
- Walking, in all directions, hip range of motion

### **Cardiovascular**

- Exercise bike with increased time and resistance
- Swimming with kicking only
- Pool jogging
- Treadmill, walking, but avoid jogging



## **Week 9-12**

### **Goals**

- Progressive quads and hamstring strengthening
- Proprioception and flexibility

### **ROM**

- Continue stretches as before ensuring achievement of full range of motion in the affected knee

### **Muscles**

- Quadriceps – Lunges ensuring proper truncal alignment, backwards step ups, eccentric step downs (up to 8 inch steps), single leg squats, low resistance jumping (two legs, then jogging, then single leg hops), progress with isokinetic programme.
- Hamstrings – Hamstring curls (in the standing, sitting and prone position) with increased resistance as tolerated, eccentric hamstring rehabilitation.
- Gluteals – Progress as before
- Calves – Eccentric heel drops

### **Proprioception**

- Catching and throwing exercises on wobble boards and mini trampoline
- Single leg stance on a floor disc (kicking drills, upper body skills)

### **Cardiovascular**

- Pool running with increased time and resistance
- Exercise bike with increased time and resistance
- Treadmill with incline walk and increased speed, but still avoid jogging



## **Week 12-16**

### **Goals**

- Continue flexibility and strengthening of the lower chain
- Commence sports specific quadriceps and hamstring strengthening
- Proprioception and cardio fitness

### **Muscles**

- Continue concentric and eccentric quadriceps and hamstring exercises
- Backward lunge walking
- Progress from jogging to running
- Single squat jumps
- Single leg drop landing (2 inches)

### **Proprioception and Agility**

- Ladder drills (forwards, side to side, backwards)
- Side step overs
- Skipping and hopping (two legs initially, progressing to single leg)
- Mini trampoline (two foot jumps, jogging, single leg jumps)
- Continue single leg floor disc exercises (aim for sports specific exercises, for example, kicking, hockey shot, cricket batting)

### **Cardiovascular**

- Pool hopping and squat jumping in shallow water
- Jogging (straight on flat, even ground. Avoid sudden cuts or change of direction).
- Treadmill jogging, progressing to running
- Sports specific cardio training



## **Week 16-26**

### **Goals**

- Sports specific load change strengthening and progressing to plyometric exercises
- Continue proprioceptive and cardiovascular fitness

### **Muscles**

- Progress as before concentrating on specific deficits on muscle groups if any arise

### **Proprioception**

- Progress on mini trampoline
- Forward and side hops (maintain five second single leg balance on landing)
- Cutting drills (quick stop and balance)

### **Agility and Plyometrics**

- Ladder drills in all directions
- Progress on running, lunging, vertical jumps and run stop side step
- Single leg forward and side hopping
- Single leg jump
- Box hops, jump and forward sprints
- Single leg drop landing (progressive up to 10 inches in height)

### **Cardiovascular**

- Increase intensity on bike, treadmill and jogging
- Progress from running to sprinting on smooth surface ensuring a proper stride
- Jogging with direction change with uneven surfaces
- Jogging with turns of 90,180 and 360 degrees
- Jogging and cutting with 45 degree change of direction
- Acceleration and deceleration running, add on tight turns and hills as tolerated
- Outdoor cycling
- Swimming, but avoid whip kicking (breast stroke)



## 6-9 months

### Goals

- Adequate cardiovascular fitness, strength, power and agility, neuromuscular control, symmetry and stability
- Continue with upper body strengthening
- Back to sports practice for upper skills as able
- Return to sports skills on own at practice with minimal risk of re-injury

### Exercise suggestions

- Single leg drop
- Jump (6 inch step)
- Large figure of 8s
- Carioca running
- Last minute decision drills
- Two and one foot hopping with control
- Forward and lateral hop with control and comparable distance left and right
- Triple jump and landing with control and comparable distance left and right
- Single limb hop for distance (within 15% of uninvolved side)
- Single limb cross over triple hop for distance (within 15% of uninvolved side)
- Single limbed timed hop over six metres (within 15% of involved side)
- Single limb vertical power hop (within 15% of uninvolved side)
- Single limb drop landing (within 15% of uninvolved side)
- Single limb drop jump
- Ten second single limb maximum vertical hop (both sides)

### Return to Sport

Successful rehabilitation will lead to a return to sport at approximately nine months. This is provided the knee is free from pain and swelling during or after functional sport, rather than specific training drills. The person will also need to show adequate strength and endurance for their specific sport. It is difficult to accurately predict a return to sport, as individual responses to rehabilitation are variable. The timeline of nine months may be delayed if there is ongoing soft tissue swelling or bony injury which presented later after the initial injury.