

## ACL Reconstruction Rehabilitation Protocol

Information for Patients

### Terminology

- CKC:** Closed Kinetic Chain; exercise with the foot in contact with a surface, ie: leg press, squats, lunge
- Concentric:** the muscle is shortening while it is contracting ('positive contraction')
- Cybox Test:** strength testing machine that can measure force, work, and power of muscle groups.
- Eccentric:** the muscle is lengthening while it is contracting ('negative contraction')
- Extension:** straightening
- Flexion:** bending
- FWB:** Full Weight Bearing
- Hamstrings:** muscles in the back of the thigh
- Isometrics:** tightening/contracting of a muscle without movement of the leg
- OKC:** Open Kinetic Chain; exercise when the lower leg is moving freely ie: leg extension
- Plyometrics:** exercises that enable a group of muscles to reach a maximum strength in as short a time as possible. It tries to bridge the gap between speed and strength training.
- Prone:** lying on your stomach
- Quadriceps:** muscles on the front of the thigh
- ROM:** Range of Motion; amount of bending and straightening of the knee
- Supine:** lying on your back

### Timeline 0-2 weeks

**Goals:** Patient education +++ re: gait, ice, strength of repair, do's & don'ts, Increase ROM (0-90 degrees), Decrease pain and swelling

Maintain flexibility of lower extremity; Balance/proprioceptive re-education  
Strengthening: quadriceps, hamstrings, hip, calves

**Gait:** Weight bearing as tolerated with crutches between 2- 6 weeks. The physiotherapist will determine progression of 2 to 1 crutch. Must have full knee extension and walk without a limp before walking without crutch use.

**ROM:** Bike circles: high seat ½ circles fwd/back -> full circles -> lower seat  
Slider board; Heel slides; Ankle pumping; Prone leg hangs

**Modalities:** Ice; Interferential current therapy; Muscle stimulation

**Flexibility:** Calf stretches seated with towel; Seated hamstring stretches; Supine hip flexor stretches

**Balance/Proprioception:** 1 foot standing 30-60 seconds eyes open->closed.

**Strength:**

Quads: CKC exercises – quadriceps tightening (isometrics) seated and in standing, weight shifting, sit to stand, static lunge, mini squat, squats on shuttle

Hams: isometrics , prone knee flexion, standing knee flexion to 90 degrees

Hip: standing flexion/extension/abduction/ adduction, prone hip extension, side lying adduction/abduction

Calves: standing heel raises 2->1 foot, shuttle heel raises

### Timeline 3-6 weeks

**Goals:** Achieve near or full flexion and extension  
Continue flexibility exercises  
Normal FWB gait  
Maintain cardiovascular fitness  
Continue strengthening hams, quads, hip, calves  
Add on balance/proprioception

**ROM:** Continue as outlined  
Pool - walking, squats, knee flexion, step-ups & downs

**Flexibility:** Continue as outlined

**Gait:** Normalize to full weight bearing

**Cardio:** Bike ,Stairmaster , Pool: swim/jog (no whip kick)

**Strength:**

Quads: step ups 4-6-8" step fwd/lateral, ½ wall squats, shuttle leg press 2->1 leg, bungee lunge, squats with pulleys

Hams: seated chair walking, standing knee flexion with weight/pulleys, seated knee flexion with bungee cord, seated ham curls, reverse stairmaster

Hip: standing abduction/adduction/extension with pulleys/ tubing

Calves: heel drops, shuttle drops, mini-tramp bouncing, single heel raises

**Balance/Proprioception:** standing 1 foot eyes closed -> balance board, wobble board

### Timeline 6-9 weeks

NB: Graft is at the weakest point now, Avoid OKC exercises

Reasons why open kinetic chain (OKC) exercises (ie: leg extensions especially with weight) are contraindicated after ACL reconstruction:

- When the quadricep muscle contracts with the above exercises, the lower leg (tibia) is pulled forward (shears) in relation to the upper leg (femur).
- This shear directly stresses the reconstructed ACL graft.
- It is believed that these shearing forces may lead to stretching of the ACL graft that may result in increased laxity.
- Shearing is minimized if the force is maintained down the whole leg during muscle contraction (i.e. foot is fixed), and therefore CKC exercises are recommended.

**Goals:** Full pain free ROM Increase cardio fitness  
Continue to strengthen hip and calves  
Intermediate proprioception  
Functional quads strength  
Concentric-eccentric hams strength

**Cardio:** Bike, fitter, stairmaster, swim (flutter kick only), pool, jogging, treadmill power walking

**Strength:**

Quads: stairmaster fwd/bkwd, bungee lunge in different directions, clock face lunges, squats with pulleys increasing weight

Hams: backward walking, ham curls progress concentric - eccentric

Hip: increase weight standing abduction/ adduction/ extension with pulleys/tubing, tubing kick backs, fitter

Calves: as above with an increase in weight

**Balance/Proprioception:** balance board progressions, wobble board progressions, trampoline balance

### Timeline 9-12 weeks

**Goals:** Progress quad and hamstring strength  
Progress proprioception  
Sport specific cardio fitness

**Cardio:** Add treadmill quick walk +/- gradient—>slow jog  
Stationary jog against bungee cord resistance  
Pool running  
Bike and stairmaster interval training

**Strength:**

Quads: continue with CKC progressions, lunge walking forward/backward aggressive pool exercises, bungee cord eccentrics - reverse lunges

Hams: increase weight with pulley ham curls prone and standing – emphasis on full angle (90-130)- focus on eccentric component – strength (high load, low rep) and endurance (low load, high rep), shuttle – kneeling hip/knee extension, shuttle- standing hip/knee extension, Hydrifitness – hamstrings only

Hip: slider, skating machine, fitter, pulleys/tubing with increased weight,

Calves: eccentric heel drops 2->1 leg, eccentric toe press 2->1 leg

**Balance/Proprioception:** mini-tramp balance -> eyes open->closed

### Timeline 12-16 weeks

**Goals:** Sport specific cardio fitness; Sport specific quad and hamstring strength  
Sport specific proprioception training; Continue with flexibility and strength of lower extremity

**Cardio:** Treadmill jog-> run; Land jogging forward without cutting;  
Stationary jog against bungy cord resistance; Pool running  
Bike standing with interval training; Mini tramp jumping 2->1 leg

**Strength:**

**Quads/Hams:** continue with CKC progressions increasing weight, bungy cord eccentrics - reverse lunges with variable speed, shuttle kick backs, high steps, lunge walking fwd/bkwd, split squats, ham curls all with emphasis on endurance, progress to pool plyometrics deep water ->shallow water

**Balance/Proprioception:** mini-tramp jump and land, 2 ->1 leg balance with upper body or opposite leg skill i.e., throwing on rebounder, phantom kicking with bungy cord resistance, throwing/passing drills, single leg balance clock drill with mini pylons

### Timeline 16-20 weeks

NB. Your physical therapist may decide to perform a Cybex test on you at week 16 or later to help define your specific strengths deficits i.e., strength, power, endurance in hamstrings and quads and the balance between the two muscle groups. This can redefine some specific goals for you to work on the next 8 weeks.

**Goals:** Progress sport specific lower extremity strengthening to plyometrics  
Increasing strength, power and endurance of lower extremity muscles  
Increase sport specific proprioception training  
Increase specific cardio fitness

**Strength:**

**Quads/Hams:** if concentric/eccentric strength is adequate, gradually add on plyometrics on land, 2->1 foot progressions – diagonal lunges or running with bungy cord around waist incorporating upper or lower body skill i.e., kicking, jumping, catching, passing, shooting, 2 leg fwd/back/side hops, 4 square hops, 2 square diagonal hops -> progress to single leg, rebounder – jumping, jump & land, shuttle – ski hops (side to side), jumping 2-> alternating->1 leg, hopping, skipping, bounding, cutting, box hops 2-4-6” side to side, front to back, jumpdown with fwd sprint, diagonal/lateral cone jumps.

**Balance/Proprioception:** Continue with sport specific drills as outlined above, cutting drills with quick stopping and maintaining balance

**Cardio:** Increase distance, duration or intensity with bike, stairmaster, treadmill, outdoor running or cycling depending on the demands of your particular sport. Add on tight turns and hills as tolerated.

### Timeline 20-24 weeks

**Goals:** Back to sport practice for upper body skills  
Functional testing in clinic to determine return to sport skills on own at practice  
Continue with sport specific proprioception training  
Continue with specific cardio fitness

**Practice Drill Ideas:**

Straight forward and backward running  
Figure 8s gradually decreasing in size  
Zig-Zag running  
Cross over stepping  
Backward with cutting  
Stop and go drills

**Functional Testing in Clinic:**

Lunge walk with control both forward and backward  
Forward hop and lateral hop with control with comparable distances L and R side  
One foot hopping with control  
Triple jump and landing with control with comparable distances L and R side  
Sport specific demands with adequate skill, speed and control

**Bracing:** This is a very controversial topic. Talk to the physiotherapist and surgeon to see if it is recommended for the athlete to use a brace to return to sports/activities.