



DR MICHAEL MCAULIFFE

ORTHOPAEDIC SURGEON

Knee, hip and lower limb specialist

This is a guide only and any specific queries should be addressed to DR McAuliffe or your physiotherapist.

ACL REHABILITATION PROGRAM

WEEK 1

In the first few days after surgery your knee will be swollen and you can expect some pain. For comfort and to speed up the removal of swelling follow the RICE programme.

REST as much as possible

ICE the knee at regular intervals for the first 48 hours

COMPRESSION - leave the knee bandaged for at least 48 hours or until swelling subsides

ELEVATION of your leg is recommended when sitting

THE STAGED PROGRAM

STAGE 1

Time Period: Day 1 to Day 10 – 14 (sutures removed)

AIM:

Post-operative pain relief and management of soft tissue surgical trauma.

Get the patient off crutches and walking normally.

GOALS:

- Wound healing.
- Manage the graft donor site morbidity, i.e. pain and swelling.
- Decrease joint swelling.
- Restore full extension.
- Establish muscle control.



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TREATMENT GUIDELINES

Partial weight bearing to full weight bearing as pain and swelling allows.

Active range of motion aiming for full extension by 14 days. Flexion will come without a great effort.

Patella mobilisations to maintain patella mobility.

Gait retraining with full extension at heel strike.

Early active quadriceps strengthening is begun as a static co-contraction with hamstrings emphasising VMO control at various angles of knee flexion and progressed into weight bearing positions.

Gentle hamstring stretching is initiated immediately to minimise painful adhesions. Hamstring tears with the patient reporting a 'pop' about the posteromedial thigh is common within the first 14 days and even within the first 6 weeks.

Early active hamstring strengthening begins with static weight bearing co-contractions and progresses to active free hamstring contractions by day 14. Resisted hamstring strengthening should be avoided for at least 4-6 weeks.

At 10 – 14 days post operatively, the dressings will be removed and the wound checked.

NB: Quadriceps exercises are to be closed chain only during the first four stages.

EXERCISES

You are encouraged to develop a range of motion from full extension (0°) to 90° flexion. The exercises described below will help improve the condition of the muscle about the knee joint and enhance your stability.

Knee Stretch:

Sit on a flat surface (floor, bed or lounge chair) with your leg straight out in front of you. Place a pillow or cushion under your heel. Relax the muscles in your leg and let gravity straighten the knee fully. Hold this position for as long as possible. You should spend 20 minutes twice per day in this position.

Knee Flexion:

Sit on a table or high chair with the knee bent comfortably. Cross your operated leg over the top of your good leg at the ankle. Use your good leg to extend to 45° (half way to full extension) and then back to 90°. (Active Assisted)



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Static Quadriceps:

Sit or lie with operated leg straight out in front of you – tighten thigh muscle and hold for 5 seconds. Repeat three sets of ten and perform ten times each day.

WALKING

If you have a splint or brace use it when walking. You do not need to wear your splint when sitting or sleeping. Crutches improve balance during walking. Use your crutches outside, particularly on uneven ground or when moving amongst people. At home you do not need to use your crutches. Practice walking without crutches in and uncluttered room, aiming for a heel toe walking pattern.

STANDING EXERCISES

Holding on to a table or other support, practice taking weight on the operated leg. For 30 seconds hold a position with the knee as straight as possible with all your weight on the leg. Do this five times, having a rest of one minute between each set.

To progress this exercise, maintain the one-legged stance and push up at the ankle to stand on your toes. Hold this position for 10 seconds.

Further progression of this exercise: Start with a one-leg stance and the knee extended.

Flex the knee about 30°, then extend. Do three sets of 10 repetitions.

Sideways step: Holding on to a table or wall bar, feet apart approximately 18 inches.

Step sideways slowly, two steps left then two steps right. Repeat these steps 20 times.



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ACL REHABILITATION PROGRAM

WEEKS TWO TO FOUR

STAGE II

HAMSTRING AND QUADRICEPS CONTROL

Time Period: 2 – 6 Weeks

GOALS:

- Obtain a full unrestricted range of motion.
- Develop good muscle control and early proprioceptive skills.
- If not done sooner, restore a normal gait.
- Reduce any persistent effusion.

TREATMENT GUIDELINES:

Aim for a full range of motion using active and passive techniques.

Progress co-contractions for muscle control by increasing the repetitions, length of contraction and more dynamic positions, e.g. two leg quarter squats, lunges, stepping, elastic cords.

Commence swimming (except for breaststroke) once the wound has healed.

Gym equipment can be introduced gradually such as stationary bike, stepper, leg press, mini trampoline.

If swelling is persistent, continue with the use of a pressure pump or tubigrip, ice and static quadriceps exercises. Hold back on gym activities until the effusion is settling.

Hamstring strengthening automatically progresses with the increased complexity and repetitions of co-contractions. Open chain hamstring exercises are also included at this stage although often they are painful. It is important to concentrate on hamstring stretches and to incorporate resistance gradually to prevent recurrent injury.



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WALKING

Spend more time walking without crutches. Increase your walking outside up to 15 – 20 minutes per day. Take your crutches if necessary for longer walks, on uneven terrain and amongst crowds. Practice walking sideways and backwards.

Dispense with your splint once you are confident walking without crutches, once IRQ and knee control adequate.

EXERCISES

Continue your previous exercises and progress.

Knee Stretch:

You should now be able to stretch the knee fully and straight without difficulty. If your knee is still tight you should spend more time on stretching to make sure the knee straightens fully.

Knee Flexion:

Once you can flex the knee easily to 90° with support from your good leg continue this exercise with your operated leg without support.

Standing Exercise:

Progress your standing exercise by not holding a support. Increase the time you spend standing on one leg, flexing and extending 30°. As you are able, do this with your eyes closed.

Hamstring Exercises:

Lying on your stomach with your knee extended, cross your operated leg over your good leg at the ankle. Now flex the knee and use the good leg to assist the motion. Do three sets and rest for one minute between sets.

Weeks 3 – 4:

Low resistant (e.g. 1-2kg ankle weight) bilateral hamstring curls are progressed to low resistant unilateral curls as pain allows.



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Weeks 4 – 6:

Care must be taken as hamstring straining may occur and impede further progression.

Low resistance, high repetition weights aim to increase hamstring muscle endurance and include hamstring flicks and wobbles.

Continue with intensive stretching exercises.

Can commence glut work eg. closed chain bridging exercises.

Week 6:

Eccentric hamstring strengthening is progressed as pain allows. Hamstring curl equipment can be introduced.

Consider beyond the knee joint for any deficits, e.g. gluteal control, tight hamstrings, ITB, gastrocs and soleus, etc.

NB: With the accelerated programme patients can feel very confident by 6 weeks. However, it must be stressed that the graft is still not mature and they must be aware of their functional restrictions to avoid the risk of graft failure.

EXERCYCLE

Once you can flex your knee easily to 90° you can begin exercycling. Put the seat up higher if necessary. Make it easy so you do not have to push hard on the pedals. Build up to at least 20 minutes a day.

POOL

If you have access to a pool this can be helpful for early rehabilitation. In the pool progress your walking exercises in chest deep water. Start kicking but do not kick hard. DO NOT use breaststroke (frog) kick as this involves abnormal knee movement.

GYMNASIUM

If you have access to a gymnasium you can use the following equipment:

Stepping Machine

Leg Press – Quadriceps (closed chain)

Leg Curl – Hamstrings



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Rower

Make these exercises easy at first with little or no resistance and slow speed.

DRIVING

Once you are confident walking without crutches and without your splint you can start driving. You must have full control of your leg for safe driving.

PHYSIOTHERAPY

At this stage you may need treatment to help regain full range of movement and strength.

ACL REHABILITATION PROGRAM

WEEKS FOUR TO TEN

EXERCYCLE

You should be able to manage up to 30 minutes in one session. Add in some resistance for short periods to work your muscles harder.

WALKING

Walk up to 30 to 40 minutes each day. Increase your stride length figure eights. Do ten in each direction. As you get more confident decrease the side of the figure eight to five to ten metres and increase your walking speed.

Square Walking: Walk 20 paces then turn left, another 20 paces then turn left, another 20 paces then turn left and return to the start point. Do ten in each direction.

Progress this exercise by gradually decreasing the size of the square to five paces in each direction.

Walking Swerves: Position ten objects (real or imaginary), at ten feet intervals directly in front of you. Weave between the objects. Progress this exercise by increasing the speed of walking.

JOGGING

Some people may be ready to start light jogging at six weeks following surgery.

If you are quite comfortable cycling for up to 30 minutes you can start sight jogging in a straight line on even ground. Ensure you do not limp by keeping stride short and slow.



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EXERCISES

Your Physiotherapist will work through the following exercises with you:

Strengthening: lower abdominals, gluteals – to promote strength around pelvis and so gain stability.

Walking:

correct alignment and co-contraction (using gluteals, hamstrings and quadriceps) – may develop new pains if poor alignment, limping, or not tightening muscles correctly.

Gymnasium:

closed kinetic chain exercises – leg press, squats, calf raises, phantom chair, step-up's and step-down's, lunges, hopping, skipping. As noted above all higher range activities will depend on progression.

Balance:

balance board, rebounder, exa-slide, swiss ball – poor balance could contribute to the risk of re-injury.

STAGE III

PROPRIOCEPTION

Time Period: 6 week – 5 months

AIM:

Improve neuromuscular control and proprioception.

GOALS:

- Continue to improve total leg strength.
- Improve endurance capacity of muscles.
- Improve patient confidence.
- Progress co-contractions to more dynamic movements, e.g. step lunges, half squats.

TREATMENT GUIDELINES:

Proprioceptive work should be more dynamic, e.g. lateral stepping, slide board etc.

Can begin jogging in straight lines on the flat.



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Progress resistance on gym equipment such as leg press and hamstring curls. Hamstring strengthening programme aims for a progression in both power and speed of contraction.

Start cycling on normal bicycle.

Continue with static control but emphasise endurance, e.g. wall squats.

Consider pelvic and ankle control plus cardiovascular fitness.

NB: Still no open chain quadriceps exercises. Solo sports such as cycling, jogging and swimming are usually permitted with little or no restrictions during this stage.

STAGE IV SPORT SPECIFIC/RETURN TO SPORT

Time Period: 5 MONTHS – 12 MONTHS

AIM:

Prepare to return to sport. Should only begin in consultation with your physiotherapist and surgeon.

GOALS:

- Incorporate more sport specific activities.
- Introduce agility and reaction time into proprioceptive work.
- Increase total leg strength.
- Develop patient confidence.

POSSIBLE PROBLEMS:

Patello-femoral irritability.

TREATMENT GUIDELINES:

Progressing of general strength work, e.g. half squats with resistance, leg press, leg curls, wall squats, step work on progressively higher steps, stepper and rowing machine.

Proprioceptive work should include hopping and jumping activities and emphasise a good landing technique. Incorporate lateral movements.

Agility work may include shuttle runs, ball skills, sideways running, skipping rope, etc.

Low impact and step aerobics classes help with proprioception and confidence.

Pool work can include using flippers.



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Sport specific activities will vary for the individual, e.g. Tennis, lateral step lunges, forward and backwards running drills: Skiing, slide board, lateral box stepping and jumping, zigzag hopping; Volleyball or Basketball – vertical jumps.

NB: The above activities are gradually introduced throughout Stage IV.

RETURN TO SPORT

GOALS

- Return to sport safely and with confidence.

TREATMENT GUIDELINES:

Can safely do open chain quadriceps work, (i.e. leg extensions).

Continue progression of plyometrics and sport specific drills.

Return to training and participating in skill exercises.

Continue to improve power and endurance.

Advice may be needed as to the need for modifications to be able to return to sport, e.g. Football – start back training in running shoes or short sprigs. Will usually return to lower grades initially; Skiing – stay on groomed slopes and avoid moguls and off piste initially.



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APPENDIX

Co-Contraction Exercises

In relation to the knee these exercises ensure that both the hamstring muscle group and the quadriceps muscle group contract simultaneously to achieve a bracing effect on the knee joint.

Not only will these two groups be contracting, however, but stabilisers above and below will also contract such as gluteals, psoas, TFL, adductors and calf muscles.

To initially teach a co-contraction, it is easiest to place a rolled pillow under the knee and ask the patient to push into the pillow. This will switch on the hamstrings and gluteals. They should then tighten the quadriceps.

A co-contraction should initially be held for approximately 15 seconds.

OPEN - v – CLOSED CHAIN EXERCISES

Closed kinetic chain exercises are performed with the foot placed on a surface (e.g. floor, step, pedal) and the entire limb is bearing an axial load.

Joint compression occurs when the limb is loaded by body weight and this provides inherent joint stability and allows more strenuous strengthening without the degree of shearing forces, or anterior tibial displacement that occurs with conventional open kinetic chain exercises. Closed chain exercises performed with co-contraction of hamstrings and quadriceps also lessen the patella-femoral joint surfaces.

The closed exercises place functional stresses on the joint and entire limb. These exercises can easily be designed to be specific to normal weight bearing activities used for ACL as well as sport.

PLYOMETRICS

Plyometrics exercises are characterised by very powerful muscle contractions in response to a dynamic loading or stretching of the muscles involved in the exercise. The muscles are pre-loaded with an eccentric contraction before a powerful concentric contraction.

Plyometrics help to improve muscle power in the later stage of rehabilitation. Examples are box drop jumps, bounding and hopping.