

Accelerated ACL Rehabilitation Programme

Evidence base

1. Advantages of early mobilisation include cartilage nutrition, loading of bone and prevention of adhesions within the joint.
2. Progressive controlled loading of the graft stimulates collagen healing and regeneration.
3. Weight-bearing has not been shown to be detrimental to the graft and is therefore allowed as rapidly as pain permits.
4. Only closed chain exercises are performed until the very end of the programme. Open chain extension exercises cause significantly more anterior tibial displacement and force on the graft.
5. Loss of the native ACL leads to loss of mechanoreceptors and proprioceptive feedback. Therefore much emphasis is placed on proprioceptive re-training prior to returning to unrestricted sporting activities.

Ideally patients are taught the exercises pre-operatively. The regime is not a "one size fits all" and may be tailored according to the patients' pathology, age, aspirations etc.

We rarely brace the knee. If needed, it is usually to maintain extension.

Exercises

Co-contraction

These are to ensure that both the hamstrings and quads contract simultaneously to achieve a bracing effect on the knee joint. Stabilisers above and below the knee will also contract e.g. gluteals, psoas, adductors and calf muscles.

Co-contraction can easily be taught with a rolled up pillow under the knee and pushing 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 15 approximately seconds.

Open v closed chain exercises.

Closed kinetic chain exercises (i.e. with the distal segment fixed) are performed with the foot placed on a surface and the entire limb is bearing an axial load. Joint compression occurs, providing inherent joint stability and allowing more strenuous strengthening without the degree of shearing forces/ anterior tibial displacement that occurs with open chain exercises (i.e. leg extensions). Closed chain exercises performed with co-contraction of hamstrings and quads lessen patello-femoral joint forces.

Plyometrics

These exercises are used to help muscle power in the later stage of rehabilitation and are characterised by powerful muscle contractions in response to dynamic loading or stretching of muscles. The muscles are pre-loaded with an eccentric contraction before a powerful concentric contraction e.g. box drop jumps, bounding and hopping

There are five stages

STAGE 1: INITIAL RECOVERY - Day 1 to day 10-14

AIM: Post-op pain relief, soft tissue recovery, wean off crutches and normal mobility

1. Ice, elevation, co-contractions
2. Gentle hamstring stretching started immediately to minimise adhesions. (Patients may feel something "ping" at the back of the thigh during this time)
3. 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 4-6 weeks
4. **Closed chain** quads exercises only
5. Partial to full weight bearing as pain allows
6. Active range of movement aiming for full extension by day 14. Flexion is not usually a great problem
7. Maintain patellar mobility
8. Gait retraining with full extension at heel strike
9. Dressings removed and wound check at 10-14 days

STAGE 2: HAMSTRING & QUADRICEPS CONTROL – 2 to 6 weeks

AIM: return to normal function and prepare for next stage

1. Active and passive techniques to regain full range of motion
2. Progress co-contractions for muscle control by increasing repetitions, length of contraction and more dynamic positions e.g. two leg quarter squats, lunges, stepping, elastic cords
3. swimming once wound has healed
4. gradual introduction of gym equipment e.g. exercise bike, stepper, leg press
5. If there is persistent swelling, continue with ice and static quads exercise and hold back on gym activities
6. Progressive hamstring exercises including open chain (may be painful). Concentrate on hamstring stretching and incorporate resistance gradually to prevent recurrent injury.

7. Patients may feel confident at end of 6 weeks. They must be made aware of their functional restrictions as graft still not mature and at risk of failure.

STAGE 3: PROPRIOCEPTION – 6 to 12 weeks

AIM: improve neuromuscular control and proprioception

1. Progress co-contractions to more dynamic movements e.g. step lunges, half squats
2. Dynamic proprioceptive work e.g. lateral stepping, slide board
3. Jogging in straight lines on the flat
4. Progress resistance on equipment such as leg press and hamstring curls.
5. Cycling on normal bicycle
6. Continue with static control but emphasise endurance e.g. wall squats
7. No open chain quads exercises yet. Cycling jogging and swimming usually permitted without restrictions at this stage

Stage 4: SPORT SPECIFIC – 12 weeks to 5 months

AIM: prepare to return to sport

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

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

Agility work including shuttle runs, ball skills, sideways running, skipping rope etc

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

Sport specific activities

Stage 5: RETURN TO SPORT – 5 to 6 months

Open chain quads exercises – i.e. leg extensions

Progression of plyometrics and sport specific drills

Return to training

Continue to improve power and endurance

Sport-specific graduated return to sport