

ACL RECONSTRUCTION REHABILITATION GUIDELINES – HAMSTRING GRAFT (Accelerated)

These rehabilitation guidelines are guidelines only and progression through them should be guided by the patient's symptoms and functional ability and/or any specific consultant requirements. All exercises should be performed within the patient's tolerance level.

REHABILITATION PHASE 1 (Day 1-7)

Goals: Manage pain and swelling, increase range of movement (ROM) in particular extension, increase strength, increase weight bearing and correct gait pattern with crutches.

Interventions -

1. Continue activities/exercises as per post-operative advice sheet.
2. **Knee extension – aim to achieve full extension by week 2 post-operatively (Maxey & Magnusson, 2007).**
3. To facilitate extension:
 - In lying place a roll under the heel and straighten the knee.
 - In sitting place the foot on a chair with the knee unsupported.
 - In prone lying let the limb (from the knee to foot) hang off the end of the bed unsupported.
4. Commence knee flexion exercises (heel slides).
5. Monitor weight-bearing status and gait with crutches. Patients should be encouraged to mobilise intermittently throughout the day to promote a normal gait pattern, facilitate quadriceps function and promote healing of the new graft.
6. Gentle scar mobilizations may be performed if necessary to prevent adhesions.
7. Gentle joint mobilizations may reduce pain.
8. Continuous passive motion may be used to reduce pain and increase ROM (O'Driscoll, SW & Giori, NJ, 2000)

** Full ROM generally should be regained anywhere between 3-10 weeks post-surgery (DeCarlo, MS et al., 1992; Tomaro, JE, 1991). Lack of early progress with ROM, in particular EXTENSION, or increased laxity in the joint may need discussion with the surgeon.*

PHASE 2: 1-2 weeks

Goals: Patient education and reinforcement of goals, pain and swelling control, increase quads contraction, full knee extension, increase knee flexion to 110°, full weight bearing (FWB) with independent gait.

*** No excessive reciprocal loading for 6 weeks i.e. cycling or excessive walking**

Interventions -

1. Continue as above for pain and oedema management, ROM and quad exercises.
2. Patient education re: the operation and recovery process, the graft and home management and exercises (Brewer, BW et al., 2000).
3. Stretches: hamstrings and gastronemius.
4. Straight leg raise (SLR): hip flexion, extension, adduction and abduction
5. Open chain knee extension exercises (between 90°-60° only). *
6. Quad and hamstring co-contraction. *
7. Closed-chain exercises: Mini-squats (0-45°, half WB). *
8. **Gentle hamstring curls in standing and prone – painfree only**
9. Multi-hip machine
10. Leg press or inclined sled (70-10°)
11. Weight shifts: side/side and forwards/backwards
12. Initiate mild cardiovascular exercises – upper body ergometer (UBE)
13. Electrical stimulation can be used to assist in obtaining quadriceps contraction
14. Joint mobilizations: patella glides, tib-fib posterior glides.

** Open-chain terminal knee extension should be avoided for 12 weeks post-operation as there is increased tibial translation during the last 30° of extension, increasing stress on the maturing graft (Doucette & Child, DD; Noyes & Baber-Westin, 1996). The co-contraction of the quads and hamstrings in closed-chain exercises prevent excessive tibial translation during knee extension exercises (Yanagawa et al., 2002).*

PHASE 3: 3-4 weeks

Goals: Control pain and oedema, ROM 0-125°, muscle control (3/5), normal gait pattern.

Interventions -

1. Continue as above for pain and oedema management, ROM and quad exercises.
2. Isometric training – multi-angle (90°, 60°, 30°)
3. Heel raise/toe raise
4. Closed-chain exercises: mini-squats (from 20°-70° and progress to 0-90°), wall-sits with increased weight-bearing bilaterally
5. Balance and proprioception work: balance board -2 legged, single leg stance (SLS) on a flat surface
6. Cone walking – stepping over a line of cones with focus on control and proprioception. Begin with stepping forwards and then progress to sideways stepping and then backwards.
7. Increase cardiovascular exercises: upper body ergometer, water walking.
8. Begin upper body and core work.

** Proprioception and balance work enhance dynamic knee stability by inducing a well coordinated strategy among the muscles that affect tibial translation (Chmielewski et al., 2002).*

PHASE 4: 5-6 weeks

Goals: Control pain and oedema, ROM 0-135°, muscle control (4/5), muscle endurance, 100% weight bearing with a normal gait, recognise patella-femoral changes or any complications.

Interventions –

1. Continue stretches and ROM activities from previous stage
2. SLRs – increase resistance with theraband
3. Increase reps/resistance/sets for isometric training, heel/toe raises, **hamstring curls**, knee extension (90-60°), wall-sits, mini-squats, multi-hip machine, leg press or inclined-sled (70-10°)
4. Continue balance board – 2 legged, single leg stances (progress with theraband).
5. Lateral step-ups: 2-4”
6. Increase cardiovascular exercises: UBE, water walking, stair master, ski machine, elliptical machine.

PHASE 5: 7-8 weeks

Goals: Full range of movement (FROM), increase strength (4/5) and endurance, independent with ‘activities of daily living’ (ADL’s), can mobilize for 20 minutes with no pain.

Interventions –

1. Continue exercises and activities as above with progressions in resistance, reps and sets: focus on stretches, SLR’s, hamstring curls, knee extension (90°-60°), Leg press (70°-10°), multi-hip machine, lateral step-ups and closed-chain exercises.
2. Progress balance and proprioception work: Balance board, SLS, resistance band walking, ball toss, ‘Skater’ positioning* (Maxey & Magnusson, 2007).
3. Increase cardiovascular exercises: Stationary bike, water walking, swimming (straight leg kicking), walking, stair master, ski machine, elliptical machine.

** ‘Skater’ positioning – stand on operated leg, extend unoperated hip and leg, flex forwards at hips and stretch arms out in front.*

PHASE 6: 9-12 weeks

Goals: Independent ADL's, increase strength (4/5) and endurance

Interventions –

1. Continue strengthening exercises as above with progressions in resistance, reps and sets.
2. Stretches: quads, hams, gastrocnemius, ilio-tibial band (ITB)
3. Continue progressing balance and proprioception work: ball work in single leg stance, use trampoline
4. Increase cardiovascular exercises: As above but include walking and backwards walking.
5. Gentle straight line jogging if patient achieves appropriate strength in the later stages of this phase.

PHASE 7: 13-26 weeks

Goals: Increase strength and endurance, begin open chain exercises to full extension, prepare for return to sport, single-leg function tests – 75% of uninjured leg*. The patient may be required to attend the Sports Surgery Clinic at 14-16 weeks post-op. for isokinetic testing to monitor progress. Isokinetic strength test goal: approximately 20-25% of uninjured leg (Cincinnati Sportsmedicine and Orthopaedic Center, 1997).

Interventions –

1. Continue strengthening and stretching exercises as above with progressions in resistance, reps and sets.
2. Continue progressing balance and proprioception work: balance board with single leg, SLS on uneven platform.
3. Begin open-kinetic chain exercises to terminal extension
4. Increase cardiovascular exercises
5. Increase running speed and distance gradually (1/2, 3/4, full speed and 1/4 mile- 1 mile). It is important to rest between running days. Only practice running X 3 per week and begin on a soft (eg. Track) surface (Maxey & Magnusson, 2007).
6. Initiate cutting program as appropriate – gentle lateral running, carioca's, figure 8s
7. Plyometric training when appropriate base strength achieved – hopping, jumping, box hops, depth jumps, leap frogs, burpees (bilateral to unilateral)
8. Sports specific drills as appropriate.

* *Single-leg functional tests: hop and stop distance, timed hop (over 6mts for time and distance), vertical jump, stair hopping (Clark, 2001; Lephart et al., Philips et al., 2000).*

PHASE 8: 27-52 weeks

Goals: Increase strength and endurance, return to sport, single-leg function tests (hop distance, timed hop – 85% of uninjured leg (Clark, 2001; Lephart et al., 1992; Philips et al., 2000). Isokinetic testing may be used again at this stage to monitor progress and suitability for return to sport (Isokinetic test – aim less than 15% deficit of uninjured leg).

Interventions –

1. Continue strengthening and stretching exercises as above with progressions in resistance, reps and sets.
2. Continue progressing balance and proprioception work: SLS on uneven platform with secondary activity.
3. Increase cardiovascular exercises
4. Running program: interval running (20, 40, 60, 100 yards), walk/rest phase (3:1 rest: work), backwards running
5. Increase cutting program – lateral running, carioca's, figure 8s
6. Increase plyometric training – Unilateral hopping, jumping, box hops, depth jumps, leap frogs, burpees, spin jumps,
7. Sports specific drills.

RETURN TO SPORT

The correct timing of when to release an athlete back to sport depends on graft maturation. Studies suggest that it is possible to return to sport at 6 months if the patient has successfully completed a full rehabilitation program. Initiating sports specific training at 4 months post-op. allows 2 months functional training adaptation and progression (Malone & Garret, 1992). Isokinetic testing may be used to determine whether the patient is ready to return to sporting activity and functional tests will also help in determining the suitability and readiness of the athlete (Clark, 2001; Lephart et al., 1992; Philips et al., 2000).