



AUCKLAND BONE AND JOINT SURGERY

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ACL HAMSTRING TENDON AUTOGRAFT RECONSTRUCTION REHABILITATION PROTOCOL

GENERAL GUIDELINES

- Focus on protection of graft during primary re-vascularization and graft incorporation
- For ACL reconstruction performed with meniscal repair or transplant, defer to ROM and weightbearing precautions outlined in the meniscal repair/transplant protocol
- Dr. Boyle may alter time frames for use of crutches and/or knee brace
- Supervised physiotherapy takes place for 5-8 months
- Use caution with hamstring stretching/strengthening based on donor site morbidity

GENERAL PROGRESSION OF ACTIVITIES OF DAILY LIVING

- No bathing/showering (sponge bath only) until after suture removal.
- Driving: 1 week for automatic transmission cars, left leg surgery
4 weeks for manual transmission cars, or right leg surgery
- Use of crutches for ambulation for 2-4 weeks until adequate quadriceps function
- Weight bearing: 0-1 week: PWB with crutches
1-2 weeks postop: FWB with crutches (wean off as quads recover)
- Return to work as directed by physiotherapist/Dr. Boyle based on work demands

REHABILITATION PROGRESSION:

Frequency of physiotherapy visits should be determined based on individual patient status and progression.

The following is a general guideline for progression of rehabilitation following ACL hamstring tendon autograft reconstruction. Progression through each phase should take into account patient status (e.g. healing, function) and surgeon advisement. Please consult Dr. Boyle if there is any uncertainty concerning advancement of a patient to the next phase of rehabilitation.

PHASE I:

Begins immediately post-op through approximately 4 weeks

Goals:

- Protect graft and graft fixation
- Minimize effects of immobilization
- Control inflammation and swelling
- Full active and passive knee extension range of motion. Caution: avoid hyperextension $>10^\circ$
- Educate patient on rehabilitation progression
- Knee flexion to 90° only in order to protect graft fixation
- Restore normal gait on level surfaces

Weightbearing Status:

- 0-1 week: PWB with two crutches to assist with balance
- 1-4 weeks: PWB progressing to FWB with normal gait mechanics
- Wean from crutches/brace for ambulation by 4 weeks as patient demonstrates normal gait mechanics and good quad control

Exercises:

- Active-assisted leg curls 0-1 week. Progress to active and resistance as tolerated after 1 week.
- Heel slides (limit to 90° knee flexion)
- Quad sets (consider neuromuscular electrical stimulation for poor quad sets)
- Gastrocnemius and soleus stretching
- Gentle hamstring stretching at 1 week
- SLR, all planes, with brace in full extension until quadriceps strength is sufficient to prevent extension lag; add weight as tolerated to hip abduction, adduction and extension
- Quadriceps isometrics at 60° and 90°
- Aquatic/pool therapy (once sutures removed) for normalizing gait, weightbearing strengthening, deep-water aqua jogging for knee ROM and swelling

PHASE II:

Begins approximately 6 weeks post-op and extends to approximately 14 weeks. Criteria for advancement to Phase II:

- Full knee extension
- Good quad set, SLR without extension lag
- Knee flexion to 90°
- Minimal swelling/inflammation
- Normal gait on level surfaces

Goals:

- Restore normal gait with stair climbing
- Maintain full knee extension, progress toward full flexion range of motion
- Protect graft and graft fixation
- Increase hip, quadriceps, hamstring, and calf strength
- Increase proprioception

Weightbearing Status:

If necessary, continue to wean from crutches

Exercises:

- Continue with knee range of motion/flexibility exercises as appropriate for the patient
- Initiate closed kinetic chain quadriceps strengthening and progress as tolerated (wall sits, step-ups, mini-squats, leg press 90°-30°)
- Progressive hip, hamstring and calf strengthening (gradually add resistance to open chain hamstring exercises)
- Continue hamstring, gastrocnemius and soleus stretches
- Stairmaster (begin with short steps, avoid knee hyperextension)
- Nordic track, elliptical machine for conditioning
- Stationary bike (progressive time and resistance)
- Single leg balance/proprioception work (ball toss, balance beam, mini-tramp balance work)
- Begin running in the pool (waist deep) at 12-14 weeks

PHASE III:

Begins at approximately 14 weeks and extends through approximately 20-24 weeks (5-6 months).

Criteria to advance to Phase III include:

- No patellofemoral pain
- Minimum of 120° of knee flexion
- Sufficient strength and proprioception to initiate pool running
- Minimal swelling/inflammation

Goals:

- Full knee range of motion
- Improve strength, endurance, and proprioception of the lower extremity to prepare for sport activities
- Avoid overstressing the graft
- Protect the patellofemoral joint
- Normalize running mechanics
- Strength approximately 70% of the uninvolved lower extremity per isokinetic evaluation

Exercises:

- Continue flexibility and ROM exercises as appropriate for patient
- Initiate open kinetic chain leg extension (90°-30°), progress to eccentrics as tolerated
- Progress toward full weightbearing running at approximately 16-18 weeks
- Begin swimming if desired
- Progressive hip, quad, hamstring, calf strengthening
- Cardiovascular/endurance training via stairmaster, elliptical, stationary bike
- Advance proprioceptive activities

PHASE IV:

Begins at approximately 5-6 months and extends through 7-8 months post-op. Criteria for advancement to Phase IV:

- No significant swelling/inflammation
- Full, pain-free knee ROM
- No evidence of patellofemoral joint irritation
- Strength approximately 70% of uninvolved lower extremity per isokinetic evaluation
- Sufficient strength and proprioception to initiate agility activities
- Normal running gait

Goals:

- Symmetric performance of basic and sport specific agility drills
- Single hop and three hop tests 85% of uninvolved leg
- Quadriceps and hamstring strength at least 85% of uninvolved lower extremity per isokinetic strength test

Exercises:

- Continue and progress flexibility and strengthening program based on individual needs and deficits
- Initiate plyometric program as appropriate for patient's athletic goals
- Agility progression including, but not limited to:
 - Side steps
 - Crossovers
 - Figure 8 running
 - Shuttle running
 - One leg and two leg jumping
 - Cutting
 - Acceleration/deceleration/sprints
 - Agility ladder drills
- Continue progression of running distance based on patient needs
- Initiate sport-specific drills as appropriate for patient

PHASE V:

Begins at 7-9 months post-op. Criteria for advancement to Phase V:

- No patellofemoral or soft tissue complaints
- Necessary knee ROM, strength, endurance, and proprioception to safely return to sport or work
- Surgeon clearance to resume partial or full activity (objective functional analysis)

Goals:

- Safe return to sport/athletics/work
- Maintenance of strength, endurance, proprioception
- Patient education with regards to any possible limitations

Exercises:

- Gradual return to sports participation
- Maintenance program for strength, endurance

Bracing:

- Functional brace generally not used, but may be recommended by Dr. Boyle on an individual basis to facilitate return to dangerous or high risk activities

ACL = anterior cruciate ligament SLR = straight leg raise ROM = range of motion
PWB = partial weight bearing FWB = full weight bearing