



ORTHOPEDICS & SPORTS MEDICINE

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Dr. John Awowale

ACL Reconstruction Hamstring Autograft

NOTE: If a meniscus repair or cartilage procedure is performed in conjunction with ACL reconstruction, please defer to the ACL with Meniscus Repair or Microfracture Protocol

Phase 1 – Maximum Protection Phase (0-4 weeks)

Goals for Phase 1

- Protect graft and fixation
- Minimize knee effusion
- ROM 0-120° as tolerated for 4 weeks

Precautions

- Avoid knee hyperextension during this phase greater than 10°
- No kicking in pool for 12 weeks
- No isolated resistance knee flexion for 12 weeks due to hamstring autograft

Criteria for Progression to Phase 2

- Good PROM flexion/extension
- Good quad set, SLR without extension lag
- Minimal swelling/inflammation
- Normal gait on level surfaces

Immobilization/Weight Bearing

- Weight bearing as tolerated
- Wean from crutches by 2 weeks if patient demonstrates proper gait mechanics and good quad control

Range of Motion

- 0-120°
- Avoid hyperextension >10°

Brace

- Post op immobilizer until nerve block wears off

Manual Therapy

- Patellar mobility (superior, inferior, medial, lateral)
- Scar massage when incisions closed
- Gentle flexibility using deep tissue mobilization of surrounding tissues
- PROM/AROM knee flexion/extension, strong emphasis on full knee extension

Strengthening

- Quadriceps setting
 - Avoid knee hyperextension with quadriceps setting
- NMES to promote quad activation
- Multi-plane hip strengthening, add resistance as tolerated
- 4-way hip strengthening, standing TKE, mini step-ups, bridging, calf raises, mini squats
- Core strengthening
- For Hamstring Autograft:
 - Avoid isolated hamstring strengthening x 12 weeks
 - Heel slides to 90° only
- For Patellar Tendon Autograft:
 - Closed kinetic chain quadriceps strengthening activities as tolerated (wall sit, step ups, mini squats, leg press 90-30°)
 - Quadriceps isometrics at 60° and 90°
 - If available, aquatics for normalizing gait, weight bearing and strengthening
 - Stationary bike – initially for promotion of ROM, progress light resistance as tolerated
 - Hamstring curls

Aquatics

- Initiate aquatic therapy program when incisions are closed



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Neuromuscular Control

- Proprioception on stable surface

Modalities

- Vaso pneumatic compression for edema management, 2-3x/week for 15-20 minutes
- Cryotherapy at home, 3x/day for 20 minutes each with knee elevated above heart
- NMES for quadriceps function
- Initiate Blood Flow Restriction Training after incisions are healed >3 weeks post-op – discuss with Dr. Awowale prior to initiation.



Phase 2 – Strengthening Phase (4-10 weeks)

Goals for Phase 2

- Restore normal gait with stair navigation
- Maintain full extension, progress toward full flexion ROM
- Protect graft and fixation
- Increase LE strength
- Increase proprioception

Precautions

- Avoid twisting and pivoting motions for 12 weeks
- Avoidance of full body weight impact activity until able to pass functional testing

Criteria for Progression to Phase 3

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

Range of Motion

- Restore full ROM
- Maintain normal LE flexibility

Strengthening

- Stationary bike or elliptical - Stairmaster as strength and gait allows
- Begin running in the pool (waist deep) or on an unweighted treadmill at 8 weeks.
 - Should have adequate strength, ROM, neuromuscular control, and limited swelling prior to initiation
- Bilateral gym strengthening with progression to unilateral as able (leg press, step-ups, hamstring curls, side-stepping, single leg squat, multi-directional lunges)
- Progress hip, hamstring and gastric strengthening
 - For hamstring autograft avoid isolated hamstring strengthening x 12 weeks
- Initiate knee flexion AROM using CKC strengthening with progression to OKC
- Core strengthening

Neuromuscular Control

- Proprioceptive drills progressing to on unstable surfaces
- Add dual tasking and reactive balance

Modalities

- Cryotherapy after activity
- Continue use of Blood Flow Restriction Training as need to build strength

Testing to Advance to Phase 3 Protocol

- **Functional strength testing** to be scheduled before 10-12 week follow-up with MD. Appointment must be scheduled with Aurora BayCare Sports Physical Therapy at the 1110 Kepler location. Please contact physician office if unable to make this arrangement for alternative testing.
- Y-Balance testing within 6 cm of involved LE
- 3PQ isometric quadriceps testing (<25% difference)
- Single leg squat without display of knee valgus
- Recommend isokinetic test with anti-shear device at 12 weeks (14-16 weeks for hamstring tendon autograft procedures) to guide continued strengthening.



Phase 3 – Strengthening and Plyometric Phase (10-16 weeks)

Goals for Phase 3

- Full ROM
- Improve strength, endurance, and proprioception of the LE to prepare for sport activities
- Initiate impact activity
- Normal running mechanics
- Strength >70% of uninvolved LE with isokinetic evaluation

Precautions

- Protect the patellofemoral Joint
- Avoid overstressing the graft
- Progressively increase resistance of hamstring (hamstring autograft)

Criteria for Progression to Phase 4

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

Strengthening

- Stationary bike, elliptical, treadmill, may begin swimming
 - Improve cardiovascular endurance
- Maintain LE flexibility – hamstring, quad, gastroc-soleus, ITB
- Unilateral gym strengthening program (single leg squats, eccentric leg press, lateral step-downs, advanced bridging, multi-directional lunges, CKC hamstring curls)
- Progress toward full weight bearing running at 12 weeks for BTB autograft (16 weeks for hamstring tendon autograft procedures).
- Suggested progression of impact activities:
 - **12+ weeks:** sagittal plane running, agility drills, sub-maximal plyometrics
 - **16+ weeks:** advance to multi-directional running if able to avoid dynamic knee valgus, cutting and pivoting drills, plyometrics
- 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
 - **Avoid** impact activities on unstable surfaces until >6 months post-op or per conversation with Dr. Awowale with functional testing results.
- Core strengthening

Neuromuscular Control

- Advanced proprioception on un-stable surfaces with perturbations and/or dual tasking, add sport specific balance tasks as able

Modalities

- Cryotherapy after activity



Phase 4 – Advanced Strength and Advanced Plyometric Phase (4-6 months+)

Goals for Phase 4

- Symmetric performance of basic and sport specific agility drills
- Single and 3 hop tests 85% of uninvolved LE
- Quadriceps and hamstring strength at least 85% of uninvolved lower extremity per isokinetic strength test

Criteria for Progression to Phase 5

- No patellofemoral or soft tissue pain or complaint
- Necessary joint ROM, strength, endurance, and proprioception to safely return to work or athletics

Strengthening

- Continue advanced strengthening
- Promote adequate quad and hamstring strength
- Activity specific
- Advanced multi-directional agility and plyometric drills
- Core and hip strengthening
- Begin building power in involved LE
- Progress running distance
- Initiate sport-specific drills as appropriate

Neuromuscular Control

- Emphasize proper motor control
- Advanced proprioceptive drills like:
 - Unsteady surface
 - Reactive balance
 - Deceleration control
 - Landing/take off drills
 - Perturbation training

Modalities

- As needed



Phase 5 – Return to Activity Phase (6 months +)

Goals for Phase 5:

- Maintain strength, endurance, proprioception
- Safely return to activity
- Sports participation

Continue progression of activities from Phase 4

Return to Function Testing: Aurora BayCare return to function for the lower extremity protocol to be used

- **6 months+:** Return to function testing per MD approval. Appointment must be scheduled with Aurora BayCare Sports Physical Therapy at the 1110 Kepler location. Please contact physician office if unable to make this arrangement for alternative testing.
- **Criteria:** Pain-free, full ROM, minimal joint effusion, isokinetic strength and functional testing at 90% compared to uninvolved, adequate knee control with sport and/or work specific tasks

This protocol was reviewed and updated by John Awowale, MD and the Ortho Therapy Committee September 2020.