ORTHOPEDICS & SPORTS MEDICINE
BAYCARE CLINIC

DR. JOHN AWOWALE
ACL RECONSTRUCTION HAMSTRING AUTOGRAFT POST-OP THERAPY PROTOCOL

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

Phase 1 – Maximum Protection Phase (0-4 weeks)
(continued on next page)

Goals for Phase 1	Precautions for Phase 1	Criteria for Progression to Phase 2
• Protect graft and fixation • Minimize knee effusion • ROM 0-120° as tolerated for 4 weeks	• 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	• 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 (continued on next page)
- 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

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

- 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

Neuromuscular Control
- Proprioception on stable surface

Modalities
- Vasopneumatic 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

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Phase 2 – Strengthening Phase (4-10 weeks)

Goals for Phase 2	Precautions for Phase 2	Criteria for Progression to Phase 3
• Restore normal gait with stair navigation • Maintain full extension, progress toward full flexion ROM • Protect graft and fixation • Increase LE strength • Increase proprioception	• Avoid twisting and pivoting motions for 12 weeks • Avoidance of full body weight impact activity until able to pass functional testing	• 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 Post-Op Therapy Protocol
- Functional strength testing to be scheduled before 10–12-week follow-up with physician.
- **Criteria**:
    - 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

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

Goals for Phase 3	Precautions for Phase 3	Criteria for Progression to Phase 4
• 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	• Protect the patellofemoral Joint • Avoid overstressing the graft • Progressively increase resistance of hamstring (hamstring autograft)	• 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 unstable surfaces with perturbations and/or dual tasking, add sport specific balance tasks as able

Modalities

- Cryotherapy after activity

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

Goals for Phase 4	Precautions for Phase 4	Criteria for Progression to Phase 5
• 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	• None	• 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

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

Goals for Phase 5	Precautions for Phase 5
• Maintain strength, endurance, proprioception • Safely return to activity • Sports participation	• None

Return to Function Testing

- **6 months+**: Return to function testing per physician approval
- **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

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