

Arthroscopic ACLR (Quadriceps Autograft) Protocol

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General Principles and Precautions

- **Donor Site Management:** Expect increased soreness at the superior pole of the patella. Early patellar mobilization is critical to prevent adhesions at the harvest site.
- **The "Extension First" Rule:** Achieving 0 degrees of extension (matching the uninvolved side) is the highest priority in the first 2 weeks to prevent permanent gait mechanics issues.
- **Graft Protection:** Avoid resisted open-chain knee extension (e.g., leg extension machine) from 0 to 40 degrees for the first 12 weeks to minimize shear stress on the new graft.

Phase I: Immediate Post-Operative / Protection (Weeks 0–2)

Goals: Full terminal extension, edema control, and quadriceps "re-education."

- **Brace Use:** Brace locked in full extension (0 degrees) for all ambulation and sleep.
- **Weight-Bearing:** Weight-Bearing As Tolerated (WBAT) with crutches.
- **Range of Motion:**
 - **Extension:** Goal is 0 degrees (matching opposite side) by day 7. Use prone hangs and towel rolls under the heel.
 - **Flexion:** Gradual progression as pain allows.
- **Exercises:**
 - **Quadriceps Activation:** Quad sets and Straight Leg Raises (SLR) in the brace. **No lag** must be present during SLR. If a lag is present, the patient must keep the brace locked for SLR.
 - **Patellar Mobilizations:** Essential to prevent harvest site scarring and infrapatellar contracture.
 - **Ankle Pumps:** daily to prevent DVT.

Phase II: Early Mobilization (Weeks 2–6)

Goals: Normalize gait, progress flexion, and initiate bilateral strengthening.

- **Brace:** Brace is typically opened to allow ROM during gait once the patient demonstrates superior quad control (No SLR lag). Wean from the brace by week 4 to 6.
- **Motion Progression:**
 - **Flexion Goal:** Reach **90 degrees** by the end of Week 6.
 - **Stationary Bike:** Begin when flexion reaches 90 degrees. Start with no resistance.
- **Strengthening (Bilateral Closed-Chain Only):**
 - **Mini-Squats:** 0 to 45 degrees.
 - **Leg Press:** 0 to 60 degrees (low weight/high reps).
 - **Proprioception:** Double-leg balance on stable surfaces.
- **Precautions:** **No lateral movements or single-leg loading.**

Phase III: Intermediate Strengthening (Weeks 6–12)

Goals: Progress flexion and build bilateral eccentric strength.

- **Motion Progression:**
 - **Flexion Goal:** Reach **120 degrees** by the end of Week 12.
- **Strengthening:**
 - **Bilateral Focus:** Continue progressive bilateral leg press and squats.
 - **Hamstrings:** Begin gentle resisted curls.
 - **Step-Ups:** Stay within 0 to 45 degrees of flexion to minimize donor-site pain.
- **Precautions:** **No lateral movements or single-leg loading** until the completion of week 12.

Phase IV: Advanced Loading & Transition to Sport (Weeks 12–16+)

Goals: Achieve full flexion, initiate single-leg tasks, and return to impact.

- **Motion Progression:**
 - **Flexion Goal:** Reach **Full Flexion** by Week 16.

- **Strengthening (Initiate Week 12+):**
 - **Lateral Movements:** Initiate side-steps, monster walks, and lateral shuffles.
 - **Single-Leg Loading:** Begin single-leg squats, step-ups, and Bulgarian split squats.
- **Criteria to Begin Running (Typically Week 16+):**
 - Full ROM and no joint effusion.
 - Quadriceps strength at least 75 percent of the uninvolved side.
- **Progression:**
 - **Agility:** Figure-8s and shuttle runs.
 - **Plyometrics:** Box jumps (focus on landing mechanics) and bilateral jumping.

Phase V: Return to Sport (Weeks 24+)

- **Contact Sports:** Typically 6 to 9 months, contingent on passing functional testing.
- **Discharge Criteria:** Quadriceps/Hamstring strength greater than 90 percent of the uninvolved side; Limb Symmetry Index (LSI) > 90 percent on hop testing.

Clinical Pearls for the Therapist

1. **Quadriceps Lag:** Because of the autograft harvest, these patients often struggle with "quadriceps inhibition." Use NMES (Electrical Stimulation) early and often during quad sets to overcome this.
2. **Donor Site Tendonitis:** If the patient develops sharp pain at the superior patella, reduce the volume of squats and focus more on isometric holds in pain-free ranges.
3. **Flexion Pacing:** We are intentionally pacing flexion (90 degrees at 6 weeks; 120 degrees at 12 weeks) to protect the healing extensor mechanism and the graft.