

# 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.

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## 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.
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## 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.**
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## 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.
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## 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.
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## 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.
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## 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.