

# Patellar / Quadriceps Tendon Repair Protocol

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## General Principles and Precautions

- **The "Extension" Rule:** Full terminal extension (0 degrees) is critical. However, **active** knee extension (using the quadriceps to lift the leg) is strictly prohibited for the first 6 weeks to prevent repair rupture.
- **Weight-Bearing:** Weight-Bearing As Tolerated (WBAT) is permitted, but **only with the brace locked in full extension (0 degrees)**.
- **Flexion Limits:** Flexion is advanced in specific increments to allow the tendon to remodel without gapping the repair.
- **The "Lag" Rule:** The patient must not perform a Straight Leg Raise (SLR) if a "quadriceps lag" (the knee sagging or bending during the lift) is present.

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## Phase I: Bone-Tendon Healing & Maximum Protection (Weeks 0–4)

**Goals:** Protect the repair, achieve 0 degrees of extension, and manage edema.

- **Brace Use:** Brace **locked in full extension (0 degrees)** for all ambulation and sleep.
- **Weight-Bearing:** WBAT with the brace locked in extension. Use crutches as needed for balance and gait symmetry.
- **Range of Motion:**
  - **Extension:** Maintain 0 degrees (matching the uninvolved side).
  - **Flexion Goal:** Gradually reach **45 degrees** by the end of Week 4. Perform gentle, therapist-led passive range of motion or heel slides within this limit.
- **Exercises:**
  - **Quadriceps Activation:** Quad sets (isometric) and Straight Leg Raises (SLR) **only if the brace is locked**. Use Neuromuscular Electrical Stimulation (NMES) to prevent atrophy.
  - **Patellar Mobilizations:** Essential once the incision is healed to prevent adhesions.
  - **Ankle Pumps:** daily to prevent DVT.

## Phase II: Early Mobilization (Weeks 4–8)

**Goals:** Gradually increase flexion and maintain quadriceps tone.

- **Brace:** Brace remains locked in extension for walking. It may be unlocked for seated exercises and supervised Range of Motion only.
- **Motion Progression:**
  - **Week 4 to 6:** Flexion goal is **60 degrees**.
  - **Week 6 to 8:** Flexion goal is **90 degrees**.
- **Strengthening:**
  - **Isometric Holds:** Multi-angle quadriceps isometrics (performed only in a locked-extension position).
  - **Hip/Core:** Side-lying hip abduction, clamshells, and glute bridges.
- **Precautions:** **No active knee extension** from a flexed position. The patient must not "kick" the leg out.

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## Phase III: Intermediate Strengthening (Weeks 8–12)

**Goals:** Discontinue brace, restore full range of motion, and initiate active extension.

- **Brace:** Wean from the brace between weeks 8 and 10 once the patient has no extension lag and can walk without a limp.
- **Motion Progression:**
  - Achieve full range of motion (0 to 135+ degrees) by week 12.
  - **Stationary Bike:** Begin at week 8 once 90 degrees of flexion is achieved (start with no resistance and high seat height).
- **Strengthening:**
  - **Active Extension:** Begin active-only knee extension (no weights) from 90 degrees to 0 degrees.
  - **Closed-Chain:** Initiate bilateral mini-squats (0 to 45 degrees) and bilateral leg press.
  - **Proprioception:** Double-leg balance on stable surfaces.

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## Phase IV: Advanced Loading (Weeks 12–20+)

**Goals:** Build eccentric control and initiate impact-loading preparation.

- **Strengthening:**
  - **Single-Leg Loading:** Begin single-leg squats (shallow), step-ups, and Bulgarian split squats.
  - **Resistance:** Progress weight on leg press and knee extension machines (Weeks 16+).
- **Running (Week 20+):** Requires full range of motion and at least 70 percent quadriceps strength symmetry.

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## Phase V: Return to Sport (Weeks 24–36+)

**Goals:** Full return to high-level athletics and heavy labor.

- **Agility:** Figure-eight running, shuttle runs, and sport-specific cutting drills.
- **Plyometrics:** Bilateral and unilateral jumping and landing mechanics.
- **Discharge Criteria:**
  - Quadriceps and 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. **Flexion Pacing:** We are intentionally pacing flexion (45 degrees at 4 weeks, 60 degrees at 6 weeks, and 90 degrees at 8 weeks) to ensure the repair is not over-tensioned during the early remodeling phase.
2. **Donor Site/Repair Pain:** If the patient develops sharp pain at the repair site during SLR, ensure the brace is tightened or revert to quad sets only.
3. **The "VMO" Focus:** Use NMES during quad sets in Phases I and II. Patellar and quad tendon repairs lead to significant Vastus Medialis atrophy, which can affect long-term patellar tracking.