

QUADRICEPS AND PATELLAR TENDON REPAIR

Physical Therapy Protocol

PATIENT

SURGEON

Andrew L. Merritt, MD

DATE OF SURGERY

PT START DATE

For the patient

Your tendon was repaired after it tore, and it needs time to heal. **You can walk with your knee locked straight in the brace. You only bend your knee while sitting or lying down**, at home and at PT, and only as far as Dr. Merritt allows. Your limit is written on your referral just for you. Your therapist starts muscle stimulation at your first visits to keep your thigh muscle strong.

PROTOCOL AT A GLANCE

WEIGHT BEARING	Full weight from day 1 with the brace locked straight . Crutches as needed for balance
BRACE	Locked straight at all times, including sleep, for 6 weeks , except to bend while sitting or lying. Then unlocked in stages for walking. Usually off by 12 weeks
MOTION GOALS	Bending only to the limit Dr. Merritt sets. 0–120° by weeks 8–10 , full bending during weeks 12–18
PHYSICAL THERAPY	Starts 5 to 7 days after surgery, 2 times a week at first
KEY PRECAUTIONS	Never bend the knee while it holds weight. No resisted knee extension (machines, weights) until 8–10 weeks at the earliest
RUNNING · SPORT	Running around 6 months . Sport around 9 to 12 months , after testing

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–6	2× a week	Brace locked; bending within your limit; muscle stimulation at PT
2	Weeks 6–12	2× a week	Brace unlocked in stages; bending toward 120°; stationary bike
3	Weeks 12–18	1–2× a week + home	Brace off; full motion; leg press, squats
4	Week 18 onward	As needed + home	Running around 6 months; sport at 9–12 months

For the Therapist

Check the surgeon notes first. They override anything else in this protocol. Questions or setbacks: call (425) 656-5060.

Surgeon notes and special instructions

General principles

- **Applies to both repairs.** This protocol covers patellar tendon and quadriceps tendon repair after acute rupture.
- **Weight-bearing rule.** Full weight bearing is allowed with the knee **locked in extension** in a hinged brace. All ROM work is done only non-weight-bearing (seated or supine), at PT and at home, within the prescribed limit.
- **ROM is prescribed by the surgeon** at referral, based on repair quality and intraoperative assessment. Follow the ROM prescription below. As ROM advances, unlock the brace to that level of motion; the orange tabs on the side lock it straight for walking and weight bearing.
- **Quad activation is a primary intervention, not an adjunct.** NMES and blood flow restriction (BFR) training are provided at each PT visit, starting at the first visit, to limit atrophy during the protected phase. No home NMES unit is needed.
- **Extension rules.** No active knee extension from a bent position in Phase 1. Unresisted active knee extension is allowed from week 6. No resisted extension (machines, weights) until 8–10 weeks at the earliest; the leg extension machine only with explicit surgeon clearance, typically week 12 or later.
- **PT frequency:** 2× a week early, then 1–2× a week with a home program.

ROM prescription (completed by Dr. Merritt at referral)

ROM WEEKS 0–2	0–_____°
ADVANCE AFTER WEEK 2	_____° per week

PHASE

1

Tendon Protection and Early Activation

Weeks 0–6

For the patient: what to expect

Walking with your knee locked straight in the brace is safe and encouraged. Bend only while sitting or lying down, never while standing or walking, and only to the limit on your referral. Sleep in the brace, locked. Your therapist starts muscle stimulation at your first visits to keep your thigh muscle from weakening.

WEIGHT BEARING	Full, with the knee locked in extension in the hinged brace for all walking and standing. Crutches for comfort and safety as needed; wean as tolerated while keeping the brace locked. Never bear weight with the knee flexed
BRACE	Locked in full extension for all weight-bearing activity (walking, standing, transfers) and for sleep. Unlock only when seated or supine for prescribed ROM exercises. No exceptions
MOTION	Per the surgeon's ROM prescription. All ROM exercises only non-weight-bearing (seated or supine); never while standing or walking

Goals

- Protect the repair: no uncontrolled knee flexion under load
- ROM per the surgeon's prescription
- Quad and VMO activation with NMES and BFR
- Conditioning with upper-body and other-leg work
- Control swelling and pain; walk independently, locked

Move on when

- ☐ Walking safely with the knee locked in extension; 100% brace compliance
- ☐ ROM within the prescribed limits, progressing per prescription
- ☐ SLR without extensor lag (critical before the brace is discontinued)
- ☐ NMES and BFR established, with a good quad contraction
- ☐ Superior and inferior patellar mobility maintained

Exercises

Exercise	How
NMES	To VMO and quadriceps at each PT visit, starting at the first visit. Priority intervention for early quad activation
BFR quad sets	Isometric quad contraction with the BFR cuff (limb occlusion pressure per PT protocol): 4 sets of 30/15/15/15 reps at 30% 1RM equivalent. Hypertrophic stimulus with minimal tendon stress
Quad sets · ankle pumps	Quad sets 3 × 15, hourly, brace locked, supine or seated. Ankle pumps hourly
Straight-leg raise	3 × 10–15, hip flexion only, brace locked. The therapist starts SLR once there is no extensor lag
Hip abduction · extension	3 × 15, in the brace
Heel slides	Passive and active-assisted knee flexion, supine; only non-weight-bearing and within the prescribed ROM
Patellar mobilization	Superior and inferior glides from week 1; 2 × 10 each direction, 2× a day. Superior glide is critical to prevent patella infera contracture
Conditioning	Upper extremity and core as tolerated; strengthening program for the other leg

Precautions

- Never bear weight with the knee flexed (risk of tendon failure)
- ROM exercises only seated or supine (non-weight-bearing), never with the foot on the floor
- No active knee extension from a bent position; SLR only with the brace locked and no extensor lag
- ROM must stay within the surgeon-prescribed limits; do not exceed them
- Re-rupture red flag: sudden loss of extension strength, a 'pop', or more pain. Stop and contact Dr. Merritt's office right away
- No resisted knee extension on any machine in Phase 1
- The patient must understand that walking with the brace locked is non-negotiable

Why: Patellar and quadriceps tendon repairs are at highest re-rupture risk in the first 8–10 weeks. The repaired tendon cannot withstand tensile load with the knee flexed during weight bearing. Weight bearing locked in extension protects the repair while preserving conditioning and limiting atrophy. ROM under load is the main mechanism of repair failure.

PHASE

2

Progressive Mobility and Gait Normalization

Weeks 6–12

For the patient: what to expect

At your 6-week visit Dr. Merritt clears you to start unlocking the brace, in stages, and you no longer sleep in it. You'll start the bike and light strengthening, and you can straighten your knee on your own with no resistance. **No weights or machines that push against straightening until at least 8 to 10 weeks.**

WEIGHT BEARING	Unlock the brace for walking in stages: locked → 0–30° → 0–60° → fully unlocked, over 2–6 weeks. Wean crutches as quad control and gait normalize
BRACE	Unlocked in stages for walking, following the surgeon's schedule. Only needed for walking; not for sleep, PT, or sitting
MOTION	Goal 0–120° by weeks 8–10. Active-assisted and active ROM; gentle overpressure at end-range flexion as tolerated. Keep full extension

Goals

- ROM toward 0–120° by the end of Phase 2
- Normal gait on level surfaces as the brace is unlocked
- Quad control for single-plane activity; off crutches
- Bike: partial revolutions from 90°, full at about 110°

Move on when

- ☐ ROM 0–120° by weeks 8–10
- ☐ Walking without crutches on level surfaces with acceptable gait
- ☐ Mini squat (0–30°) pain-free with good quad control
- ☐ Stationary bike 20 min without pain
- ☐ No extensor lag with SLR

Exercises

Exercise	How
NMES · BFR	At PT as needed for quad activation; taper as voluntary strength returns
Stationary bike	Rocking or partial revolutions once flexion reaches 90°; full revolutions once flexion reaches about 110°. Low resistance, 15–20 min, progressing to 30 min
Pool walking	Once the incision is fully healed; offloads the joint while allowing ROM
Active knee flexion and extension	Unresisted, 0–90° arc, from week 6
Mini squats	0–30° to start
Hip strengthening	Abduction, extension, external rotation
Calf raises	Both legs, progressing to single leg
Patellar mobilization	Continue superior and inferior glides

Precautions

- Follow the surgeon's brace-unlocking schedule; do not advance faster than directed
- No resisted knee extension (machines, weights) until 8–10 weeks at the earliest; no leg extension machine in Phase 2
- Watch for a returning extensor lag; if present, return to the brace and contact Dr. Merritt's office
- No running, jumping, or stair descent without brace clearance from the surgeon
- No aggressive passive stretching into flexion; ROM gains should be active or active-assisted

Why: The tendon-to-bone interface reaches enough strength for progressive loading at about 8–10 weeks. Controlled closed-chain loading in this period stimulates organized collagen remodeling without exceeding the repair's tensile strength.

PHASE

3

Strength Development

Weeks 12–18

For the patient: what to expect

Your tendon has healed enough for harder strengthening: deeper squats, single-leg exercises, and heavier loads. Be patient. Getting your quad strength back usually takes 4 to 6 months in total.

WEIGHT BEARING · BRACE

Full, without the brace (discontinued)

MOTION

Full, progressing to 0–130°+. Gentle stretching into terminal flexion as needed

Goals

- Full ROM (0–130°+)
- Quad strength 60–70% of the other leg
- Single-plane functional activity pain-free (step-downs, lunges)
- Independent in the home strengthening program
- Start low-impact conditioning (swimming, cycling, walking program)

Move on when

- ☐ Full ROM (0–130°+)
- ☐ Single-leg squat (0–45°) × 10 without pain
- ☐ Step-down pain-free with symmetric mechanics
- ☐ Quad strength ≥60% of the other leg
- ☐ Walking 30 min continuously without pain

Exercises

Exercise	How
Squats	0–90°, progressing to full depth; both legs, advancing to single leg
Leg press	Both legs, progressing to single leg; progressive load
Step-downs	8-inch step; eccentric quad control
Leg extension machine	Only after surgeon clearance, typically week 12 or later. Limited arc (60–90°) at first, progressing to full arc
Lunges	Reverse and forward; progress load
Hip thrust	3 × 12 with weight
Hip strengthening	Side-lying abduction and external rotation progression
Bike · elliptical	Bike with more resistance and time; elliptical pain-free
Swimming · walking	Flutter kick; no breaststroke kick until ROM is full. Walking program on a level surface; increase duration and pace

Precautions

- No running program until quad strength is ≥70% of the other leg and the surgeon has cleared it (usually around 6 months)
- Advance resisted knee extension (leg extension machine) only with explicit surgeon clearance
- Monitor for anterior knee pain or patellar tendinopathy symptoms with progressive loading
- No plyometrics, jumping, or impact activity in Phase 3

Why: Tendon repair maturation continues through 4–6 months. Progressive closed-chain loading in this period is evidence-based and safe. Open-chain resisted extension (the leg extension machine) generates peak tendon stress and needs explicit surgeon clearance before it is introduced.

PHASE

4

Advanced Strengthening and Return to Activity

Week 18 onward

For the patient: what to expect

This last phase gets you back to your full activity level. **Running usually starts around 6 months**, then impact training and sport-type movements as your strength allows. **Return to sport is usually around 9 to 12 months**. It depends on passing strength and function tests, not on time alone. Keep up your strength work even after you are back to full activity.

WEIGHT BEARING · MOTION	Full, unrestricted
RUNNING	Around 6 months, once criteria are met and the surgeon has cleared it. Walk-run intervals, progressing to continuous running over 6–8 weeks
SPORT	Around 9–12 months, after return-to-sport testing and surgeon clearance

Goals

- Quad strength 80–90% or more of the other leg
- Return to full recreational or sport activity without pain
- Symmetric hop testing and functional performance

Move on when

- ☐ Quad strength 80–90% or more of the other leg (isokinetic or functional testing)
- ☐ Hop tests ≥90% LSI
- ☐ Running 20–30 min continuously without pain
- ☐ Sport-specific movement patterns normalized
- ☐ Surgeon clearance for full return to sport

Exercises

Exercise	How
Sport-specific strength	Single-leg squat, plyometrics (both legs → single leg), cutting drills, acceleration and deceleration
Running program	Walk-run intervals progressing to full continuous running over 6–8 weeks
Plyometric progression	Double-leg jump and land → single-leg hop → reactive drills
Agility	Agility ladder and sport-specific cutting drills, if applicable
Return-to-sport testing	Single-leg hop for distance, triple hop, crossover hop
Maintenance	Continue the quad and hip strengthening program

Precautions

- Return to sport is typically 9–12 months; a time-based return without meeting the strength criteria is not appropriate
- Monitor for patellar tendinopathy symptoms during high-load training
- Contact sports need surgeon clearance in addition to the functional criteria

Why: Returning to sport before adequate tendon maturation and quad strength recovery is the main risk factor for re-rupture. Objective, criteria-based return reduces that risk.

Return to Sport

All criteria must be met before clearance.

Measure	Target
Quadriceps strength	80–90% or more of the other leg (isokinetic at 60°/sec or functional testing)
Single-leg hop	≥90% LSI
Motion	Full, pain-free ROM (0–130°+)
Running	20 min continuously without pain
Extensor lag	None with SLR
Psychological readiness	Ready to return to activity
Clearance	Formal clearance from Dr. Merritt; sport usually around 9–12 months

Functional testing

- Strength: isokinetic testing at 60°/sec, or functional testing
- Hop tests: single-leg hop for distance, triple hop, crossover hop

Typical timelines: recreational walking and cycling around 4–5 months; running around 6 months; sport around 9–12 months, depending on repair quality, quad strength recovery, and activity demands.