

YOUR ACL RECOVERY — A GUIDE TO PHYSICAL THERAPY

THE ROLE OF PHYSICAL THERAPY IN YOUR RECOVERY

Surgery repairs the ligament — physical therapy is what makes your knee work again. The two most important things we protect early on are full straightening of your knee and quad muscle strength. If you fall behind on either, it is much harder to catch up. Your therapist and I are aligned on the same goals, and this guide will help you understand what to expect at each stage.

Important: You advance through phases based on what your knee can do — not simply because a certain number of weeks have passed. Progress is guided by your pain level, swelling, strength, and motion.

YOUR RECOVERY TIMELINE

PHASE	TIMEFRAME	PT VISITS	WHAT YOU'RE WORKING ON
1	Weeks 1–6	2× per week	- Control swelling and protect the repair - Restore full straightening — the top priority - Reactivate your quad muscle - Get off crutches and walk normally
2	Weeks 6–12	1× per week + home program	- Build strength with squats, step-ups, and bike - Reach full bending (past 120°) - Balance and single-leg control - Home exercises are now your primary work
3	Months 3–6	Every 1–2 weeks	- Progressive strengthening — mostly on your own - Jogging program when cleared - Limb symmetry testing at month 3 and 6 - PT checks in to guide and advance your program
4	Months 7–9	Weekly or more as needed	- Sport-specific drills, agility, and cutting - Final strength testing — hop tests, symmetry index - PT frequency often increases to get you fully ready - Return to sport when all criteria are cleared

Questions about your PT progress? Call our office or bring them to your next appointment. We are always glad to coordinate with your therapist.

ACL RECONSTRUCTION — PHYSICAL THERAPY PROTOCOL

Patient Name: _____ **Surgeon:** Andrew L. Merritt, MD
Date of Surgery: _____ **PT Start Date:** _____

Overview & General Principles

Criterion-based protocol — patients advance when they meet the goals for each phase, not simply because a number of weeks have passed. Pain, effusion, and quadriceps control are the primary governors of progression. PT and surgeon should communicate around any setbacks or significant delays.

- Extension is the priority throughout all phases; flexion follows
- Effusion control is critical — excess swelling drives arthrogenic inhibition and slows quad recovery
- Closed kinetic chain (CKC) exercises preferred in early phases to minimize anterior tibial shear
- Blood flow restriction (BFR) training: approved and encouraged throughout recovery — especially valuable in non-weight-bearing phases (Phase 1–2) to limit quad and hamstring atrophy at low loads
- Cold compression therapy: compression cryotherapy unit preferred over ice bags for effusion management in Phases 1–2; 20 min on/off after all exercise and as needed throughout the day
- Contralateral limb: train the non-surgical leg throughout recovery — bilateral strength work improves overall outcomes and produces more accurate LSI comparisons at RTS testing
- Scheduled strength testing: Month 3 baseline LSI, Month 6 pre-RTS screening — do not wait for the patient to request return to sport before formal strength and hop testing is initiated
- Pre-operative conditioning (prehab) strongly recommended when surgery is delayed

CONCOMITANT PROCEDURE MODIFICATIONS

ACL + LET (Lateral Extra-Articular Tenodesis)

- Dr. Merritt routinely adds an LET in high-risk patients to reduce retear rate
- Standard ACL protocol applies — no significant timeline changes
- Avoid aggressive internal tibial rotation resistance exercises in Phase 1

PHASE 1 — Protection & Early Recovery (Weeks 0–2)

INFORMATION FOR THE PATIENT — What to Expect This Phase

You'll be on crutches but walking from Day 1 — this is safe and important. Your #1 job right now is getting your knee fully straight, not bending it farther. Ice constantly, keep your leg elevated, and do your quad-tightening exercises every hour. Swelling is your biggest obstacle this phase — control it aggressively. Avoid the leg extension machine. Your new ligament is fragile for the first couple months.

Goals:

- Full passive knee extension (0°) by end of Week 1
- Flexion to 90° by Week 1; 110° by Week 2

- Restore quadriceps activation — visible VMO contraction with quad set
- Normalize gait with crutches; advance weight-bearing as tolerated
- Control pain and effusion

Weight-Bearing Status:

- WBAT with bilateral crutches; advance to single crutch or cane by Week 2 if quad control allows

Range of Motion:

- Extension priority — prone lying 10–15 min 2–3×/day; heel props for passive extension
- Flexion: active-assisted ROM and heel slides; do not force beyond comfort
- Patellar mobilizations (all 4 directions) — begin Day 1

Bracing:

- Hinged brace locked at 0° for ambulation and sleep; unlocked only during supervised PT
- Advance to unlocked ambulation when quad control adequate (SLR without lag)

Exercises:

- Quad sets: isometric quad activation against rolled towel — every waking hour
- Straight leg raises: begin when SLR performed without extension lag
- Short arc quads (0°–40°): when quad control present
- BFR training: quad sets and SLR with BFR cuff — high priority if significant quad inhibition
- Hip strengthening: SLR in all 4 planes; hip abduction/adduction sidelying
- EMS / neuromuscular biofeedback: if unable to perform volitional quad activation
- Cold compression therapy: 20 min on/off after all exercise; consistent compression and elevation

Progression Milestones:

- Full passive extension (0°) achieved
- Flexion $\geq 90^\circ$
- Quad set: visible/palpable VMO contraction
- Independent ambulation on crutches with minimal pain

PRECAUTIONS — Phase 1

- No isolated OKC knee extension — anterior tibial shear is highest at the graft attachment site
- Hamstring graft: no aggressive hamstring stretching or resisted curl through Week 6
- Do not force flexion ROM — aggravates effusion and inhibits quad recovery
- No loading beyond 90° of knee flexion

Rationale: The graft is at peak mechanical weakness in Weeks 0–4 (necrotic/remodeling phase, ~10–20% of native ACL strength). Body weight loading is safe because compressive forces neutralize tibial shear; isolated quad extension does not.

PHASE 2 — Early Strengthening (Weeks 2–6)

INFORMATION FOR THE PATIENT — What to Expect This Phase

You'll drop the crutches and start building real strength this phase. Expect some soreness from squats, step-ups, and the stationary bike — that's normal. Your knee should not swell significantly after exercise; if it

does, you did too much — back off and ice. Focus on walking normally, reaching 120° of bend, and keeping swelling down. By Week 6 you should feel noticeably stronger and more stable.

Goals:

- ROM 0°–125° by Week 6
- Full weight-bearing without assistive device by Week 4–6
- Normalize gait on level surfaces
- Activate quad with functional CKC exercises
- Effusion minimal at rest

Weight-Bearing Status:

- Progress from 2 crutches → 1 crutch → FWB; most patients off crutches by Week 4–6
- Limit loaded knee flexion to 90° through Week 8

Range of Motion:

- Target: 0°–120° by Week 4; 0°–125° by Week 6
- Stationary bike (seat high) is the preferred ROM and conditioning tool

Bracing:

- Continue hinged brace for ambulation; wean when full extension, quad control, and normal gait established
- If achieved full extension, quad control and normal gait, can discontinue brace. No specific timeframe.

Exercises:

- Stationary bike: begin with 90° max flexion, low resistance; 10–20 min
- Mini squats (0°–45°) and leg press (0°–60°): bilateral, controlled
- Step-ups (4-inch): forward and lateral
- Single-leg balance: 30–60 seconds, progress to eyes closed in Phase 3
- Lateral band walks and hip strengthening
- BFR training: leg press and mini squats with BFR cuff — effective for quad hypertrophy at sub-maximal loads
- Pool walking (if available): begin Week 4

Progression Milestones:

- ROM 0°–120° without pain
- Walking without antalgic gait
- Mini squats without pain or effusion increase
- Single-leg stance 30+ seconds

PRECAUTIONS — Phase 2

- No OKC knee extension 0°–40° — anterior shear still relevant through Week 8
- Hamstring graft: no resisted hamstring curl through Week 6
- No loaded flexion beyond 90°
- No running, jumping, or pivoting

Rationale: The graft is vascularizing but remains mechanically inferior (~30% native ACL at Week 6). CKC exercises are safe due to hamstring co-contraction; OKC quad extension is not.

PHASE 3 — Intermediate Strengthening (Weeks 6–12)**INFORMATION FOR THE PATIENT — What to Expect This Phase**

This is where your knee starts feeling like a knee again. You'll work harder in the gym, stop using the brace, and tackle stairs without holding the railing. No running outdoors yet, but the elliptical and bike will push your conditioning. Full bend ($135^{\circ}+$) is the last range-of-motion goal this phase — if lingering swelling is limiting you, controlling that matters more than forcing the stretch. You should leave Phase 3 moving confidently.

Goals:

- Full ROM (0° – $135^{\circ}+$)
- Quad and hamstring strength toward 70% LSI
- Wean brace; normalize stair negotiation
- Begin neuromuscular and proprioceptive training
- Improve endurance and conditioning

Weight-Bearing Status:

- Full weight-bearing; aqua jogging if available and criteria met

Range of Motion:

- Full pain-free ROM by Week 12; persistent deficits at this stage are typically effusion-driven

Bracing:

- Discontinue brace when quad control is adequate; may continue for athlete confidence

Exercises:

- Stationary bike and elliptical (begin Week 8–10): progressive resistance and duration
- Squats: body weight to loaded; progress toward parallel
- Leg press: progressive load; expand arc beyond 60° as tolerated
- Step-ups: advance step height to 6–8 inches; add weight
- Hamstring curls: light-moderate resistance
- OKC knee extension (Week 8+): 90° – 40° arc only
- Single-leg balance: eyes-closed, perturbation, balance board
- Stair training: reciprocal pattern without rail

Progression Milestones:

- Full ROM (0° – $135^{\circ}+$)
- Stairs reciprocally without pain or compensation
- Single-leg stance 60 seconds, stable
- No effusion at rest

PRECAUTIONS — Phase 3

- No outdoor running — graft ~50% native ACL strength at Month 3
- No pivoting or lateral cutting — highest-risk load for a maturing graft
- OKC extension: 90° – 40° arc only; avoid terminal extension range

Rationale: New collagen fibers are forming but not yet organized; estimated graft strength 30–50% at Month 3. Controlled gym loading is appropriate; impact and rotational forces are not.

PHASE 4 — Advanced Strengthening & Neuromuscular Training (Months 3–6)

INFORMATION FOR THE PATIENT — What to Expect This Phase

You'll start jogging, learn to jump and land safely, and train sport-specific movements. This is also where patients most want to rush — don't. Your graft is still maturing, and returning to sport too early is the #1 risk factor for re-tearing it. Every new activity should feel controlled and confident before you increase the load or speed. Watch your swelling after each new training stimulus — it's your knee telling you it needs more time.

Goals:

- 80–90% LSI for quad and hamstring strength
- Introduce and progress plyometric training
- Initiate return-to-run program
- Begin sport-specific movement patterns
- Address psychological readiness alongside physical criteria

Weight-Bearing Status:

- Full; return-to-run program initiated when criteria met (typically Month 4–5)

Exercises:

- Heavy compound lifts: barbell squats, leg press, hip hinge
- Single-leg squats and lunges: progressive loading
- Nordic hamstring curls: eccentric emphasis
- Running mechanics screen before initiating return-to-run: assess for contralateral pelvic drop, knee valgus, and excessive forward trunk lean — address deficits before progressing running volume
- Return-to-run: walk-run intervals on flat surface once mechanics screen passed
- Double-leg plyometrics: vertical jump, broad jump, box jump — controlled landing mechanics
- Single-leg hops when double-leg testing is symmetric
- Agility: cone drills, ladder, figure-8 at increasing speed
- Sport-specific movement patterns: cutting, deceleration, change of direction

Progression Milestones:

- Running without pain, swelling, or gait deviation
- Single-leg hop for distance $\geq 70\%$ LSI
- Quad and hamstring strength $\geq 80\%$ LSI
- No effusion with running or high-demand activity

PRECAUTIONS — Phase 4

- No return to pivoting sport before RTS testing criteria are met
- Plyometrics only after adequate strength base ($\geq 70\%$ LSI) — poor landing mechanics with weak quad loads the graft and contralateral knee
- Significant post-activity swelling = volume/intensity exceeded healing tissue tolerance; reduce load
- Assess psychological readiness — fear of reinjury is a strong independent predictor of non-return to sport

Rationale: Graft strength estimated 50–70% native ACL at Months 3–6; ligamentization is active but incomplete. The highest re-tear risk period is return to sport — aggressive RTS testing is not optional.

PHASE 5 — Return to Sport (Months 6–9+)

INFORMATION FOR THE PATIENT — What to Expect This Phase

You're close — but the 9-month minimum is not negotiable. Research shows athletes who return earlier re-tear their ACL at 4× the rate of those who wait. You'll pass formal strength and hop tests before Dr. Merritt clears you. Feeling mentally ready matters as much as the physical numbers — if you're anxious about returning, tell your therapist. Keep lifting after you return to sport; a strong hamstring is your best long-term protection.

Goals:

- ≥90% LSI for quad and hamstring strength
- Pass single-leg hop test battery
- Full sport-specific movement patterns at speed
- Psychological clearance (ACL-RSI ≥ 65)
- Formal RTS clearance from Dr. Merritt

Weight-Bearing Status:

- Full unrestricted when criteria met

Exercises:

- Continue Phase 4 at progressive intensity
- Full sport-specific practice: positional drills, scrimmage, game simulation
- Strength maintenance: 2–3 sessions/week — do not drop resistance training at return to sport
- Ongoing hamstring emphasis: hamstring is the primary dynamic restraint of the ACL
- Upon RTS clearance: initiate FIFA 11+ (or equivalent neuromuscular prevention warm-up program) as part of every practice and game warm-up — strong evidence for reducing subsequent ACL injury rate

Progression Milestones:

- Quad strength ≥ 90% LSI; H:Q ratio ≥ 60%
- Single-leg hop ≥ 90% LSI; triple hop ≥ 90% LSI
- Y-balance composite ≥ 94%
- No pain, effusion, or instability with sport activity
- ACL-RSI ≥ 65

PRECAUTIONS — Return to Sport

- Minimum 9 months regardless of strength testing — time is an independent predictor of re-tear
- Athletes returning before 9 months have ~4× the re-tear rate of those returning at 9+ months
- Psychological readiness testing required — low ACL-RSI scores predict re-tear independent of physical criteria
- Hamstring graft: confirm hamstring strength recovery before clearance

Rationale: Graft ligamentization continues through 2 years. A comprehensive RTS battery — strength, functional hop testing, and psychological readiness — is the current evidence-based standard.

RETURN TO SPORT / ACTIVITY CRITERIA

Criteria for Return:

- Time: minimum 9 months from surgery
- Quadriceps strength: $\geq 90\%$ LSI (consider $\geq 100\%$ LSI for pivoting/contact sport)
- Hamstring strength: $\geq 90\%$ LSI; H:Q ratio $\geq 60\%$
- Single-leg hop: $\geq 90\%$ LSI; triple hop: $\geq 90\%$ LSI
- Y-balance composite $\geq 94\%$
- ACL-RSI psychological readiness scale ≥ 65
- No pain, effusion, or instability with high-demand activity
- Formal clearance from Dr. Merritt
- Post-clearance: begin FIFA 11+ neuromuscular prevention program at every practice/game warm-up

Functional Testing:

- Strength: isokinetic dynamometry preferred; handheld dynamometry acceptable
- Hop test battery: single hop, triple hop, crossover hop, 6-meter timed hop
- Y-balance or Star Excursion Balance Test
- ACL-RSI psychological readiness scale

Clinical Note

- LSI compares involved to uninvolved limb — the uninvolved limb is often significantly weaker than normative data, meaning LSI can overestimate function. Compare bilateral results to age-matched norms when available rather than relying solely on inter-limb comparison.

GRAFT-SPECIFIC CONSIDERATIONS

Hamstring Autograft (Semitendinosus $\pm$ Gracilis)

- Protect harvest site: no aggressive hamstring stretching, prone knee flexion, or resisted curl through Week 6
- Hamstring weakness can persist 6–12 months — emphasize hamstring strengthening throughout all phases
- Confirm hamstring strength recovery before RTS clearance — deficit is a leading re-tear risk factor

Patellar Tendon (BTB) Autograft

- Anterior knee pain and kneeling discomfort expected 6–12 months post-op — counsel patient
- Bone-to-bone healing allows slightly more aggressive early CKC progression
- Patellofemoral stress may limit step-downs and deep squats — modify per pain
- Ensure full extension is achieved — extension lag risks Cyclops lesion formation
- Common to have anterior knee pain with quad activities as the rehab increases between 4–7 months. Do not need to refer back to Dr. Merritt

Quadriceps Tendon Autograft

- Anterior thigh soreness at harvest site expected 4–6 weeks; quad activation is safe early
- Less anterior knee pain than BTB; no kneeling restriction
- Protocol progression mirrors patellar tendon graft but with often slower quad recovery. BFR is encouraged.

Surgeon Notes / Special Instructions: