

YOUR PCL RECONSTRUCTION RECOVERY A GUIDE TO PHYSICAL THERAPY

THE ROLE OF PHYSICAL THERAPY IN YOUR RECOVERY

The PCL is the strongest ligament in the knee and sits at the back of the joint. PCL reconstruction heals more slowly than ACL reconstruction because gravity constantly tries to pull the shin bone backward when you are lying down, directly loading the graft. All early range of motion is done face-down (prone) — this shifts the shin bone forward and protects the graft. Isolated hamstring exercises are also avoided for 12 weeks, because hamstring contraction is the primary force that pulls the shin bone backward.

Important: All range-of-motion exercises in early phases are done face-down (prone). No supine knee bending until Phase 3. No isolated hamstring exercises (leg curls) for 12 weeks.

YOUR RECOVERY TIMELINE

PHASE	TIMEFRAME	PT VISITS	WHAT YOU'RE WORKING ON
1	Weeks 1–4	2–3× per week	• Non-weight-bearing — strict NWB to protect the graft from backward forces • All range of motion done face-down (prone) — gravity-protective position • Quad sets and VMO activation; kneecap mobilization daily • No hamstring exercises — hamstring pulls the shin backward and stresses the graft
2	Weeks 4–8	2× per week	• Toe-touch weight-bearing begins — brace locked in extension • Continue prone range of motion; progress toward 90° bending • Quad strengthening advances — leg press and step-ups when WB allows • Patellar mobilization continues daily
3	Months 2–4	2× per week	• Full weight-bearing — wean crutches progressively • Careful hamstring introduction in closed-chain exercises • Progressive strengthening — stationary bike, step-ups, mini squats • No isolated leg curls until Week 12
4	Months 4–12+	1× per week + home program	• Return to jogging, then sport-specific training • Final strength and hop testing before clearance • Return to contact and cutting sport: minimum 12 months • Dr. Merritt confirms clearance — PCL rehab is not rushed

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

PCL RECONSTRUCTION — PHYSICAL THERAPY PROTOCOL

Patient Name: _____
Date of Surgery: _____

Surgeon: Andrew L. Merritt, MD
PT Start Date: _____

Overview & General Principles

PCL reconstruction rehabilitates more slowly than ACL reconstruction due to the graft's anatomical position, the constant posterior tibial sag force imposed by gravity, and the complexity of posterior knee stability. The central principle guiding this protocol is controlling posterior tibial translation throughout recovery. This protocol is criterion-based as well as time-based. Specific interventions should be based on individual exam findings and clinical decision making. Timeframes may vary based on additional procedures and surgeon preference.

1. **In supine, gravity drives the tibia posteriorly, directly loading the PCL graft. The brace locked in extension neutralizes this force. All early ROM is performed PRONE — prone positioning shifts the tibia anteriorly, which is graft-protective. GRAVITY IS THE ENEMY:**
2. **Hamstring contraction is the primary muscular driver of posterior tibial translation. Isolated hamstring exercises (leg curls, Nordic curls, prone hamstring curls) are prohibited through Week 12. Hamstring co-contraction in closed-chain activities is acceptable. NO HAMSTRING ISOLATION × 12 WEEKS:**
3. **Prolonged bracing and NWB create significant risk of infrapatellar contracture. Daily patellar glides in all four planes begin Day 1 and continue throughout the protocol. PATELLAR MOBILIZATION FROM DAY 1:**
4. **The PCL has limited vascular supply and heals slowly. Rushing weight bearing or ROM before graft maturation risks uncorrectable posterior instability. Follow phase timelines strictly. Return to contact/cutting sport: minimum 12 months. PCL REHAB IS SLOW:**

PHASE 1 — STRICT PROTECTION (Weeks 0–4)

Goals: Protect the graft. Minimize pain and swelling. Establish quad activation. Achieve prone knee flexion 0–90°.

5. Strict NWB — protect graft from posterior tibial loading
6. Maintain patellar mobility — daily patellar mobilization all four planes from Day 1
7. Establish quadriceps activation — quad sets with VMO contraction
8. Prone knee flexion 0–90° only — graft-protective ROM
9. Control swelling and pain with ice, elevation, and compression

Precautions:

10. **ABSOLUTE NWB × 4 weeks** — any load without brace locked in extension produces posterior tibial sag that stresses the graft
11. **NO supine knee flexion** — gravity in supine produces posterior tibial sag; all ROM is performed PRONE
12. **NO hamstring activation** — hamstring contraction causes posterior tibial translation; avoid in any form
13. **NO hyperextension** — stresses posterior capsular structures and the graft
14. **Brace locked in full extension 24 hrs/day** — remove only for supervised prone ROM exercises and hygiene

Weight-Bearing Status: Strict non-weight bearing × 4 weeks. Crutches required for all mobility. Brace locked in full extension at all times.

Range of Motion: PRONE knee flexion ONLY — progress 0–90°. In prone, gravity produces anterior tibial translation (graft-protective). In supine, gravity produces posterior tibial sag (graft-loading). Prone heel slides or gravity-assisted prone flexion, 3×10, progress toward 90° by end of Phase 1. Maintain full passive extension throughout.

Bracing: Brace locked in full extension 24 hours per day. Remove only for prone ROM exercises and hygiene.

Exercises:

15. Patellar mobilizations (superior, inferior, medial, lateral) — 2×2 min daily; begin Day 1
16. Quad sets — 3×15, every 1–2 hours; VMO activation priority
17. SLR (supine, brace locked) — 3×10
18. Prone knee flexion 0–90° (gravity-assisted) — 3×10
19. Prone extension: lie prone with leg hanging off table edge to maintain full extension
20. Ankle pumps — every hour while awake
21. Hip strengthening: sidelying abduction, prone hip extension — 3×15
22. NMES to quadriceps if significant arthrogenic muscle inhibition — 20–30 min, 2× daily
23. Ice and elevation — 20 min after exercises; hourly first week
24. Passive hamstring and calf stretch — PASSIVE ONLY, 3×30 sec

Progression Milestones — Must Meet All Before Advancing:

25. Prone knee flexion to 90° without pain
26. Full passive extension (0°) maintained
27. SLR without extensor lag
28. Quad set with visible VMO activation
29. Patellar mobility full in all four directions
30. No active inflammation (minimal swelling, no warmth)

PHASE 2 — EARLY MOBILIZATION (Weeks 4–6)

Goals: Progress passive ROM toward 90°. Advance quad strength. Maintain strict NWB and brace compliance.

31. Passive ROM progresses toward 90° in prone; carefully supported supine ROM may begin
32. Continued patellar mobility maintenance
33. Quad strength progressing — SLR without lag, short arc quads (SAQ)
34. Maintain strict NWB through Week 6

Precautions:

35. NWB strictly maintained through Week 6 — no weight bearing of any degree
36. Supine ROM only with therapist providing posterior tibial support — unsupported supine flexion causes posterior sag
37. NO hamstring isolation — continues through all of Phase 2 and Phase 3
38. Brace locked for all ambulation — remove only for supervised exercises

Weight-Bearing Status: Strict NWB continues through Week 6. Crutches for all mobility. Brace locked in extension for ambulation.

Range of Motion: Progress passive ROM toward 90° by end of Week 6. Continue prone flexion as primary method. Supported supine passive flexion with anti-sag strap under distal tibia — therapist-assisted only. Full extension must be maintained.

Bracing: Brace locked in extension for all ambulation and rest. Remove only for exercises with therapist present.

Exercises:

39. Continue patellar mobilizations — 2×2 min daily
40. Prone knee flexion — progress toward 90°, 3×15
41. Supine passive flexion with posterior tibial support strap — therapist-assisted only, 3×10
42. Short arc quads (SAQ, 0–45°) — 3×15
43. Quad sets — 3×15
44. SLR (4 planes) — 3×10
45. Hip strengthening: abduction, extension with resistance band — 3×15
46. Sidelying hip external rotation (clamshell) — 3×15
47. Hooklying transversus abdominus activation — 3×10
48. Continue NMES if quad inhibition present
49. Ice after exercises

Progression Milestones — Must Meet All Before Advancing:

50. Passive ROM to 90° or greater
51. Full passive extension maintained (0°)
52. SLR without extensor lag in all 4 planes
53. Patellar mobility full in all directions
54. No active inflammation

PHASE 3 — PROGRESSIVE WEIGHT BEARING (Weeks 6–12)

Goals: Full weight bearing without assistive device by Weeks 8–10. Normal gait. Stationary bike and closed-chain strengthening established. ROM 120°+ by Week 10, full by Week 12. Quad strength 50–60% contralateral.

Precautions:

55. Leg press limited to 0–60° initially — progress to 0–90° by Weeks 8–12 only as tolerated; do not exceed 90°
56. Mini-squats 0–45° initially — progress to 0–90° by Weeks 8–12 as quad control allows
57. No isolated hamstring exercise through Week 12
58. Advance WB only as fast as a normal gait pattern can be maintained; posterior tibial sag with gait = slow progression
59. Brace worn for all ambulation and activity through Week 12; NOT required for sleep, rest, or sedentary activity; progressively unlocked as quad control and gait normalize

Weight-Bearing Status: Begin partial WB at 25–50% body weight at Week 6. Progress to 75% at Weeks 7–8. Full WB by Weeks 8–10. Wean bilateral crutches → single crutch → no crutch as gait normalizes.

Range of Motion: Progress active and passive ROM. Target 120°+ by Week 10, full symmetric ROM by Week 12. Continue prone flexion. Supine flexion progresses with support as tolerated. Stationary bike provides safe cyclic ROM in a low posterior-sag position.

Bracing: Brace continues through Week 12 for all ambulation and activity. NOT required during sleep, rest, or sedentary activity. Progressively unlock the brace range as quad control is confirmed and pain-free walking is established. Wean at 12-week surgeon visit based on clinical stability examination.

Exercises — Weeks 6–8:

60. Wall slides 0–45° — 3×15
61. Leg press 0–60° bilateral — 3×12, light load, progress resistance
62. Mini-squats 0–45° — 3×15
63. Terminal knee extension (TKE) with resistance band — 3×15
64. Step-ups 4–6 inch — 3×10
65. Standing 4-way hip exercise: resisted flexion, extension, abduction, adduction — 3×15
66. Sidelying hip external rotation (clamshell) — 3×15
67. Bilateral calf raises — 3×15
68. Single-leg balance, firm surface with brace — 3×30 sec
69. Gait training over level ground

Exercises — Weeks 8–12 (add to above):

70. Stationary bike — foot placed forward on pedal without toe clips to minimize hamstring activation; seat height slightly higher than normal; low resistance, 10–20 min progressing to 30 min
71. Elliptical trainer — when full WB and gait normalized
72. Leg press 0–90° — progress range and resistance; do NOT exceed 90°
73. Mini-squats 0–90° — progress depth as quad control allows
74. Seated calf raises — 3×15
75. Single-leg balance: progress firm → unsteady surface, static → dynamic — 3×30–60 sec
76. Closed-chain TKE with weight machine or band — 3×15

Progression Milestones — Must Meet All Before Advancing:

77. Full WB without crutch and near-normal gait by Weeks 8–10
78. Stationary bike 30 min without pain
79. Leg press 0–90° ×12 without pain, posterior sag, or extensor lag
80. ROM approaching or equal to contralateral limb
81. Quad strength 50–60% contralateral (handheld dynamometer or isokinetic testing)
82. No effusion/swelling/pain after exercise
83. Normal gait pattern

PHASE 4 — STRENGTHENING & RETURN TO ACTIVITY (Months 3–6 | Weeks 12–24)

Goals: Brace weaned at Week 12. Full ROM. Progressive hamstring loading. Single-leg exercise progression. Aquatic conditioning established. Bilateral plyometric foundation. Quad strength $\geq 80\%$ contralateral by Month 6.

Precautions:

- 84. Introduce hamstring loading gradually — begin light RDL (Week 12–14) before leg curls (Week 14+); monitor for posterior instability symptoms with each progression
- 85. No contact or cutting sports — minimum 12 months post-operative
- 86. No running — return to running reserved for Phase 5 (Month 6+) after meeting functional strength criteria
- 87. Plyometrics bilateral only initially — bilateral plyometrics may begin Week 16+; single-leg plyometrics in Phase 5 only
- 88. No breaststroke or frog kick — swimming permitted but breaststroke applies valgus/rotational force that stresses posterior structures

Weight-Bearing Status: Full, unrestricted. Brace weaned per 12-week surgeon assessment.

Range of Motion: Full, unrestricted. Implement flexibility program for hamstrings, quadriceps, and calf.

Exercises — Strengthening:

- 89. Squats — full depth, progress load progressively
- 90. Leg press — progress beyond 90° now permitted; increase resistance
- 91. Step-ups 8 inch and eccentric step-downs — 3×10
- 92. Romanian deadlift (RDL) — introduce Week 12–14, 3×12
- 93. Leg curl (light, progress slowly) — introduce Week 14–16, 3×15
- 94. Single-leg press — begin once bilateral squat and step-up are solid
- 95. Slide board lunges: retrograde and lateral — 3×10 each direction
- 96. Lateral step-ups and lateral step-downs — 3×10
- 97. Single-leg squats — 3×10 , progress depth and load
- 98. Single-leg wall slides — 3×10
- 99. Step-ups with march — 3×10
- 100. Bridges and single-leg bridges — 3×15
- 101. Hip abductor/adductor machine, hip extension machine/roman chair — 3×15
- 102. Stationary bike at high resistance — 30 min

Exercises — Balance & Proprioception:

- 103. Lateral step-overs
- 104. Joint position sense training
- 105. Progressive single-limb balance including perturbation training
- 106. Single-leg squat with eyes closed — progress surface difficulty

Exercises — Aquatic Conditioning (introduce Month 3–4):

- 107. Pool jogging with aquatic vest or belt — excellent cardiovascular conditioning with minimal joint load
- 108. Swimming — all strokes permitted EXCEPT breaststroke and frog kick
- 109. Aquatic walking and backward walking — gait quality in gravity-reduced environment

110. Water resistance exercises for hip and quad strengthening

Exercises — Cardiovascular:

111. Treadmill walking — progress speed and incline
112. Elliptical trainer — 20–40 min, increase resistance

Exercises — Plyometric Foundation (Week 16+ only):

113. Bilateral jumps: box jumps on/off, forward broad jumps, tuck jumps — controlled landing mechanics required
114. Shuttle press: double-leg, progressing low to moderate intensity
115. Forward and backward hops over line or cone — bilateral only
Single-leg plyometrics are NOT introduced until Phase 5.

Progression Milestones — Must Meet All Before Advancing to Phase 5:

116. Full ROM equal to contralateral limb
117. Quad strength $\geq 80\%$ contralateral (handheld dynamometer or isokinetic testing)
118. Hamstring strength progressing without posterior instability symptoms
119. Single-leg squat controlled and symmetric
120. Bilateral plyometrics with proper landing mechanics and no pain/swelling
121. Treadmill walking 30–40 min without pain or giving way
122. Surgeon clearance to advance to running program

PHASE 5 — ADVANCED STRENGTHENING & RETURN TO RUNNING (Months 6–9)

Goals: Safely complete structured return-to-running program. Quad and hamstring strength $\geq 90\%$ contralateral. Single-leg plyometrics and lateral agility established. Sport-specific conditioning begins.

Precautions:

123. No running without criteria met — quad and hamstring strength must be $\geq 80\%$ contralateral before initiating any running; start on soft surfaces only
124. 10% rule — increase running mileage no more than 10% per week; do not increase pace and distance simultaneously
125. Swelling = regression — any increase in swelling or pain after a session requires stepping back one level
126. No contact or cutting sports — cutting, pivoting, and contact sports remain off-limits until Phase 6 criteria are fully met

Exercises — Continued Strengthening:

127. Continue all Phase 4 strengthening with progressive load
128. Single-leg plyometrics: progressive single-leg jump tasks, bounding run, lateral single-leg hops
129. Scissor jumps
130. Backward/forward hops over line/cone — single leg
131. Lateral jumps with sport cord

Exercises — Agility (Phase I — Anterior Progression):

- 132. Forward run
- 133. Backward run
- 134. Forward lean into a run
- 135. Forward run with 3-step deceleration
- 136. Figure 8 run
- 137. Circle run
- 138. Ladder drills

Exercises — Cardiovascular (continued):

- 139. Pool jogging with vest — continue as cross-training on non-running days
- 140. Swimming — continue (no breaststroke)
- 141. Stationary bike and elliptical — maintain cardiovascular base

Return-to-Running Program: Begin Phase I only after: quad strength $\geq 80\%$ contralateral · no effusion · normal gait · surgeon clearance.

PHASE I — Walk/Jog Intervals (Warm up walk 15 min · Cool down walk 10 min)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Week 1	W5/J1×5	W5/J1×5	W4/J2×5	W4/J2×5			
Week 2	W3/J3×5	W3/J3×5	W2/J4×5				
Week 3	W2/J4×5	W1/J5×5	W1/J5×5	Return to Run			

Key: W = Walk (minutes) · J = Jog (minutes) · ×5 = 5 repetitions of that interval. Only progress if no pain or swelling during or after the session. Runs should occur on softer surfaces during Phase I.

PHASE II — Progressive Running (Warm up walk 15 min · Cool down walk 10 min)

Week	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	20 min	20 min		20 min		25 min	
2	25 min		25 min		30 min		
3	30 min	30 min		35 min		35 min	
4	35 min		40 min		40 min		
5	40 min	45 min		45 min		45 min	
6	50 min		50 min		50 min		
7	55 min	55 min		55 min		60 min	
8	60 min		60 min				

10% rule: no more than 10% increase in mileage per week. Non-impact activity on off days. Goal is to increase mileage then pace — avoid increasing both simultaneously.

Progression Milestones — Must Meet All Before Advancing to Phase 6:

- 142. Completion of full running program (Phase I + II) without pain, swelling, or giving way

- 143. Quad strength $\geq 90\%$ contralateral (isokinetic testing preferred)
- 144. Hamstring strength $\geq 90\%$ contralateral
- 145. Hamstring:Quad ratio $\geq 66\%$
- 146. Single-leg hop testing $\geq 90\%$ limb symmetry index
- 147. KOOS-Sports subscale >90
- 148. IKDC Subjective Knee Evaluation >93
- 149. No posterior instability with any functional activity
- 150. Surgeon clearance to advance to full sport training

PHASE 6 — UNRESTRICTED RETURN TO SPORT (Months 9+)

Goals: Symmetrical performance on all sport-specific drills. Multi-plane plyometrics and agility fully integrated. Safe, graduated return to full sport participation.

Precautions:

- 151. Minimum 12 months — no contact or cutting sport before 12 months post-operative regardless of testing results
- 152. All criteria must be met — MD clearance AND all Phase 5 functional milestones must be satisfied before returning to full sport
- 153. Progressive exposure — non-contact practice → full practice → full competition; do not skip stages

Exercises — Agility Phase II (Lateral Progression):

- 154. Side shuffle
- 155. Carioca
- 156. Crossover steps
- 157. Shuttle run
- 158. Zig-zag run
- 159. Lateral ladder drills

Exercises — Agility Phase III (Multi-Planar):

- 160. Box drill
- 161. Star drill
- 162. Side shuffle with hurdles
- 163. Hard cutting and pivoting — individualized to sport demands
- 164. Sport-specific pattern work

Exercises — Plyometrics (Phases II–III):

- 165. Lateral jumps over line/cone — double and single leg
- 166. Lateral tuck jumps over cone
- 167. Box jumps with quick change of direction
- 168. 90° and 180° rotation jumps
- 169. Multi-plane plyometric combinations

Return-to-Sport Progression Sequence:

- 170. Sport-specific movement drills — non-contact individual work
- 171. Non-contact practice with teammates
- 172. Full practice including contact and cutting
- 173. Scrimmage / controlled competition
- 174. Unrestricted full competition — after surgeon sign-off

Return to Sport Criteria

All criteria below must be satisfied AND surgeon clearance must be obtained before return to cutting or contact sport. Minimum 12 months post-operative for contact and cutting sports regardless of testing.

Return-to-Sport Criterion	Required Threshold
Quadriceps Strength (LSI)	≥90% contralateral limb
Hamstring Strength (LSI)	≥90% contralateral limb
Hamstring:Quad Ratio	≥66–70%
Single-Leg Hop Testing (LSI)	≥90% contralateral limb (4-test battery)
KOOS-Sports Subscale	>90 points
IKDC Subjective Knee Evaluation	>93 points
Full Pain-Free ROM	Equal to contralateral limb
Posterior Stability	No instability with any functional activity
Minimum Time — Cutting/Contact Sports	12 months post-operative
Surgeon Clearance	Required prior to return to full sport

Clinical Timeline

- 175. Low-impact conditioning (cycling, swimming, aquatic jogging): Month 3–4
- 176. Treadmill walking program: Month 3–4
- 177. Structured return-to-running program: Month 6+ with criteria met and surgeon clearance
- 178. Running and non-cutting, non-contact sport: Month 6–9 with all Phase 5 criteria met
- 179. Cutting, pivoting, contact sports: Minimum 12 months — all criteria met AND surgeon clearance required

Note: PCL reconstruction has a longer maturation timeline than ACL reconstruction. Clinical judgment and objective testing always take precedence over timeline alone. If a clinician requires assistance in the progression of a post-operative patient, they should consult with the referring surgeon.

Surgeon Notes / Special Instructions:

