

PCL RECONSTRUCTION

Physical Therapy Protocol

PATIENT

SURGEON

Andrew L. Merritt, MD

DATE OF SURGERY

PT START DATE

For the patient

The PCL is the strongest ligament in the knee and sits at the back of the joint. It heals more slowly than an ACL, because when you lie on your back, gravity pulls your shin bone backward and stretches the new graft. That is why **early bending is done lying face-down**, which lets the shin fall forward instead. Your hamstring (the back of your thigh) also pulls the shin backward, so **no leg curls or other hamstring exercises for 12 weeks**. PCL recovery is a marathon, not a sprint.

PROTOCOL AT A GLANCE

WEIGHT BEARING	No weight at all for 6 weeks , crutches for every step. Then add weight; full by 8 to 10 weeks
BRACE	Locked straight day and night for 6 weeks . Then for walking and activity only, weaned at the 12-week visit
MOTION GOALS	Face-down bending only at first: 90° by 4 weeks. 120° or more by week 10, full by week 12
PHYSICAL THERAPY	Starts 5 to 7 days after surgery, 2 times a week at first
KEY PRECAUTIONS	No unsupported bending on your back until Phase 3. No hamstring exercises for 12 weeks . No hyperextension
RUNNING · SPORT	Running from 6 months , with criteria met. Cutting and contact sports no sooner than 12 months

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–4	2× a week	No weight, brace locked, face-down bending to 90°, quad activation
2	Weeks 4–6	2× a week	No weight, supported bending, quad strength
3	Weeks 6–12	2× a week	Add weight, off crutches, closed-chain strength
4	Months 3–6	1× a week + home program	Brace off, hamstring loading, pool, two-leg jumping
5	Months 6–9	1× a week + home program	Return to running, single-leg jumping, agility
6	Months 9+	1× a week + home program	Sport drills, testing; cutting and contact at 12 months or later

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

- **Control posterior tibial translation.** This is the central principle throughout. The protocol is criterion-based as well as time-based; interventions should follow the individual exam and clinical judgment. Timeframes may vary with additional procedures.
- **Gravity is the enemy.** In supine, gravity drives the tibia posteriorly and loads the graft. The brace locked in extension neutralizes this. All early motion is prone, which shifts the tibia anteriorly and protects the graft.
- **No hamstring isolation for 12 weeks.** Hamstring contraction is the main muscular driver of posterior tibial translation. Leg curls, Nordic curls, and prone hamstring curls are prohibited through week 12. Hamstring co-contraction in closed-chain activity is acceptable.
- **Brace off only for prone motion and hygiene.** Prone motion can be done at home or in the clinic once taught. Supported supine motion is therapist-only.
- **Patellar mobilization from day 1.** Prolonged bracing and non-weight bearing create a real risk of infrapatellar contracture. Daily glides in all 4 directions continue throughout.
- **PCL rehab is slow.** The PCL has a limited blood supply. Rushing weight bearing or motion risks uncorrectable posterior instability. Return to contact or cutting sport: minimum 12 months.
- **NMES** is provided at PT visits for significant arthrogenic muscle inhibition. No home unit is needed.
- **Cold therapy:** 20 minutes on, 20 minutes off, after exercise and as needed.

Activity timeline

LOW-IMPACT	Cycling, swimming (no breaststroke), aquatic jogging: months 3–4
TREADMILL WALKING	Months 3–4
RUNNING PROGRAM	Month 6 or later, with criteria met and surgeon clearance
NON-CONTACT SPORT	Running and non-cutting, non-contact sport: months 6–9, with Phase 5 criteria met
CUTTING · CONTACT	Minimum 12 months, with all criteria met and surgeon clearance

PHASE

1

Strict Protection

Weeks 0–4

For the patient: what to expect

No weight on your leg at all, not even a toe-touch. Use crutches for every step. Your brace stays locked straight day and night. It comes off only for face-down bending and washing. Your therapist will teach you face-down bending, and then you'll do it at home. **Never bend your knee lying on your back, and don't use your hamstring.** Work your quad often and keep your kneecap moving.

WEIGHT BEARING	Strict non-weight bearing for 6 weeks. Crutches for all mobility
BRACE	Locked in full extension 24 hours a day. Remove only for prone motion (home or clinic, once taught) and hygiene
MOTION	Prone knee flexion only, 0–90° by the end of Phase 1 (prone heel slides or gravity-assisted flexion). Full passive extension maintained

Goals

- Protect the graft from posterior tibial loading
- Prone flexion 0–90°
- Quad activation with VMO contraction
- Patellar mobility in all 4 directions
- Pain and swelling controlled

Move on when

- ☐ Prone flexion to 90° without pain
- ☐ Full passive extension (0°)
- ☐ SLR without an extension lag
- ☐ Quad set with visible VMO activation
- ☐ Full patellar mobility
- ☐ No active inflammation

Exercises

Exercise	How
Patellar mobilization	All 4 directions; 2 × 2 min daily from day 1
Quad sets	3 × 15, every 1–2 hours; VMO activation is the priority
Straight-leg raise	Supine, brace locked; 3 × 10
Prone flexion	Gravity-assisted, 0–90°; 3 × 10
Prone hang	Leg off the table edge to maintain full extension
Hip strengthening	Side-lying abduction only, or glute sets; 3 × 15
Stretching	Hamstring and calf, passive only; 3 × 30 sec
Ankle pumps	Every hour while awake
NMES · ice	NMES at PT visits if the quad is inhibited. Ice 20 min on, 20 min off

Precautions

- Absolute non-weight bearing for 6 weeks
- No supine knee flexion: gravity in supine produces posterior tibial sag; all motion is prone
- No hamstring activation in any form: it causes posterior tibial translation
- No hyperextension: it stresses the posterior capsule and the graft
- Brace locked in full extension 24 hours a day, off only for prone motion and hygiene

PHASE

2

Early Mobilization

Weeks 4–6

For the patient: what to expect

Still **no weight on your leg** through 6 weeks, and the brace stays locked straight. Keep up your face-down bending at home. Your therapist may also start bending your knee while you lie on your back, holding your shin forward with a strap. **Only do that with your therapist.** No unsupported bending on your back until Phase 3.

WEIGHT BEARING	Strict non-weight bearing through week 6. Crutches for all mobility
BRACE	Locked in extension for all walking and rest. Off only for prone motion (home or clinic) and hygiene; supported supine motion only with the therapist
MOTION	Toward 90° or more by the end of week 6. Prone flexion remains the main method. Supported supine passive flexion with an anti-sag strap under the distal tibia, therapist-assisted only

Goals

- Passive flexion 90° or more
- Quad strength progressing: SLR without lag, short-arc quads
- Patellar mobility maintained
- Strict non-weight bearing through week 6

Move on when

- ☐ Passive flexion 90° or more
- ☐ Full passive extension (0°)
- ☐ SLR without lag in all 4 planes
- ☐ Full patellar mobility
- ☐ No active inflammation

Exercises

Exercise	How
Prone flexion	Progress toward 90°; 3 × 15
Supported supine flexion	Posterior tibial support strap; therapist-assisted only; 3 × 10
Quad work	Quad sets 3 × 15. Short-arc quads (0–45°) 3 × 15. SLR 4 planes, 3 × 10
Hip strengthening	Abduction and extension with band 3 × 15. Side-lying clamshell 3 × 15
Core	Transversus abdominis activation, supine with legs straight; 3 × 10
Patellar mobilization	2 × 2 min daily
NMES · ice	NMES at PT visits if the quad is still inhibited. Ice after exercise

Precautions

- Non-weight bearing through week 6, with no weight bearing of any degree
- Supine motion only with the therapist supporting the tibia; unsupported supine flexion causes posterior sag
- No hamstring isolation through Phases 2 and 3
- Brace locked for all walking; off only for prone motion and hygiene

PHASE

3

Progressive Weight Bearing

Weeks 6–12

For the patient: what to expect

You start adding weight at 6 weeks and usually walk without crutches by 8 to 10 weeks. Wear the brace whenever you are up and walking until your 12-week visit, but not for sleep or sitting. Supported bending on your back is now OK. **Still no leg curls until 12 weeks.**

WEIGHT BEARING	25–50% at week 6, 75% at weeks 7–8, full by weeks 8–10. Wean crutches as gait normalizes
BRACE	For all walking and activity through week 12, not for sleep or rest. Unlocked progressively as quad control allows. Weaned at the 12-week visit
MOTION	120° or more by week 10, full by week 12. Prone flexion continues; supported supine flexion as tolerated

Goals

- Full weight bearing and normal gait by weeks 8–10
- Bike and closed-chain strength established
- Quad strength 50–60% of the other leg

Move on when

- ☐ Full weight bearing, near-normal gait by weeks 8–10
- ☐ Bike 30 min without pain
- ☐ Leg press 0–90° × 12 without pain, sag, or lag
- ☐ Motion near the other knee; quad 50–60%
- ☐ No swelling or pain after exercise

Exercises

Exercise	How
Wall slides · squats	Wall slides 0–45°, 3 × 15. Mini squats 0–45°, 3 × 15, progressing per the precautions
Leg press	Both legs, 0–60°, light, 3 × 12; progress range per the precautions
Step-ups · calves	4–6-inch step-ups 3 × 10. Calf raises 3 × 15; seated calf raises from week 8
Hip	Standing 4-way hip with resistance, 3 × 15. Clamshell 3 × 15
Balance · gait	Single-leg balance with brace, firm, 3 × 30 sec; from week 8 unsteady and dynamic, 3 × 30–60 sec. Gait training
Bike · elliptical	Bike from week 8: foot forward on the pedal, no toe clips, seat slightly high, low resistance, 10–20 → 30 min. Elliptical once gait is normal

Precautions

- Leg press 0–60° at first, to 0–90° by weeks 8–12 as tolerated; never past 90°
- Mini squats 0–45° at first, to 0–90° by weeks 8–12 as quad control allows
- No isolated hamstring exercise through week 12
- Advance weight bearing only as fast as a normal gait allows; posterior tibial sag with gait means slow down

PHASE

4

Strengthening and Return to Activity

Months 3–6

For the patient: what to expect

Your brace comes off at 12 weeks. Hamstring exercises start slowly, and you add single-leg strength, pool work, and two-legged jumping from about week 16. **No running yet.** Swimming is fine, but no breaststroke or frog kick.

STATUS

Full weight bearing and full motion. Brace weaned per the 12-week visit. Flexibility program for hamstrings, quads, calves

Goals

- Full motion; gradual hamstring loading
- Single-leg strength, pool conditioning, two-leg plyometrics
- Quad strength $\geq 80\%$ of the other leg by month 6

Move on when

- ☐ Full motion; quad $\geq 80\%$ of the other leg
- ☐ Hamstrings progressing, no posterior instability
- ☐ Symmetric single-leg squat
- ☐ Clean two-leg landings, no pain or swelling
- ☐ Treadmill 30–40 min, no pain or giving way
- ☐ Surgeon clearance to start running

Exercises

Exercise	How
Squats · leg press	Full-depth squats with load. Leg press past 90° now permitted
Hamstring loading	RDL from weeks 12–14, 3 × 12. Light leg curl from weeks 14–16, 3 × 15
Step · single-leg work	Step-ups (8-inch, lateral, with march), eccentric step-downs, single-leg squats, wall slides, slide-board lunges: 3 × 10. Single-leg press once squats are solid
Hip · glutes	Bridges, single-leg bridges, hip machines or Roman chair; 3 × 15
Balance	Step-overs, joint position sense, perturbation, single-leg squat eyes closed
Aquatic (months 3–4)	Pool jogging with a vest, pool walking, water resistance; swimming
Cardio	Bike, high resistance, 30 min; treadmill walking; elliptical 20–40 min
Plyometrics (week 16+)	Two legs only: box, broad, and tuck jumps; shuttle press; hops over a line

Precautions

- Hamstring loading gradually: light RDL (weeks 12–14) before leg curls (week 14+); watch for posterior instability
- No running until Phase 5 (month 6+); no contact or cutting sport before 12 months
- Plyometrics two legs only from week 16; single-leg in Phase 5 only
- No breaststroke or frog kick: valgus and rotational force stresses the posterior structures

PHASE

5

Advanced Strengthening and Return to Running

Months 6–9

For the patient: what to expect

Running starts now, once your strength is at least 80% of the other leg and your knee isn't swelling. Follow the walk-jog plan below and build up slowly. **If your knee swells or hurts after a session, step back one level.** Cutting and contact sports are still off-limits.

RUNNING	Start only with quad and hamstring strength $\geq 80\%$ of the other leg, no effusion, normal gait, and surgeon clearance. Soft surfaces first
PROGRESSION	10% rule: increase mileage no more than 10% a week. Increase distance first, then pace, never both at once

Goals

- Complete the structured return-to-running program
- Quad and hamstring strength $\geq 90\%$ of the other leg
- Single-leg plyometrics and lateral agility
- Sport-specific conditioning

Move on when

- ☐ Full running program done without pain, swelling, or giving way
- ☐ Quad and hamstring strength $\geq 90\%$ (isokinetic preferred)
- ☐ Hamstring-to-quad ratio $\geq 66\%$
- ☐ Single-leg hop testing $\geq 90\%$ LSI
- ☐ KOOS-Sports > 90 ; IKDC subjective > 93
- ☐ No posterior instability with any activity
- ☐ Surgeon clearance for full sport training

Exercises

Exercise	How
Strength	Continue the Phase 4 program with progressive load
Single-leg plyometrics	Progressive single-leg jumps, bounding run, lateral single-leg hops, scissor jumps, single-leg hops forward and backward over a line, lateral jumps with a sport cord
Agility (anterior)	Forward run, backward run, forward lean into a run, forward run with 3-step deceleration, figure-8 run, circle run, ladder drills
Cardio	Pool jogging with a vest on non-running days; swimming (no breaststroke); bike and elliptical

Return-to-running program: walk/jog intervals

Warm up with a 15 min walk; cool down with a 10 min walk. W = walk (min), J = jog (min), $\times 5 = 5$ repeats. Progress only with no pain or swelling during or after. Softer surfaces in this stage.

	Day 1	Day 2	Day 3	Day 4
Week 1	W5/J1 $\times 5$	W5/J1 $\times 5$	W4/J2 $\times 5$	W4/J2 $\times 5$
Week 2	W3/J3 $\times 5$	W3/J3 $\times 5$	W2/J4 $\times 5$	
Week 3	W2/J4 $\times 5$	W1/J5 $\times 5$	W1/J5 $\times 5$	Return to run

Return-to-running program: progressive running

Warm up with a 15 min walk; cool down with a 10 min walk. Non-impact activity on off days.

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				

Precautions

- No running until criteria are met: quad and hamstring strength $\geq 80\%$ of the other leg; soft surfaces first
- 10% rule: mileage up no more than 10% a week; don't raise pace and distance together
- Swelling means regression: more swelling or pain after a session means stepping back one level
- No cutting, pivoting, or contact sport until Phase 6 criteria are fully met

PHASE

6

Unrestricted Return to Sport

Months 9+

For the patient: what to expect

You add side-to-side and multi-direction drills and work back into your sport step by step: drills on your own, then practice, then games. **No cutting or contact sports before 12 months**, even if your testing looks great. Dr. Merritt must clear you first.

Goals

- Symmetric performance on all sport-specific drills
- Multi-plane plyometrics and agility fully integrated
- Safe, graduated return to full sport

Move on when

- ☐ All return-to-sport criteria met (next page)
- ☐ At least 12 months for cutting and contact sport
- ☐ Surgeon clearance

Exercises

Exercise	How
Agility (lateral)	Side shuffle, carioca, crossover steps, shuttle run, zig-zag run, lateral ladder drills
Agility (multi-planar)	Box drill, star drill, side shuffle with hurdles, hard cutting and pivoting individualized to the sport, sport-specific patterns
Plyometrics	Lateral jumps over a line or cone (two legs and single leg), lateral tuck jumps, box jumps with quick change of direction, 90° and 180° rotation jumps, multi-plane combinations

Return-to-sport sequence

Step	Activity
1	Sport-specific movement drills: non-contact, individual
2	Non-contact practice with teammates
3	Full practice, including contact and cutting
4	Scrimmage or controlled competition
5	Unrestricted full competition, after surgeon sign-off

Precautions

- Minimum 12 months: no contact or cutting sport before 12 months, regardless of testing
- All criteria must be met: surgeon clearance and all Phase 5 milestones before full sport
- Progressive exposure: non-contact practice → full practice → full competition; do not skip stages

Return to Sport

All criteria must be met, with surgeon clearance, before return to cutting or contact sport.

Measure	Target
Time from surgery	At least 12 months for cutting and contact sport, regardless of testing
Quadriceps strength	≥90% LSI
Hamstring strength	≥90% LSI
Hamstring-to-quad ratio	≥66–70%
Single-leg hop testing	≥90% LSI (4-test battery)
KOOS-Sports subscale	>90
IKDC subjective	>93
Motion	Full, pain-free, equal to the other knee
Posterior stability	No instability with any functional activity
Clearance	Formal clearance from Dr. Merritt

Functional testing

- Strength: isokinetic testing preferred; handheld dynamometry acceptable
- Single-leg hop battery (4 tests)
- KOOS-Sports subscale and IKDC Subjective Knee Evaluation

PCL reconstruction matures more slowly than ACL reconstruction. Clinical judgment and objective testing always take precedence over the timeline alone. If you need help with a patient's progression, please contact Dr. Merritt.