

PCL SPRAIN

Nonoperative Physical Therapy Protocol

PATIENT

PHYSICIAN

Andrew L. Merritt, MD

DATE OF REFERRAL

PT START DATE

For the patient

The PCL is the strongest ligament in the knee, and it heals better than the ACL because it has a better blood supply. **Most PCL injuries, even complete tears, do very well without surgery** with a structured rehab program. **Your quad muscle is your best protection:** a strong quad does part of the PCL's job with every step. **When you lie down, keep a pillow under your calf, not your thigh,** so gravity can't pull your shin backward and stress the healing ligament.

PROTOCOL AT A GLANCE

WEIGHT BEARING	Grade I–II: full as tolerated from day 1. Grade III: partial weight on 2 crutches for 2 weeks, then as tolerated
BRACE	Grade I: no brace needed (optional for comfort for a short time). Grade II–III: PCL brace for all walking (not locked); Grade II off by weeks 8–10, Grade III wears it for sport to week 16
MOTION GOALS	Full straightening from day 1. Bend lying face-down: 90° by week 2 (Grade III 75°); full by week 6
PHYSICAL THERAPY	2× a week for weeks 0–8, then 1× a week plus a home program
KEY PRECAUTIONS	Pillow under the calf, not the thigh. Grade II–III: no hamstring curls until weeks 8–12 (no limit for Grade I). Leg press no deeper than 90°
RETURN TO SPORT	Usually Grade I 2–4 weeks , Grade II at least 6–8 weeks , Grade III 12–16 weeks , after testing and clearance

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–4	2× a week	Grade II–III: walk in the PCL brace, no hamstring exercises. All: shin supported forward at rest; quad sets hourly
2	Weeks 4–8	2× a week	Step-ups, leg press, bike; brace weaning; balance; hamstrings only in two-leg exercises
3	Weeks 8–16+	1× a week + home program	Jogging, sport training, gradual hamstring work; testing before cutting sports

Questions about PT? Call our office or ask at your next visit. We are glad to coordinate with your therapist.

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

- **Scope.** Isolated PCL injuries (Grades I–III) without associated ligament instability, bone injury needing fixation, or failed conservative management. The PCL is well vascularized and heals far better than the ACL; most isolated injuries, including complete Grade III tears, respond well to criterion-based rehab. Reconstruction is considered if pain or functional instability persists after a full nonoperative program.
- **Gravity is the enemy: position matters.** Supine with the knee unsupported, gravity sags the tibia posteriorly and stresses the injured PCL. Always support the tibia anteriorly (pillow under the proximal tibia, not the distal femur) during rest, sleep, and all supine exercises.
- **The quadriceps are the primary stabilizer.** Quad contraction translates the tibia anteriorly, reducing posterior sag and compensating for PCL insufficiency. Aggressive quad rehabilitation is the cornerstone of this protocol: prioritize activation early and maintain it throughout.
- **Grade II–III: no isolated hamstring contraction for 8–12 weeks** (the hamstrings pull the tibia backward). No leg curls or resisted supine knee flexion early; closed-chain co-contraction is introduced gradually. **Grade I has no hamstring limits.**
- **Prone position for early ROM.** Prone knee flexion does not produce gravity-driven tibial sag and is the safest early ROM position. Avoid supine ROM with the tibia unsupported until Phase 2.
- **Dynamic PCL brace (the one fitted in clinic), Grade II–III only.** It pushes the proximal tibia forward to reduce posterior sag. Worn for all weight-bearing activity for the first 8–12 weeks, depending on grade. **Grade I needs no brace;** it is optional for comfort for a short time.
- **Grade-dependent timeline.** The phase timelines are written for more significant tears. Lower-grade injuries can progress faster, as long as each phase's milestones are met. Minimum time before sport: Grade I (mild sprain) 2–4 weeks; Grade II (moderate partial tear) at least 6–8 weeks; Grade III (complete tear) 12–16 weeks. All phase timelines are minimums; progression is criterion-based.
- **Monitor effusion.** Reduce the intensity of any exercise that reproduces effusion. Recurrent effusion causes arthrogenic muscle inhibition and delays recovery.
- **Pain rule.** Exercise pain $\leq 2/10$ that settles by the next day is acceptable. Back off if swelling increases.

PHASE

1

Acute Protection

Weeks 0–4

For the patient: what to expect

Control swelling, protect the healing PCL, and get your quad working. **You can walk right away:** gentle loading helps the PCL heal. If you have a brace (Grade II–III), it pushes your shin forward, so **wear it whenever you are on your feet**, and **no hamstring curls**. Grade I needs no brace and has no hamstring limits. Bend your knee lying face-down. In bed, pillow under your calf, not your thigh.

WEIGHT BEARING	Grade I–II: WBAT from day 1 (Grade II in the brace); crutches only if pain limits gait. Grade III: PWB, 2 crutches × 2 weeks, then WBAT once effusion resolves and the quad fires
MOTION	Prone flexion unrestricted. Supine ROM only with the therapist supporting the proximal tibia. 0–90° by the end of week 2 (Grade III 0–75°). Full passive extension from day 1; treat any loss as urgent
BRACE	Grade II–III: dynamic PCL brace (the one fitted in clinic) for all weight bearing; not locked; off for sleep and showers. Grade I: none needed, optional briefly for comfort

Goals

- Control effusion and pain
- Full passive extension equal to the other side
- Patellar mobility (prevent infrapatellar contracture)
- Quad set with VMO; SLR without extension lag
- Normal gait with the brace; prone flexion 90°

Move on when

- ☐ Effusion trace or less at rest
- ☐ Full passive extension equal to the other side
- ☐ SLR without extension lag
- ☐ Prone knee flexion ≥90°
- ☐ Normal gait pattern with the brace

Exercises

Exercise	How
Ice and elevation	Ice 20 min on, 20 min off, as needed, especially in the first week
Quad sets	3 × 15, 5-sec hold, VMO emphasis; also every waking hour
Straight-leg raise	3 × 15; no advancement until no extension lag
Short-arc quads · mini squats	Both 0–45°, 3 × 15; mini squats with bilateral support
Prone flexion · patella	Active-assisted prone flexion 3 × 10, full range as tolerated. Patellar mobilization, all directions, 2–3 min daily
Hip, ankle, calf	Side-lying hip abduction and adduction 3 × 15. Ankle pumps 3 × 20. Seated calf raises 3 × 20
Gait training	Partial weight bearing with the brace; normal heel-toe pattern

Precautions

- **Tibia supported anteriorly:** pillow or roll under the proximal tibia, not the distal femur, supine or asleep
- **Grade II–III, no isolated hamstring contraction:** no leg curls or resisted supine knee flexion
- **No unsupported supine knee flexion** (prone ROM unrestricted). **No hyperextension** past 0° (posterior capsule)
- **Grade II–III: brace for all weight-bearing activity** in this phase

PHASE

2

Progressive Loading and Strengthening

Weeks 4–8

For the patient: what to expect

Now you build strength, get full bending back, and start the bike. Grade II–III: keep the unlocked brace on for exercise and busier activities, and **still no hamstring curls**. Leg press and squats are fine: the quad does most of the work.

WEIGHT BEARING	Full; stop crutches once gait is normal with no limp
MOTION	Progress prone and supine ROM; flexion equal to the other side by week 6. Daily prone flexion. Bike from 115°, once a full revolution is possible
BRACE	Grade II–III: unlocked, for all exercise and high-demand activity; off for sitting, driving, sleeping from week 4. Grade II: wean from weeks 6–8. Grade III: full-time with activity to week 10. Grade I: no brace

Goals

- Full weight bearing, no assistive device
- Full ROM; flexion equal to the other side by week 6
- Quad strength $\geq 70\%$ LSI
- Single-limb squat without valgus collapse or trunk deviation
- Step-over-step stairs; bike without pain or effusion

Move on when

- ☐ Normal gait, no assistive device
- ☐ Full flexion equal to the other side
- ☐ No effusion with ADLs, exercise, or ≥ 20 min bike
- ☐ Single-limb squat to 60° without compensation
- ☐ Quad LSI $\geq 70\%$ (dynamometer or isokinetic)

Exercises

Exercise	How
Stationary bike	From 115° of flexion; low resistance, 20–30 min
Squats · leg press	Mini squats progressing to 0–90°, 3 × 15. Bilateral leg press 0–90°, 3 × 15
Step-ups · step-downs	Forward, lateral; 4 → 6 → 8 inch, 3 × 15. Eccentric step-downs 3 × 15
Wall slides (0–60°)	3 × 15, with isometric hold
Standing hip strengthening	Abduction and extension with band (terminal range only), 3 × 15
Balance · calf raises	Single-leg: flat → foam → perturbation, 3 × 30–60 sec. Calf raises 2 → 1 leg, 3 × 20
Mobility	Prone flexion stretch; patellar mobilization as needed; gentle passive seated hamstring stretch
Pool walking	Aquatic therapy if available; excellent low-load strengthening

Precautions

- **Grade II–III, no isolated hamstrings through weeks 8–10:** no leg curls, Nordics, or resisted knee flexion; closed-chain co-contraction OK
- **Leg press 0–90° only:** deeper flexion produces peak posterior tibial force
- **Monitor effusion:** reduce the intensity of any exercise that reproduces it
- **No rapid deceleration or pivoting** until Phase 3: high posterior shear on the tibia

PHASE

3

Advanced Strengthening and Return to Activity

Weeks 8–16+

For the patient: what to expect

Hamstring work comes back gradually, and jogging and agility begin. **Return to sport depends on strength testing**, not the calendar alone. Grade II can usually stop the brace; Grade III may keep it for sport to week 16.

MOTION	Full weight bearing. Full, symmetric ROM expected. Flexibility for quads, hamstrings, hip flexors, calf. A persisting deficit needs manual therapy and stretching before higher-demand activity
BRACE	Grade II: stop by weeks 8–10; athletic brace optional. Grade III: PCL brace for sport through week 16, then wean by symptoms and strength

Goals

- Quad LSI $\geq 85\%$; hamstring LSI $\geq 80\%$
- Single-leg squat, press, and lunge without pain or compensation
- Pain-free running with no effusion
- Agility, neuromuscular control; criteria-based return

Move on when

- ☐ Quad LSI $\geq 85\%$ (isokinetic or single-leg press)
- ☐ Hamstring LSI $\geq 80\%$
- ☐ No effusion or pain with running
- ☐ Hop LSI $\geq 90\%$ (triple hop, timed 6-meter hop)
- ☐ Y-Balance within 4 cm; physician clearance

Exercises

Exercise	How
Romanian deadlift	Light load, hip hinge; safe early hamstring loading. 3 × 12
Hamstring curls	Seated or standing (not prone) from weeks 10–12; low load, 3 × 15
Nordic hamstring curls	Week 12+, only after hamstring strength $\geq 70\%$ LSI
Single-leg strength	Leg press 0–90°, 3 × 15. Bulgarian split squat 3 × 12. Squat to 70–80°, 3 × 12
Lateral lunges · cross-overs	Lateral lunges and cross-over step-downs 3 × 12
Plyometrics	Squat and box jumps 2 × 10; then single-leg, forward, lateral hops 3 × 8
Running progression	Jog → run → acceleration, when quad LSI $\geq 85\%$
Agility	Shuffle, carioca, 45°/90° cuts once running is pain-free; then sport drills
Core	Plank progressions, rotational work, hip-knee coordination

Precautions

- **Do not rush hamstrings:** RDL and seated curls before prone or Nordic work (strain risk)
- **Not on time alone:** quad LSI $\geq 85\%$ is a hard minimum for running and sport (re-injury, arthrosis risk)
- **Medial or patellofemoral pain** (chronic laxity): modify loading and inform Dr. Merritt
- **Grade III** still unstable or short of strength criteria after Phase 3: refer to Dr. Merritt about surgery

Return to Activity Criteria

All criteria must be met before clearance for sport.

Measure	Target
Quadriceps strength	LSI $\geq$ 85% (isokinetic or single-leg press)
Hamstring strength	LSI $\geq$ 80% (isokinetic)
Hop test battery	LSI $\geq$ 90% (single hop, triple hop, timed 6-meter hop)
Y-Balance	Anterior reach asymmetry $\leq$ 4 cm
Motion	Full ROM equal to the other side
Effusion	None at rest or with functional activity
Function	Pain-free running and direction changes
Time from injury	Grade I: 2–4 weeks. Grade II: at least 6–8 weeks. Grade III: 12–16 weeks. Physician clearance for all grades

Functional testing

- Isokinetic or single-leg press testing for quadriceps; isokinetic testing for hamstrings
- Single-leg hop battery: single hop, triple hop, timed 6-meter hop
- Y-Balance test, anterior reach

If the patient completes this program with persistent pain or functional instability, refer back to Dr. Merritt for a surgical consultation: PCL reconstruction outcomes are better than continued functional instability. Long-term outlook: PCL laxity does not always correlate with functional limitation, and many patients return to high-level sport with objective laxity. However, chronically PCL-deficient knees have a significantly higher long-term rate of medial and patellofemoral arthrosis. Strength and neuromuscular control are the modifiable factors that most strongly predict good long-term outcomes.