

PATELLOFEMORAL PAIN SYNDROME

Nonoperative Physical Therapy Protocol

PATIENT

PHYSICIAN

Andrew L. Merritt, MD

DATE OF REFERRAL

PT START DATE

For the patient

Patellofemoral pain syndrome is **pain at the front of the knee**, around the kneecap. It comes from too much pressure, or pressure in the wrong place, on the joint behind the kneecap. **Weak hip muscles are a main cause:** they let the knee cave inward with each step and overload the outer side of the kneecap. Treatment combines kneecap mobilization with hip and thigh (quad) strengthening. For now, **cut back on what hurts** (deep squats, going down stairs, downhill running). This is temporary. Most people improve a lot within 6 to 12 weeks.

PROTOCOL AT A GLANCE

DIAGNOSIS · GOAL	Front-of-knee pain from kneecap overload. Unload the outer kneecap, strengthen hips and quads
ACTIVITY	Full weight. For now, cut back deep squats, stair descent, downhill running, long sitting with the knee bent
PHYSICAL THERAPY	2 times a week for 8 weeks, then 1× a week, then as needed
PAIN RULES	Aim for pain under 3/10 with daily activity. If pain above 2/10 lasts more than 24 hours, step back
PROGRESSION	Advance by the milestones: pain control, then loading and step-downs, then running and sport
RETURN TO ACTIVITY	Most improve in 6 to 12 weeks . Keep up the hip and quad program long term

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–4	2× a week	Pain control, taping, kneecap mobilization, hip strength, reduce painful activities
2	Weeks 4–8	2× a week	Quad and hip loading, step-downs, running form, orthotics if overpronation
3	Weeks 8–12+	1× a week, then as needed	Running and sport return; long-term hip and quad program

Questions about your progress? Call our office or bring them to your next appointment.

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

- **Diagnosis.** Anterior knee pain from excessive or maldistributed patellofemoral stress. Dr. Merritt emphasizes **lateral overload** (tight lateral retinaculum, weak hip stabilizers, and/or altered patellar tracking) as a central mechanism in most presentations. Conservative care is effective in the majority of patients.
- **Lateral overload.** A tight lateral retinaculum drives excessive lateral patellar compression and tilt. Manual patellar mobilization (medial glide, lateral retinacular stretching) and McConnell taping for medial correction unload the lateral facet and reduce pain.
- **VMO.** Evidence does not strongly support isolated VMO exercises over general quad strengthening. However, VMO–VL EMG timing is impaired in many patients, and biofeedback-guided quad activation may improve motor patterning in functional tasks.
- **Hip strengthening.** Robust evidence supports hip abductor and external rotator strengthening as a primary intervention. Hip weakness allows dynamic valgus and femoral internal rotation, increasing lateral patellar load; hip-focused programs often give faster and more durable relief than quad-only programs.
- **Orthotics.** Foot overpronation may increase internal tibial rotation and lateral patellar stress. Consider orthotics when pronation is clinically significant.
- **Activity modification.** Reduce or temporarily stop activities that load the patellofemoral joint in a painful arc (deep squats, stair descent, downhill running). Identify and correct training errors (volume, frequency, surface).
- **Pain rules.** Phase 1 target: pain <3/10 with daily activities; no loaded flexion past 90° until pain is consistently <3/10. Advance running only if walking and step-downs are <2/10. Pain >2/10 lasting more than 24 hours after a session: regress.
- **Ice** after activity for pain control, 20 min on, 20 min off.

PHASE

1

Pain Control and Baseline Activation

Weeks 0–4

For the patient: what to expect

The focus is calming your knee pain and waking up the muscles around your kneecap. Cut back on what bothers your knee and start the hip and thigh exercises. Most people notice real pain relief within 3 to 4 weeks.

WEIGHT BEARING	Full as tolerated. Until pain-free, avoid deep flexion >90°, stair descent, downhill running, and long sitting with the knee bent
MOTION	Full as tolerated. Avoid painful arcs (usually deep flexion >90° and loading in terminal extension)
TAPING · SLEEVE	McConnell taping (medial glide and tilt correction) or a patellar sleeve to reduce lateral loading and give feedback. Reassess each visit; continue only if it consistently reduces pain

Goals

- Anterior knee pain <3/10 with daily activities
- Lateral overload corrected with taping and mobilization
- Quad/VMO activation and hip abductor/external rotator strengthening started
- Understands activity modification

Move on when

- ☐ Pain <3/10 with walking, stair ascent, and sit-to-stand
- ☐ Straight-leg raise without an extensor lag
- ☐ Tolerates 20 min of the daily exercise program without a pain flare

Exercises

Exercise	How
Quad sets	With VMO biofeedback; seated towel-roll quad compression sets
Straight-leg raises, 4-way · clamshells	SLR flexion, abduction, extension; clamshells 3 × 15–20
Side-lying hip abduction · bridges	Each 3 × 15
Stretches	Hamstring and IT band / lateral retinacular, each 3 × 30 sec
Stationary bike · ice	Low resistance if pain-free, seat a little high · ice after activity, 20 min on, 20 min off
Patellar mobilization	Medial glide and tilt correction, superior and inferior glides; lateral retinacular soft tissue as needed

Precautions

- Avoid loaded knee flexion >90° until pain is consistently <3/10
- No deep squats, lunges past parallel, or heavy stair descent at first
- Do not force patellar mobilization; the medial glide should be pain-free
- Avoid running on hills or cambered surfaces in the acute phase
- Stop McConnell taping if a skin reaction develops

Why: Early loading in provocative arcs perpetuates the lateral compression cycle. Controlled activation with unloaded exercises lets muscle patterning improve without aggravating the patellofemoral joint.

PHASE

2

Progressive Loading and Patellar Tracking

Weeks 4–8

For the patient: what to expect

Your knee is ready for more load: controlled squats, step-downs, and more hip work. Stronger hip and thigh muscles help your kneecap track better. By the end of this phase most people walk and do daily activities without much pain.

WEIGHT BEARING	Full. Advance activity as pain allows
MOTION	Full, pain-free. Progress loading in knee flexion gradually
TAPING · SLEEVE	Wean taping and sleeve as symptoms allow; may continue if taping consistently relieves pain during exercise

Goals

- Pain-free squats to 60° and step-downs
- Hip abductor/external rotator strength symmetric
- Better control in squat and lunge patterns
- Taping weaned; flat walking and light cycling pain-free

Move on when

- ☐ Step-down (8-inch box) without pain or pelvic drop
- ☐ Single-leg mini squat (0–45°) × 10 without pain
- ☐ Quad strength ≥80% of the other side on manual muscle testing
- ☐ Pain <2/10 with stair descent and moderate-distance walking

Exercises

Exercise	How
Mini squats · wall slides · step-downs	0–60°, progressing to 0–90° as tolerated; forward and lateral step-downs for eccentric quad control
Bulgarian split squats	Limited range; progress depth as tolerated
Hip strength	Lateral band walks 3 × 20 steps each way; single-leg bridges 3 × 12–15; machine or band abduction and external rotation
VMO biofeedback	During the functional squat pattern
Stationary bike · elliptical	Bike to 30–45 min at moderate resistance; elliptical if pain-free
Patellar self-mobilization · running form	Medial glide as home program; correct running form; foot orthotics if overpronation contributes

Precautions

- No deep squats past 90° until step-down mechanics are normal
- Watch for trunk lean or dynamic knee valgus during step-downs; cue correction
- Advance running only if walking and step-downs are pain-free (<2/10)
- No plyometrics or running programs until the criteria to start Phase 3 are met

Why: Returning to impact before patellar tracking and hip strength are normal is a leading cause of recurrence. Step-down mechanics are a reliable clinical proxy for dynamic valgus and lateral patellar overload.

PHASE

3

Functional Strengthening and Return to Activity

Weeks 8–12+

For the patient: what to expect

This phase gets you back to your full activity level. You will progress to harder single-leg exercises, add light impact, and start training for your sport or activity. By the end, most people are back to their regular fitness routine with little or no knee pain. **Keep up your hip and thigh exercises afterward:** the pain is most likely to come back in the first 6 to 12 months.

WEIGHT BEARING	Full, no restrictions
MOTION	Full, unrestricted
RUNNING	Walk-run intervals on a flat surface, progressed over 4–6 weeks

Goals

- Full sport or recreational activity without pain
- Symmetric quad and hip strength on functional testing
- Normal running mechanics and activity-specific movement patterns
- Independent with a long-term home maintenance program

Move on when

- ☐ Single-leg squat × 15 without pain or dynamic valgus
- ☐ Single-leg hop for distance ≥90% limb symmetry index
- ☐ Running 20 min continuously on a flat surface without pain
- ☐ Return to full activity with pain <1/10

Exercises

Exercise	How
Single-leg squats	0–60°, 3 × 12–15; focus on pelvic stability and knee tracking
Reverse and forward lunges	Full range if pain-free
Single-leg leg press	Progress load
Step-down progressions	Increase box height, add load
Lateral step-ups	Progress as tolerated
Weighted hip thrusts	3 × 12
Running program	Walk-run intervals on a flat surface; progress over 4–6 weeks
Plyometrics	Two-leg landing → single-leg landing, if relevant to the sport
Sport-specific drills	Agility, cutting, and deceleration as indicated
Maintenance mobility	Patellar self-mobilization and lateral retinacular stretching

Precautions

- Watch for pain flares when plyometrics start; regress if pain >2/10 lasts more than 24 hours
- Avoid high-volume impact training on back-to-back days at first
- Recurrence risk is highest in the first 6–12 months; continue the hip and quad maintenance program

Why: Patellofemoral pain recurs often when athletes return to full training without adequate hip and quad strength. A long-term home maintenance program for the hip abductors, external rotators, and VMO activation is recommended.

Return to Full Activity Criteria

All criteria met, with pain no higher than 1/10.

- Pain $\leq 1/10$ with all functional activities, including running and stair descent
- Single-leg squat $\times 15$ without pain or dynamic knee valgus
- Single-leg hop test $\geq 90\%$ limb symmetry index (sport-specific patients)
- Hip abductor and external rotator strength symmetric with the other side
- Independent with the home maintenance program
- No pain with a 20-min continuous run on a flat surface

Most patients improve significantly within 6–12 weeks. If pain persists despite a full program, the patient returns to Dr. Merritt, who discusses further options at the visit.