Pediatric Rehabilitation for Patellofemoral Pain Syndrome

This guideline is intended to provide the clinician with a guideline of the non-operative course of care for Patellofemoral Pain Syndrome for the pediatric/adolescent patient. Specific intervention should be based on the needs of the individual and should consider exam findings and clinical decision making. The timeframes for expected outcomes contained within this guideline may vary. If a clinician requires assistance in the progression of a patient, they should consult with the referring provider.

The interventions included within this protocol are not intended to be an inclusive list. Therapeutic interventions should be included and modified based on the progress of the patient and under the discretion of the clinician.

Patellofemoral Pain Syndrome (PFPS) is a general category of anterior knee pain that is characterized as pain behind or around the patella, as a result of patella malalignment, altered patellofemoral (PF) joint forces and/or repetitive stress to the area. This condition is also known as Runner's Knee, chondromalacia patella, retropatellar pain syndrome, anterior knee pain syndrome, patellar malalignment, and patellofemoral arthralgia. Patellofemoral syndrome can have a collection of signs and symptoms which may encompass body regions throughout the kinetic chain, from the lumbar spine to the feet.

Considerations for the Pediatric/Adolescent Patient:

Children are not small adults! Children have different psychological and physiological needs than adults. These needs should be considered when designing any rehabilitation program. Rehabilitation timeframes may be protracted by these factors and often will require modification/adaptation to the individual patient.

Diagnosis Considerations	• Pain: typically reported anywhere circumferential to the anterior knee or retropatellar region. Common Aggravating Factors: prolonged sitting, squatting, climbing/descending stairs, running, and jumping. • Increased tibiofemoral varum/valgum or tibial varum: normal subjects with hypermobility exhibit larger Q angles than normal subjects with normal mobility. Patients with greater amounts of medial rotation of the femur with respect to the tibia, typically produce larger amounts of contact area at the patellofemoral joint. • Foot position/footwear. Excessive or late pronation during gait can increase tibial internal rotation, thus altering patellofemoral forces. • Higher-level activities which include landing with excessive hip internal rotation and/or knee valgus may contribute to abnormal PF joint loading. • Strength deficits (including balance and eccentric control) may be noticeable throughout the lower extremity and lumbopelvic region. • Special tests: Vastus Medialis Coordination Test, Patellar Apprehension Test, Clarke's Test, Eccentric Step Test, McConnell's Test, Patellar Tilt Test, Tibial Angulation Test, single leg squat	
Differential Diagnosis	• Articular cartilage injury • Bone tumor • Chondromalacia patella • Referred pain from low back or hip • Hoffa's Disease • Iliotibial Band Friction Syndrome • Inflammatory joint disease • Loose Bodies • Meniscal pathology	• Osgood-Schlatter disease • Osteochondritis dissecans • Patellar stress fracture • Patellofemoral arthritis • Pes Anserine Bursitis • Prepatellar Bursitis • Quadriceps/Patellar tendinopathy • Sinding-Larsen-Johansson Syndrome • Symptomatic Bipartite Patella

	• Neuromas	

PHASE I: IMMEDIATE/ACUTE (0-2 WEEKS)

Rehabilitation Goals	• Reduce any swelling, minimize pain
	• Restore patellar, lower extremity mobility (including hip and ankle)
	• Restore tolerance to full motion
	• Minimize arthrogenic muscle inhibition and re-establish quadriceps~~/hip control~~
	• Patient education
	  ○ Minimize aggravating factors as much as possible, such as descending stairs, prolonged sitting, running, jumping
	  ○ Body weight management
	  ○ Biomechanics thought to contribute to relative overload of patellofemoral joint
	  ○ ~~Initial~~ self-symptom management and joint protection
	  ○ ~~Independent with initial home exercise program~~

Interventions	*Manual interventions*
	• Soft Tissue Mobilization
	• Patellar Taping (McConnell/Kinesiotaping)
	• Patella Mobilizations
	• Stretching
	
	Range of Motion/Mobility:
	• Stationary Biking for tolerable mobility (minimal resistance)
	• Stretching/Foam Rolling
	  ○ Hip flexors
	  ○ Hamstrings
	  ○ Quadriceps
	  ○ Iliotibial Band
	  ○ Adductors
	  ○ Hip Extensors/Rotators
	  ○ Gastroc-soleus Complex
	
	Strengthening
	• Quadriceps isometrics at 0, 45, and 90 degrees of flexion
	• Straight leg raise
	• Bridge/Unilateral Bridge
	• Sidelying Clamshell
	• Sidelying Hip Abduction
	• ~~Standing Hip Abduction~~
	• Core/lumbopelvic stabilization: transverse abdominus isometrics, multifidus lifts, front/side planks
	
	Pre-fabricated foot orthoses for those with greater than normal pronation (only up to 6 weeks)

Criteria to Progress	• Full Knee motion, equal to uninvolved side • Appropriate quad contraction with superior patella glide and full active extension • Able to perform straight leg raise without quad lag or pain • Full tolerance to weightbearing with relative knee extension

PHASE II: INTERMEDIATE/SUB-ACUTE (2-4 WEEKS)

Rehabilitation Goals	• Progress to closed-chain/weightbearing activities without loading of knee flexion • Maintain full ROM • ~~Tolerance to closed chain strengthening without loading of knee joint in flexion~~

	• Independent with progressed home exercise program and daily activities
Additional Interventions *Continue with Phase 1 interventions as indicated	*Strengthening* • Terminal Knee Extension • Sumo walks • Monster walks • 4-way hip drills • Calf Raises *Balance/Proprioception* • Single-leg stance • Clock taps • Ball toss *Correction of movement abnormalities with functional tasks*
Criteria to Progress	• Tolerance to weightbearing activities • Maintenance of full ROM • Normalize muscle length or achieve muscle length goals

PHASE III: LATE/CHRONIC (4-6 WEEKS)

Rehabilitation Goals	• Maintain full ROM • Promote proper movement patterns • Avoid post exercise pain/swelling • Achieve all muscle strength goals • Negotiating stairs unlimited • Full tolerance to closed chain knee joint loading with flexion, with appropriate eccentric control • Achieve daily/functional goals
Additional Interventions **Continue with Phase I-II interventions as indicated*	*Strengthening* • Partial bilateral mini squat, squat to chair, wall slide, single leg squat • 3-way reach • Lunge, reverse lunge, lateral lunge • Step ups, Step downs, Decline Step downs • Leg press • Lateral Step down

Criteria for Discharge	• 10 repetitions of single leg squat with proper form through at least 60 degrees knee flexion
	• Drop vertical jump with good control
	• KOOS-sports
	• Functional Assessment
	  ○ Quadriceps index >80%; HHD or isokinetic testing 60d/s
	  ○ Hamstrings ≥80%; HHD or isokinetic testing 60 d/s
	  ○ Glut med, glut max index ≥80% HHD

PHASE IV: RETURN TO SPORT (6-12 WEEKS)

Rehabilitation Goals	• ~~Safely~~ progress strengthening • ~~Safely~~ initiate sport specific training program • Avoid post exercise pain/swelling
Additional Interventions **Continue with Phase I-III interventions as indicated*	*Interval Running Program* • Retraining strike pattern, increasing cadence, or cueing to decrease hip adduction while running • Return to Running Program

	Progress to plyometric and agility program • Agility and Plyometric Program *Sport-Specific Program*

Criteria for Discharge	• Independent self-management of symptoms
	• Demonstrate appropriate understanding of condition and maintenance to prevent risk of recurrence
	• Completion jog/run program without pain/effusion / swelling
	• Functional Assessment
	  ○ Quadriceps index ≥ 95%; HHD or isokinetic testing 60d/s
	  ○ Hamstring/Quad ratio ≥ 66%
	  ○ Hop Testing ≥90% compared to contra lateral side, demonstrating good landing mechanics

Contact	Please email MGHSportsPhysicalTherapy@partners.org with questions specific to this protocol

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