

Knee: Patellofemoral Pain Syndrome, Chondromalacia Patella

Diagnosis/Condition:	Chondromalacia of the patella Patellofemoral pain syndrome Anterior knee pain Runner's knee Patellar misalignment syndrome
Discipline:	DC
ICD-10 Codes:	M22.40
Origination Date:	1996
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Next Review Date:	07/2025

Knee pain around the patella is inconsistently referred to as patellofemoral pain syndrome (PFPS), anterior knee pain, or runner's knee. PFPS has been defined as self-reported pain around or behind the patella that is aggravated by activities that loads the joint, e.g., squats, stairs, running or jumping.^{1,2} Incidence is over 20% in the general population and just under 30% in adolescence.³ It is the most common injury in running and jumping athletes.

Chondromalacia patella is often used to describe this condition as well, but this term refers specifically to the anatomical appearance of the patellofemoral cartilage, which is actual fraying and damage to the underlying patellar cartilage and is a pathologic diagnosis.⁴ The relationship between the appearance of deranged cartilage of chondromalacia patella and symptoms of PFPS is questionable.⁵

The classical presentation of patients with patellofemoral pain syndrome is anterior knee pain that typically occurs with activity and often worsens when going up or down steps or hills. It can also be triggered by prolonged sitting with knees bent.⁶ One or both knees can be affected. It is an overuse disorder and is the most common cause of knee pain seen by primary care providers.⁷ It is often seen in athletes, most often in runners. There is a higher incidence in women.^{8,9} While formerly characterized as a condition affecting adolescent and younger patients, recent epidemiological studies have documented increasing incidence with increased age highest among patients in their 60's.¹⁰

Consensus is lacking regarding the cause of the syndrome. PFPS is thought to be due to abnormal forces across the patella due to one or more of: a tracking disorder of the patella in the femoral groove, muscular imbalance in the quadriceps, abnormal patellar anatomy, altered foot

or ankle biomechanics, an increased Q angle, and abnormal development of the femoral condyles.^{6,11} These can occur due to trauma, joint overload, overuse, or misalignment.¹² The onset in athletes often follows a change in training regimens, running surface, or footwear.

Subjective Findings and History

- History of knee injury (e.g., fracture, dislocation), overuse, overload, or insidious onset.
- Onset after increase in physical activity.¹³
- History of anterior knee pain, classically worse after prolonged sitting (movie-goer's sign).
- Limited ROM, associated crepitus.
- Aggravated by ascending and descending stairs, work, squatting, or running.
- Pain, stiffness, catching, locking of knee.
- May be associated with pes planus, pes cavus, increased Q-angle, muscular imbalance.

Objective Findings

The reliability of individual physical examination findings in PFPS is limited as it is a multifactorial condition.¹⁴ However clusters of test findings and situational phenomena (i.e., the clinical history) are more diagnostic.¹⁵

- Pain or crepitation during squatting (Waldron test) or on palpation.
- Provocative maneuvers with muscular contractions (patellar apprehension).
- Static biomechanical abnormalities including: leg length discrepancy, hamstring tightness, abnormal patellar mobility, hallux valgus, abnormal foot morphology.
- Dynamic biomechanical abnormalities including muscle weakness or imbalance, knee abduction impulses, hip weakness on adduction, excessive foot pronation, insufficient foot pronation.
- Other findings described include limited motion, effusion, catching and/or locking.
- Evaluate the entire kinetic chain (core strength, hip, knee, ankle, foot) and spine for weakness and joint dysfunction.
- Special orthopedic tests: patellar tendon palpation, patellofemoral compression test, patella facet/retinaculum tenderness, patellar glide, apprehension test, popliteal angle, evaluation for dynamic misalignment, patellar grind, medial plica, Q angle test.
- Thorough bilateral knee exam (observation strength, palpation, and ROM) to rule out other sources of pain.
- A thorough examination for diagnosing this condition can be found at: American Family Physician. Persistent anterior knee pain.
- Diagnostic imaging is generally not helpful in the diagnosis of PFPS. Imaging may be helpful to rule out osteochondritis dissecans, infection or neoplasm. In general, six weeks of no improvement is a reasonable period to wait before ordering plain-film radiographs. X-rays may be positive for joint space narrowing/osteophytic changes. X-ray may show irregular patellar surface.
- Advanced imaging (magnetic resonance imaging (MRI), computed tomography (CT), musculoskeletal ultrasound (MSK US), and radionuclide scanning) is not indicated in

the initial evaluation but may be considered in patients who do not improve to rule out other pathology.

Assessment

- Rule out “red flags” of serious diseases (infection, tumor, inflammatory arthritis).
- Rule out non-local causes of pain (e.g., referred back pain).
- The clinical impression should indicate the specific anatomical structures involved and clinically correlate with any mechanism of injury, the history, subjective complaints, and objective findings.
- The Ottawa Knee Rule provides guidance for appropriate use of imaging.¹⁶ Radiographs may be warranted if the patient's symptoms fail to improve after one to two months of appropriate conservative therapy.

Plan

PFPS is perhaps best thought of as a multi-factorial condition with a number of potential causes. Treatment strategies for PFPS calls for an individually tailored multimodal approach; immediate pain relief should be a priority to gain patient trust; patient empowerment by emphasizing active over passive interventions; and patient education and activity modification are essential.¹⁷

Passive Care:

- Multimodal physiotherapy modalities.¹⁸
- Randomized controlled trials suggest that incorporating hip and core strengthening (HIP) with knee-focused rehabilitation (KNEE) improves PFPS outcomes.^{19,20}
- There is only limited evidence for the effectiveness of NSAIDs for short term pain reduction in PFPS.²¹
- There is limited evidence to support the use of intraarticular injection of corticosteroid or glycosaminoglycan polysulfate (GAGPS).²¹ New studies suggest injection of Botulinum toxin A is effective.^{22,23}
- Nutritional supplementation for inflammation.
- Patellar strap, knee orthoses²⁴, kinesio taping.^{25,26,27,28,29,30,31}
- Lower extremity and spinal manipulation to correct joint dysfunction, manual therapy.^{26,32,33}
- Foot orthotics or insoles.^{26,28,34}
- Myofascial release.³⁵
- Acupuncture.^{26,36,37}

Active Care:

- Open or closed chain exercises to improve strength, ranges of motion, and function.^{38,39}
- Proprioceptive neuromuscular facilitation stretching and strengthening exercises for the hip external rotator and abductor muscles and knee extensor muscles.⁴⁰
- Training in proper mechanics of joint protection and exercise therapy.^{26,28,41,42}

- Activities/work restrictions: Limit activity depending upon diagnosis, degree of symptoms, and type of daily activities.
- Biofeedback.⁴³
- Transcutaneous Electrical Nerve Stimulation (TENS).⁴⁴
- Exercise combined with whole body vibration.⁴⁵
- Nutritional supplementation (Vitamin C, manganese, magnesium, calcium, glucosamine sulfate, chondroitin, methylsulfonylmethane, bromelain and essential fatty acids).
- Botanical supplementation to reduce inflammation (*Curcuma longa* (turmeric), *Capsicum annuum* (cayenne), *Arnica montana* (arnica), *Ruta graveolens* (rue), *Hypericum perforatum* (St. John's wort), and *Gaultheria procumbens* (wintergreen)).
- Topical treatments (e.g., comfrey poultice, hypericum, arnica, wintergreen).

Outcomes Assessment Tools

- Pain scale (VAS, NRS, etc.).
- Anterior Knee Pain Scale (Kujala Patellofemoral Score).⁴⁶

Referral Criteria

- Referral may be considered if no progress after one month, intra-articular loose bodies are present, and/or progressive loss of range of motion or strength.
- Referral to physical therapy if not available in your clinic.

Resources for Clinicians

Crossley KM, Van middelkoop M, Callaghan MJ, Collins NJ, Rathleff MS, Barton CJ. 2016 Patellofemoral pain consensus statement from the 4th International Patellofemoral Pain Research Retreat, Manchester. Part 2: recommended physical interventions (exercise, taping, bracing, foot orthoses and combined interventions). *Br J Sports Med*. 2016;50(14):844-52.

Dutton RA, Khadavi MJ, Fredericson M. Patellofemoral Pain. *Phys Med Rehabil Clin N Am*. 2016;27(1):31-52.

Resources for Patients

MayoClinic.com. Chondromalacia patella. <http://www.mayoclinic.com/health/chondromalacia-patella/DS00777>

Medline Plus. Chondromalacia patella. <http://www.nlm.nih.gov/medlineplus/ency/article/000452.htm>

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¹⁵ Cook C, Hegedus E, Hawkins R, Scovell F, Wyland D. Diagnostic accuracy and association to disability of clinical test findings associated with patellofemoral pain syndrome. *Physiother Can*. 2010 Winter;62(1):17-24.

¹⁶ http://www.ohri.ca/emerg/cdr/docs/cdr_knee_card.pdf

¹⁷ Harrison W. The Best Practice Guide to Conservative Management of Patellofemoral Pain. 2015 Phisiospot. <https://www.physiospot.com/research/the-best-practice-guide-to-conservative-management-of-patellofemoral-pain/>

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