

A Practical Guide to Understanding and Treating Patellofemoral Pain

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Abstract

There is no shortcut to accurate diagnosis in the patellofemoral pain patient. Most important in the process is a desire and ability to specifically identify the structural and biomechanical origin of pain. This can be elusive and often requires a careful analysis of all factors affecting the patient, including documenting his or her specific history of pain origin and specific treatments to date, and acknowledging the patient's localization of the pain origin. Many patients can pinpoint the site of pain origin when given the time and encouragement to do so. Of all sources of anterior knee pain, intractable pain related to diffuse patella articular cartilage deficiency can be most troublesome, particularly in a young person. Rest and removal of inciting causes of pain must always be the first option. Surgery is usually unnecessary, but may be extremely helpful in recalcitrant cases. Releasing excessively tight, painful contracture, removing unstable fragments and impinging synovial tissue, and sometimes permanently unloading a well-documented painful distal or lateral articular lesion by anteromedial tibial tubercle transfer will eliminate resistant pain in even the most resistant anterior knee pain patient.

Anterior knee pain is common (AKP), particularly in young females. Understanding the biomechanics of a rapidly growing young female knee, whose pelvis is relatively wider than her male counterpart, helps greatly in understanding origins of AKP.¹

Compared with males of similar weight and size, females often walk and run with increased valgus at the knee and internal rotation of the hip on heel strike. The patella contacts the lateral edge of the trochlea with more focal load on the distal lateral patella for a longer time in a female than in a male of similar stature because of the increased lateral force vector. Add the rigors of athletics, excessive body weight, use of high heels, or a predisposing structural anomaly, and painful focal overload can develop—resulting in pain on stairs, inability to run, and a visit to your office. Some male patients also develop AKP, often related to patellofemoral dysplasia or activity-related overload leading to a similar pattern and need for care. Fortunately, most young patients improve when they reduce physical activity, attain stable musculoskeletal maturity, or both.

In addition to focal articular overload occurring, retinacular structures about the anterior knee can be stressed by the structural imbalance resulting from the excessive and sudden internal rotation of the hip that occurs even during normal gait and often is related to female lower extremity function. Small nerve damage in the stressed retinaculum is an important cause of peripatellar pain² and is best identified by clinical examination. Additionally, the infrapatellar fat pad may become pinched, causing synovial inflammation.

With these patients, reassurance can go a long way, and resting, taping, bracing, and anti-inflammatory medications are helpful. Dye³ has emphasized non-

Take-Home Points

- Anterior knee pain is common, particularly in young females.
- For most patients, activity modification and rest will control the pain; continuing to engage in painful activity only prolongs symptoms.
- In physical therapy, core stability, weight loss, and hip strengthening are essential.
- Surgery is required only in a very small subset of patients with anterior knee pain.
- Traumatic and overload-related chondral defects that have resisted a reasonable amount of conservative (nonoperative) treatment may be arthroscopically assessed and treated when documented to cause persistent pain.

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operative treatment and allowing patients to re-establish homeostatic balance of the patellofemoral joint. Establishing normal body weight plays a key role in the process, and focusing on lower extremity core stability, starting with increased strength in the hip external rotators, is important.⁴ In the majority of patients, these measures are all that is needed.

Traumatic Anterior Knee Pain

Direct trauma to the anterior knee causes an entirely different sort of pain. Knee pain may be retinacular, neuronal, synovial, bony, or articular. Nothing replaces careful, detailed clinical history taking and physical examination in determining the source of this pain. Much AKP, particularly in its early stages, is very focal. A specific injection of an anesthetic into a suspected retinacular pain location may solve the diagnostic dilemma. With many patients, paying attention to the specific degree of knee flexion in which the injury occurred helps in localizing the lesion. A flexed-knee impact injury (dashboard or fall directly onto anterior knee) is a common cause of articular damage on the mid or proximal patella and distal medial femoral condyle. Identifying this cause is particularly important in worker's compensation cases, as the pattern is diagnostic of a direct blow to the knee and may confirm the patient's history.

Treating painful patellofemoral lesions related to direct trauma can be difficult. Once they are identified and correlated with the physical examination and magnetic resonance imaging (MRI) findings, a treatment plan can be developed.

Examination, Testing, Imaging

Knowing how AKP started is important. Asking a patient to point to the origin of pain is essential. A pain diagram (having the patient draw a picture of the pain location) is also very helpful.⁵ Spontaneous onset suggests an underlying structural and/or functional problem rather than a traumatic event. Examination should include palpation of all structures and the retinaculum about the knee; careful appraisal of patella tracking, location of pain, and crepitus (angle of knee flexion), and evidence of possible pain referred from the back or hip; gait analysis for functional aberrations; assessment of patellar mobility; and standard radiographs, including a perfect lateral radiograph and a knee-flexion axial radiograph of no more than 30° to 45°. Computed tomography, radionuclide scintigraphy,³ and MRI can be very useful in select patients, but such imaging generally is not neces-

sary in the management of routine AKP. However, these studies can be extremely helpful in patients with resistant pain.

Resistant Anterior Knee Pain

When nonoperative measures (rest, bracing, taping, physical therapy, activity modification) fail to relieve pain, more aggressive treatment may be warranted. The clinician must take extra time to listen to the patient, look for the precise source of the pain, and address it directly. Treatment depends on the specific source of pain. A chronically painful retinacular lesion or neuroma usually responds to release of the painful segment. After a retinacular source of pain has been identified and temporarily eliminated with injection of a local anesthetic, the pain source can be accurately resected and the patient quickly cured. When the chronically painful locus is an injured fat pad, resection provides complete relief.

For most orthopedic surgeons, the greatest dilemma is how to address a young person's persistent pain in the setting of minimal objective evidence. In my experience with hundreds of arthroscopies, distinct distal lateral patella articular softening is common. In some cases, the degree of articular softening can be extreme, extending toward the central ridge or even across the center of the patella and involving 40% to 50% of the patella articular surface. This spongy, soft cartilage does not resist load normally, and in many cases pain is disabling. Most important is to acknowledge the problem, as many of these patients have been living with articular lesion pain for a year or more. As quality of life can be severely diminished by chronic patellofemoral pain, it behooves us to find answers and provide appropriate treatment. Although patients with this degree of articular softening and breakdown represent a small percentage of all patients with patellofemoral pain, identifying these cases is essential.

However benign-appearing, a resistant, painful patella articular lesion can be disabling. The key to treating a young person with a patella articular lesion objectively proved with imaging or arthroscopy is to inform the patient and family of the resistant nature of some lesions. In a referral patellofemoral practice, I see many patients who are disabled and depressed about the results of articular breakdown related to focal overload. Once the problem is identified, there is hope.

Prolonged rest and activity withdrawal usually help, but in some cases pain with stairs and daily activities continues. Running is usually impossible,

which can be devastating for many young people.

My approach is to exhaust the nonoperative measures, which include focusing intensely on core stability training. The physical therapist must understand the importance of this treatment component; the patient must understand the importance of strengthening the hip external rotators and the vastus medialis oblique, modifying gait, avoiding pain-inducing activities, controlling weight, using proper footwear, and being patient. Applying heavy resistance to the quadriceps during rehabilitation will likely perpetuate or exacerbate the problem. The goals are to limit loading of the articular lesion and improve lower extremity function emphasizing reduction and balanced distribution of load.

Other Causes of Anterior Knee Pain

The possibility of an unusual source of pain should always be considered. Some causes (osteochondral lesion, bipartite patella, patella baja, radiographic evidence of focal overload) are apparent only on imaging. MRI may provide evidence of hypertrophic synovium, thickened fat pad, or patellar tendonitis. The physical examination is important in determining unusual sources of pain, such as those related to trauma or retinacular neuronal injury from direct impact. Pain referred from the hip or back can also cause AKP. As kinesiophobia may also play a role, it should be considered whenever an objective cause of the pain cannot be identified.

Surgery for Anterior Knee Pain

Surgery should be considered only after prolonged rest and healing have failed to resolve the pain caused by sustained direct trauma to the anterior

knee. Physical therapy typically is not useful in direct trauma. If a painful traumatic articular lesion persists, then direct treatment—removing loose articular fragments and resurfacing or unloading a damaged articular surface—may be appropriate. In most cases, 6 to 12 months should be allowed before considering surgery. Meanwhile, rest, bracing, anti-inflammatory measures, reassurance, and work modification are the cornerstones of treatment.

After all conservative measures have failed in a patient with spontaneous-onset AKP related to repetitive focal overload, and disability caused by an objectively proven articular lesion related to mechanical dysfunction or dysplasia, diagnostic arthroscopy may be appropriate. Quantitation and characterization of the lesion with images and measurements are imperative in forming an optimal surgical plan. Remember that not all problems can be cured with surgery, and there is no patellofemoral problem that cannot potentially be made worse with improper surgery.

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References

1. Sanchis-Alfonso V, Dye SF. How to deal with anterior knee pain in the active young patient. *Sports Health.* 2016 Dec 5. [Epub ahead of print]
2. Fulkerson JP, Tennant R, Jaivin JS, Grunnet M. Histologic evidence of retinacular nerve injury associated with patellofemoral malalignment. *Clin Orthop Relat Res.* 1985;(197):196-205.
3. Dye SF. The pathophysiology of patellofemoral pain: a tissue homeostasis perspective. *Clin Orthop Relat Res.* 2005;(436):100-110.
4. Souza RB, Powers CM. Differences in hip kinematics, muscle strength, and muscle activation between subjects with and without patellofemoral pain. *J Orthop Sports Phys Ther.* 2009;39(1):12-19.
5. Post WR, Fulkerson J. Knee pain diagrams: correlation with physical examination findings in patients with anterior knee pain. *Arthroscopy.* 1994;10(6):618-623.