Clinical
Insights

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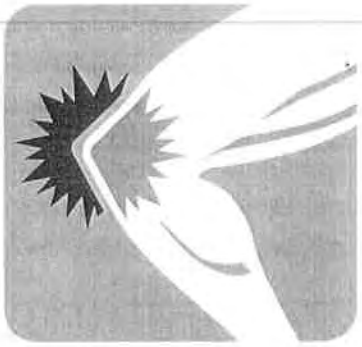

The Most Common Cause of Knee Pain

Patellofemoral pain syndrome (PFPS), also called "runner's knee," describes the symptom complex of knee discomfort, swelling or crepitus that results from excessive or imbalanced forces acting on the joint. PFPS can be traumatically induced but more commonly results from muscular imbalance and cumulative overload. It is the most common cause of knee pain in the general population, affecting an estimated 25 percent of adults.[1, 5, 23] Many PFPS patients are young and athletic.[32] Data suggests the condition may affect nearly 10 percent of young athletes.[2]

Normal patellar tracking is dependent upon the static and dynamic stabilizers of the patella acting in concert. Imbalances in these stabilizers can alter the distribution of forces to the patellofemoral articular surfaces and related soft tissues. Researchers estimate that patellofemoral forces are between one-third and half of a person's body weight while walking and can increase almost twentyfold when squatting.[3] Biomechanical tracking stresses are quickly compounded, causing irritation to the patellofemoral cartilage and eventual patellofemoral degeneration.

PFPS is most commonly related to lateral tracking of the patella.[4] The patella has a natural tendency to migrate laterally due to the pull of the quadriceps and the slight natural valgus of the lower extremity.[5] Compounding this problem it the fact that the patellofemoral orientation is largely determined by the hip and foot.[6, 7] Pes planus causes internal rotation of the tibial and subsequent deviation of the patella, increasing one's risk of PFPS.[8, 24] Gluteus medius weakness results in valgocity of the knee and subsequent lateral tracking. Current research suggests that patellar movement and tracking are more dependent on global femur and tibia biomechanics than any individual knee muscle strength.[26]

Additional risk factors for the development of PFPS include: joint overload/overuse; trauma; tight lateral knee capsule; patellar hypermobility; and muscular imbalance, particularly quadriceps or iliotibial band hypertoncity and vastus medialis or quadriceps weakness.[9, 28-30]

PFPS patients generally present with dull peripatellar pain that is exacerbated by activities that load the joint, including prolonged walking, running, squatting, jumping, kneeling, arising from a seated position or stair-climbing, especially walking down stairs or downhill. Swelling may accompany the pain. Disruption of patellofemoral cartilage may result in crepitus, intermittent locking or giving way.[27]

Clinical evaluation of PFPS should be directed toward identifying factors that create imbalanced force on the patella. PFPS patients often have hypertonic soleus, hamstring, iliopsoas, piriformis and thigh adductor muscles with tightness in the iliotibial band

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and posterior hip capsule.[8, 9, 10] Weakness in the quadriceps or hamstring muscles increases one's risk of developing the problem three- to fivefold.[24] Weakness in the gluteus maximus or medius is common in patients with knee pain and contributes to PFPS.[12, 33] Gluteus medius weakness may be assessed by observing for pelvic drop or knee valgus (Trendelenberg sign) when performing a single-leg stand, an overhead squat test, a single-leg squat or a single-leg 6-inch step-down.

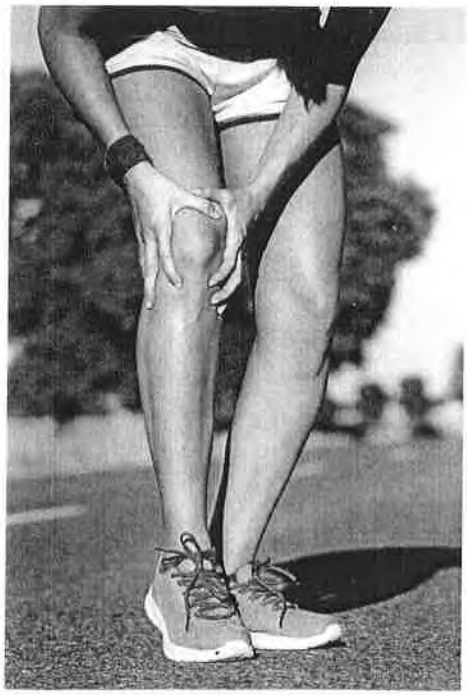
Palpation generally reveals peripatellar tenderness with exacerbation of symptoms upon patellar compression. Clinicians may consider alternatives to the patellar grind test (aka Clarke sign), as this assessment has been shown to be unreliable and may even generate new complaints.[34, 35] Patellar mobility may be assessed with the patellar glide test and the patellar tilt test or by observing patellar tracking during active knee flexion/exten-

sion (patellar tracking assessment).[16] Static assessment of patellofemoral orientation is an unreliable measurement tool.[13, 14] Historically, increased Q angles were thought to increase lateral pressures and were considered an etiologic factor.[31] Newer studies show that normal Q angles vary from 10 to 20 degrees and are similar in symptomatic and nonsymptomatic patellofemoral patients.[15, 16]

Differentiation of meniscal pain from patellofemoral pain may be accomplished by having the patient perform a two-legged squat. Meniscal pain is expected at the bottom of the squat, while patellofemoral pain is present during descent and ascent.

Knee radiographs may be necessary to rule out fracture in those with a history of trauma or osteoarthritis and in patients older than 50. Radiographs may also be appropriate in patients with significant swelling, a recent history of knee surgery and in those whose pain does not improve with a trial of treatment.[17] Radiographic assessment of PFPS would include a standing lateral, AP, sunrise and patellofemoral (merchant) view.

The differential diagnosis for anterior knee pain includes: fracture, infection, neoplasm, patellar or quadriceps tendinopathy; Osgood-Schlatter disease; bursitis; and cartilaginous irritation, including osteochondritis dissecans, chrondromalacia patella and patellofemoral arthritis. Additional considerations would include: Sinding-Larsen-Johansson syndrome, plica, iliotibial band syndrome, symptomatic bipartate patella and referred pain from the spine or hip.[18]



Management of PFPS should progress from minimization of aggravating factors and anti-inflammatory measures to long-term correction of functional deficits. Decreasing fear-avoidance behavior may lead to improved outcomes.[30] Lifestyle modification may be necessary to reduce pain-provoking activities, especially running, jumping and activities that induce a valgus stress. Athletes should avoid allowing their knee to cross in front of their toes while squatting. Electrotherapy and ice may be useful initially for reduction of pain and inflammation. Russian Stim (10:30) is a consideration to activate the VMO. NSAIDS or anti-inflammatory medication may provide short-term benefit for relief of pain and inflammation.

Myofascial release and stretching should be directed at hypertonic muscles, including the TFL, the gastroc, the soleus, the hamstring, the piriformis, the hip rotators and the psoas. Myofascial release or IASTM may be appropriate for tightness in the iliotibial band, the vastus lateralis, the posterior hip capsule and the lateral knee retinaculum.

Since gluteus medius and VMO weakness are key factors in the development of PFPS and knee pain, strengthening exercises are generally necessary for those muscles.[19] Stabilization exercises may include: pillow push (push the back of your knee into a pillow for five to six seconds), supine heel slide, terminal knee (short-arc) extension, clam, glut bridge, semi-stiff dead lift, posterior lunge and monster walk. Eccentric quadriceps strengthening is more effective than concentric exercise in the treatment of PFPS.[25]

Manipulation may be necessary for restrictions in the lumbosacral and lower extremity joints. Hypermobility is common in the ipsilateral SI joint with restrictions present contralaterally. Patellofemoral problems are part of a complex biomechanical chain, and corrective taping, including "McConnell taping," is generally ineffective.[20, 21] Kinesiotape for PFPS has anecdotal support.

Arch supports or custom orthotics may be necessary to correct hyperpronation. Research has shown that runners with PFPS benefit from a combination of exercise and foot orthotics.[22]

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Runners should change shoes every 250 to 500 miles. Sequelae of unmanaged PFPS include accelerated degenerative changes and sedentarism. A surgical "lateral release" of the lateral retinaculum is a last resort when conservative measures have failed. ■

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