

Differential Diagnosis Patellofemoral Arthralgia and Chondromalacia Patellae

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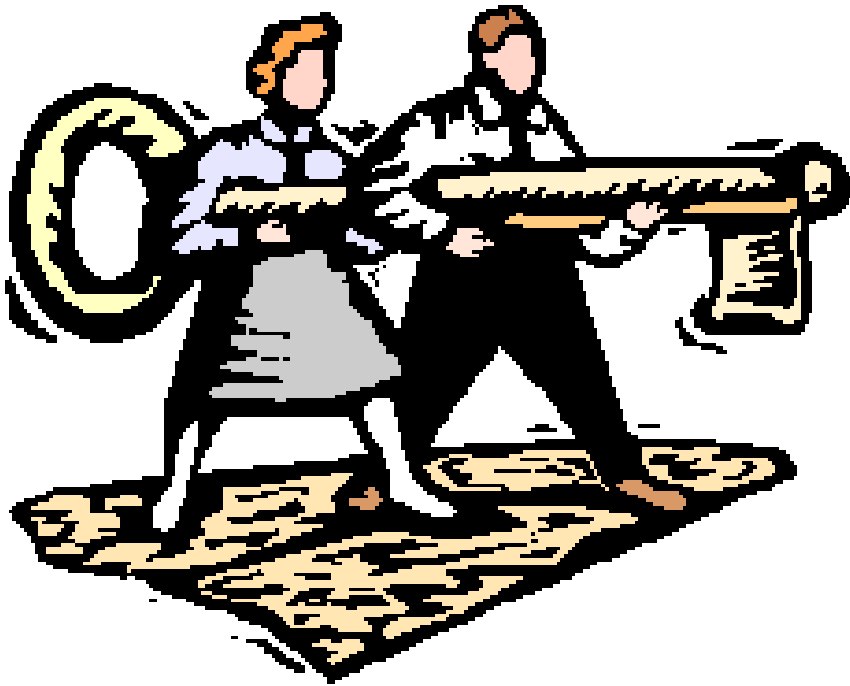
Learning Objectives

- Elicit a neuromusculoskeletal patient history and record the subjective findings in order to perform differential diagnosis procedures and determine use of objective testing.

Learning Objectives

- Identify injured and painful tissues through careful assessment and intelligent use of neuromusculoskeletal testing and document the findings.

Opening Statement ...



- Diagnosis is the key to successful treatment!

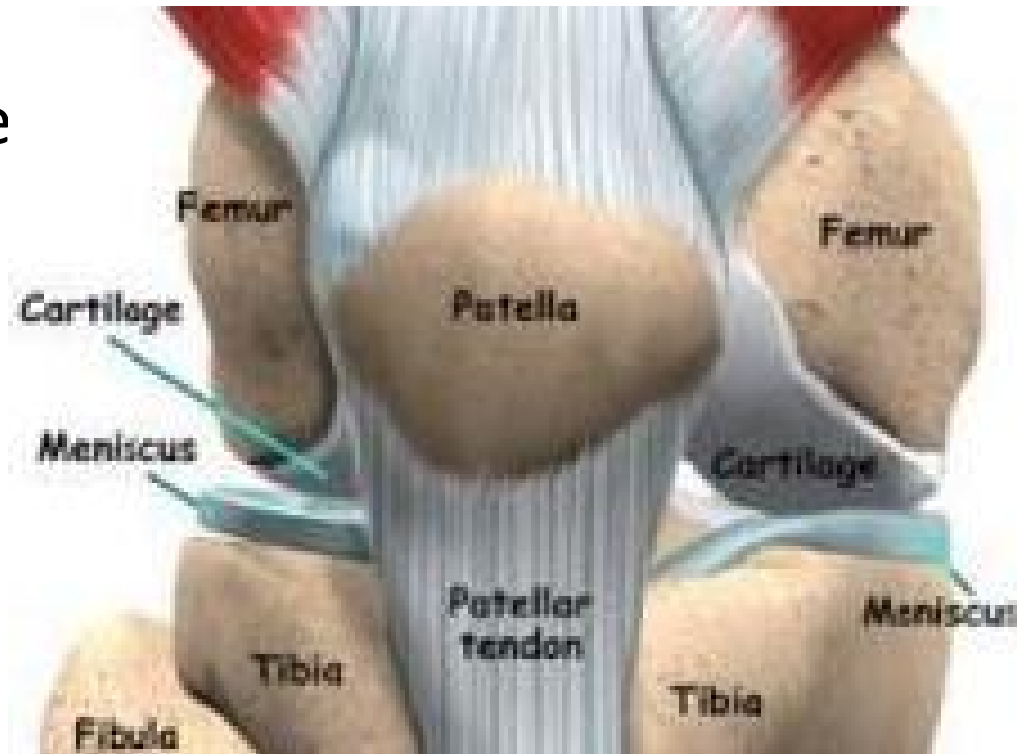
- Managing patellofemoral pain syndrome is a challenge, in part because of lack of consensus regarding its cause and treatment.
- Contributing factors include overuse and overload of the patellofemoral joint, biomechanical problems and muscular dysfunction.
- The initial treatment plan should include quadriceps strengthening and temporary activity modification.
- Additional exercises may be incorporated as dictated by the findings of the physical examination.
- Footwear should be closely evaluated for quality and fit, and the use of arch supports should be considered.
- Mark JS. Patellofemoral Pain Syndrome: A Review and Guidelines for Treatment. Am Fam Physician. 1999 Nov 1;60(7):2012-2018.

Patellofemoral Pain Syndrome (PFPS)

- The term “PFPS” is often used interchangeably with “anterior knee pain,” (patellofemoral arthralgia) or “runner's knee.”
- PFPS can be defined as anterior knee pain involving the patella and retinaculum that excludes other intra-articular and peri-patellar pathology.
- Reid DC. The myth, mystic and frustration of anterior knee pain [Editorial]. *Clin J Sport Med*. 1993;3:139–43.

Patellofemoral Pain Syndrome (PFPS) or Patellofemoral Arthralgia (PFA)

- Patellofemoral pain syndrome (PFPS) is one of the most common causes of orthopedic related physician visits each year, especially among women.

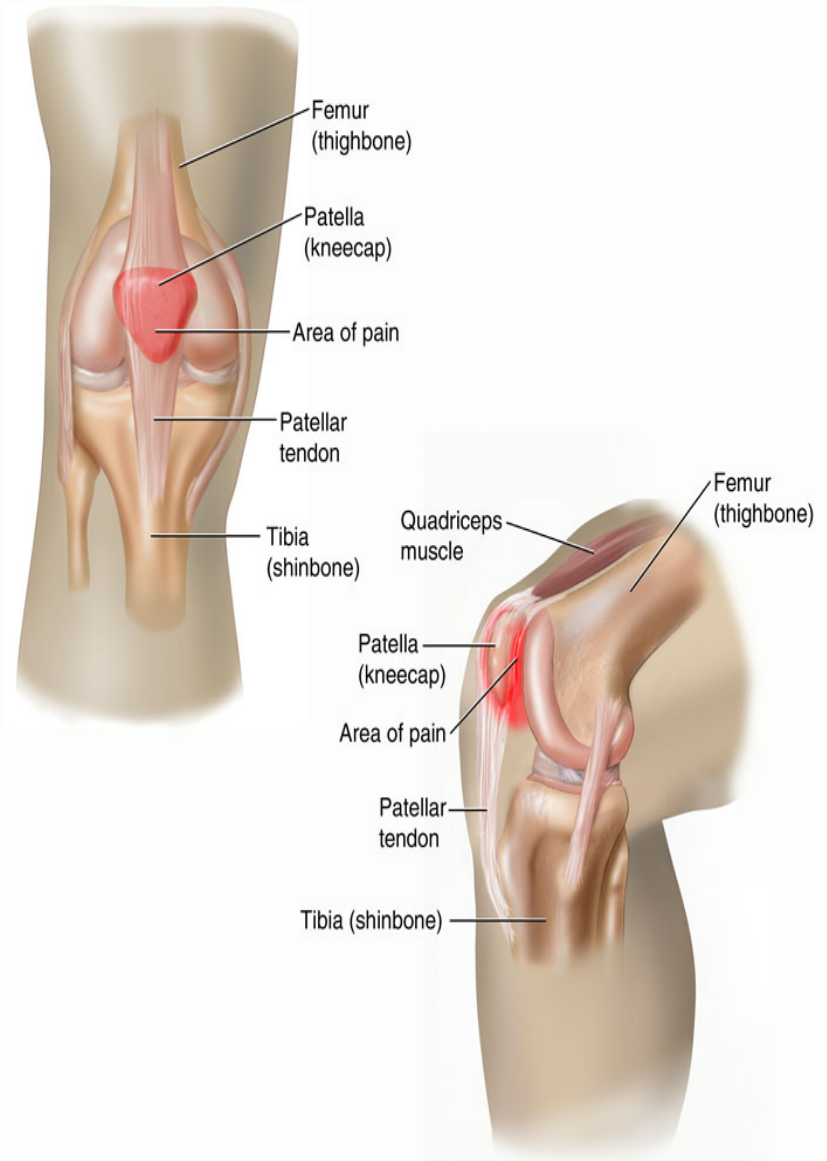


- Taunton JE, Ryan MB, Clement DB, McKenzie DC, Lloyd-Smith DR, Zumbo BD. A retrospective case-control analysis of 2002 running injuries. *Br J Sports Med.* 2002;36:95–101.

Patellofemoral Pain Syndrome (Runner's Knee)

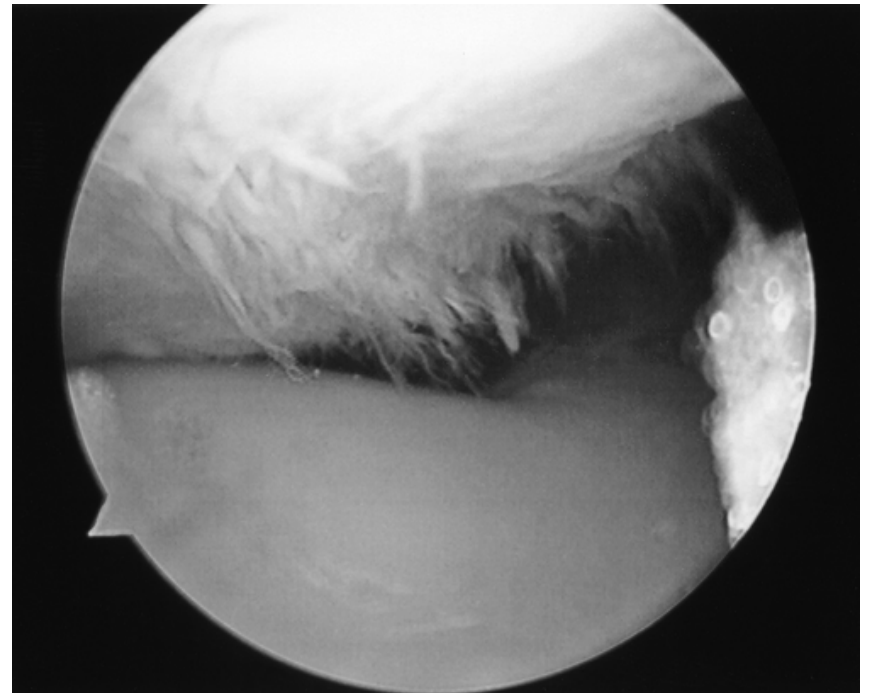
- Patellofemoral pain syndrome (PFPS) is the most common cause of knee pain in the outpatient setting.

- SAMEER DIXIT and JOHN P. DIFIORI. Management of Patellofemoral Pain Syndrome. *Am Fam Physician*. 2007 Jan 15;75(2):194-202.



Chondromalacia Patellae

- Chondromalacia patellae is inflammation of the underside of the patella and softening of the cartilage as demonstrated with this arthroscopic examination.

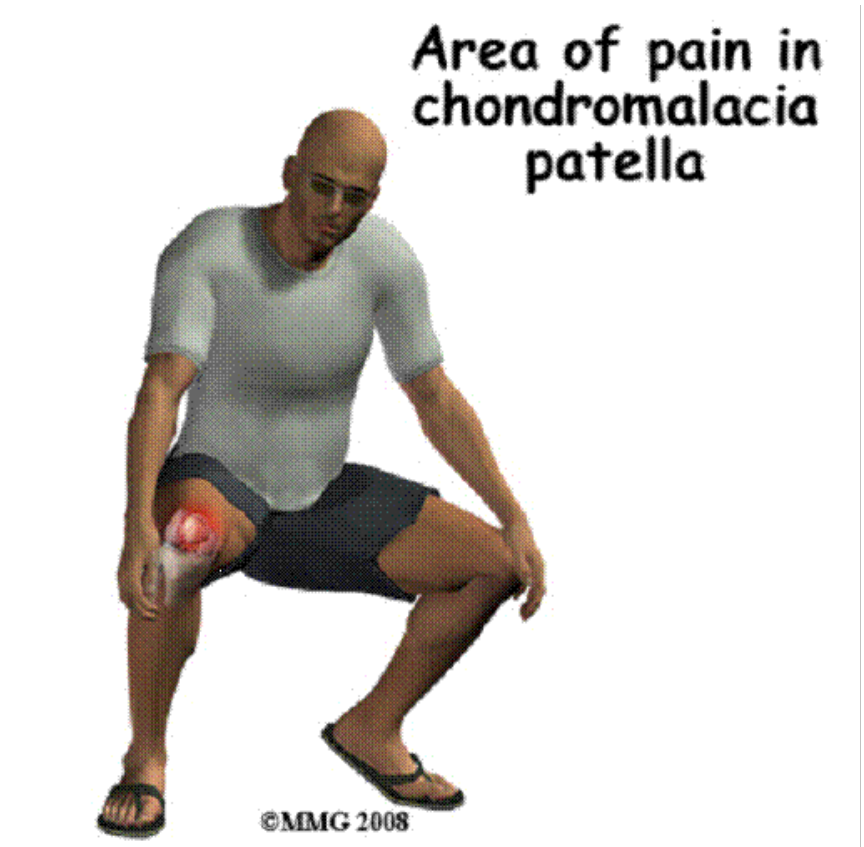


**Patellar
shift
and
damage to
articular
cartilage**



Chondromalacia Patellae

- Chondromalacia patellae is a term sometimes treated synonymously with patellofemoral pain syndrome.



Chondromalacia Patellae

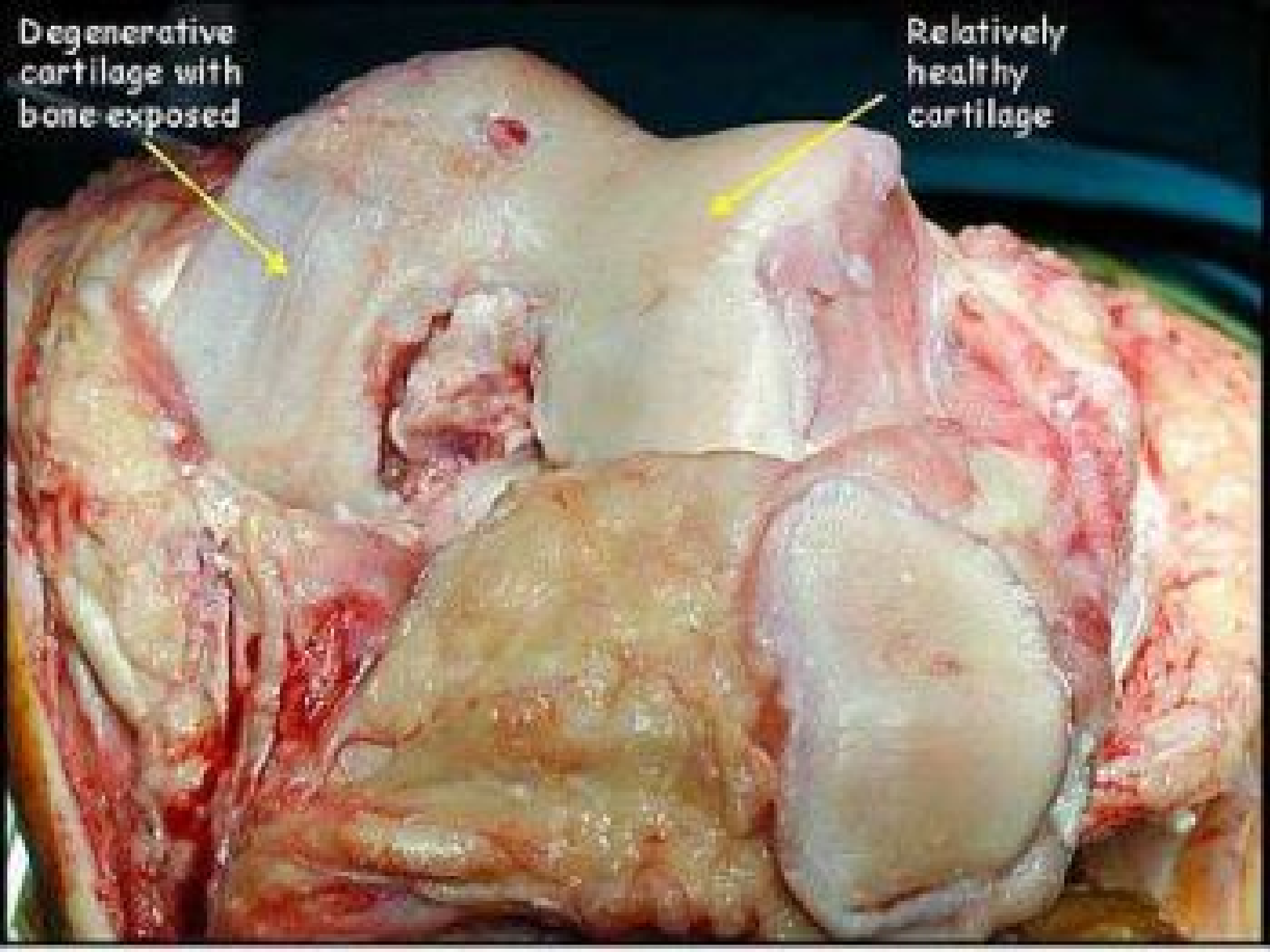
- Patellofemoral pain syndrome is a term that applies only to individuals without cartilage damage, thereby distinguishing it from chondromalacia patellae, a condition characterized by softening of the patellar articular cartilage.

Chondromalacia patella
(runner's knee)



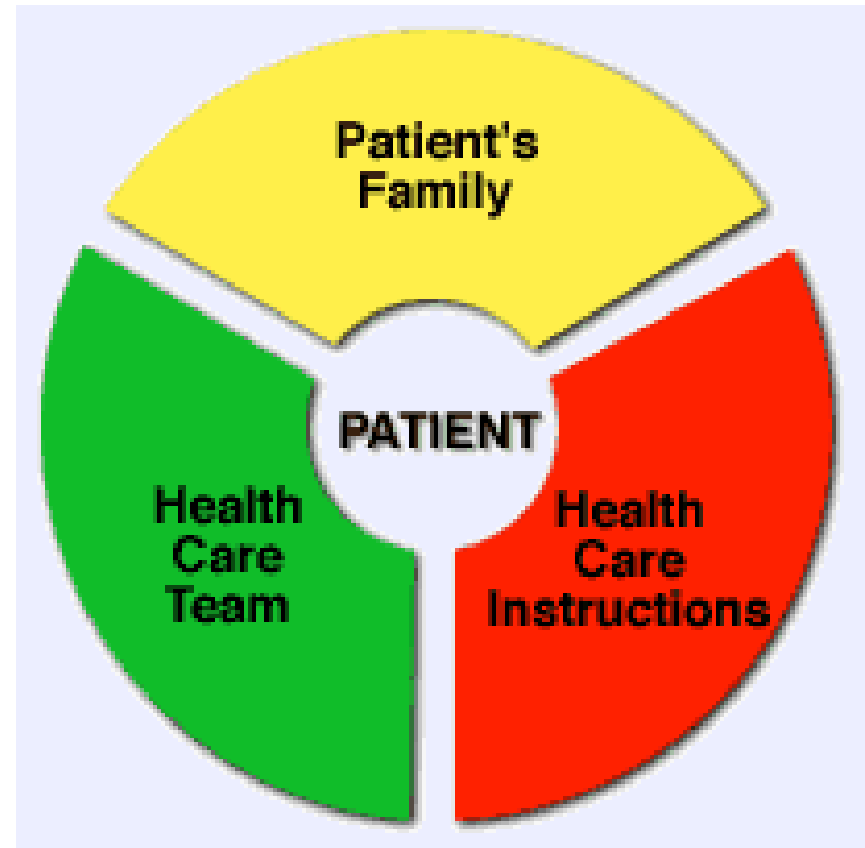
Degenerative cartilage with bone exposed

Relatively healthy cartilage

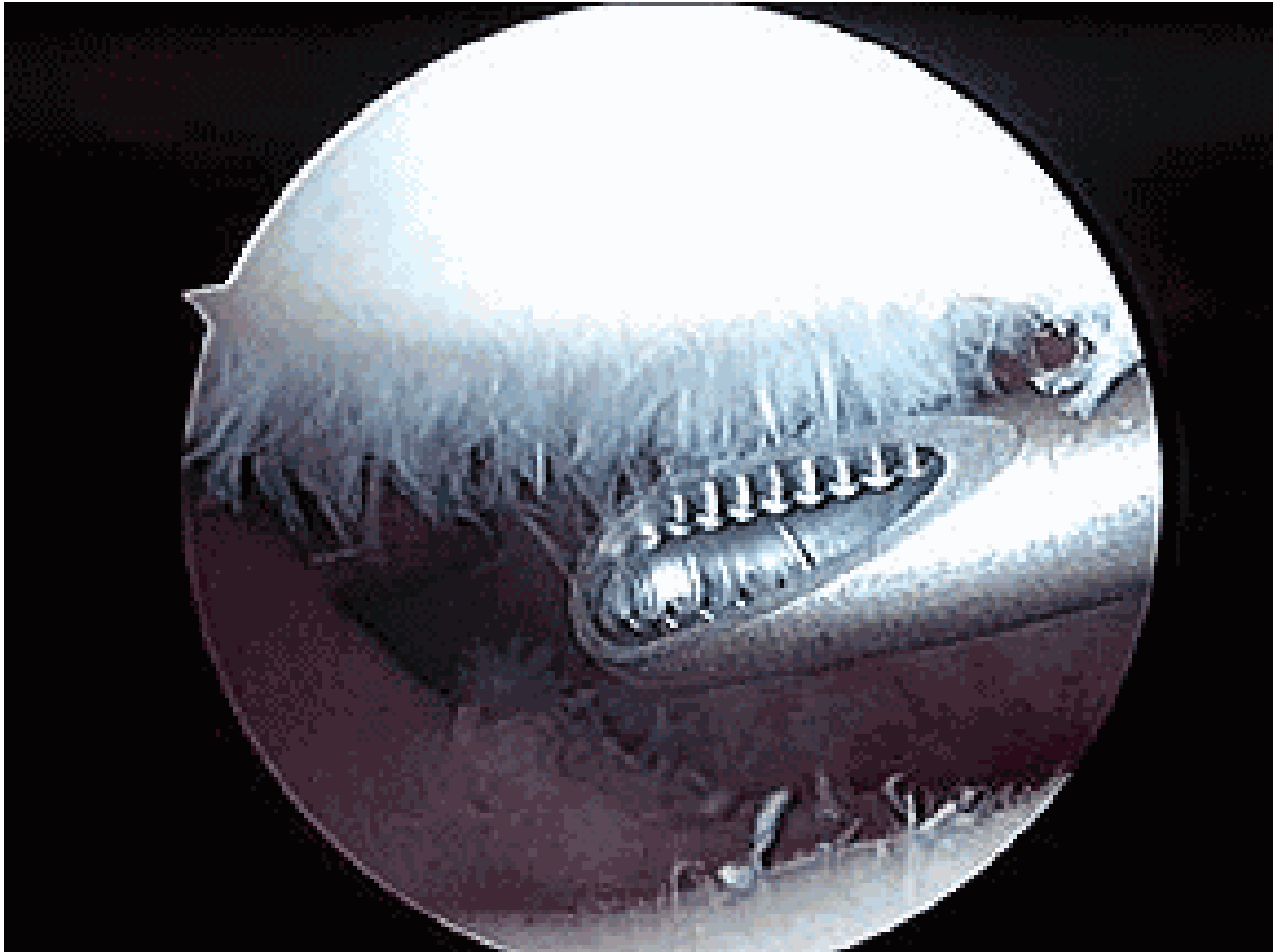


Chondromalacia Patellae

- Patient centered care should be discussed prior to surgical intervention.
- Treatment is similar to that of patellofemoral pain syndrome.



Arthroscopic Shaving



Patellofemoral Pain Syndrome

- Eleven percent of musculoskeletal complaints in the office setting are caused by anterior knee pain (which most commonly results from PFPS), and PFPS constitutes 16 to 25 percent of all injuries in runners.
- Garrick JG. Anterior knee pain (chondromalacia patella). *Physician Sportsmed.* 1989;17:75–84.
<http://www.aafp.org/afp/2007/0115/p194.html>



Patellofemoral Pain Syndrome (PFPS)

- Patellofemoral pain syndrome can be caused by direct trauma to the knee, or the cause can be insidious in nature.



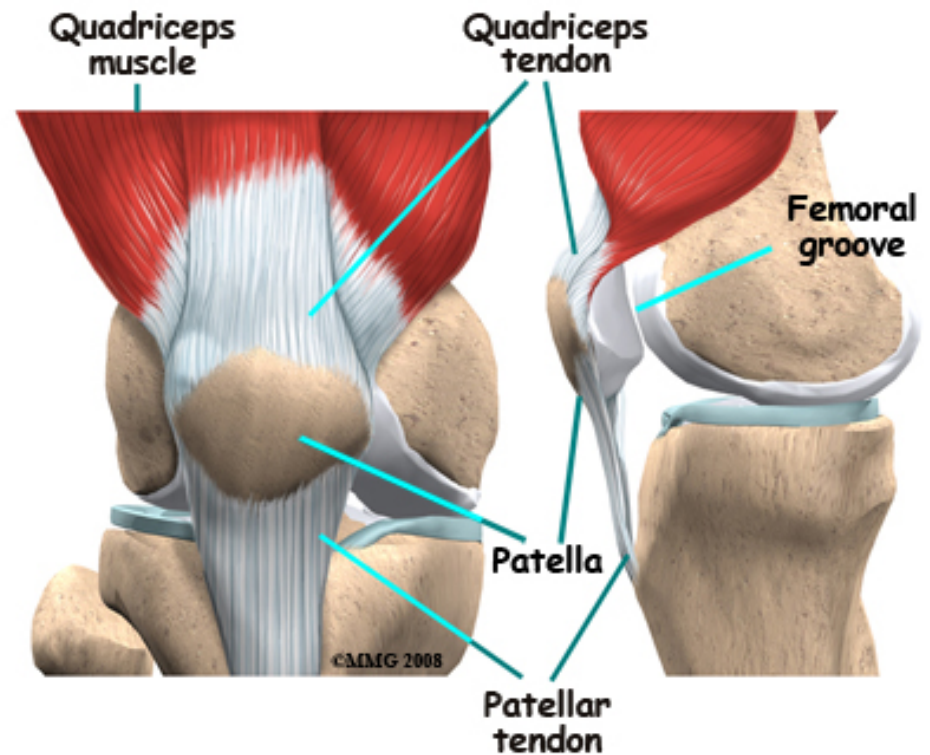
Patellofemoral Pain Syndrome “Runner’s Knee”

- Risk factors include overuse, trauma, muscle dysfunction, tight lateral restraints, patellar hypermobility, and poor quadriceps flexibility.



Patellofemoral Arthralgia (PFA) or Patellofemoral Pain Syndrome (PFPS)

- Altered lower-extremity biomechanics, such as poor hip rotation control, excessive foot pronation, femoral ante-version, tibial torsion, bone configuration, or tight muscles are thought to contribute to PFPS by initiating alterations in patellofemoral kinematics.



Question

What conditions present with anterior knee pain?



Partial List of Differential Diagnoses

- Articular cartilage damage
- Quadriceps tendinopathy
- Chondromalacia patellae
- Iliotibial band syndrome
- Osteochondritis dissecans (Loose bodies)
- Osgood-Schlatter's disease
- Patellofemoral Pain Syndrome
- Pes anserine or pre-patellar bursitis
- Referred pain from lumbar spine or hip joint pathology
- Patellofemoral osteoarthritis

Subjective Findings

- **Location:** around, beneath or underneath patella, difficult to localize and could be bilateral (Anterior Knee Pain)
- If asked to point to the location of pain, patients may place their hands over the anterior aspect of the knee or draw a circle with their fingers around the patella (*circle sign*)
- **Mechanism:** usually does not follow traumatic incident
- Often a history of increased activities (running, squatting or lunging) or worn footwear
- **New:** first episode or chronic with exacerbations
- **Onset:** gradual
- **Provocative:** climbing or descending stairs, squatting , running
- Prolonged sitting with knees flexed (*theater sign*) painful
- **Palliative:** walking or extending knee(s) relieves pain
- **Quality of pain:** ache but may become sharp, localized pain

Circle Sign



Theater Sign



Overuse, Recent Changes in Activities



Provocative Activities



Objective Findings

- Biomechanical problems
 - Pes planus or cavus
 - Abnormal Q angle
 - Patellar maltracking
- Muscular dysfunctions
 - Weakness of quadriceps, especially the vastus medialis obliquus,
 - Tight iliotibial band, gastrocnemius and soleus, hamstrings, hip adductors and abductors

Objective Findings

- Pain/tenderness with palpation
- Range of motion variations
- Patellar glide abnormalities
- Patellar tilt + for restriction
- Patellar grind pain
- Crepitus
- Popping and clicking

Pes Planus

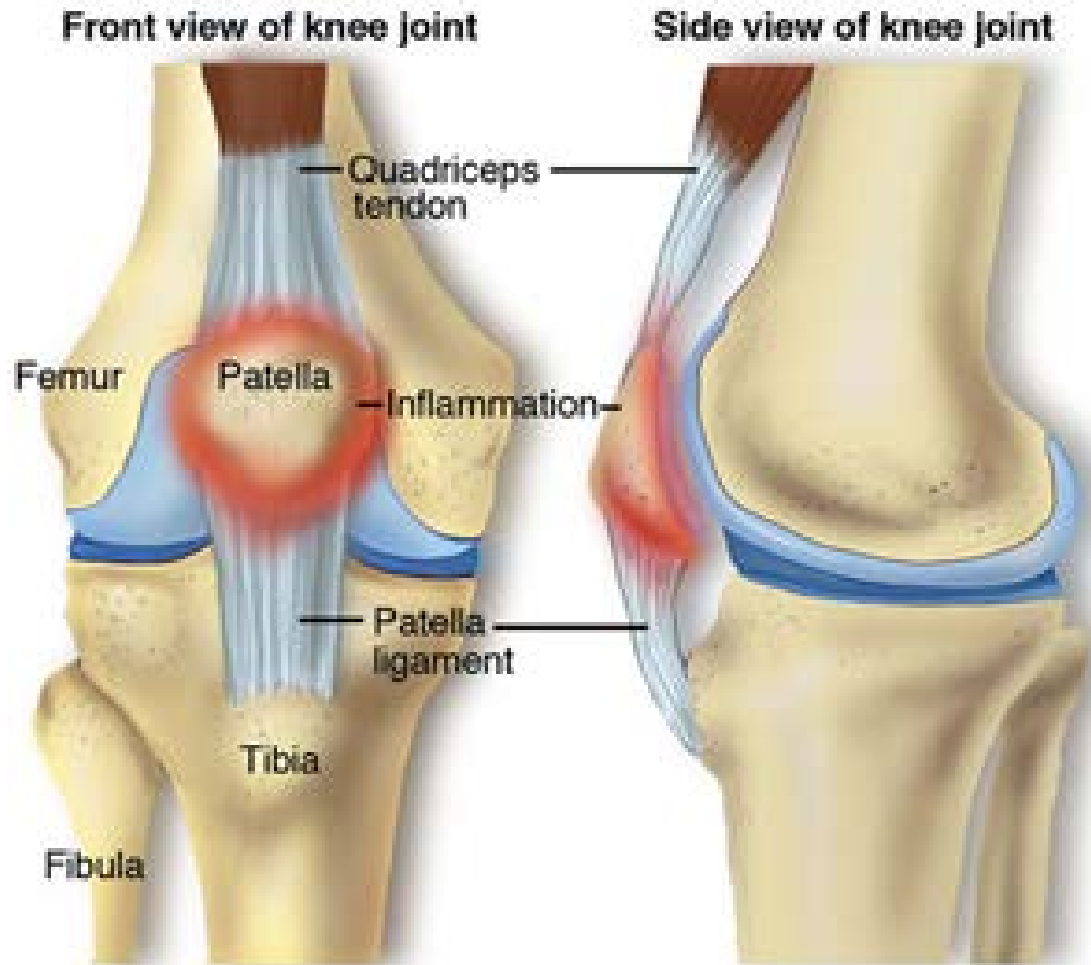
Helbing's Sign

Excessive foot
pronation
alters
patellofemoral
kinematics



No single biomechanical factor has been identified as a primary cause of patellofemoral pain, although many have been hypothesized.

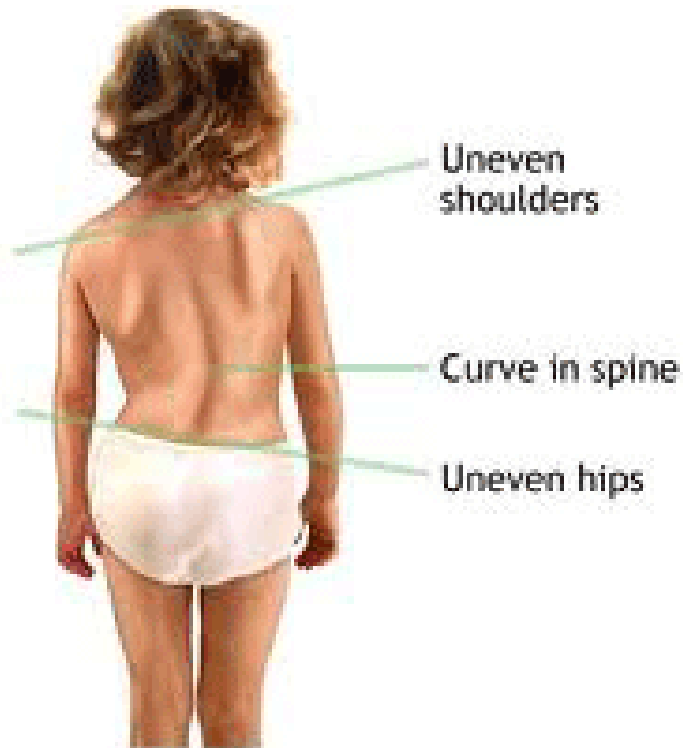
Patellofemoral Pain



Kannus P, Niittymaki S. Which factors predict outcome in the nonoperative treatment of patellofemoral pain syndrome? A prospective follow-up study. *Med Sci Sports Exerc.* 1994;26:289–96.

Natri A, Kannus P, Jarvinen M. Which factors predict the long-term outcome in chronic patellofemoral pain syndrome? A 7-yr prospective follow-up study. *Med Sci Sports Exerc.* 1998;30:1572–7.

Pelvic Obliquity and PFPS Theory



- Gluteus medius weakness causing pelvic obliquity with functional short leg
- Increased weight distribution to short leg with resultant pes planus
- Outcome PSPS with increased weight or repetitive trauma

Comparison of male and female Q angles

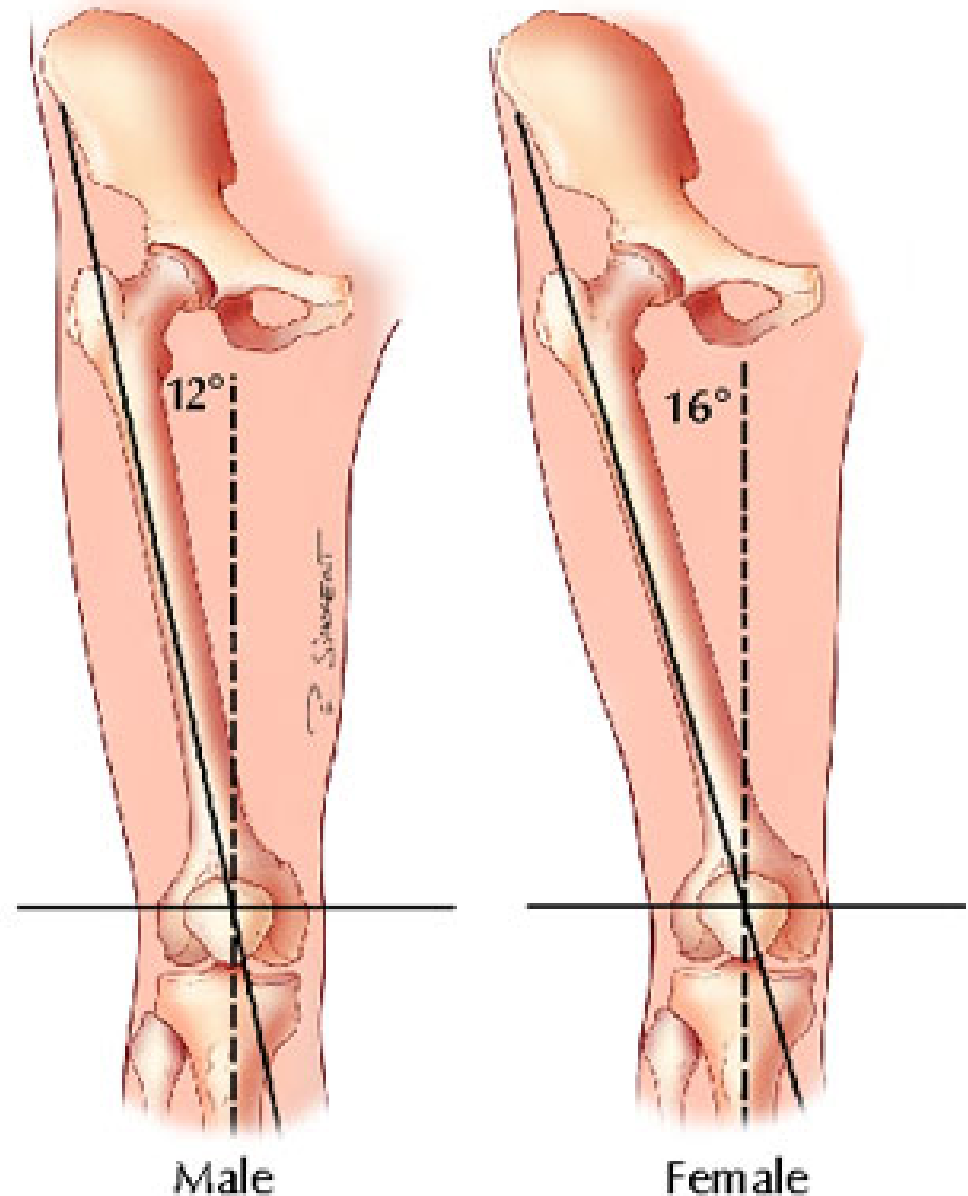
Male and Female Q Angles

Women have a wider pelvis than men; therefore, the Q angle is greater in women than in men.

A large Q angle can concentrate increasing force on the ACL each time the knee twists, increasing the risk of an ACL tear.

Griffin LY. Noncontact ACL Injuries: risk factors and prevention strategies. Journal of the American Academy of Orthopaedic Surgeons. 2000;8:141-150.

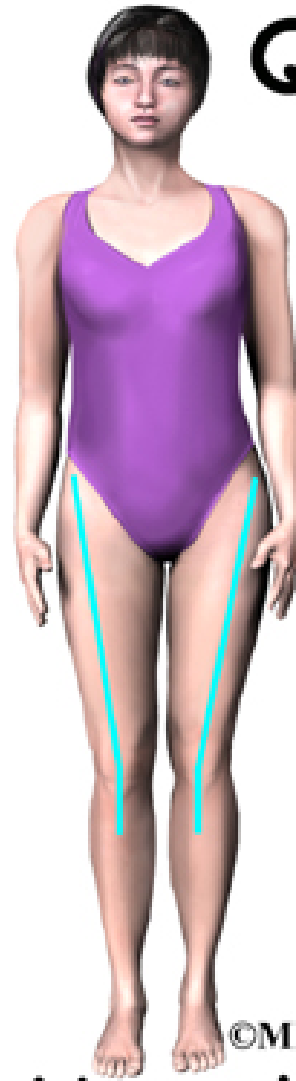
Evans NA. The Natural History and Tailored Treatment of ACL Injury. Physician and Sportsmedicine. 2001;29(9):19-34.



Patellofemoral Pain Syndrome (PFPS)

Tight muscles are thought to contribute to PFPS by initiating alterations in patellofemoral kinematics.

Q Angle



Normal

©MMG 2004



Abnormal

Increased Q Angle and PFPS

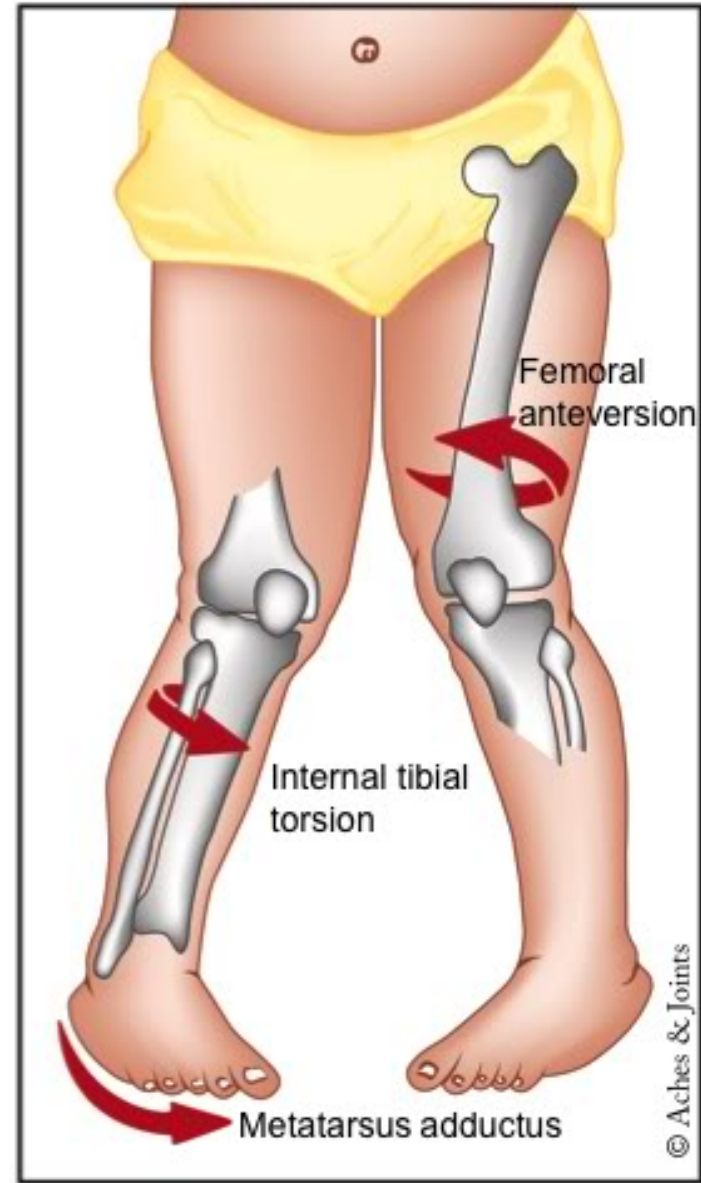
Genu valgum

- External tibial torsion
- Laterally positioned tibial tuberosity



Patellofemoral Pain Syndrome (PFPS)

Internal
femoral
anteversion

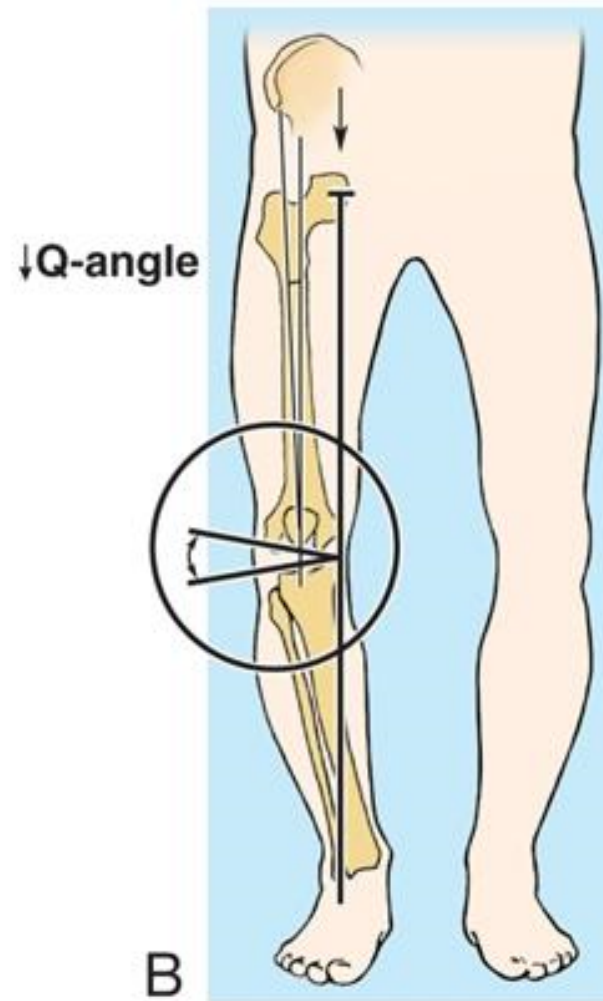


Genu Varum , ITBS and PFPS

Weak hip abductors, especially the gluteus medius, are often found. With pelvic obliquity and ITBS.

Genu varum (bow legs), pronation of the foot (subtalar joint pronation), leg length discrepancy, and running on a crowned surface may cause ITBS.

Genu varum = ITBS = Tight lateral retinaculum = PFPS

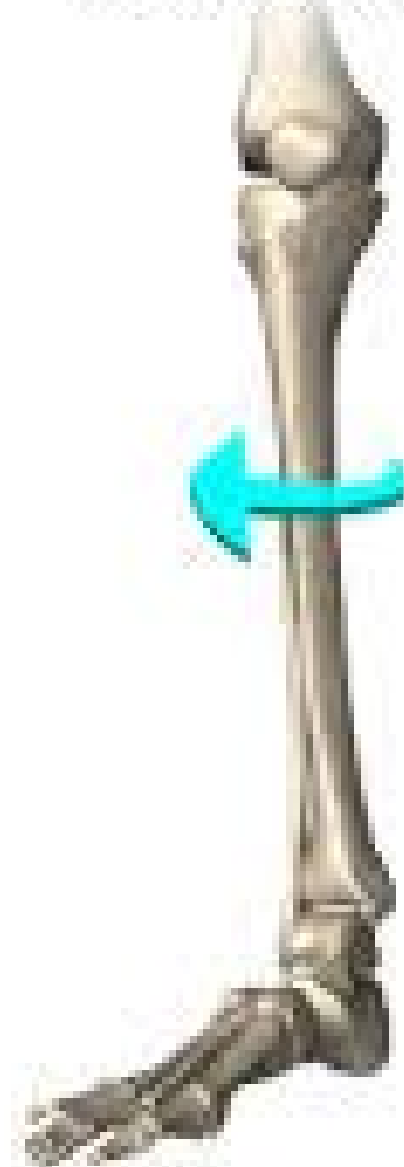


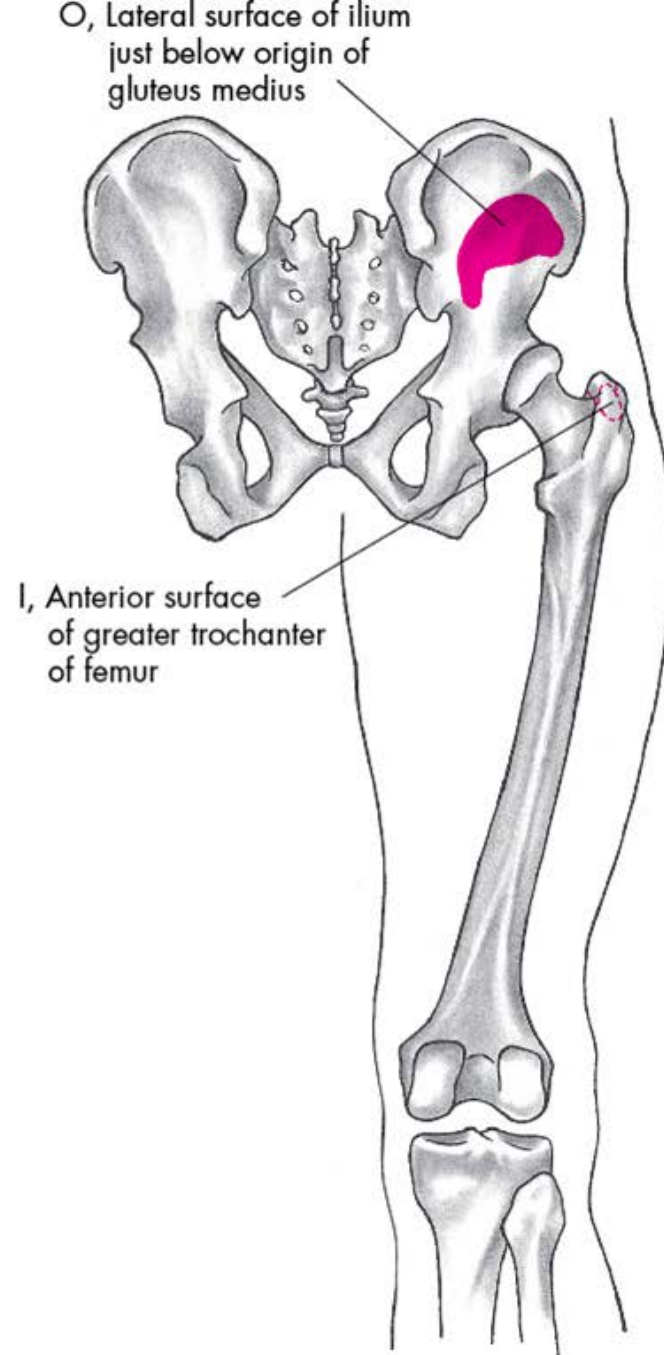
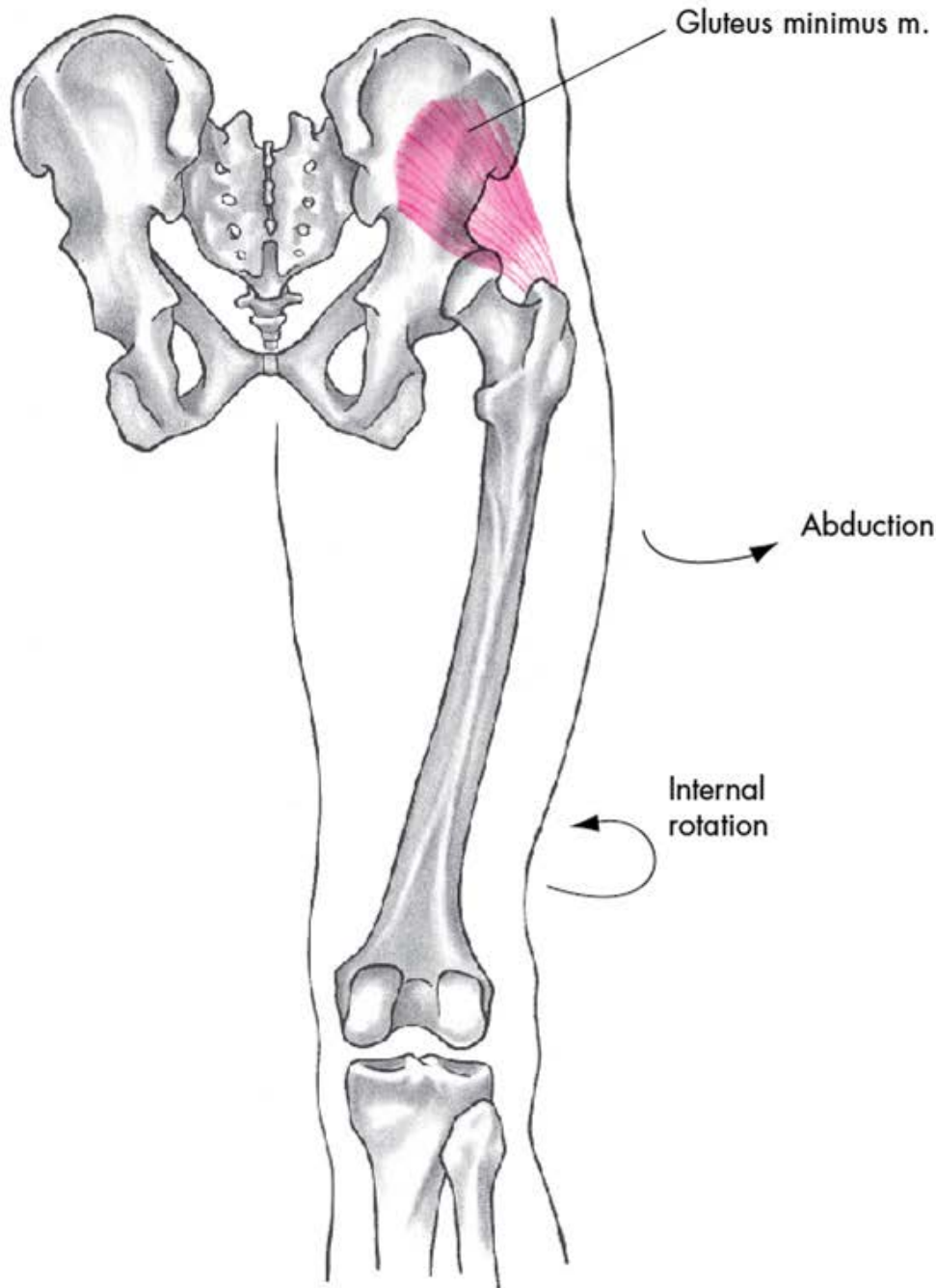
Rotational Deformities

Internal tibial torsion

External tibial torsion

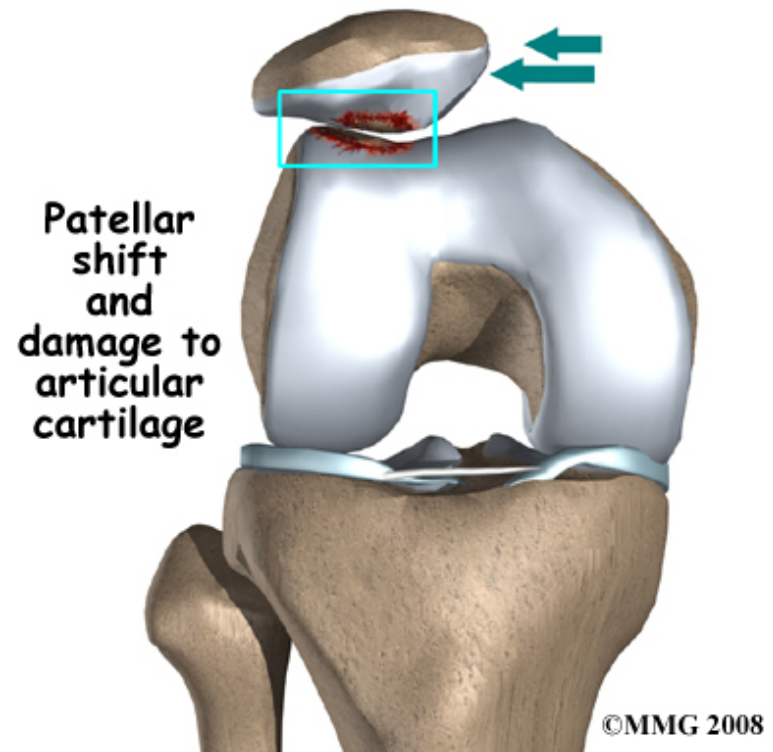
Normal





Patellofemoral Pain Syndrome (PFPS) AKA Patellofemoral Arthralgia (PFA)

- Vastus medialis oblique muscle dysfunction also has been proposed as a contributor to altered patellofemoral kinematics.

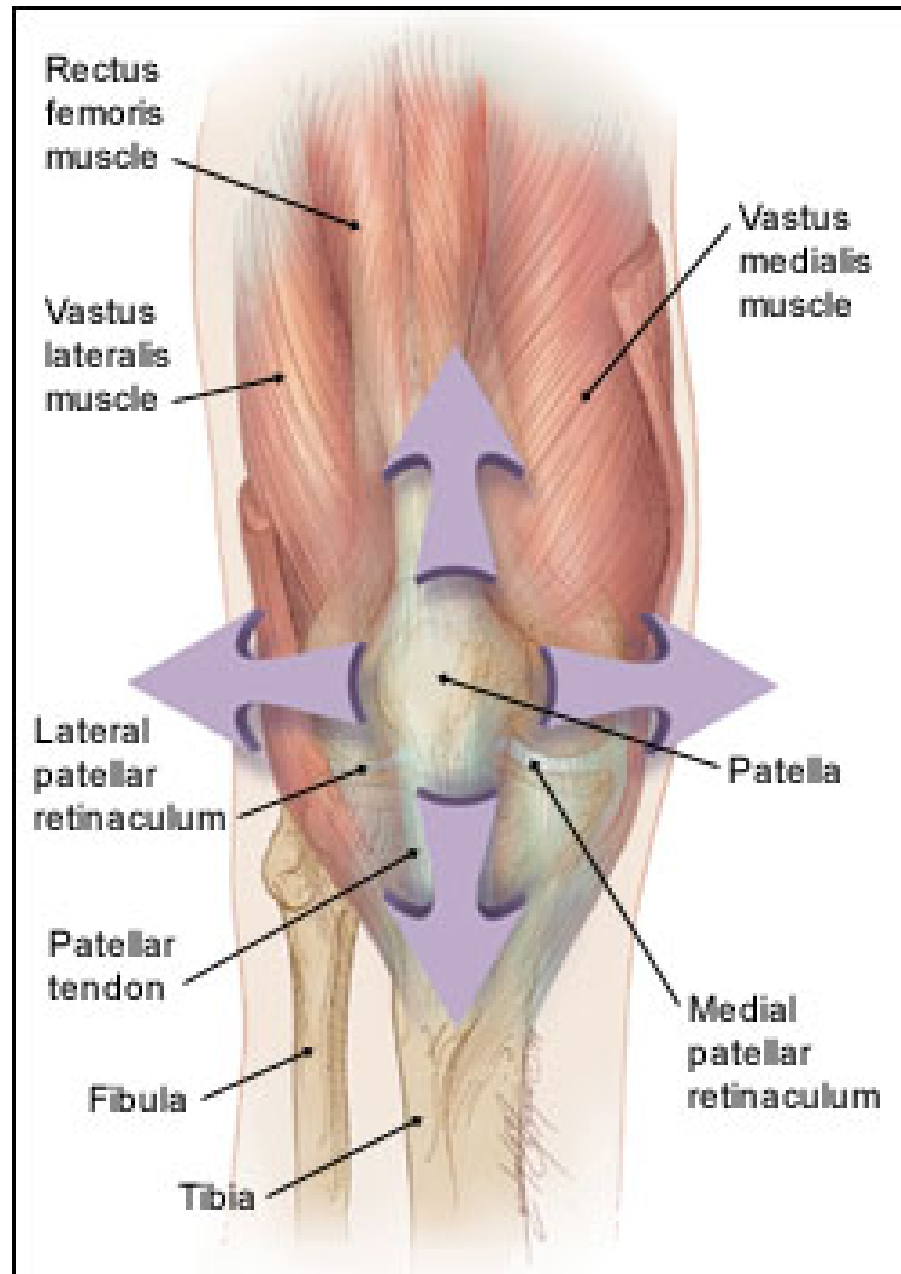


A common misconception is that the patella only moves in an up-and-down direction.

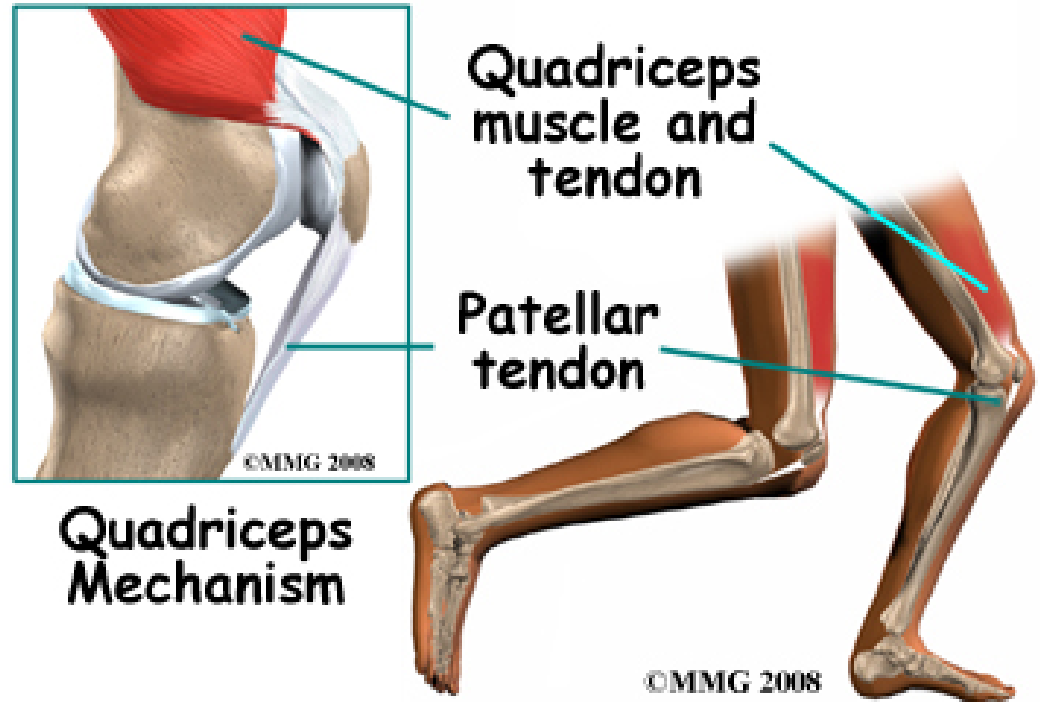
In fact, it also tilts and rotates, so there are various points of contact between the undersurface of the patella and the femur.

Koh TJ, Grabiner MD, De Swart RJ. In vivo tracking of the human patella. *J Biomech.* 1992;25:637-43.

Reid DC. Sports injury assessment and rehabilitation. New York: Churchill Livingstone, 1992:345-98.

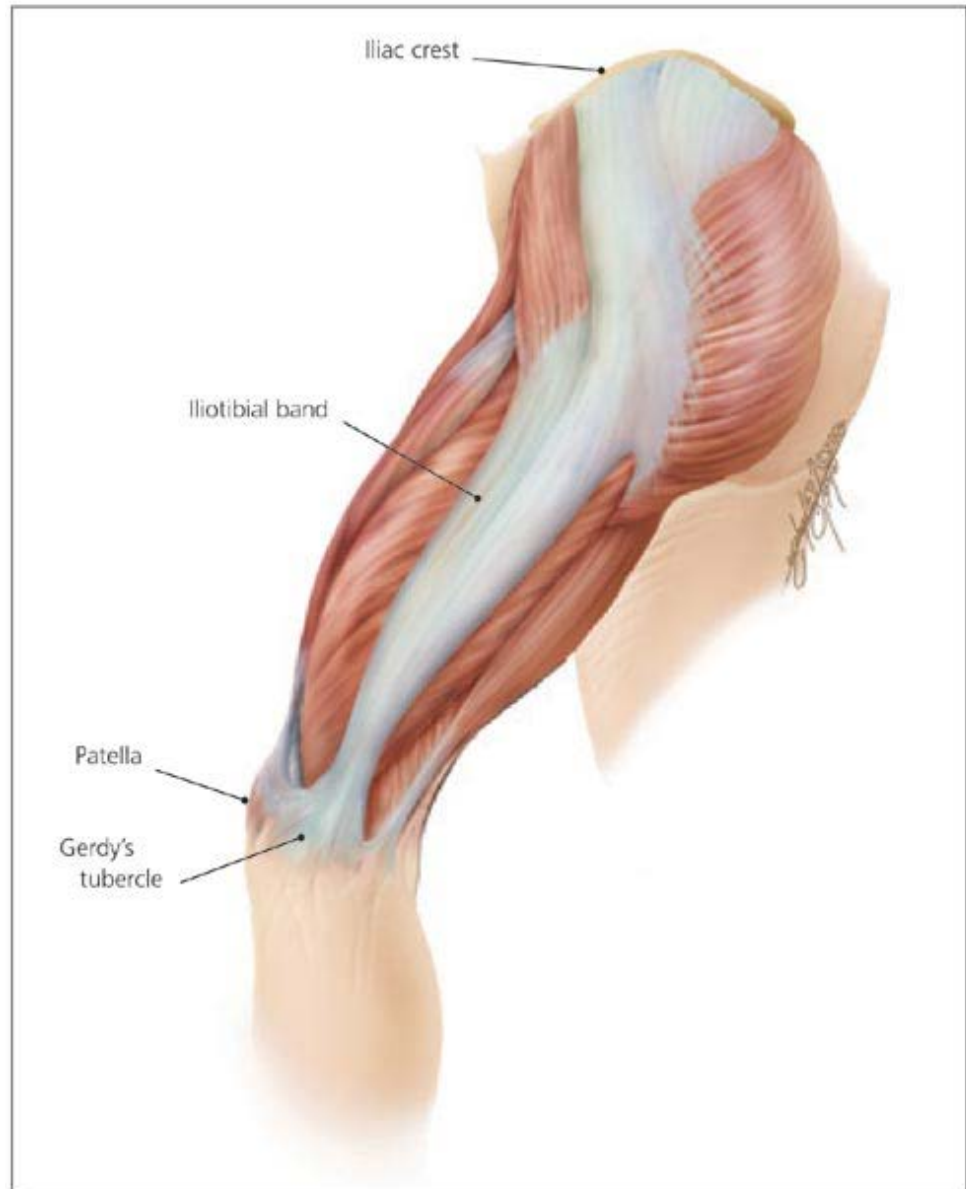


Repetitive contact at any of these areas, sometimes combined with maltracking of the patella that is often not detectable by the naked eye, is the likely mechanism of patellofemoral pain syndrome.



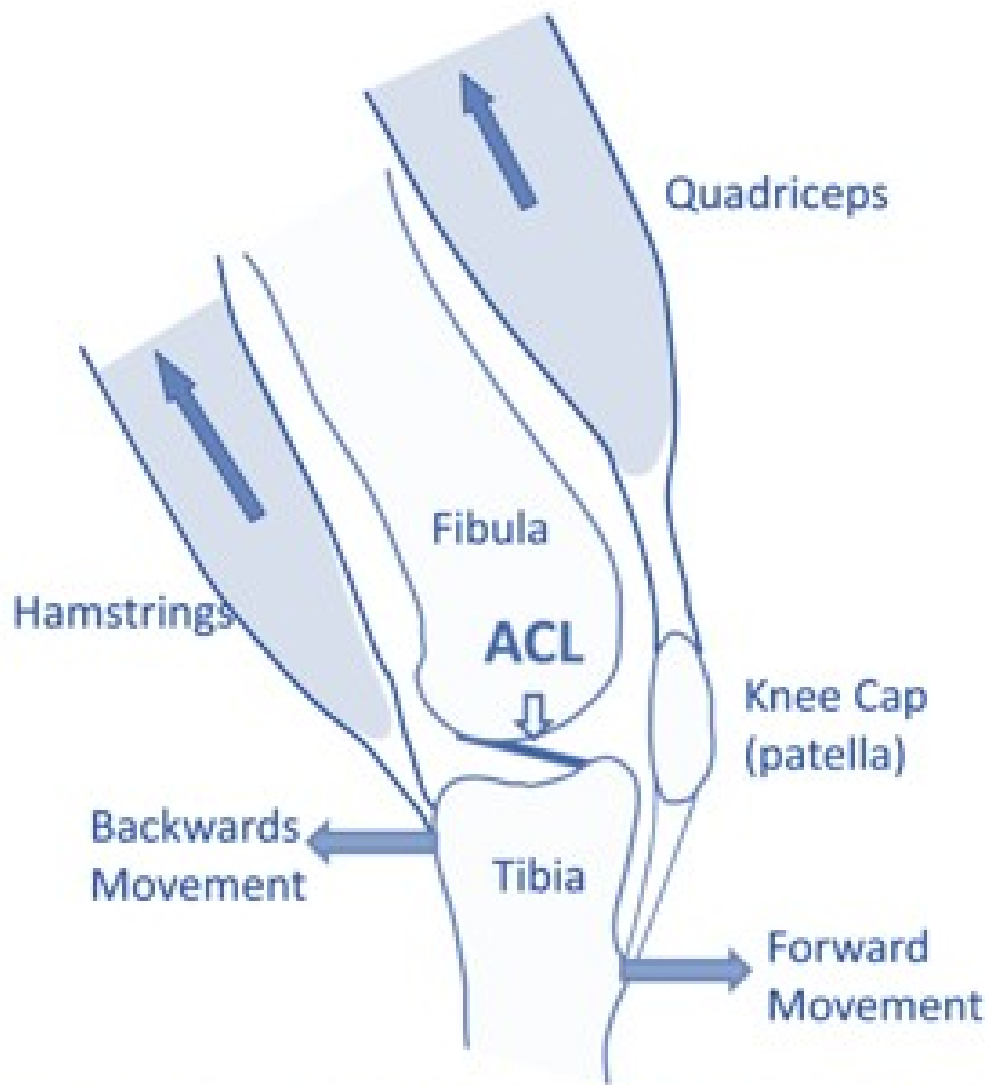
A tight iliotibial band places excessive lateral force on the patella and can also externally rotate the tibia, upsetting the balance of the patellofemoral mechanism. This problem can lead to excessive lateral tracking of the patella.

Winslow J, Yoder E. Patellofemoral pain in female ballet dancers: correlation with iliotibial band tightness and tibial external rotation. *J Orthop Sports Phys Ther.* 1995;22:18–21.



The hamstring muscles flex the knee. Tight hamstrings place more posterior force on the knee, causing pressure between the patella and femur to increase.

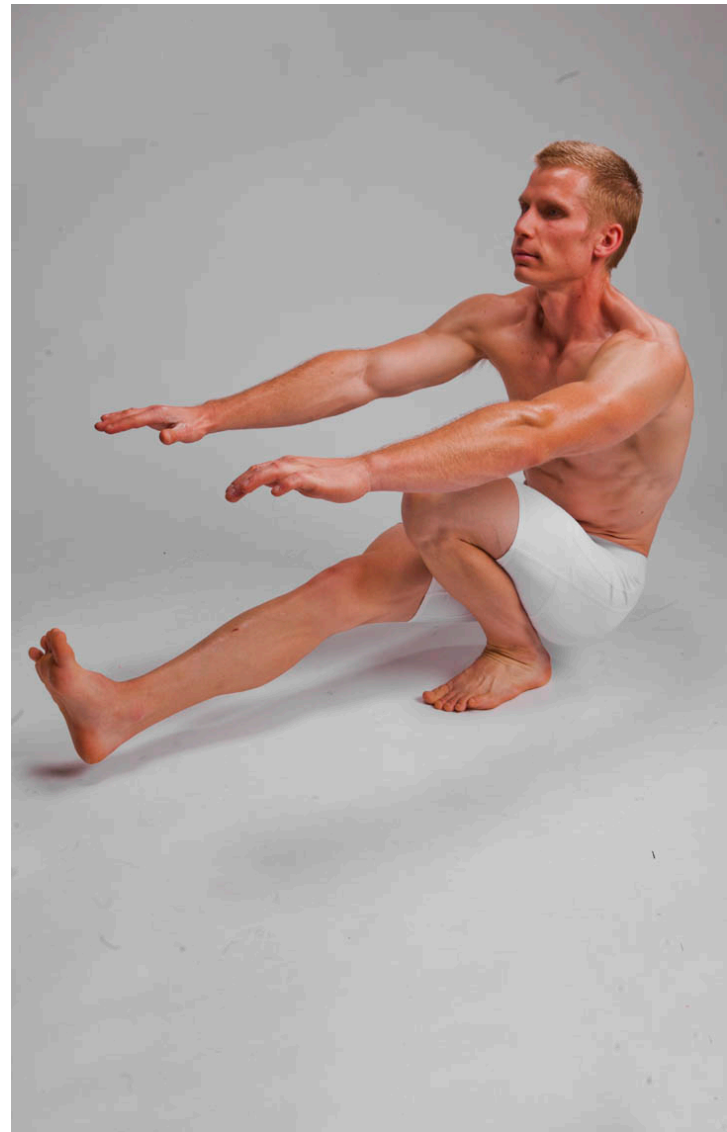




The muscular forces acting on the knee and ACL. Contraction of the quadriceps tends to pull the tibia forward while contraction of the hamstrings tends to pull it backwards. Hamstring activation tends to help stabilize the knee and support the ACL during landing and cutting movements.

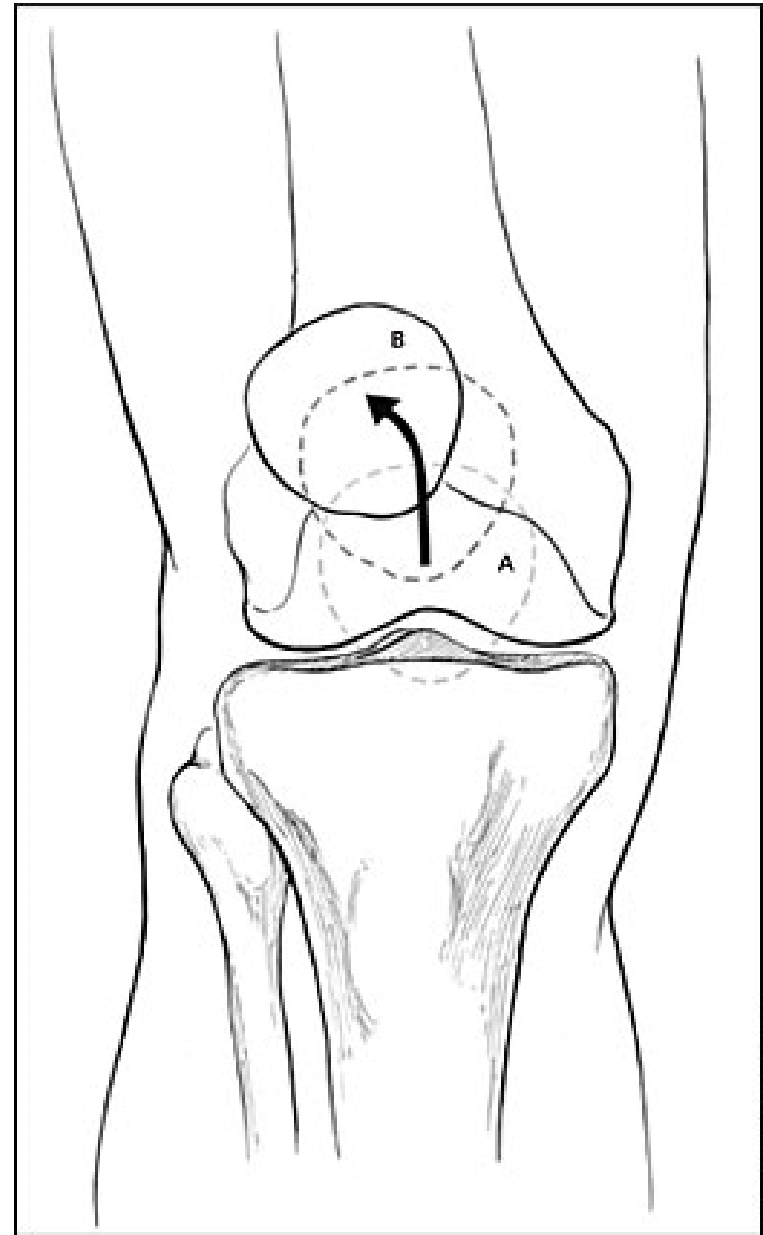
J Sign

Dynamic patellar tracking can be assessed by having the patient perform a single leg squat and stand.



J Sign

Imbalance between the medial and lateral patellar forces (caused by vastus medialis obliquus [VMO] dysfunction or lateral structure tightness) can be manifested by an abrupt medial deviation of the patella as the patella engages the trochlea early in flexion, known as the “J” sign.



J Sign

Alternatively, the “J” sign may be observed with the patient supine or seated and the knee extended from a flexed position. Lateral deviation of the patella can be observed during the terminal phase of extension



Orthopedic test

A provocative maneuver (most often) using stretching, compressing, and contracting to duplicate the pain and identify the involved tissues.



Palpation

Careful palpation should be performed in an attempt to isolate the location of the pain



Palpation

Quadriceps muscle tone can be assessed by direct palpation at rest and with isometric contraction.

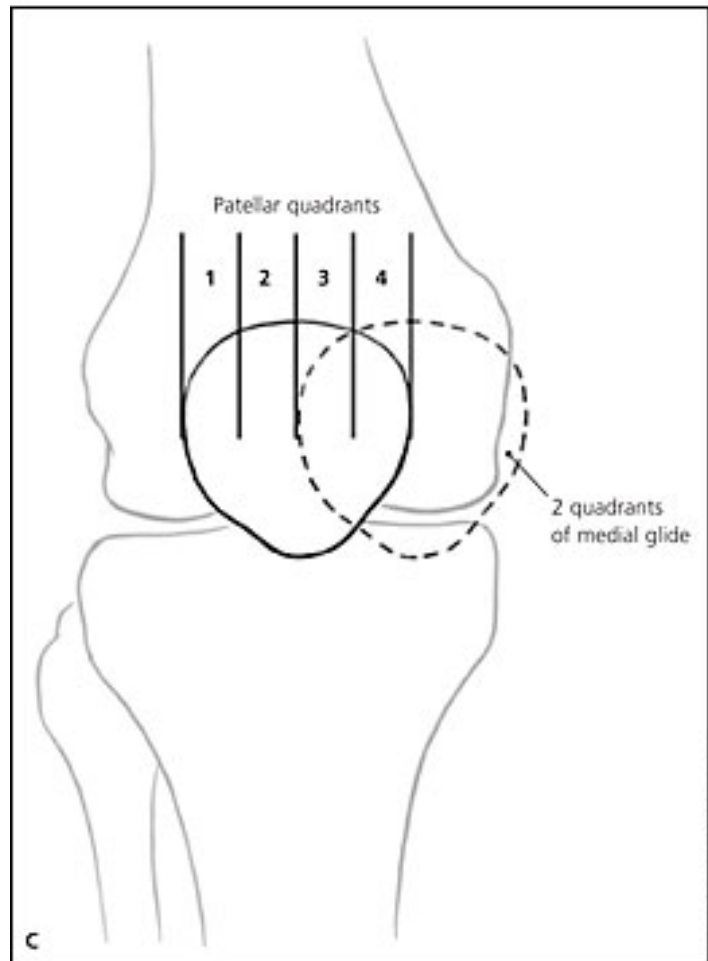
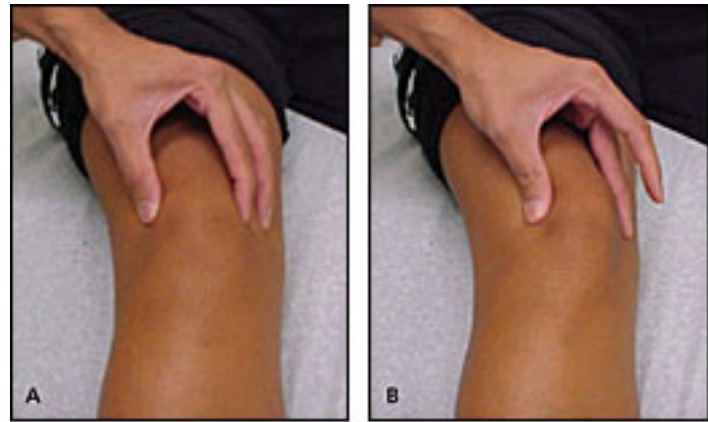


Mobility Testing

Displacement of less than one quadrant medially indicates tightness of the lateral structures.

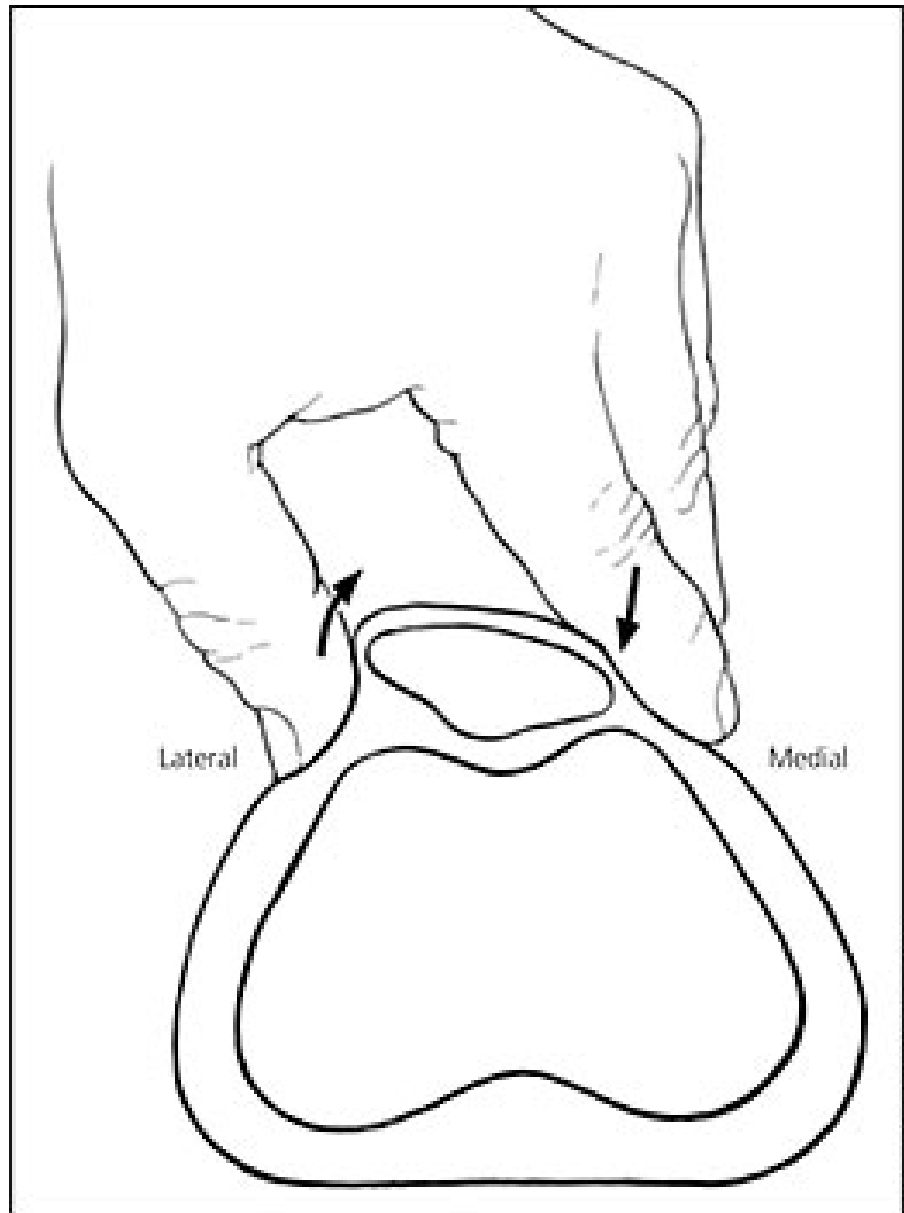
Displacement of more than three quadrants is considered hypermobile.

Fulkerson JP. Diagnosis and treatment of patients with patellofemoral pain. *Am J Sports Med.* 2002;30:447–56.



Patellar Tilt Test

Positive test (i.e., lateral aspect of patella is fixed and cannot be raised to at least horizontal position) indicates tight lateral structures



Clarke's
patellar
scrape
(grind) test is
most often
positive with
pain and
crepitation.



Patellofemoral
Pain Syndrome
is a clinical
diagnosis

**2013 ICD-10-
CM Diagnosis
Code M25.569**



Medical Management

- Interventions for PFPS include patellar taping, patellar bracing, selective strengthening of the vastus medialis muscle, iliotibial band stretching, ankle-foot orthotics, or a combination of these interventions.



Chiropractic Management

1. PRICEMM
2. Ice with HVG or Estim
3. NSAIDS (Day 3-10)
4. PRE: Vastus medialis final 20-30 degrees of extension
5. Stretching
6. Spinal manipulation (pelvic obliquity)
7. Myofascial trigger point pressure release
8. Orthotics (pes planus or cavus)
9. Taping



Knee Extension Rehab



Active Learning Task

- You have determined that your working diagnosis is “Patellofemoral Pain Syndrome” due to running.
- Please list the orthopedic examination testing with positive and negative findings that would confirm your working diagnosis. (10 minutes)
- Spokesperson presents (15 minutes)

Active Learning Task

Differential Diagnosis

- Groups of 3-4 doctors
- Select a spokesperson
- Create a list of 5 possible conditions
- Rule-in and rule-out diagnoses
- Select working diagnosis (es) (10 minutes)
- Spokespersons present (15 minutes)

Active Learning Task

- Your 45-year old female patient presents with bilateral, anterior knee pain without previous knee pain
- She began a running program 2 months earlier
- Her walking shoes are 3 years old
- No history of trauma to the knee
- She becomes uncomfortable (dull, ache) with sitting at her desk or when watching television
- Infrequent sharp, knee pain with walking and feels like knee is giving out

Thank You!

