

Patellofemoral Pain Syndrome

Background

1. Definition

- "Patellofemoral pain syndrome" (PFPS), "anterior knee pain", "runner's knee" is knee pain involving patella and retinaculum
 - Excludes other intra-articular and peri-patellar pathology
- Chondromalacia patella implies histological abnormalities of patellar articular cartilage
 - Not present in all pts w/PFPS

2. General information

- Patella
 - Sesamoid bone that articulates w/trochlear groove of femur
 - Acts as a lever, incr mechanical advantage of quadriceps muscle
 - Stabilized dynamically and statically

Pathophysiology

1. Pathology of dz

- Etiology unclear
- Thought to be related to imbalance of forces over joint and resulting altered patellar tracking caused by
 - Overuse/ trauma
 - Biomechanical problems
 - Muscular dysfunction or imbalance
- Overuse
 - Repetitive flexion and extension of knee (runners) can cause incr pressure at points of contact between patella and femur
- Biomechanical factors
 - Pes planus (pronation) "flat feet"
 - Pes cavus (supination) "high arched foot"
 - Abnormal "Q" angle
 - Angle formed by line drawn from anterior superior iliac spine to midpoint of patella and line drawn through midpoint of patella and tibial tuberosity
- Muscular dysfunction
 - Weakness in quadriceps especially VMO (vastus medialis obliquus)
 - Weakness in hip abductors, external rotators
 - Tightness in
 - ITB (iliotibial band)
 - Hamstring
 - Rectus femoris
 - Gastrocnemius
 - Soleus

2. Incidence/ prevalence

- 30% of all injuries seen in sports medicine clinics
- 9% of young athletes and 15% of military recruits report hx of PFPS
- Females > Males
- Accounts for 33% of all knee injuries in female athletes
- 18% of all knee injuries in male athletes

3. Risk factors

- Anatomic anomalies
 - Hypoplasia of medial facet
 - Global flattening of trochlear groove
 - Bipartite patella
- Malalignments and altered biomechanics of lower extremity incl
 - Genu valgum
 - Genu varum
 - Genu recurvatum
 - Leg-length discrepancy
 - Femoral anteversion
 - External tibial torsion
 - Lateral displacement of tibial tubercle
 - Excessive pronation of subtalar joint
- Muscle weakness in quadriceps, particularly vastus medialis obliquus
- Patellar hypermobility
- Poor quadriceps, hamstring, or iliotibial band flexibility
- Previous surgery
- Tight lateral structures: lateral retinaculum and iliotibial band
- Training errors or overuse
- Trauma

Diagnosics

1. History

- Achy pain behind, underneath, or around patella
- Usually gradual onset
- Pain worse w/
 - Prolonged sitting w/knees flexed (theater sign)
 - Climbing stairs
 - Squatting
 - Running
- Poorly localized: pt may draw a circle around patella (circle sign)
- Swelling is NOT characteristic
- Pts may feel popping or clicking
 - Locking suggests meniscal injury

2. Physical exam

- Inspection
 - Observe lower extremity alignment
 - Gait
 - Patellar tracking
 - Quadriceps bulk
 - Poor VMO tone common
- **"J" sign**
 - As knee is fully extended from 90° of flexion patella deviates laterally at full extension
- Palpation
 - Check for effusion (uncommon)
 - Muscle tone
 - Verify location of pain

- Check ligaments
 - ROM: usually normal, may have crepitus (non-specific)
 - May feel "pseudo locking" or "pseudo giving away"
- 3. Diagnostic testing
 - Lab studies: none indicated
 - Dx studies: Radiographs useful if
 - Trauma
 - Surgery
 - Effusion
 - Age >50
 - Very young pts
 - Failed conservative tx
 - Views: wt bearing, A/P, lateral, and sunrise
 - Indications for plain x-rays in knee injuries
 - Ottawa knee rules
 - Knee Injuries: Indications for Radiography
 - CT / MRI usually not needed
- 4. Special tests
 - Patellar glide:
 - Tests patellar mobility
 - In resting position, grasp patella and move it medially
 - Extent of displacement is described in relation to width of patella and is measured in quadrants
 - Displacement of less than one quadrant medially indicates tightness of lateral structures
 - Displacement of more than three quadrants is considered hypermobile
 - Patellar tilt:
 - Assess tight lateral structures
 - Extend knee
 - Grasp patella between thumb and forefinger
 - Compress medial patella posteriorly while elevating lateral side of patella
 - If lateral patella is fixed and cannot be raised to horizontal position (0 degrees)
 - Test is positive and indicates tight lateral structures
 - Also seen in pts w/patellofemoral osteoarthritis
 - Patellar Grind:
 - Test is positive if inhibition of patella causes pain
 - With pt supine, knee extended, examiner displaces patella inferiorly into trochlear groove
 - Ask pt to contract quadriceps while examiner palpates patella and provides gentle resistance to superior movement of patella

Differential Diagnosis

1. Chondromalacia patella
2. Osgood-Schlatter disease
3. Iliotibial band syndrome
4. Pes anserine bursitis
5. Patellofemoral arthritis

6. Neuroma
7. Patellar tendonitis
8. Plica syndromes of anterior knee
9. Radicular pain
10. Infection of knee joint
11. Tumor-knee joint, femur

Therapeutics

1. Acute tx
 - Main focus is reduction of pain
 - Ice: 10 to 15 mins at a time, especially after activity
 - Non-steroidal anti-inflammatory drugs for short-term pain relief
 - Rest: restrict painful activities
 - Avoid squatting and kneeling
 - Home exercise program
 - Restore quadriceps strength w/exercises
 - Exercise therapy with quadriceps strengthening reduces pain in PFPS
 - "Step downs"
 - Modified straight leg raise (Muncie method)
 - Also, stretching lateral structures such as IT band and patella
 - The Physician and Sports medicine: Coping With Patellofemoral Syndrome
 - http://www.physsportsmed.com/issues/2004/0704/labotz_pa.htm
 - Taping: Anterior Knee Pain in Clinical Sports Medicine
 - <http://www.clinicalsportsmedicine.com/chapters/24c.htm>
2. Further management
 - Continue above
 - Physical therapy
 - Refer if pt fails home program after 2-4 wks
 - Tx focus
 - Strengthening quads (especially vastus medialis)
 - Incr flexibility of lateral structures (vastus lateralis)
 - Exercise handout for PFPS
 - <http://familydoctor.org/online/famdocen/home/healthy/physical/injuries/479.html>
3. Long term care
 - Activity modification: develop plan to
 - Avoid activities that caused symptoms
 - Prevent recurrence
 - Bracing, patellar taping, foot orthosis: commonly used
 - Evidence is mixed for effectiveness
4. Related links
 - AAFP Management of Patellofemoral Pain Syndrome
 - <http://www.aafp.org/afp/20070115/194.html>

Follow-Up

1. Return to play
 - Return for follow up after completion of physical therapy program
 - Recommend for earlier follow-up if symptoms progress or fail to resolve

- During pre-season or early season training pts should start at 50% of activity and advance 10% per wk as tolerated
 - During late season training or before important events pts should limit aggravating activities during training
 - May participate in event if able to tolerate discomfort
2. Refer to specialist
- Surgical consult or sports medicine specialist if:
 - Symptoms persist 6-12 mos of rehab program
 - Other causes of anterior knee pain have been excluded

Prognosis

1. Non-operative tx eliminates symptoms in better than 75% of pts
2. 70% experience return of symptoms w/in 12 mos

Prevention

1. Preventive exercises are most important in eliminating relapse/treatment
 - Encourage pts to adhere to prescribed tx program

References

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2. Labelle, Cynthia M.D. Patellofemoral pain syndrome: evaluation and treatment . *Primary Care: Clinics in Office Practice* 2004; 31:977-1003 *MD Consult: Patellofemoral pain syndrome: evaluation and treatment: Primary Care: Clinics in Office Practice*
3. Potter, Patrick M.D. Patellofemoral Syndrome. *E-Medicine*. 3/16/2006. *eMedicine Clinical Knowledge Base, Institutional Edition*
4. Labotz, M, MD, Patellofemoral Syndrome, *Physician and Sportsmedicine*, 2004, Vol. 32: July 7

Evidence Based Inquiry

1. What exercises are most effective for relieving the pain of patellofemoral syndrome?

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