Anterior Knee Pain:
Patellofemoral Pain—a review
Overview

• Anatomy review
• A brief understanding of biomechanics
• The differential for anterior knee pain
• Pertinent history and physical
• Imaging—which one and when
• Overview of treatment to include a systematic review from 2003
• Summary and Questions
The Knee

- The Joint Compartments
  - Medial tibiofemoral
  - Lateral tibiofemoral
  - Patellofemoral
- The Patella
- The Joint Line
- The Meniscus
- Anterior and Posterior Cruciate Ligaments
- Medial and Lateral Collateral Ligaments
- Iliotibial Band
Biomechanics

• Position of patella at rest
  – Superior and lateral at full extension

• Tracking of patella through its movement
  – S-shaped path during flexion
  – Can be a wobbly path that requires soft tissue and boney restraint

• During closed chained exercise the quad force is minimal as the knee is extended and increases as it is flexed

• During open chained exercise the quad force required to extend steadily increases as the knee moved from flex to extend
Anterior Knee Pain

• Second most common site of knee pain
• Result of:
  – Articular cartilage damage
  – Retinacular tightness
  – Patellofemoral malalignment
  – Localized trauma
  – Periarticular soft tissue inflammation
• Tends to be synonymous with patellofemoral pain syndrome
Differential Diagnosis

- Injury to quadriceps or patella
- Large joint effusions
- Patellofemoral syndrome (commonly b/l)
- Osteoarthritis (adv stage all compartments)
- Prepatellar bursitis (Housemaid’s knee)
- Patellar tendonitis (Jumper’s Knee)
- Osgood Schlatter Disease
- Inflammatory arthritis
- Septic Arthritis
- Osteochondritis dissecans
History

• Mechanism of injury
• What part of knee is causing pain
• Relationship to activity
  – “Movie theater” sign
  – Running, jumping, squatting, downstairs, hills
• Quality
  – Dull and achy
• Uni or Bilateral
  – 50% bilateral
Symptoms of Knee Pain

• Localized pain
• Focal swelling
• Inflammatory changes
• Noises
• Effusion
• Loss of support
• Loss of smooth movement
Physical

• Tests:
  – Patellar compression
  – Heel to buttocks
  – Palpation of bursae
  – Crepitus with ROM
Other tests

- General Observation
  - Bony malformation
  - Abnormal alignment
  - Quadriceps atrophy
  - Retinacular tightness
  - Elevated quadriceps angle

- Knee Exam
  - Effusion
  - Patellar tracking
  - Crepitus
  - Compression
  - “J” sign
  - Lateral pull test
  - Patellar glide test
  - Patellar tilt test
  - Q angle (QAF)
  - Tubercle sulcus angle
  - Palpation of the peripatellar soft tissues
Imaging

• Diagnosis is clinical, but if no improvement after 6 weeks of nonoperative treatment consider:
  – Weight bearing AP
  – Weight bearing AP view at 45 flex
  – Lateral view at 30 flex
  – Axial view with knee at 30 or 45 flex
Overview of Treatment

• Nonoperative treatment
  – Rest
  – Physical therapy
  – Patellar taping
  – Biofeedback
  – NSAIDs
  – Shoe orthoses
  – Knee sleeves
  – Resistive knee brace
  – Acupuncture
  – Injections of glycosaminoglycan polysulfate.
Systematic Review
by Bizzini et al., 2003

- Systemic Review of the Quality of Randomized Controlled Trials for Patellofemoral Pain Syndrome
- Conclusion: based on results of trials with sufficient level of quality recommended
  - Acupuncture
  - Quad strengthening
  - Use of resistive brace
  - Combination of exercises with patellar taping and biofeedback
  - Soft foot orthotics for excessive foot pronation
Acupuncture—appears to be effective

• Jensen et al (1999)
  – Mechanism for relief is unclear
  – Related to the gate and endorphin theories for pain reduction
  – 4 week intervention showed improvement of symptoms at 12 month follow up
  – Highest value for methodology
  – Weak study in terms of randomization
  – Can be difficult to create a blinded study
Injections and/or Exercises unclear

- Kannus, et all (1998)
  - Intra-articular and Intra-muscular injections of glycoaminoglycan polysulfate (GAGPS)
  - Inhibit degradative enzyme reactions, to inhibit the inflammatory cascade
  - Stimulate metabolism of chondrocytes and synovial cells

- 2 studies with follow up at 6 weeks, 6 months, and 7 years.

- Showed no significant difference in groups.

- Conflicting study done in 1990 claims positive relief. Therefore unclear role for injections.
Exercise, Education, Taping—positive for combo tx with exercise

- 4 groups, looking at combined treatment
  - Exercise, taping and education
  - Exercise and education
  - Taping and education
  - Education alone.
- Patients who received the exercise program were more likely to be discharged after 3 months
- Patient satisfaction was used as the criterion for discharge.
- No significant differences in pain, anxiety and depression, quad strength, and function at 3 mo and 1 year follow up
Kinetic Chain Exercises—positive results with any program

• Witvrouw et al (2000)
  – Evaluated the efficacy of non-weight bearing exercises vs weight-bearing exercises
  – Increased function and decreased pain in both groups
  – No difference in pain, muscle performance, and functional outcomes between groups.
Exercise with Knee Brace
some positive evidence

• Timm et al (1998)
  – Compared a group using Protonics brace during daily activities against a control group of no treatment.
  – Brace provided progressive resistance to knee motion in sagittal plan
  – Showed improved function and reduced pain
Options for braces
Sacroiliac Joint Manipulation: some positive evidence

  - Documented presence of quadriceps activation failure (QAF) in patients with anterior knee pain
  - Speculated that SI joint dysfunction may adversely affect patellofemoral biomechanics
  - Reports that patients who received DI joint manipulation had short-term results decreasing QAF.
PT Program, Foot Orthotics
some positive evidence

• Eng et al (1993)
  – Looked at soft foot orthotics in a group of adolescent females with excessive foot pronation.
  – 16 weeks of a physical therapy program consisting of exercises and wearing of soft foot orthotics were shown to have significant reduction in pain as compared to physical therapy alone.
Low-level Laser unclear

• Rogvi-Hansen et al (1991)
  – Looked at difference in symptoms between patients with arthroscopically diagnosed chondromalacia patellae who received real versus sham low-level laser.
  – Results showed that low-level laser treatment was not effective in the management of pain.
Patella Mobilization
unclear

• Rowland et al (1999)
  – Comparison of those who received detuned ultrasound versus patellar mobilization.
  – Reported no difference in functional outcome, but mobilization group showed significantly lower levels of pain at one month
PT and Patellar Taping unclear

  - Physical therapy for 8 weeks incorporating stretching and isometric, isotonic, and isokinetic quad strengthening versus the same exercises with patellar taping.
Patellar Brace—no adequate evidence

  - Compared 3 groups
    - “dynamic patellar brace”
    - knee strap
    - no-brace
  - No difference in pain reduction

- Finestone et al (1993)
  - Compared 3 groups
    - Elastic knee sleeve with patellar ring
    - Simple elastic sleeve
    - No treatment
  - No difference in pain reduction
  - Wearing the sleeve with ring resulted in skin abrasions.
Medications—no adequate evidence

- Fulkerson et al (1986)
  - Compared diflunisal and naproxen in patients with anterior knee pain.
  - Reported significant levels of pain relief for both.
  - Patients had a variety of conditions that were primarily inflammatory
Modalities—no adequate evidence

• Antich et al (1986)
  – First RCT to evaluate effect of different modalities on strength and improvement for chondromalacia patella, infrapatellar tendonitis, peripatellar pain.
  – Ice, phonophoresis, iontophoresis, and ultrasound-ice contrast were compared
  – Results suggested ultrasound-ice was most effective for treatment of pain
Case Study
Mascal et al 2003

• 2 Cases on evaluating management of anterior knee pain targeting hip, pelvis, and trunk muscle function

• Conclude that you should consider treatment of hip, pelvis, and trunk if a patient has abnormal lower body kinetics

• Looked at active, passive, and accessory mobility of the rearfoot, tibiofemoral joint, hip joint, and lumbar spine
Summary

• There are a lot of options for outpatient management
• But, there is no clear guidelines as to what works
• Important to start out with a clear diagnosis
• Evaluate the joints above and below to look for comorbid conditions
• Treatment should focus on patient education, flexibility, quad strengthening, short term use of braces if needed, orthotics for foot pronation, and close follow up.
Questions