Patellofemoral Pathology

Matthew Murray, MD
UT Health Science Center/UT Medicine
Sports Medicine and Arthroscopic Surgery

I have disclosed that I am a consultant for Biomet Orthopaedics.

Anterior Knee Pain

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Anterior Knee Pain

- Patellar chondromalacia
- Patellofemoral Pain
- Patellofemoral syndrome PFS
- Loose kneecaps
- Patellar malalignment
- Girl's knees
- Tendinitis
- Growing pains

Patellofemoral Syndrome

- Pathology
  - Overuse
  - Malalignment
  - Trauma
- Increased subchondral bone activity
- Typically normal radiological studies
  - Including MRI

Important to differentiate pain versus instability
Symptoms can overlap, but typically caused by one or the other
PFS - History

- Typically atraumatic
  - Sometimes describe remote injury or fall
- Can describe knee giving way or buckling
  - But not a true dislocation or subluxation
- Pain with stairs
- Pain with prolonged knee flexion
- Can have some anterior swelling
  - But not a frank effusion

PFS - Exam

- Pain with patellar compression/grind
  - Differentiate from patellar apprehension
- Rule out
  - Patellar tendinitis
  - Pes anserine bursitis
  - Medial plica
  - Saphenous neuritis
  - IT band syndrome

PFS - Management

- Nonsurgical - Mainstay of treatment
  - Activity modification
  - Quadriceps Strengthening
    - Closed versus open chain
    - Traditional Isolated VMO exercises
      - Not supported by recent literature
  - Hip/Core strengthening
  - Flexibility - quadriceps
  - Bracing/Taping
PFS - Management

- Surgical
  - Rarely necessary
  - Minimum 3 months of compliant rehab
  - Reconsider differential diagnosis
- Lateral release
  - For lateral patellar tilt
  - No history of patellar instability
  - Minimal patellar chondromalacia

Patellar instability

Epidemiology

- Annual incidence 5.8/100,000
- 30-40/100,000 in 10-17 year old population
- 11% Musculoskeletal Symptoms in office setting
- Higher incidence in females
- Etiology
  - 61-89% associated with sporting activities/military
  - Mechanism
    - Indirect 66-82% - noncontact
    - Direct – medial or lateral contact at 20-30deg of flexion
Anatomy

Early Flexion
- Only distal patella in contact with trochlear groove
- Quadriceps – dynamic stabilizer
- MPFL – primary static restraint to lateral translation

20 deg flexion
- Patella engages in trochlear groove
  - Stability due to lateral trochlea and medial soft tissues
  - Past 90 deg – medial facet articulates with lateral aspect of MFC

3 layers of medial knee
- 1 – VMO fascia
- 2 – Sup MCL/POL, MPFL
- 3 – Deep MCL

MPFL
- Inserts on superomedial patella, 6 mm below superior pole
- Origin - entire height of anterior aspect of medial femoral epicondyle
  - Anterior and distal to add tubercle
  - Posterior and superior to medial epicondyle

MPFL
- Thickening of medial retinaculum
- Early studies found variable existence of MPFL
- More recent studies have shown a distinct structure 100%
- Mean failure load – 208 N
- Almost universally disrupted in patella dislocation
  - Typically avulsed off femoral insertion
  - Less commonly intrasubstance tear
  - Rarely off patella → in Adults
biomechanics

- Isolated sectioning of MPFL – 50% increase in lateral translation of patella
- MPFL resists lateral patellar translation from 20-90deg
  - Minimal contribution to stability past 90deg
  - Due to bony constraint of femoral trochlea

Physical exam

- Effusion
- Hemarthrosis
- ACL
- Meniscus
- Patella dislocation
- Joint line tenderness
- Thorough ligamentous exam
- Apprehension test/Laxity
- Compare contralateral side/signs of hyperlaxity

Associated Injuries

- Osteochondral Injury – up to 70% in first time dislocations
  - Medial patellar facet
  - Lateral femoral condyle
  - Loose bodies
Imaging

Radiographs
- AP
- Lateral
  - Patellar Height
  - Insall-Salvati
  - Modified Insall-Salvati
  - Blackburne-Peel
  - Caton-Deschamps
  - Blumensaat line

Imaging

MRI
- Confirm injury
- Evaluate ACL, MCL, meniscus
- Evaluation of medial-sided structures
- 85% sensitive for MPFL injuries
- 50-80% MPFL disrupted from femoral origin
- Identifying chondral injuries/loose bodies
- Typical bone bruise pattern

Imaging

Dejour et al 1994
- CT and Radiographic Factors contributing to patellar instability
  - Trochlear Dysplasia (80%)
  - Quadriceps Dysplasia – affecting patellar tilt (83%)
  - Patella alta – Caton-Deschamps 1.2 or greater (24%)
  - TT-TG ≥ 20mm (56%)
management

- Nonoperative treatment – acute dislocation
  - Immobilization 3-6 weeks
    - Stiffness
    - Similar recurrence as early motion
  - Immediate functional rehabilitation
    - Functional patellar brace
    - Early rom
    - Closed chain exercises
  - 40-50% recurrence rate either treatment
    - Only 16% return to play by 6 weeks
    - Only 2/3 RTP by 6 months

management

- Operative indications – controversial
  - Osteochondral loose bodies
  - Failure of nonoperative management
  - Recurrent instability
  - Avulsion of MPFL – femur or patella
  - Persistent patellar subluxation
  - Consider age, activity level
  - Proximal realignment
  - Distal realignment
Operative Treatment

- More than 100 described operations
  - REPAIR
  - RECONSTRUCT
  - RELEASE
  - REALIGN

- No defined Gold Standard operation
  - lack or prospective randomized trials
  - No two studies have used the exact same procedure

MPFL Repair

- Medial Retinacular Repair (Reefing)
  - Injury to the medial structures is a constant
  - Useful for acute traumatic dislocation with loose body
  - Or failed nonoperative treatment
  - Mainstay of early surgical treatment of these injuries
  - Combined with lateral release

Case 1

- 15 yo male seen 2 days after twisting injury to Left knee while landing after a lay-up
  - Large effusion
  - Difficult exam
  - No frank apprehension
  - 2+ med/lat instability – symmetric to contralateral side
MPFL Reconstruction

- 1990s – Biomechanical Importance of MPFL
  - Techniques evolved
    - Several graft choices
    - Numerous fixation methods
  - All graft choices well exceed 208N threshold
  - Graft needed to guide patella into trochlea at 10-30deg
    - Not expected to hold patella in place once engaged in trochlea

MPFL Reconstruction

- No gold standard technique
- Numerous graft choices
  - Hamstring
  - Patella
  - Quad
  - Allograft
- Numerous fixation methods
  - Tunnels
  - Suture anchors
  - Suture buttons
  - Interference screws
  - Screw and washer
Case 2

- 14 year old male
- Initial nonoperative management for first dislocation
- Braces, PT
- 2 subsequent dislocations
Rehabilitation

- Repair or Reconstruction
  - Immediate Weight bearing with brace locked
  - 6 weeks locked
  - Transition to functional patella brace
- Immediate ROM with reconstruction
  - Advance slowly to full ROM by 3 months
- Start ROM at 4-6 weeks with repair
- Running 3-4 months
- Return to play typically at least 6 mos

Distal Realignment

- Patella Alta
- Increased Tibial Rotation (TT-TG > 20mm)
- Fulkerson Osteotomy (Anteromedialization)
Case 3

- 27 year old female with 10 year history of left patella dislocations
- Most recent 10 days prior to presentation
Summary

- The treatment for patellofemoral syndrome is physical therapy
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- Easy to confuse patella dislocation for ACL injury
- Non-operative treatment typical for primary patella dislocation
  - 40-50% recurrence rate
- Surgical management for 1st time dislocation
  - Loose body – Arthroscopy with medial repair
  - MPFL avulsion – medial sided repair
- Recurrent Instability
  - MPFL reconstruction
  - Distal realignment