Patellofemoral Disorders

• One of the most common problems seen in the knee surgeons office
• They remain oftentimes difficult and frustrating to manage
• Anterior knee pain is very common in the workplace setting

Classification of Patellofemoral Pathology

• TRAUMA
  • direct impact (e.g. dashboard knee)
  • Fracture
  • Tendons rupture (quadriceps, patellar tendon)
• DISLOCATION
• MALALIGNMENT
  • patellar compression syndrome
  • OCD
• Patellar instability
• ARTICULAR CARTILAGE DISORDERS INCLUDING ARTHRITIS
• TENDINITIS, APOPHYSITIS

Patellar Dislocation: Define

• Patella Completely leaves the trochlear groove
• It dislocates laterally
• It can be traumatic as a result of an acute injury
  • it can also be relatively atraumatic in someone with congenital factors
  • it can be partial or a SUBLUXATION

Acute Patellar Dislocation

• Be suspicious, may be confused with MCL sprain, beware associated injuries
• Hemarthrosis/medial epicondyle and/or medial patellar border tenderness
• Suspect displaced osteochondral damage
• X-rays, MRI

Acute traumatic hemarthrosis without fracture

• Knee swelled within hours after injury (has to be blood)
• ACL most common
• PATELLAR DISLOCATION second most common
• Other causes: Osteochondral fracture not seen on X-ray, deep MCL tears, PCL, peripheral meniscal detachments
• can easily be confused with MCL or other injuries

What’s typically injured?

• Medial patellofemoral ligament
• Medial patellar avulsion (margin) fracture
• Non-displaced articular injury
• Displaced articular injury
**Radiographs**
- In addition to normal AP and lateral, always get axial or “sunrise” views of patella

**Osteochondral injury**
- Patellar bone bruise/avulsion fx 28-41%
- Contusion lat femoral condyle 31-100%
- **MY opinion:**
  - ALWAYS GET MRI after acute traumatic dislocation

**Why MRI??**
- Chondral, osteochondral injury
- Associated Injuries
  - Location of soft tissue damage
  - Exact position of patella
- Associated factors that led to a dislocation

**MPFL and Medial Restraints Tear after Acute Dislocation**

**Non-operative treatment**

<table>
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<tr>
<th>Author</th>
<th>F/U</th>
<th># Knees</th>
<th>Subjective</th>
<th>Recurred</th>
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<tr>
<td>Cofield 1977</td>
<td>11.8 yrs</td>
<td>48</td>
<td>67% satisfied</td>
<td>44%</td>
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<td>Hawkins 1986</td>
<td>40 mos.</td>
<td>20</td>
<td>50% mod/severe</td>
<td>15%</td>
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<tr>
<td>Cash 1988</td>
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<td>103</td>
<td>58% good ex</td>
<td>29%</td>
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<tr>
<td>Garth 1996</td>
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<td>69</td>
<td>66% good ex</td>
<td>26%</td>
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<tr>
<td>Nikku 1997</td>
<td>2 yrs.</td>
<td>55</td>
<td>71% good ex</td>
<td>27%</td>
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**Highest recurrence rates**
- Young, skeletally immature patients
- Young females
- Occurs with minimal trauma
- Patients with history of instability in other knee
- Predisposing factors: patella alta, trochlear dysplasia, bony malalignment
- Not as high in middle aged work place injury, but still significant
Preferred treatment

Consider arthrocentesis to allow possible reduction of medial soft tissue injury
Immobilization in extension to allow early ligament healing and minimize swelling, WBAT
MRI for traumatic dislocations with hemarthrosis

Why Treat Non-Operatively When There Is An Acute Tear and Recurrence Rate is High?

Non-operative treatment has similar results to operative treatment of primary dislocation
Since we can't predict who will do well with non-operative treatment, we should avoid operative treatment unless there is a displaced articular surface fragment

“First, do no harm”

Is repair/realignment warranted after an acute patellar dislocation?

My indications for MPFL repair:
1. Large osteochondral/chondral fractures requiring fixation
2. Asymmetrical static lateral displacement of the patella with massive sleeve avulsion off patella

Other Possible Roles for Acute Repair

Patients who cannot afford the chance of recurrent instability due to work or sport considerations
Poor reduction of the patella S/P dislocation

Anatomic Consequences

MPFL (80%)
Inferomedial Patella Avulsion (40%)
Nondisplaced Patella Avulsion (20%)
Patella Sided Injuries-MPFL
Femoral Sided Injuries-MPFL

Causes of Instability in Addition to Loss of Medial Restraints

Trochlea Dysplasia (85%)
Quadriceps Dysplasia (85%)
TT-TG ≥ 20 mm (56%)
Patella Alta (24%)

Exception

Unstable osteochondral fragments require early surgery for ORIF or excision, medial repair

Patellar Dislocation/Instability strategy

Non-op treatment 70% good or excellent leaves 30% considering more treatment
Of those 30%, surgery later for recurrent instability would have 80% success
Total satisfied pts 70%+24%=94% of patients initially injured with this strategy

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“First, do no harm”
Causes
- Femoral Anteversion
- External Tibial Torsion
- Genu Valgum
- Patella Alta
- Excessive Q Angle and High TT-TG
- Ligamentous Instability
- VMO Dysplasia
- Tight Lateral Retinaculum

Proximal Stabilization Procedures
Indicated for recurrent lateral instability of the patella where there is evidence that the medial soft tissue restraints are deficient.
The primary restraints are passive:
- Trochlea
- Medial soft tissue restraints

The primary restraints are passive!
MPFL is the primary static soft tissue restraint against lateral patellar loads.
Reconstruction of the MPFL restores tracking to near normal when the medial restraints are deficient.
Conlan et al, JBJS 1993

Why does the Patella Dislocate?
"There exists no evidence that any amount of malalignment will cause dislocation unless the passive stabilizers are damaged."
Davis and Fithian '02

Options for Proximal Stabilization
- Repairing/refixing medial restraints
- Arthroscopic
- Mini-open
- Open
- VMO advancement
- Reconstructing a medial restraint
- Anatomic MPFL Reconstruction
- Better control over tensioning, tracking, does not depend on quality of soft tissue

MPFL Reconstruction with Double limb Semitendinosus
Vu-Medi AANA Knee Surgical Techniques
Bio-tenodesis screw on femoral side
"Reverse Loop" suture anchors in trough on patella

Lateral Retinacular Lengthening versus lateral release
1. I probably only do something laterally with MPFL reconstruction 20% of the time
2. I prefer lengthening for instability cases
3. If you are a releaser, do last!

Distal realignments are for instability and/or pain/chondrosis associated with tubercle malalignment
Assessing Tubercle Malalignment

1. Quadriceps or q-angle
2. Tuberosus angle
3. TT-TG Distance
   - CT measurement of distance between center of trochlear groove and center attachment of patellar tendon on tubercle

TT–TG: distance between center of trochlear groove and center of PT attachment on tibial tuberosity

Jones Study
- Normal up to 12
- Abnormal greater than 15

Schepsis study:
- Normal up to 12
- Abnormal greater than 15

TIP: Pay attention to TT-TG >20 mm

CT Tracking Study for complex instability/malalignment
- Underutilized tool
- Mid-axial image of patellar joint from 0 to 60 degrees in 10 degree increments
- Allows tracking measurement in early flexion where instability usually occurs

More precise anatomical measurements

Tubercle Osteotomy

Patella Alta

Severe cases (>1.4)
- Distal tubercle transfer

Distal Transfer (step cut)
- Step cut will have much higher stress risers
- NWB 6-8 weeks plus

Anteromedialization: larger 8 cm shingle osteotomy

Case Example: AMZ procedure

Fresh OA patellar graft & AMZ: osteotomy approach with LR lengthening

Anteromedialization

Anteriorization

Tip: Only anteriorize if you are unloading distally based lesions
Combined proximal and distal patellar escape at 20 degrees trochlear dysplasia T-T of 20 mm MRI grade 3 changes distal medial quadrant of patella

22 yo female

Dislocatable Patella

Proximal Stabilization and Distal Realignment

Trochleoplasty (short, flat lateral trochlea → raising lateral condyle)

Average Rehabilitation Times for Return to Full Duty
- MPFL Reconstruction: 4 months
- Tubercle ostetomy, with or without MPFL: 6 months
- Cartilage Restoration procedure: ACI, OATS, Allograft: 8 months to a year
- Final prognosis usually most dependent on status of articular cartilage

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Thank You