Differential Diagnosis
of Knee Pain

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• Research support: Porter Adventist Hospital
• Royalties: Innomed
• Evaluation of knee pain

• Differential diagnosis

• Specific knee conditions
Evaluation of Knee Pain

• Meticulous gathering of patient history
• Thorough physical exam
• Imaging studies
• Possible laboratory studies
• Possible arthrocentesis
Most Diagnoses Can Be Made With:

- History
- Physical exam
- Plain radiographs
History

- Age, gender
- Duration of pain
- Location
- Quality
- Alleviating factors
- Exacerbating factors
- History of trauma
- Locking, catching, swelling
- Weight-bearing pain
- Night pain
History

- PMH
  - Previous surgery?
- Meds
  - Steroids? NSAIDs?
- Social hx
  - EtOH? Smoking?
- Family hx
  - Rheumatologic conditions?
- ROS
Physical Exam

- Spine
- Hip
- Knee
Spine Exam is Part of the Knee Exam!

- Physical examination of the lumbar spine
- Unexplained “knee” pain
- Referred pain from lumbar radiculopathy
- Spinal stenosis
Hip Exam is Part of the Knee Exam!

• Physical examination of the hip
• Referred pain from the hip
• Hip arthritis
• Failed THA
Physical Examination of the Knee

- Observation
  - Gait pattern (antalgia)
  - Spine, pelvic deformity
  - Muscle atrophy
  - Skin and prior incisions
  - Alignment
    - Varus
    - Valgus
  - Effusion
Physical Exam

• Palpation
  – Crepitus
  – Tenderness
    • Medial joint line
    • Lateral joint line
    • Peripatellar
    • Pes bursa
  – Pulses
Physical Exam

• Motion
  – Active motion
  – Passive ROM
  – Contractures
  – Fixed vs correctable deformities
Physical Exam

- Stability
  - Lachman
  - Anterior drawer
  - Posterior drawer
  - Pivot shift
  - Varus / valgus
Physical Exam

• **Strength**
  - Quadriceps
    • Extension lag?
  - Hamstrings
Physical Exam

• Neurologic exam
Differential Diagnosis

- Extra-articular
- Peri-articular
- Intra-articular
Differential Diagnosis

• Extra-articular
  – Lumbar spine pathology
    • Degenerative disc disease
    • Nerve root impingement
    • Spinal stenosis
Differential Diagnosis

• Extra-articular
  – Hip pathology
    • Arthritis
    • AVN
    • Fracture
    • Failed THA
Differential Diagnosis

• Extra-articular
  – Vascular disease
    • Insufficiency
    • Aneurysm
    • Thrombosis
Differential Diagnosis

• Extra-articular
  – Psychological illness
Differential Diagnosis

- Peri-articular
  - Tendonitis
    - Patellar
    - Quadriceps
    - Hamstring
    - Iliotibial band
Differential Diagnosis

• Peri-articular
  – Bursitis
    • Prepatellar
    • Pes
Differential Diagnosis

- Peri-articular
  - Cutaneous neuroma
  - Saphenous neuralgia
Differential Diagnosis

• Peri-articular
  – Reflex sympathetic dystrophy
Differential Diagnosis

• Intra-articular
  – OA
  – Meniscal pathology
  – Ligament compromise
  – Osteochondritis dissecans
  – AVN
  – SPONK
  – Inflammatory arthropathy
Imaging Studies

- X-rays
- MRI
- CT scan
- Bone scan
Radiographs

- **AP**
  - Weight-bearing
  - Fracture, joint space narrowing, OCD, loose bodies, alignment

- **Lateral**
  - Lateral decubitus with knee flexed 30 to 45 deg, tension on tendon
  - Patellar alta, baja
  - Patella fx
Radiographs

• Merchant
  – Patellar tilt, subluxation, dislocation
  – Osteochondral fx
  – PF osteophytes
Additional Radiographs

- PA flexion (Rosenberg)
  - Flexion WB radiograph
  - Assessment of early joint space narrowing
  - OCD
Additional Radiographs

- **Hip-to-ankle**
  - Limb alignment
  - Hip pathology
  - Pre-op templating
MRI

- Consider MRI when plain radiographs appear normal but need to further evaluate source of knee pain
- Reasonable for aiding in diagnosis of SPONK, AVN, meniscal tear, ligament tear
CT Scan

- Fracture diagnosis
  - Occult fracture
  - Fracture pattern
- Patella-femoral mal-alignment
- Assess bone loss, defects
Bone Scan

- Technetium 99m
- Historically useful for diagnosis of SPONK
- Focally intense uptake of affected condyle or tibial plateau
- Less commonly utilized with the advent of MRI
Specific Knee Conditions
Meniscus Tear

• **Traumatic**
  - Twisting injury
  - Can be associated with ligament injury, hemarthrosis

• **Degenerative**
  - Usually complex tears
  - Locking, catching, giving way, effusions
  - Exacerbated by hyperflexion
Osteochondritis Dissecans

- More common in males
- Age 15 to 20
- MFC lateral aspect
- Gradual onset of symptoms
- 50% trauma hx
- Pain and locking if detached fragment
SPONK

- 3x more common in females
- Older than 60 yo
- Sudden onset of pain
- Worse at night
- Acute phase 6 to 8 wks
SPONK

- Focal area of severe tenderness on medial femoral condyle
- May appear locked due to pain, effusion, muscle spasm
- Usually medial fem condyle but can also be lateral fem condyle, tib plateau
SPONK

- Stage 1 – normal x-rays, positive bone scan, bone edema on MRI T2
Stage 2 – flattening of weight-bearing portion

Stage 3 – radiolucent area, sclerotic halo
• Stage 4 – subchondral collapse
• Stage 5 – bony collapse with secondary degeneration
SPONK

- **Non-op rx**
  - Crutches, NSAIDS, PT
  - Good results with symptomatic rx

- **Operative**
  - Scope debridement
  - Osteochondral allograft
  - HTO
  - Core decompression
  - Arthroplasty
Secondary Osteonecrosis

- Younger than 45 yo
- Gradual onset of pain
- > 80% bilateral
- Multiple lesions
- Often have concomitant hip involvement
- Steroids, EtOH, SLE, sickle cell anemia, Gaucher’s, caisson
Secondary Osteonecrosis

• **Non-op rx**
  - Crutches, NSAIDS, PT
  - POOR results with conservative rx

• **Operative**
  - Scope debridement
  - Osteochondral allograft
  - HTO
  - Core decompression
  - Arthroplasty
Inflammatory Arthritis

- Systemic conditions
  - Rheumatoid arthritis
  - Psoriatic arthritis
  - Reactive arthritis
  - Colitis-associated arthritis
  - Undifferentiated spondyloarthropathy
  - Lupus
  - Sarcoidosis
  - Behcet’s disease
Inflammatory Arthritis

- Crystal-associated
  - Gout
  - Calcium pyrophosphate disease
  - Calcium oxalate disease
**Arthrocentesis**

<table>
<thead>
<tr>
<th>Inflammatory</th>
<th>Septic</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC 2000 - 75,000</td>
<td>WBC &gt; 100,000</td>
</tr>
<tr>
<td>PMN &gt; 50%</td>
<td>PMN &gt; 75%</td>
</tr>
<tr>
<td>Crystals - present?</td>
<td>Crystals - none</td>
</tr>
<tr>
<td>Culture - negative</td>
<td>Culture - positive</td>
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</tbody>
</table>
Inflammatory Arthritis

- **Treatment**
  - NSAIDs
    - COX-2 selective inhibitors
  - Corticosteroids
Inflammatory Arthritis

- **Treatment**
  - Disease-Modifying Anti-rheumatic Drugs
    - Hydroxychloroquine, sulfasalazine, methotrexate, leflunomide, etanercept, infliximab, akakinra, adallimumab
  - Biological Response Modifiers
    - TNFα antagonist
    - IL-1 antagonist
Summary

• A thorough history, physical exam, and plain x-rays can establish diagnosis in most cases
• Differential diagnosis should include extra-articular, peri-articular, and intra-articular etiologies
• Ancillary testing / imaging may be helpful in equivocal cases
Thanks for your attention

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