I have nothing to disclose.
At the end of this session you will be able to...

1. List 3 physical exam maneuvers to identify meniscus tear
2. Identify 2 red flag indications for knee arthroscopy
3. Identify physical exam maneuvers that increase the likelihood of rotator cuff tear.
4. Describe treatment for femoroacetabular impingement of the hip.

Case #1

60 y/o woman presents with 3 months of medial knee pain. (+) swelling, and instability. No frank locking. Pain is worse with weight bearing. Better with rest, ice, and NSAIDs. Exam: Neutral knee alignment when standing, tender medial joint line + medial femoral condyle + medial tibial plateau. Small effusion. ROM 0-120, limited by pain. Mild crepitus. (+) medial McMurray, medial knee pain with squat. No ligamentous laxity.
What is the best next step for this patient?

A. Order knee MRI
B. Refer to physical therapy
C. Refer for arthroscopic partial meniscectomy
D. Refer for total knee arthroplasty

Case #1

60 y/o woman presents with 3 months of medial knee pain. (+) swelling, and instability. No frank locking. Pain is worse with weight bearing. Better with rest, ice, and NSAIDs. She brings a knee MRI for your review.

Exam: Neutral knee alignment when standing, tender medial joint line + medial femoral condyle + medial tibial plateau. Small effusion. ROM 0-120, limited by pain. Mild crepitus. (+) medial McMurray, medial knee pain with squat. No ligamentous laxity.
Joint line tenderness (JLT)

Medial: Sensitivity 83%, Specificity 76%
Lateral: Sensitivity 68%, Specificity 97%


Meniscus: McMurray test
Sensitivity medial 65%, Specificity medial 93%

Test for meniscus:
Internally rotate the tibia and extend → lateral meniscus
Externally rotate the tibia and extend → medial meniscus
Pain and / or snap/click at the joint line = concerning for meniscus tear

Video courtesy of Dr. Anthony Luke
Composite exam: JLT + McMurray

- JLT more sensitive than McMurray for meniscus tear
- McMurray more specific than JLT for meniscus tear
- Joint line tenderness LR 0.9 for positive exam
- McMurray LR 1.3 for positive exam
- Composite assessment LR 2.7 for positive exam

Standing: Meniscus: squat

- Patient stands flat-footed
- Examiner holds their hands for balance
- Patient squats as low as possible
- (+) If pain or feeling of locking while knees bent

Sensitivity 75-77%, Specificity 36-42%
### Criteria for diagnosis of knee OA

<table>
<thead>
<tr>
<th>Clinical</th>
<th>95% sensitive</th>
<th>69% specific</th>
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</thead>
<tbody>
<tr>
<td><strong>Knee pain and at least 3 of 6:</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Age &gt; 50</td>
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<tr>
<td>• Stiffness &lt; 30 minutes</td>
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<tr>
<td>• Crepitus</td>
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<tr>
<td>• Bony tenderness</td>
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<td>• Bony enlargement</td>
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<tr>
<td>• No warmth</td>
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</tbody>
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### Knee x-rays

3 views for knee pain
1. **Weight bearing** flexed PA (aka notch view)
2. Lateral of affected side
3. Sunrise or merchant view
Does arthroscopic partial meniscectomy (APM) help middle aged patients with degenerative meniscus tears +/- OA?

- ¾ studies show subjects treated with APM + PT versus PT alone both improved substantially over first year, no sig difference between groups
  - Limitation: difficult to interpret due to cross-over (30%) before assessment of the primary outcome
  - Factors associated with crossover from PT to APM: shorter duration of symptoms and higher initial pain score (Katz JN et al. JBJS 2016.)
- Patients with mechanical symptoms (clicking, locking) have similar outcomes after APM compared to those without mechanical symptoms (MacFarlane LA et al. Arthritis Care Res 73 2021.)

Osteoarthritis with meniscus tear

- Degenerative meniscus tear is part of the natural history of osteoarthritis
- Treat with non operative knee osteoarthritis protocol initially
- Imaging: Start with x-ray
- Consider referral for arthroscopy vs MRI if exam c/w meniscus tear and not improving with PT, though we need more evidence on this group (who might benefit from more rigorous PT)

OA treatment

From: Diagnosis and Treatment of Hip and Knee Osteoarthritis: A Review

Indications for knee surgery: meniscus
If x-rays were negative in case #1 I would consider ordering an MRI to look for the following:

- Meniscus tears that are not degenerative
  - Acute meniscus tear
  - Bucket handle meniscus tear
  - Meniscal root tear
Bucket handle meniscus tear

- Younger person
- Acute injury
- Usually medial (rarely lateral meniscus)
- Locked knee, effusion
- Benefits from urgent repair

Meniscal root tear

- 40-50 y/o patient
- Acute knee pain, relatively minor event, +/- hear a pop
- Pain posteriorly, moderate-large effusion
- Can lead to rapid development of OA (as if total meniscectomy)
- Root repair restores normal contact forces and is indicated urgently in patients who do not have OA

Faucett SC et al. Meniscus root repair vs meniscectomy or nonoperative management to prevent knee osteoarthritis after medial meniscus root tears. AJSM 3/8/18.
Case #2

57 y/o RHD man presents with R shoulder pain that started after he slipped and fell 3 months ago. Pain lateral shoulder deep to deltoid. He tried physical therapy without benefit. Waking at night from sleep due to pain.

Exam: Shoulder is nontender. Shoulder AROM intact with pain on abduction between 60 and 120 degrees. 4/5 strength with Empty can (aka Jobe’s) test, belly press and resisted external rotation on R side.

Radiographs of the R shoulder a few weeks post injury were normal.

What is the most likely diagnosis?

A. Biceps tendinitis  
B. Labral tear  
C. Impingement syndrome  
D. Rotator cuff tendinitis or partial thickness tear  
E. Rotator cuff full thickness tear
Shoulder exam: Range of motion is key

Active range of motion

1. Forward flexion
2. Abduction
3. External rotation
4. Internal rotation
Passive range of motion

1. Abduction (glenohumeral joint allows abduction from 0 - 90°; the rest of abduction is due to scapulothoracic motion)
2. External rotation
3. Internal rotation

Case #2

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Shoulder exam: Range of motion is key

Rotator cuff disease is common

- Prevalence of shoulder pain in general population: 14-34% \(^1,2\)
- Of patients with shoulder pain, RCD is cause in 65% \(^3\)

Rotator cuff disease (RCD)

1. Impingement
2. Tendinitis/tendinopathy
3. Partial thickness tear
4. Full thickness tear
Partial Tears

Small full thickness tear

Slide from Brian Feeley, MD; used with permission.
Painful arc for rotator cuff disease

- Examiner brings arm into abduction
- (+) If pain between 60-120°
- If painful, positive LR 3.7 for rotator cuff disease.
- This is the most sensitive and specific pain provocation test for rotator cuff disease (more so than Hawkins, Neers).

JAMA. Rational clinical exam: Does this patient have rotator cuff disease? Aug 2013.
Empty can test (Jobe’s test)

71% sensitivity
41% specificity for rotator cuff disease.
(+) LR 1.3

JAMA. Rational clinical exam: Does this patient have rotator cuff disease? Aug 2013.

Belly press
Subscapularis
Resisted external rotation
Infraspinatus

Rotator cuff disease treatment

- Impingement
- Tendinitis, tendinopathy
  \[
  \text{PT} +/\ - \text{Injection} \\
  +/\ - \text{Medication}
  \]

- **Traumatic full thickness tear → orthopaedics referral.**
- **Atraumatic partial and full thickness tears → data unclear about what’s best: surgery or no surgery**

Algorithm impingement/partial thickness

1. Impingement or partial thickness tear
   - Mild pain with activity
   - Night pain
     - Physical therapy
     - NSAIDs
     - Not better
     - MRI to evaluate rotator cuff tear. Consider injection
     - Not better
     - Surgical consult
     - Better

2. Moderate pain with activity
   - Wakes patient up
   - Physical therapy
   - NSAIDs
   - Consider injection
     - Better
     - Home exercise program

Algorithm full thickness tears

1. Suspect Full Thickness Cuff Tear
   - Acute
     - MRI: full thickness tear
     - Surgical consult

2. Chronic
   - Physical therapy
   - Injection
     - Better
     - Monitor
     - Not better
     - MRI: tear
     - Surgical consult
Benefits of subacromial corticosteroid injections (CSI) in rotator cuff disease?

- Maybe small benefit for CSI over placebo at 4wks. Difficult to pool data due to heterogeneity. (Buchbinder R. et al. Cochrane Database Syst Rev. 2003.)
- CSI better than controls for pain relief and function, in short term follow-up. Ultrasound guided steroid injections better than landmark-guided injections in the shortest follow-up interval. Overall evidence quality is low and very low – the recommendation is to measure effect to determine whether or not progress is made if giving this treatment. (Steuri R et al. BJSM 2017).

Risks of CSI use in rotator cuff disease?

- Repeated preoperative CSIs may increase retear rates postoperatively (Addison C et al. Arthroscopy 2020.)
- Preoperative CSIs may be associated with increased risk of revision rotator cuff repair (Kunze KN et al. Arthroscopy. 2020.)
Main goals for the internist

- Identify patients who have RCD
  - Of those, identify those who have full thickness rotator cuff tears and refer
    - Especially when
      - Acute injury (acute tendon tear)
      - Acute change in clinical course (known tear, now increased in size)
- Think of MRI as a useful to guide surgery

Case #3

- 29 y/o woman with R hip pain
- Localizes to R groin
- Started when running on sand
- Was running 10 miles/week
- Pain 2/10 sitting, 5/10 standing
- Aleve helps
- Groin pain can be sharp with certain movements
- Did PT but didn’t help
- No h/o amenorrhea, no eating disorder, no h/o stress fracture

Case #3 exam

- No ecchymosis
- Tender R inguinal canal
- ROM: bilateral flexion 130, IR 40 and ER 60 but R groin pain with flexion and IR.
- FADIR and FABER R hip cause R groin pain
- No pain with FADIR and FABER L hip

What’s the diagnosis?

- Greater trochanteric pain syndrome
- Sacroiliac joint dysfunction
- Femoroacetabular impingement
- Femoral neck stress fracture
- Hip osteoarthritis
Locate the hip pain

- Anterior groin = hip joint, hip flexor
- Buttock = Lumbar spine, SI joint, hamstring origin (ischial tuberosity)
- Lateral hip = greater trochanteric pain syndrome, iliotibial band syndrome, meralgia paresthetica
- Radiating to thigh = could be hip joint
- Radiating to the foot = lumbar spine

Hip PROM

Video from UCSF MSK Exam Tutor iOS App:
FADIR

Video from UCSF MSK Exam Tutor iOS App:

FABER

Video from UCSF MSK Exam Tutor iOS App:
Femoroacetabular Impingement (FAI)

- Abnormal bony anatomy that forms during development
- Age group 15 to 45 years old with anterior hip pain
- More commonly chronic injury (can be acute)
- Can lead to intra-articular injury to labrum and cartilage
- Can lead to early arthritis

FAI X-rays

- AP pelvis
- Dunn view lateral
  - Hip flexed 90 and abducted 20 degrees
- Lateral can miss impingement

Hip labral tear imaging

- Xrays: normal or impingement, r/o OA
- MRI vs MR arthrogram?
  - Historically MR arthrogram more sensitive than MRI but this is institution specific (ask your radiologist their preference)

http://www.currentprotocols.com/WileyCDA/CPUnit/refId-mia2602.html

Treatment FAI +/- labral tear

- Physical therapy
  - Core strengthening
  - Hip muscle strengthening
- Activity modification
- Corticosteroid injection
  - Short term pain relief
  - Confirm that provides pain relief (right diagnosis)
- Hip arthroscopic surgery if symptomatic despite non surgical treatment
UCSF Sports Medicine Rehab
Free online video and handouts for common sports injuries

https://sportsrehab.ucsf.edu/

UCSF Ortho YouTube
https://www.youtube.com/channel/UC1i4_V6oO4fCwYvjSjRlbrw/videos

Lumbar Spine Exam
Cindy J. Chang, MD

Shoulder Exam
Brian Feeley, MD

Surgery or No Surgery?
Nicholas Colyvas, MD

Cartilage Care
Benjamin Ma, MD

Upper Extremity Exam
Nicole Schroeder, MD

Subacromial Injection
Carlin Senter, MD and Elizabeth Marshall, MD

Hip Problems
Alan Zhang, MD
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Thank you!

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