Exaining the Physical Exam
How to Make Yours Better

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Primary Care Medicine: Update 2017

Overview
Quick approach to MSK problems
• History – what does it mean?
• Considering the differential diagnosis
• Physical exam – confirm the diagnosis

Who
Is the patient?
• Age
• Occupation/Activity
• Recreational, competitive, or elite
• Handedness
• Past medical history
• Family history

“The patient will tell you what the problem is”
Age factor

Children
- Tendons and ligaments relatively stronger than epiphyseal plate
- Insertional overuse injuries (OSD, SLJ, Sever’s)

Elderly
- Decreased flexibility
- Apoptosis – “programmed” cell death; repair affected

What is the Chief Complaint?

The BIG THREE
1. Pain
2. Instability
3. Dysfunction
   - Other complaints: swelling, numbness and tingling, decreased performance

Swelling

- Intra-articular vs. extra-articular
- Consider onset of swelling
  1) Immediate - minutes
  2) In 24 hours
  3) Insidious - days

Bone Pain

- Constant
- Sharp
- Greater load = greater pain (i.e. weightbearing)
- May have pressure features
**Tendon Pain**

- May be present at the start of an activity then “warm-up”
- Sore when the muscle is used
- May occur in “compensation” for other structural problems near by
- Check for underlying spondyloarthropathy: Psoriasis, GI symptoms, STD

**Onset of injury?**

- Acute
- Chronic
- Acute on Chronic

**Mechanism of Injury?**

**Ligament Anatomy and Biomechanics**

Ultimate Ligament Tension Failure

- ACL: 2200 N (Anterior)
- PCL: 2500 N (Posterior)
- MCL: 4000N (Valgus)
- LCL: 750N (Varus)
- Posteromedial Corner
- Posterolateral Corner
Biomechanical Studies

Forces on the ACL/Graft
- Level Walking = 169 N
- Ascending Stairs = 67 N
- Descending Stairs = 445 N
  Morrison, Biomech, 1970
  Morrison, Bio Eng, 1968, 1969
- Normal Walking = 400 N
- Sharp Cutting = 1700 N
  Butler, Clin Orthop, 1985
- Sports = 2000+ N

Where is the injury located?
- Think about structures in injured area
- Is the pain referred?
- The one-finger test
- Know your anatomy

Red Flag Symptoms
- Severe disability
- Numbness and tingling
- Night pain
- Constitutional symptoms (fever, wt loss)
- Swelling with no injury
- Systemic illness
- Multiple joint injury

Why?
Intrinsic Risk Factors
- Growth
- Anatomy
- Muscle/Tendon imbalance
- Illness
- Nutrition
- Conditioning
- Psychology

Extrinsic Risk Factors
- Training
- Technique
- Footwear
- Surface
- Occupation
- TO PREVENT INJURIES!!
### First Test - Physical Exam

<table>
<thead>
<tr>
<th>Physical Exam</th>
<th>SPECIAL TESTS</th>
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<tbody>
<tr>
<td>LOOK – Observation</td>
<td>Provocative tests</td>
</tr>
<tr>
<td>• Swelling, Erythema, Atrophy, Deformity, Surgical Scars (SEADS)</td>
<td>• Reproduce patient’s pain</td>
</tr>
<tr>
<td>FEEL – Palpate important structures</td>
<td>Stress tests</td>
</tr>
<tr>
<td>• Stress structures for instability (i.e. ligaments)</td>
<td>Functional tests</td>
</tr>
<tr>
<td>MOVE – Assess Range of Motion</td>
<td>• Assess functional movements (i.e. weight bearing activity)</td>
</tr>
<tr>
<td>Always check Neurovascular Status</td>
<td></td>
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### Physical exam

- Confirms or excludes the suspected diagnosis
- Tests are often non-specific
- Groups of tests can improve sensitivity and specificity

### Other physical exam

- Alignment
- Motor strength
- Flexibility of agonists and antagonists
- Neurologic
- Check the joint above and the joint below
- THINK KINETIC CHAIN

### Case - Knee Swelling

22 year old Skier comes has twisting injury in her knee skiing. Develops immediate swelling after injury and has to be brought down by ski patrol
Look (Standing)
- Alignment
- Ankles together
- Ankles apart
- On toes
- Walk
- Red flag – can’t do it
- Hop test

Look (Supine)
- "SEADS"
  - Swelling
  - Erythema
  - Atrophy
  - Deformity
  - Surgical scars

Feel
- Bulge sign
- "Milk medially, push laterally"
- (Patellar tap)

Feel
- Patella
  - Tender over facets of patella
  - Apprehension sign suggests possible instability
Feel - Patellar mobility

Feel Joint Line

Special Tests ACL

- Lachman's test – test at 20°
  Sens 81.8%, Spec 96.8%

- Anterior drawer – test at 90°
  Sens 22 - 41%, Spec 97%*

- Pivot shift
  Sens 35 - 98.4%*, Spec 98%*

Malanga GA, Nadler SF. Musculoskeletal Physical Examination, Mosby, 2006

* - denotes under anesthesia

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Drop Lachman test
Medial Collateral Ligament (MCL) Injury

Physical Exam
- Tender medially over MCL (often proximally)
- May lack ROM “pseudolocking”
- Valgus stress test

Posterior Cruciate Ligament (PCL) Injury

Mechanism
- Fall directly on knee with foot plantarflexed
- “Dashboard injury”

Symptoms
- Pain with activities
- “Disability” > “Instability”

Physical Exam
- Sag sign
- Posterior drawer test


X-ray—often non-diagnostic

MRI is test of choice
Meniscus Tear

Mechanism
• Occurs after twisting injury or deep squat
• Patient may not recall specific injury

Symptoms
• Catching
• Medial or lateral knee pain
• Usually posterior aspects of joint line
• Swelling

Special Tests: Meniscus

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint line tender</td>
<td>85.5%</td>
<td>29.4%</td>
</tr>
<tr>
<td>Hyperflexion</td>
<td>50%</td>
<td>68.2%</td>
</tr>
<tr>
<td>Extension block</td>
<td>84.7%</td>
<td>43.75%</td>
</tr>
<tr>
<td>McMurray Classic (Med Thud)</td>
<td>28.75%</td>
<td>95.3%</td>
</tr>
<tr>
<td>McMurray Classic (Lat pain)</td>
<td>50%</td>
<td>29%</td>
</tr>
<tr>
<td>Appley (Comp/Dist)</td>
<td>16% / 5%</td>
<td>80%</td>
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</tbody>
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Modified McMurray Testing

• Flex hip to 90 degrees
• Flex knee
• Internally or externally rotate lower leg with rotation of knee
• Fully flex the knee with rotations

Thessaly Test

• Hold patient’s hands for support
• Patient bends knee to 5° while he/she twists on knee
• Twisting movement will reproduce pain from meniscal injury
• Repeat with 20° knee flexion

Medial side: Sens 89%, Spec 97%
Lateral side: Sens. 92%, Spec 96%

Karachalios et al. J Bone Jt Surg Am, 2005; 87: 955-962

Courtesy of Keegan Duchicella MD
Ankle Injury

40 y.o. Male Tennis player suffers inversion injury to the ankle

Symptoms
• Localized pain usually over the lateral aspect of the ankle
• Difficulty weight bearing, limping
• May feel unstable in the ankle

Physical Exam

LOOK
• Swelling/bruising laterally

FEEL
• Point of maximal tenderness usually ATF

MOVE
• Limited motion due to swelling

Special Tests Anterior Drawer Test

• Normal ~ 3 mm
• Foot in neutral position
• Fix tibia
• Draw calcaneus forward
• Tests ATF ligament

Sens = 80%
Spec = 74%
PPV = 91%
NPV = 52%

Subtalar Tilt Test

- Foot in neutral position
- Fix tibia
- Invert or tilt calcaneus
- Tests Calcaneofibular ligament

Grading Ankle Sprains

<table>
<thead>
<tr>
<th>Grade</th>
<th>Drawer/Tilt Test results</th>
<th>Pathology</th>
<th>Functional Recovery in weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drawer and tilt negative, but tender</td>
<td>Mild stretch with no instability</td>
<td>2 – 4</td>
</tr>
<tr>
<td>2</td>
<td>Drawer lax, tilt with good end point</td>
<td>ATFL torn, CFL and PTFL intact</td>
<td>4 – 6</td>
</tr>
<tr>
<td>3</td>
<td>Drawer and tilt lax</td>
<td>ATFL and CFL injured/torn</td>
<td>6 – 12</td>
</tr>
</tbody>
</table>

Ottawa Ankle Rules

- Inability to weight bear immediately and in the emergency/office (4 steps)
- Bone tenderness at the posterior edge of the medial or lateral malleolus (Obtain Ankle Series)
- Bone tenderness over the navicular or base of the fifth metatarsal (Obtain Foot Series)
“High Ankle” Sprains

Mechanism
• Dorsiflexion, eversion injury
• Disruption of the Syndesmotic ligaments
• Most commonly the anterior tibiofibular ligament
• R/O Proximal fibular fracture

External Rotation Stress Test

• Fix tibia
• Foot in neutral
• Dorsiflex and externally rotate ankle

No Sens/ Spec Data
Kappa = 0.75


External Rotation Stress Test

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• Foot in neutral
• Dorsiflex and externally rotate ankle

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Squeeze test

• Hold leg at mid calf level
• Squeeze tibia and fibula together
• Pain located over anterior tibiofibular ligament area

No Sens/ Spec Data
Kappa = 0.50

Achilles Tendinopathy

28 y.o. Female track athlete has pain in back of calf running
• Pushing off, running, sprinting, jumping
• “Hit in back of leg” while sprinting

Exam - Thompson’s test
• Squeeze calf
• Foot should plantarflex

Sens = 96 %
Spec = 93 %

3 Basic P/E findings for tendinopathy

1. Tenderness on direct palpation
2. Reproduction of pain with resisted contraction (eccentric loading)
3. Reproduction of pain with passive stretch

Shoulder Impingement Syndrome

Mechanism
• Impingement under acromion with flexion and internal rotation of the shoulder
• Rotator cuff, subacromial bursa and biceps tendon

Impingement Symptoms

Problems with:
• Overhead activities?
• Sleep?
• Putting on a jacket?
**Shoulder Pain Differential Diagnosis**

- Rotator cuff tendinopathy
- Rotator cuff tears
- SLAP Lesion
- Calcific tendinopathy
- “Frozen” shoulder (adhesive capsulitis)
- Acromioclavicular joint problems
- **Scapular weakness**
- **Cervical radiculopathy**

**LOOK**

“SEADS”

- Swelling
- Erythema
- Atrophy
- Deformity
- Surgical Scars

**Winging**

- Long Thoracic Nerve
  - Serratus Anterior
- Less common
  - Spinal Accessory Nerve (trapezius)
  - Dorsal Scapular Nerve (rhomboids)
- **Scapular Dyskinesis** – MOST COMMON
  - Pain may alter mechanics or vice versa
Shoulder Impingement Syndrome

50 year old woman Left-handed
• Has 3 month history of worsening pain in the Left Shoulder
• Doesn’t remember any history of pain.
• Has difficulty lifting arm and reaching behind her
• Sleeping is uncomfortable

MOVE

Painful Arc 60 - 120°
Flexion and External rotation

MOVE

External rotation
Internal rotation

Rotator Cuff strength testing

Supraspinatus
• Empty can
• Thumbs down abducted to 90°
• Horizontally adduct to 30°

For tendonitis
Sens = 77 %
Spec = 38 %
For tears,
Sens = 19 %
Spec = 100 %

**Rotator Cuff strength testing**

Infraspinatus/teres minor -
External rotation
- Keep elbows at 90°
- Patte’s test at 90° shoulder abduction

For tendonitis,
Sens = 57%
Spec = 71%
For tears,
Sens = 36%
Spec = 95%


**Rotator Cuff strength testing**

Subscapularis – Internal rotation / Lift-off test

For lesions,
Sens = 50%
Spec = 84%
For tears,
Sens = 50%
Spec = 95%


**Impingement Signs**

Neer
- Passive full flexion
- Positive is reproduction of shoulder pain

Sens = 83%
Spec = 51%
PPV = 40%
NPV = 89%


**Impingement Signs**

Hawkin’s test
- Flex shoulder to 90°
- Flex elbow to 90°
- Internally rotate
- Positive - reproduce shoulder pain

Sens = 88%
Spec = 43%
PPV = 38%
NPV = 90%

Impingement Signs

- Spurling’s test for cervical radiculopathy

  Sens = 64%
  Spec = 95%
  PPV = 58%
  NPV = 96%

Stability Tests

Apprehension test - caution if acute dislocation
- Abduct shoulder to 90°
- Externally rotate arm

  Sens = 69%
  Spec = 50%
  For labral tear

Rowe CR, Zarins B. J

Stability Tests

Sulcus sign (MDI)

  No Sens / Spec Data

Rowe CR, Zarins B. J
Labral Test (O'Brien Test)

Step 1: Palm Down
Step 2: Palm Up

For AC joint pathology, + pain over AC joint
Sens = 100%
Spec = 97%

For labral tear, + pain deep in shoulder
Sens = 67-69%
Spec = 41-50%

Rotator Cuff Tear vs Impingement?

- Difficulty lifting
  - Pain vs weakness?
- Drop arm sign
- Fail conservative Tx
- Tears uncommon < 40 y.o.

Sens = 10%
PPV = 100%

Summary

- Think History first to make the diagnosis
- Reproduce the mechanism of injury during the exam
- Master “Look – Feel – Move”
Thank You

12th UCSF Primary Care Sports Medicine Conference
San Francisco, Dec 1-3, 2017
Hotel Intercontinental