PRACTICE OF MEDICINE

Musculoskeletal Exam of Lower Extremity
Monday 29 October 2001

GOALS:
1) Review general techniques for examining any joint
2) Learn beginning exam techniques for back and lower extremity

EVIDENCE-BASED LESSONS:
• How to exclude knee and ankle fractures using only the history and physical exam

General Examination Principles (review from 9/7/2001 lecture)

Inspection

Observe patient as they move
Adequate exposure is important

Joint:
Findings: Asymmetry (compare to unaffected side)
Deformity or misalignment
  Varus- distal extremity deviates medially
  Valgus- distal extremity deviates laterally

Overlying tissues:
Findings: Discoloration
  Erythema (redness)
  Ecchymosis (bruising)
  Edema

Palpation- includes range of motion (ROM) and muscle strength
Technique:
  Palpate bones, joints, surrounding muscles
  If injury or pain is present, start with normal side first
    Gives you an idea of uninjured baseline
    Prepares the patient for exam on the affected side

Findings:
  Warmth
    Compare to unaffected side
    Use back of hand
    Switching hands back and forth may bring out subtle difference

  Tenderness
  Crepitus (KREPP-it-uss)- grating feel and sound
Palpation, cont’d

Range of motion (ROM):
If injury or pain is present, start with normal side first
Test active ROM first
Then passive ROM
Discrepancy may be due to weakness, joint disorder, or pain

Strength: (usually reported as part of neurologic exam)
Compare with contralateral side
Grade resistance against gravity and against you

<table>
<thead>
<tr>
<th>Grade</th>
<th>Muscle Function Level</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>No contractility</td>
</tr>
<tr>
<td>1</td>
<td>Slight contractility, no movement</td>
</tr>
<tr>
<td>2</td>
<td>Full passive ROM with gravity eliminated</td>
</tr>
<tr>
<td>3</td>
<td>Full ROM against gravity</td>
</tr>
<tr>
<td>4</td>
<td>Full ROM against some resistance</td>
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<tr>
<td>5</td>
<td>Full ROM against full resistance</td>
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Examination of Specific Joints

Thoracic/Lumbar Spine

Inspection:

Landmarks
Head directly over gluteal cleft
Shoulders
Scapulae left and right should be equal height
Iliac crests (Iliac crests cross L4- landmark for lumbar puncture)

Lateral inspection
Lordosis- “swayback” curve in lumbar area
Pregnancy, muscle imbalance, obesity
Kyphosis- “humpback” curve in thoracic area
Osteoporosis

Palpation:
Spinous processes
Paraspinal muscles
Thoracic/Lumber Spine, cont’d

ROM:
Flex/extend (touch toes, lean back)
You can examine for scoliosis as patient straightens from flexion
Lateral bending
Rotation

Special test:

Straight leg raise (SLR)
Purpose:
Used to evaluate back pain that radiates into leg (sciatica)
Places tension on sciatic nerve and inflamed nerve root
Technique:
Patient supine, legs straight
Passively lift affected lower extremity with knee straight
Findings:
Positive test is reproduction of sciatic-type pain when hip is flexed between 30 and 70 degrees
Dorsiflexion of foot may aggravate pain

Hips

Inspection: Can assess entire lower extremity here-hips, knees, ankles
Symmetry, deformity, discoloration
Hips: Symmetry of iliac crest height, gluteal folds
Can assess hip strength by watching patient rise from chair

Palpation:
Can include iliac crest and greater trochanter
Palpate for stability in trauma patients

ROM:
Flexion with knee bent
Extension (prone, on side, or standing)
Adduction/abduction
Rotation with knee flexed to 90 degrees
Internal rotation (note: to test this, foot goes externally- think about it!)
External rotation (likewise, foot rotates medially for this)
**Knees**

**Inspection:**
- Symmetry, deformity, discoloration
- Alignment, landmarks

**Palpation:**
- Popliteal space (swelling may indicate Baker’s cyst)
- Tibiofemoral joint space-lateral and medial
- Patella

**ROM and strength:**
- Flexion/extension

**Special tests to evaluate injury:**

- Mediolateral instability- collateral ligaments
  - Varus/valgus stress to knee at 30° flexion

- Anterior-posterior instability- anterior cruciate ligament
  - Stabilize foot, knee flexed, hamstrings relaxed, pull tibia anteriorly
  - Lachman test- knee at 20-30°
  - Drawer test- knee at 45-90°
  - Positive if increased laxity compared to normal side

- Meniscal tear-
  - McMurray test-
    - Flex knee completely
    - Encircle joint space with thumb and index finger
    - Rotate foot laterally with other hand
    - Extend knee
    - Repeat with foot rotated medially
    - Clunk or pop may indicate meniscal tear

**EVIDENCE-BASED LESSON: Ottawa Knee Rules**

You can exclude knee fracture (and avoid X-ray) almost certainly if patient has none of the following:
- Age 55 or over
- Tenderness at head of fibula
- Inability to flex to 90°
- Isolated patellar tenderness
- Inability to bear weight both immediately and in ER
Ankle/Foot
Inspection: symmetry, deformity, discoloration
often helpful to observe during weight-bearing
Palpation: Achilles tendon, medial and lateral malleoli, forefoot
ROM:
Dorsiflexion/plantarflexion
Inversion/eversion (inversion when sole points “in”)
Abduction/adduction

EVIDENCE-BASED LESSON: Ottawa ankle rules
You can exclude ankle fracture (and avoid X-ray) almost certainly if patient has none of the following:
Bone tenderness over distal 6cm of posterior fibula
Bone tenderness over distal 6cm of posterior tibia
Inability to bear weight both immediately and in ER

Hip examination in newborn
To exclude congenital hip dysplasia
Present in 1/600 infants
Easy to treat if diagnosed early, hard to treat if missed
Exam is done as part of EVERY newborn and infant well-child exam

Check symmetry of gluteal folds
Hips should abduct more than 160°
Allis sign:
Infant supine, flex both knees with feet flat on table
“Positive” if one knee is lower than the other
Barlow-Ortolani maneuver
Stand at infant’s feet
Flex knees and hips to 90°
Thumbs on inside of thighs, base of thumbs on knees, middle fingers on greater trochanters
Adduct hips, press into table (this will dislocate an abnormal hip)
Abduct while pulling up with your middle fingers (like opening a book while pressing on the binder)
This will replace dislocated hip with a “clunk”