Beyond Inspection and Palpation to Specialized Examinations

Sarah Bolander, MMS, PA-C
Objectives

- Review components of a comprehensive musculoskeletal physical exam.
- Identify specialized musculoskeletal exams for the upper and lower extremity.
- Demonstrate appropriate specialized musculoskeletal exam techniques.
- Correlate physical exam findings with differential diagnosis.
Components of Musculoskeletal Physical Examination

- Inspection
- Palpation
- Range of motion
  - Active typically followed by passive
- Neurologic
  - Sensory and motor
- Peripheral vascular
- Specialized Exams
Shoulder
<table>
<thead>
<tr>
<th>Shoulder Tests</th>
<th>Positive Findings</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painful Arc</td>
<td>Pain between 60° and 120°</td>
<td>Subacromial impingement Rotator cuff tendonitis</td>
</tr>
<tr>
<td>Neer’s</td>
<td>Pain with internal rotation</td>
<td>Subacromial impingement Rotator cuff tendonitis</td>
</tr>
<tr>
<td>Hawkins</td>
<td>Pain</td>
<td>Supraspinatus impingement Rotator cuff tendonitis</td>
</tr>
<tr>
<td>External Lag</td>
<td>Inability to maintain external rotation</td>
<td>Supraspinatus pathology</td>
</tr>
<tr>
<td>External Rotation Resistance</td>
<td>Pain or weakness</td>
<td>Infraspinatus pathology</td>
</tr>
<tr>
<td>Gerber Lift Off</td>
<td>Inability to resist</td>
<td>Subscapularis pathology</td>
</tr>
<tr>
<td>Empty Can (Jobe’s)</td>
<td>Weakness or pain</td>
<td>Rotator cuff tear Tendinopathy</td>
</tr>
<tr>
<td>Drop Arm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder Tests</td>
<td>Positive Findings</td>
<td>Differential Diagnosis</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Apley Scratch</td>
<td>Asymmetry in comparison ROM</td>
<td>Rotator cuff pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Labral pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arthritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adhesive capsulitis</td>
</tr>
<tr>
<td>Apprehension, Relocation, and Release</td>
<td>Pain/apprehension relieved by relocation</td>
<td>Shoulder laxity/instability</td>
</tr>
<tr>
<td>Sulcus Sign</td>
<td>&gt; 2cm depression of humeral head</td>
<td>Inferior shoulder instability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subluxation</td>
</tr>
<tr>
<td>Yergason</td>
<td>Pain</td>
<td>Biceps Tendonitis</td>
</tr>
<tr>
<td>Speeds</td>
<td>Pain</td>
<td>Biceps Tendonitis</td>
</tr>
<tr>
<td>Cross-Body Adduction</td>
<td>Pain</td>
<td>AC pathology</td>
</tr>
</tbody>
</table>
Impingement Tests
Pain Provocation Test: Painful Arc Test

1. Passively adduct the arm $0^\circ$-$180^\circ$

2. Determine degrees of pain

Positive test: pain between $60^\circ$ and $120^\circ$
Neer’s Sign

1. Stabilize scapula with one hand
2. Raise extended arm in external and internal rotation
3. Observe for pain worse with internal rotation (pronation)

Positive: Pain with internal rotation. Amount of impingement correlates with degree of flexion:
   - 90°: mild
   - 60-70°: moderate
   - 45°: severe
Hawkins

1. Stabilize the shoulder with one hand.
2. Flex elbow to 90 degrees
3. Passively flex shoulder to 90 degrees
4. Internally rotate the shoulder

Pain → impingement → rotator cuff concerns
Rotator Cuff Tear
External Lag Sign

1. Flex elbow to 90 degrees
2. Passively externally rotate shoulder fully
3. Ask patient to maintain position

Positive test: inability to maintain position and resist antagonistic muscles
Gerber Lift Off

1. Patient seated or seated
2. Ask patient to rest dorsum of hand on low back/sacrum
3. Ask patient to lift off to increase amount of internal rotation
4. Apply gentle resistance to hand

Positive: inability to lift off or maintain resistance
External Rotation Resistance Test

1. Ask patient to flex elbows to 90° in supination
2. Stabilize one arm
3. Apply internal pressure at wrist
4. Ask patient to externally rotate against resistance

Positive: pain or weakness
Internal Rotation Lag Sign

1. Ask pt to place dorsum of hand on back with elbow flexed to 90°
2. Passively lift the hand increasing the amount of internal rotation
3. Ask patient to maintain position

Positive test: inability to maintain position and resist antagonistic muscles
Empty Can (Jobe’s Test)

1. Passively forward flex shoulders to while maintaining hyperpronation (thumbs down), elbow extension, and slight abduction

2. Ask patient to resist downward pressure

Positive: inability to maintain resistance and may indicate supraspinatus injury/tear
Drop Arm

1. Passively abducts shoulder to 120 degrees

2. Ask patient to slowly lower back to side

Positive: Inability to fully abduct the arm or maintain a smooth transition back to side
Apley scratch test

1. Ask patient to reach for opposite scapula
   - Abduction/External Rotation
   - Adduction/Internal Rotation

2. Compare ROM to both sides
Adhesive Capsulitis
Shoulder Instability
Apprehension, Relocation, and Release Test

1. Patient supine
2. Elbow flexed 90 degrees and arm abducted 90 degrees
3. Gently apply external rotation at the shoulder while observing for apprehension
4. Apply posterior pressure to the humerus (relocation)
5. Abruptly remove pressure from the humerus (release)

*Positive: Pain and apprehension with ROM testing AND pain is relieved with relaxation/relocation.
Sulcus Sign

1. Arm in neutral relaxed position
2. One hand stabilizes shoulder
3. Downward pressure applied at antecubital fossa

Depression or “sulcus” of the shoulder ≥ 2 cm near the acromion
   – Evaluates for inferior instability
   – Pt may voluntarily show this sign
Biceps Tendonitis
Yergason Test

1. Flex elbow to 90° in pronation
2. Place hand in patient’s palm
3. Ask patient to supinate and externally rotation against resistance

Positive: Pain along biceps tendon
Speeds

1. Extend elbow with full supination
2. 30 ° shoulder flexion
3. Ask patient to resist downward pressure

Positive: pain along biceps tendon
Cross-Body Adduction Test

1. Passively adduct arm across body toward with shoulder at 90°

Positive: pain elicited and localized to the AC joint
Epicondylitis

Medial: Golfers

- Pain with resisted wrist flexion

Lateral: Tennis Elbow

- Pain with resisted wrist extension
Tinels Sign at Elbow: Cubital Tunnel Syndrome

1. Flex elbow 90°
2. Externally rotate arm
3. Tap over ulnar nerve (groove between medial epicondyle and olecranon)

Positive: shooting electric sensation or paresthesia over ulnar nerve distribution

Medisavvy
Wrist/Hand
Carpal Tunnel
Tinels Sign at the Wrist

1. Slightly extend at the wrist
2. Percuss over the median nerve

Positive: Shoot electric sensation or paresthesia in the distribution of the median nerve
Phalen’s Test

1. Ask patient to fully flex or hyperextend wrists

2. Maintain position for 30-60 seconds

Positive: paresthesia in the distribution of the median nerve
de Quervain’s Tenosynovitis
Finkelstein Test

- Ask patient to create a fist over thumb
- Actively ulnar deviate wrist
- May consider passively increasing about of deviation

Positive: pain along 1st dorsal compartment
Hip
<table>
<thead>
<tr>
<th>Hip Tests</th>
<th>Positive Findings</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trendelenburg</td>
<td>Contralateral</td>
<td>Labral tear</td>
</tr>
<tr>
<td></td>
<td>Weakness</td>
<td>Nonspecific hip pathology</td>
</tr>
<tr>
<td>FADIR</td>
<td>Pain</td>
<td>Labral pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Femoral Acetabular Impingement</td>
</tr>
<tr>
<td>FABER</td>
<td>Pain</td>
<td>Groin: intra-articular concerns or iliopsoas strain/bursitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI join: SI joint dysfunction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posterior: posterior hip impingement</td>
</tr>
</tbody>
</table>
Trendelenburg

1. Observe the patient from behind

2. Ask patient to lift leg with hip and knee flexion

Positive: pelvis drops > 2 cm and indicates weakness of the contralateral hip abductors
FADIR (Impingement Test)

With the patient supine passively provide:

1. Hip flexion
2. Adduction
3. Internal rotation

Positive: Reproduction of anterolateral hip pain consistent with FAI
FABER
(Patrick Test, Figure-of-Four)

1. Patient supine
2. Hip flexion 45°
3. External rotate and abduct the hip with foot resting at the knee
4. Stabilize the contralateral hip
5. Apply downward pressure at the knee

Positive: pain to groin, SI joint, or posterior hip

AFP 2014
Knee
<table>
<thead>
<tr>
<th>Knee Tests</th>
<th>Positive Findings</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patellar Glide</td>
<td>Mobility $&lt;\frac{1}{4}$ of patella width: tightness of retinaculum)</td>
<td>Hypermobility/Subluxation Patellofemoral pain syndrome</td>
</tr>
<tr>
<td></td>
<td>Mobility $&gt;\frac{3}{4}$ of patella width: hypermobility</td>
<td></td>
</tr>
<tr>
<td>Apprehension</td>
<td>Straightens leg or pain</td>
<td>Patellofemoral pain syndrome</td>
</tr>
<tr>
<td>J-Sign</td>
<td>Lateral patellar tracking at terminal extension</td>
<td>Patellar tracking dysfunction VMO weakness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patellofemoral pain syndrome</td>
</tr>
<tr>
<td>Bulge Sign</td>
<td>Medial bulge present</td>
<td>Minor effusion</td>
</tr>
<tr>
<td>Ballottement</td>
<td>Effusion observed or palpated</td>
<td>Major effusion</td>
</tr>
<tr>
<td>Knee Tests</td>
<td>Positive Findings</td>
<td>Differential Diagnosis</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Valgus Stress</td>
<td>Pain or medial joint space laxity</td>
<td>MCL sprain or tear</td>
</tr>
<tr>
<td>Varus Stress</td>
<td>Pain or lateral joint space laxity</td>
<td>LCL sprain or tear</td>
</tr>
<tr>
<td>Anterior Drawer</td>
<td>Pain or laxity without firm endpoint</td>
<td>ACL sprain or tear</td>
</tr>
<tr>
<td>Lachman</td>
<td>Pain or laxity without firm endpoint</td>
<td>ACL sprain or tear</td>
</tr>
<tr>
<td>Posterior Drawer</td>
<td>Pain or laxity without firm endpoint</td>
<td>LCL sprain or tear</td>
</tr>
<tr>
<td>Apley Grind and Distraction</td>
<td>Pain with compression which is relieved by distraction</td>
<td>Meniscus pathology</td>
</tr>
<tr>
<td>McMurray</td>
<td>Pain, clicking or catching</td>
<td>Meniscus pathology</td>
</tr>
</tbody>
</table>
Patellar Glide

Patient supine

Extend knee to relax quads

Displace patella medially and laterally

Positive: Displacement < ¼ or patella (tightness of retinaculum) or > ¾ of patella width (hypermobility)
Patellar Apprehension Test

- Knee flexed 30°
- Apply medial pressure to displace patella laterally
- Observe for apprehension

Positive: Patient attempts to straighten leg
J-Sign

1. Knee flexion of 45-90°
2. Slowly extend the knee
3. Observe patellar tracking

Positive: Lateral tracking of the patella when approaching terminal extension
1. Patient supine with leg in extension
2. Sweep downward with one hand “milking” the fluid toward the patella
3. Apply infrapatellar pressure to each side observing for a bulge or alternatively, stroke medial side upwards followed but the lateral side downwards

Positive: medial bulge appreciated with presence of effusion
Ballottement of the Patella

1. Patient supine
2. Leg fully extended
3. Compress suprapatellar pouch
4. Press patella toward the femur
5. Oscillate for motion and observe for fluid return to suprapatellar pouch

Positive: Fluid present beneath the patella
Valgus Stress Test (MCL)

1. Patient supine
2. Stabilize at lateral joint line medial ankle
3. Apply lateral to medial force at joint line while restricting axial rotation
4. Complete exam at 0 and 30 degrees of flexion

Positive: pain or medial joint space laxity
Varus Stress Test (LCL)

1. Patient supine
2. Stabilize at **medial** joint line lateral ankle
3. Apply medial to lateral force at joint line while restricting axial rotation
4. Complete exam at 0 and 30 degrees of flexion

Positive: pain or lateral joint space laxity
1. Patient supine
2. Flex hips and knees to 90°
3. Stabilize foot flat on table
4. Thumbs on medial and lateral joint line with fingers on hamstring insertions
5. Pull tibia forward checking for excessive forward movement

Positive: anterior translation without firm endpoint
Lachman (ACL)

1. Patient in supine position
2. Knee flexion to 20-30°
3. Stabilize the distal femur with one hand while attempting to displace tibia anteriorly with the other hand

Positive: anterior translation without firm endpoint
1. Patient supine
2. Flex hips and knees to 90°
3. Stabilize foot flat on table
4. Thumbs on medial and lateral joint line with fingers on hamstring insertions
5. Pull tibia back checking for excessive posterior movement

Positive: posterior translation without firm endpoint
Apley Grind (Compression) and Distraction Tests

1. Patient prone
2. Knee flexed 90°
3. Apply downward force to foot and rotate internally and externally
4. Stabilize thigh with examiner’s knee
5. Provide longitudinal distraction while gripping the ankle

Positive: Pain with compression relieved with distraction
McMurray Test

Start with flexed knee: grasp heel with one hand & joint line of knee with thumb and index finger.

Medial meniscus
  - Externally rotate at heel, flex maximally, then slowly extend the knee while providing (valgus) stress to knee

Lateral meniscus
  - Internally rotate at the heel, flex maximally, then slowly extend the knee while providing (varus) stress to knee

J Man Manip Ther 2009
Lower Leg/Ankle
Anterior Drawer Test of Ankle

1. Patient supine or seated
2. Stabilize the distal tibia with one hand
3. Grasp the calcaneus and pull anteriorly

Positive: laxity associated with lateral collateral ligaments (anterior talofibular ligament) instability
Thompson Test: Achilles Tear

1. Patient prone or can kneel on stool
2. Squeeze calf
3. Observe for plantar flexion

Positive: No plantar flexion response with squeeze

Stretanski, M. 2015
Resources

- *Bates' Guide to Physical Examination and History Taking*
- AAOS
- AAFP
- Essentials of Musculoskeletal Care, by the American Academy of Orthopedic Surgeons.
References


