Examination of the Extremities and Back

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NOTE: This study guide focuses on the **musculoskeletal and peripheral vascular** examination. Refer to the neurologic exam study guide for more information on **motor/sensory** testing of the extremities.

**Equipment Needed**

- None
General Considerations

- The patient should be undressed and gowned as needed for this examination.
- Some portions of the examination may not be appropriate depending on the clinical situation (performing range of motion on a fractured leg for example).
- The musculoskeletal exam is all about anatomy. Think of the underlying anatomy as you obtain the history and examine the patient.
- When taking a history for an acute problem always inquire about the mechanism of injury, loss of function, onset of swelling (< 24 hours), and initial treatment.
- When taking a history for a chronic problem always inquire about past injuries, past treatments, effect on function, and current symptoms.
- The cardinal signs of musculoskeletal disease are pain, redness (erythema), swelling, increased warmth, deformity, and loss of function.
- Always begin with inspection, palpation and range of motion, regardless of the region you are examining. Specialized tests are often omitted unless a specific abnormality is suspected. A complete evaluation will include a focused neurologic exam of the effected area.

Regional Considerations

- Remember that the clavicle is part of the shoulder. Be sure to include it in your examination.
- The patella is much easier to examine if the leg is extended and relaxed.
- Be sure to palpate over the spinous process of each vertebrae.
- It is always helpful to observe the patient standing and walking.
- Always consider referred pain, from the neck or chest to the shoulder, from the back or pelvis to the hip, and from the hip to the knee.
- Pain with, or limitation of, rotation is often the first sign of hip disease.
- Diagnostic hints based on location of pain:

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Inspection

1. Look for scars, rashes, or other lesions. [1]
2. Look for asymmetry, deformity, or atrophy.
3. Always compare with the other side.

Palpation

1. Examine each major joint and muscle group in turn.
2. Identify any areas of tenderness. [2]
3. Identify any areas of deformity.
4. Always compare with the other side.

Range of Motion
Start by asking the patient to move through an active range of motion (joints moved by patient). Proceed to passive range of motion (joints moved by examiner) if active range of motion is abnormal.

**Active**

1. Ask the patient to move each joint through a full range of motion.
2. Note the degree and type (pain, weakness, etc.) of any limitations.
3. Note any increased range of motion or instability.
4. Always compare with the other side.
5. Proceed to passive range of motion if abnormalities are found.

**Passive**

1. Ask the patient to relax and allow you to support the extremity to be examined. ++ [3]
2. Gently move each joint through its full range of motion.
3. Note the degree and type (pain or mechanical) of any limitation. [4]
4. If increased range of motion is detected, perform special tests for instability as appropriate.
5. Always compare with the other side.

**Specific Joints**

- Fingers - flexion/extension; abduction/adduction
- Thumb - flexion/extension; abduction/adduction; opposition
- Wrist - flexion/extension; radial/ulnar deviation
- Forearm - pronation/supination (function of BOTH elbow and wrist)
- Elbow - flexion/extension
- Shoulder - flexion/extension; internal/external rotation; abduction/adduction (2/3 glenohumeral joint, 1/3 scapulo-thoracic) [5]
- Hip - flexion/extension; abduction/adduction; internal/external rotation
- Knee - flexion/extension
- Ankle - flexion (plantarflexion)/extension (dorsiflexion)
- Foot - inversion/eversion
- Toes - flexion/extension
- Spine - flexion/extension; right/left bending; right/left rotation [p466, p477]

**Vascular**

**Pulses**

1. Check the radial pulses on both sides. If the radial pulse is absent or weak, check the brachial pulses.
2. Check the posterior tibial and dorsalis pedis pulses on both sides. If these pulses are absent or weak, check the popliteal and femoral pulses.

**Capillary Refill**

1. Press down firmly on the patient's finger or toe nail so it blanches. ++
2. Release the pressure and observe how long it takes the nail bed to "pink" up.
3. Capillary refill times greater than 2 to 3 seconds suggest peripheral vascular disease, arterial blockage, heart failure, or shock.
Edema, Cyanosis, and Clubbing

1. Check for the presence of edema (swelling) of the feet and lower legs.
2. Check for the presence of cyanosis (blue color) of the feet or hands.
3. Check for the presence of clubbing of the fingers.

Lymphatics

1. Check for the presence of epitrochlear lymph nodes. ++
2. Check for the presence of axillary lymph nodes. ++
3. Check for the presence of inguinal lymph nodes. +++

Special Tests

Upper Extremities

Snuffbox Tenderness (Scaphoid)

1. Identify the "anatomic snuffbox" between the extensor pollicis longus and brevis (extending the thumb makes these structures more prominent). ++
2. Press firmly straight down with your index finger or thumb.
3. Any tenderness in this area is highly suggestive of scaphoid fracture. [6]

Drop Arm Test (Rotator Cuff)

1. Start with the patient's arm abducted 90 degrees. ++
2. Ask the patient to slowly lower the arm.
3. If the rotator cuff (especially the supraspinatus) is torn, the patient will be unable to lower the arm slowly and smoothly.

Impingement Sign (Rotator Cuff)

1. Start with the patient's arm relaxed and the shoulder in neutral rotation. ++
2. Abduct the arm to 90 degrees.
3. Significant shoulder pain as the arm is raised suggests an impingement of the rotator cuff against the acromion.

Flexor Digitorum Superficialis Test

1. Hold the fingers in extension except the finger being tested. ++
2. Ask the patient to flex the finger at the proximal interphalangeal joint.
3. If the patient cannot flex the finger, the flexor digitorum superficialis tendon is cut or non-functional.

Flexor Digitorum Profundus Test

1. Hold the metacarpophalangeal and proximal interphalangeal joints of the finger being tested in
extension. ++
2. Ask the patient to flex the finger at the distal interphalangeal joint.
3. If the patient cannot flex the finger, the flexor digitorum profundus tendon is cut or non-functional.

Vascular and Neurologic Tests

**Allen Test (Radial/Ulnar Arteries)**

1. Ask the patient to make a tight fist. ++
2. Compress both the ulnar and radial arteries to stop blood flowing to the hand.
3. Ask the patient to open the hand.
4. Release pressure on the ulnar side. The hand should "pink" up in a few seconds unless the ulnar artery is occluded.
5. Repeat the process for the radial artery as indicated.

**Phalen's Test (Median Nerve)**

1. Ask the patient to press the backs of the hands together with the wrists fully flexed (backward praying). ++
2. Have the patient hold this position for 60 seconds and then comment on how the hands feel.
3. Pain, tingling, or other abnormal sensations in the thumb, index, or middle fingers strongly suggest carpal tunnel syndrome.

**Tinel's Sign (Median Nerve)**

1. Use your middle finger or a reflex hammer to tap over the carpal tunnel. ++
2. Pain, tingling, or electric sensations strongly suggest carpal tunnel syndrome.

Lower Extremities

**Collateral Ligament Testing**

1. The patient should be supine with the legs resting on the exam table. ++
2. Hold the leg to be examined in 20-30 degrees of flexion. [7]
3. Place one hand laterally just below the knee. Grasp the leg near the ankle with your other hand.
4. Gently push with both hands in opposite directions to stress the knee.
5. If the knee joint "opens up" medially, the medial collateral ligament may be torn.
6. Reverse your hands and repeat the stress.
7. If the knee joint "opens up" laterally, the lateral collateral ligament may be torn.

**Lachman Test (Cruciate Ligaments)**

1. Ask the patient to lie supine on the exam table. [8] ++
2. Grasp the thigh with one hand and the upper tibia with the other. Hold the knee in about 15 degrees of flexion.
3. Ask the patient to relax and gently pull forward on the tibia.
4. The normal knee has a distinct end point. If the tibia moves out from under the femur, the anterior
cruciate ligament may be torn.
5. Repeat the test using posterior stress.
6. The normal knee has a distinct end point. If the tibia moves back under the femur, the posterior cruciate ligament may be torn.

**Anterior/Posterior Drawer Test (Cruciate Ligaments)**

1. Ask the patient to lie supine on the exam table with knees flexed to 90 degrees and feet flat on the table. [9] ++
2. Sit on or otherwise stabilize the foot of the leg being examined.
3. Grasp the leg just below the knee with both hands and pull forward.
4. If the tibia moves out from under the femur, the anterior cruciate ligament may be torn.
5. Without changing the position of your hands, push the leg backward.
6. If the tibia moves back under the femur, the posterior cruciate ligament may be torn.

**Ballotable Patella (Major Knee Effusion)**

1. Ask the patient to lie supine on the exam table with leg muscles relaxed. ++
2. Press the patella downward and quickly release it.
3. If the patella visibly rebounds, a large knee effusion (excess fluid in the knee) is present.

**Milking the Knee (Minor Knee Effusion)**

1. Ask the patient to lie supine on the exam table with leg muscles relaxed. ++
2. Compress the suprapatellar pouch with your thumb, palm, and index finger.
3. "Milk" downward and laterally so that any excess fluid collects on the medial side.
4. Tap gently over the collected fluid and observe the effect on the lateral side, or ballot the patella as outlined above.
5. A fullness on the lateral side indicates that a small knee effusion is present.

**Back**

**Straight Leg Raising (L5/S1 Nerve Roots)**

1. Ask the patient to lie supine on the exam table with knees straight. ++
2. Grasp the leg near the heel and raise the leg slowly towards the ceiling.
3. Pain in an L5 or S1 distribution suggests nerve root compression or tension (radicular pain).
4. Dorsiflex the foot while maintaining the raised position of the leg.
5. Increased pain strengthens the likelihood of a nerve root problem.
6. Repeat the process with the opposite leg.
7. Increased pain on the opposite side indicates that a nerve root problem is almost certain.

**FABER Test (Hips/Sacroiliac Joints)**

FABER stands for Flexion, ABduction, and External Rotation of the hip. This test is used to distinguish hip or sacroiliac joint pathology from spine problems. [10] ++

1. Ask the patient to lie supine on the exam table.
2. Place the foot of the effected side on the opposite knee (this flexes, abducts, and externally rotates the
hip).
3. Pain in the groin area indicates a problem with the hip and not the spine.
4. Press down gently but firmly on the flexed knee and the opposite anterior superior iliac crest.
5. Pain in the sacroiliac area indicates a problem with the sacroiliac joints.

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**Notes**

2. It is wise to start palpation some distance from a suspected tender area. Proceed slowly and minimize palpation of tender spots once they are identified. Examine at least one joint above and below an injured area.
3. Additional Testing - Tests marked with (++) may be skipped unless an abnormality is suspected.
4. Joint motion may be limited by any combination of pain, weakness, mechanical block within the joint, deformity, contracture of the soft tissues (muscles, ligaments, musculo-tendinous structures, joint capsule, etc), and patient factors. Joint motion may be increased by instability, ligamentous laxity and/or deformity.
5. Normally the ratio of glenohumeral to scapular movement is 2:1. If the range of motion of the glenohumeral joint is reduced, the patient will increase the amount of scapular movement to compensate and the ratio will change.
6. Snuffbox Tenderness is more sensitive than an x-rays for identifying scaphoid fractures. Tenderness in this area after an injury should be treated as a fracture even if the x-rays are negative.
7. Holding the knee in flexion helps isolate the collateral ligaments. Secondary stabilizers (anterior cruciate ligament, joint capsule) come into play when the knee is in full extension. If the knee "opens up" in full extension, these secondary structures may also be damaged.
8. The Lachman Test is used by athletic trainers on the field to check for cruciate ligament injury. It is very accurate and can be done on an acutely injured knee (when the patient cannot tolerate bending the knee for a drawer test).
9. The Drawer Test is the "classic" technique to check for cruciate ligament injury. It is less accurate and cannot be done on an acutely injured knee (when the patient cannot tolerate bending). The Lachman Test is preferred in most situations.
10. The FABER Test is also known as the Fabere or Patrick test.

*Prepared with assistance from Robert Vander Griend, MD*